Grade 3 Mathematics Curriculum

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2024-2025

FRONT MATTER

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Course Description

In Grade 3, instructional time should focus on four critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100; (2) developing understanding of fractions, especially unit fractions (fractions with numerator 1); (3) developing understanding of the structure of rectangular arrays and of area; and (4) describing and analyzing two-dimensional shapes.

Critical Area 1:
Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division.

Critical Area 2:
Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket, but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.

Critical Area 3:
Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.

Critical Area 4:

Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

Curriculum Map

STANDARD	1	2	3	4	5	6	7	8
OPERATIONS AND ALGEBRAIC THINKING - 3.OA								
A. REPRESENT AND SOLVE PROBLEMS INVOLVING MULTIPLICATION AND DIVISION								
1. Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.	✓	✓						✓
2. Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.				✓				
3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	✓			✓		✓		✓
4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?	✓							
B. UNDERSTAND PROPERTIES OF MULTIPLICATION AND THE RELATIONSHIP BETWEEN MULTIPLICATION AND DIVISION								
5. Apply properties of operations as strategies to multiply and divide.2 Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be	✓		✓	✓	✓			

found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)								
6. Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.				✓				✓
C. MULTIPLY AND DIVIDE WITHIN 100								
7. With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	✓		✓	✓	✓	✓	✓	✓
D. SOLVE PROBLEMS INVOLVING THE FOUR OPERATIONS AND IDENTIFY AND EXPLAIN PATTERNS IN ARITHMETIC								
8. Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations)			✓	✓			✓	✓
9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.	✓		✓	✓				
STANDARD	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
NUMBER & OPERATIONS IN BASE TEN - 3.NBT								

A. USE PLACE VALUE UNDERSTANDING AND PROPERTIES OF OPERATIONS TO PERFORM MULTI-DIGIT ARITHMETIC								
1. Use place value understanding to round whole numbers to the nearest 10 or 100.			✓					
2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.		✓	✓	✓		✓		✓
3. Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.				✓			✓	

STANDARD	1	2	3	4	5	6	7	8
NUMBER & OPERATIONS - FRACTIONS - 3.NF								
A. DEVELOP UNDERSTANDING OF FRACTIONS AS NUMBERS								
1. Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3 .					✓	✓		✓
2. Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size and that the endpoint of the part based at 0 locates the number on the number line. For example, partition the number line from 0 to 1 into 3 equal parts, represent on the number line and show that each part has a size . b. Represent a fraction a/b on a number line diagram by marking off a length 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.					✓	✓		✓

3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size. Understand two fractions as equivalent if they are located at the same point on a number line. b. Recognize and generate simple equivalent fractions by reasoning about their size, (e.g.). Explain why the fractions are equivalent with the support of a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form ; recognize that ; locate and 1 at the same point on a number line diagram. d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions with the support of a visual fraction model					✓	✓		✓

STANDARD	1	2	3	4	5	6	7	8
MEASUREMENT - 3.M								
A. SOLVE PROBLEMS INVOLVING MEASUREMENT AND ESTIMATION								
1. Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.						✓		
2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Clarification: “Measure and estimate liquid volumes and masses” excludes compound units such as cm3 and finding the geometric volume of a container. “Multiplying to solve one-step word problems” excludes multiplicative comparison problems (problems involving “times as much”; See Glossary, Tables 2a–2d))						✓		

B. GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF AREA AND RELATE AREA TO MULTIPLICATION AND TO ADDITION								
3. Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by unit squares is said to have an area of square units.	✓							✓
4. Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).						✓		✓
5. Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths and is the sum of and . Use area models to represent the distributive property in mathematical reasoning. d. Recognize the area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.		✓	✓	✓				✓
C. GEOMETRIC MEASUREMENT: RECOGNIZE PERIMETER								
6. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.		✓					✓	✓
DATA LITERACY- 3.DL								

A. Understand data-based questions and data collection.								
1. Develop data-based questions and decide what data will answer the question. (e.g., "What size shoe does a 3rd grader wear?", "How many books does a 3rd grader read?")	✓							✓
2.Collect student-centered data (e.g. collect data on students' favorite ice cream flavor) or use existing data to answer data-based questions.	✓							✓
B. Represent and interpret data.								
3.Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.	✓							✓
4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.					✓			
STANDARD	1	2	3	4	5	6	7	8
GEOMETRY- 3.G								
A. REASON WITH SHAPES AND THEIR ATTRIBUTES								
1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories							✓	
2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.					✓			

Pacing Guide

UNIT		STANDARDS	PACING	2024-2025
QUARTER 1				
Unit 1: Introducing Multiplication	A: Interpret and Represent Data on Scaled Graphs	3.M.B, 3.M.B.3	8 days	September 3-16
	B: From Graphs to Multiplication	3.OA.A, 3.OA.A.1, 3.OA.A.3, 3.OA.A.4, 3.OA.D.9	7 days	September 17-26
	C: Represent Multiplication with Arrays and the Commutative Property	3.M.B.3, 3.OA.A, 3.OA.A.1, 3.OA.A.3, 3.OA.B.5, 3.OA.C.7, 3.OA.D.9	6 days	September 27 - October 4
	Unit Assessment		1 day	October 7
Unit 2:	A: Concepts of Area Measurement	3.M.C.5, 3.M.C.6, 3.OA.A.1	4 days	October 8-15

Area and Multiplication	B: Relate Area to Multiplication	3.M.C.6, 3.M.C.7, 3.OA.B.5, 3.OA.D.9	7 days	October 16-28
	C: Find Area of Figures Composed of Rectangles	3.M.C.5, 3.M.C.6, 3.M.C.7, 3.NBT.A.2	4 days	October 29 - November 4
	Unit Assessment		1 day	November 5
BENCHMARK ASSESSMENT			1 day	November 6
QUARTER 2				
Unit 3: Wrapping Up Addition and Subtraction Within 1,000	A: Add Within 1,000	3.NBT.A.2, 3.OA.D.9	6 days	November 7-19
	B: Subtract Within 1,000	3.NBT.A.2, 3.OA.B.5	6 days	November 20 - December 4
	C: Round Within 1,000	3.NBT.A.1, 3.OA.C.7	4 days	December 5-12
	D: Solve Two-Step Problems	3.NBT.A.1, 3.NBT.A.2, 3.OA.C.7, 3.OA.D.8	5 days	December 13-19
	Unit Assessment		1 day	December 20
Unit 4: Relating Multiplication to Division	A: What is Division?	3.NBT.A.2, 3.OA.A.2, 3.OA.A.3	5 days	January 2-9
	B: Relate Multiplication and Division	3.M.C.7, 3.NBT.A.3, 3.OA.A.2, 3.OA.A.3, 3.OA.B.6, 3.OA.C.7, 3.OA.D.9	6 days	January 10-21
	C: Multiplying Larger Numbers	3.M.C.7, 3.NBT.A.3, 3.OA.A.3, 3.OA.B.5, 3.OA.D.8	6 days	January 22-30
BENCHMARK ASSESSMENT			1 day	January 31
QUARTER 3				
Unit 4: Relating	D: Dividing Larger Numbers	3.M.C.7, 3.NBT.A.3, 3.OA.A.2, 3.OA.A.3, 3.OA.A.4, 3.OA.B.5, 3.OA.C.7, 3.OA.D.8	5 days	February 3-11

Multiplication to Division	Unit Assessment		1 day	February 12
Unit 5: Fractions as Numbers	A: Introduction to Fractions	3.G.A.2, 3.NF.A.1, 3.OA.C.7	4 days	February 13-20
	B: Fractions on the Number Line	3.NF.A.2, 3.NF.A.3, 3.OA.C.7	5 days	February 21-27
	C: Equivalent Fractions	3.NF.A.3, 3.OA.B.5	4 days	February 28 - March 6
	D: Fraction Comparisons	3.NF.A.2, 3.NF.A.3	5 days	March 7-13
	Unit Assessment		1 day	March 14
Unit 6: Measuring Length, Time, Liquid Volume, and Weight	A: Measurement Data on Line Plots	3.M.B.4, 3.NF.A.3, 3.OA.C.7	5 days	March 17-21
	B: Weight and Liquid Volume	3.M.A.2, 3.NF.A, 3.OA.C.7	3 days	March 24-27
	C: Problems Involving Time	3.M.A.1	3 days	March 28 - April 2
	D: Measurement Problems in Context	3.M.A.1, 3.M.A.2, 3.NBT.A.2, 3.OA.A.3, 3.OA.C.7	5 days	April 3-9
	Unit Assessment		1 day	April 10
BENCHMARK ASSESSMENT			1 day	April 11
QUARTER 4				
Unit 7: Two-dimensional Shapes and Perimeter	A: Reason with Shapes	3.G.A.1, 3.NBT.A.3, 3.OA.C.7	5 days	April 14-30
	B: What is Perimeter?	3.M.D, 3.M.D.8, 3.NBT.A.2, 3.OA.C.7	4 days	May 1-7
	C: Expanding on Perimeter	3.M.D.8, 3.OA.C.7, 3.OA.D.8	3 days	May 8-13

	D: Design with Perimeter and Area	3.G.A.1, 3.M.D.8	3 days	May 14-19
	Unit Assessment		1 day	May 20
Unit 8: Equal Groups	A: Fraction Fun	3.NF.A.1, 3.NF.A.2, 3.NF.A.3	3 days	May 21-27
	B: Measurement and Data	3.M.B.3, 3.M.C.7, 3.M.D.8, 3.NBT.A.2, 3.OA.D.8	4 days	May 28 - June 4
	C: Multiplication and Division Games	3.OA.A.3, 3.OA.B.6, 3.OA.C.7	4 days	June 5-12
	D: Create and Design	3.M.B.4, 3.NBT.A.2, 3.OA.A, 3.OA.A.1	4 days	June 17-24
	Unit Assessment		1 day	June 13
BENCHMARK ASSESSMENT			1 day	June 16

Materials List

REUSABLE MATERIALS		
ITEM	QUANTITY PER 30 STUDENTS	LESSONS
Bags	45	3.7.2
Base-ten blocks	30 hundreds, 300 tens, 1200 unit cubes	3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.7, 3.3.9, 3.3.10, 3.4.12, 3.4.13, 3.4.14, 3.4.15, 3.4.16, 3.4.17, 3.4.18, 3.4.19, 3.4.20, 3.5.7
Centimeter cubes	3,000 cubes	
Colored Pencils		3.1.21, 3.2.10, 3.2.15, 3.3.7, 3.3.18, 3.4.1, 3.4.2, 3.4.5, 3.4.13, 3.4.15, 3.5.4, 3.5.14, 3.5.15, 3.6.5, 3.6.12, 3.6.15, 3.7.8, 3.8.10
Connecting cubes	1500 cubes	3.1.9, 3.1.16, 3.1.17, 3.1.18, 3.1.21, 3.4.1, 3.4.2, 3.4.13, 3.4.18
Crayons		3.1.21, 3.2.10, 3.2.15, 3.3.7, 3.3.18, 3.4.1, 3.4.2, 3.4.5, 3.4.13, 3.4.15, 3.5.4, 3.5.14, 3.6.5, 3.6.12, 3.6.15, 3.7.8, 3.8.10
Counters	1,350 counters	3.1.9, 3.1.17, 3.1.18, (3.1.21), 3.4.1, 3.4.2, 3.4.13, 3.4.18, 3.7.3
Dot Cube	144	
Folders	15	3.2.4, 3.5.4, 3.7.3
Glue		3.6.5, 3.8.10
Inch Tiles	1200 tiles	3.1.21, 3.2.2, 3.2.3, 3.2.5, 3.2.10
Markers		3.1.21, 3.2.10, 3.2.15, 3.3.7, 3.3.18, 3.4.1, 3.4.2, 3.4.5, 3.4.13, 3.4.15, 3.5.4, 3.5.14, 3.6.5, 3.6.6, 3.6.12, 3.6.15, 3.7.8, 3.8.2, 3.8.10, 3.8.12, 3.8.13, 3.8.14

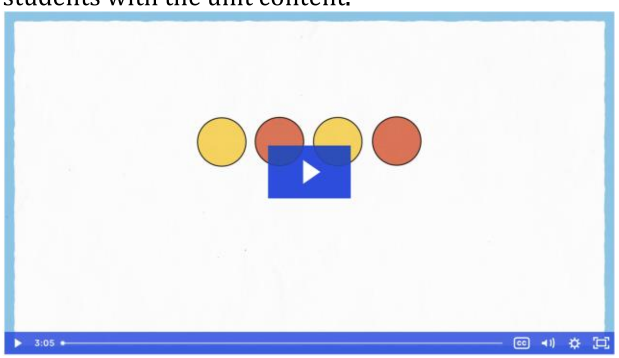
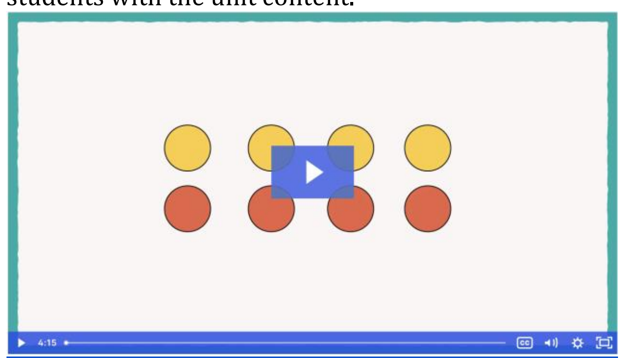
Markers (dry-erase)	1	3.6.7
Numbers cubes	96 cubes	3.5.7, 3.5.12, 3.8.11
Paper clips	400	3.3.12, 3.5.15, (3.6.16), 3.7.6
Pattern blocks	500	3.2.1
Pencils	30	3.3.12
Picture books	15	3.8.12, 3.8.14
Rulers	30	3.2.9, 3.5.18, 3.6.16, 3.6.3, 3.6.16, 3.8.14, 3.2.6, 3.2.8
Scissors	15	3.2.1, 3.2.6, (3.2.15), 3.5.5, 3.6.5, 3.7.11, 3.7.12
Tape	8 rolls	3.6.5, 3.7.11, 3.7.12, 3.7.15, 3.8.10
Tape (painters or masking)	10 rolls	3.2.9, 3.6.16, 3.8.2
Two-color counters	1600	3.1.9, 3.1.17, 3.1.18, (3.1.21), 3.4.1, 3.4.2, 3.4.13, 3.4.18, 3.7.3
Yardsticks	8	3.2.9, 3.6.16
CONSUMABLE MATERIALS		
ITEM	**QUANTITY PER 30 STUDENTS**	**LESSONS**
Chart paper	81 sheets	3.8.12, 3.8.13, 3.8.14
Index Cards	30	3.3.16

Patty paper	1	3.2.6
Pipe cleaners	30	3.6.16
Sticky notes	390	3.1.2, 3.3.18, 3.4.15

Building Thinking Classrooms Non-Curricular Tasks

UNIT PLANS

Unit 1: Math In Our World

PEDAGOGICAL CONTENT KNOWLEDGE RESOURCES FOR TEACHERS		
Learning Narrative Video The Unit Launch: Learning Narrative video for Grade 3, Unit 1 gives insight into the unit objectives, models and representations, possible student errors and misconceptions, and tips that might be used to help support student understanding. The Learning Narrative video is ideal for teachers to study prior to teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 	**Learning Progressions Video** The Unit Launch: Learning Progressions video for Grade 3, Unit 1 details how the content of a unit builds upon prior knowledge, and how the understanding of the content provides students with readiness for future learning. The Learning Progressions video is ideal for teachers to study before teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 	**Learning Supports Video** The Unit Launch: Learning Supports video for Grade 3, Unit 1 gives an in-depth look into the models and representations used in this unit to help support student understanding. The Learning Supports video is ideal for teachers to study prior to teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 

STAGE 1 - DESIRED RESULTS	
Assessed Focus Standards **NJSLS.MATH.CONTENT. 2.DL.B.4** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four	**UNIT DESCRIPTION** In this unit, students interpret and represent data on scaled picture graphs and scaled bar graphs. Then, they learn the concept of multiplication.This is the first of four units that focus on multiplication. In this unit, students explore scaled picture graphs and bar graphs as an entry point for learning about equal-size groups

categories. Solve simple put together, take-apart, and compare problems using information presented in a bar graph.

NJSLS.MATH.CONTENT.3.OA.A.1
Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.

NJSLS.MATH.CONTENT.3.OA.A.3
Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

NJSLS.MATH.CONTENT.3.OA.A.4
Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?

NJSLS.MATH.CONTENT.3.OA.B.5
Apply properties of operations as strategies to multiply and divide.2 Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)

NJSLS.MATH.CONTENT.3.OA.C.7
Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of

and multiplication. In grade 2, students analyzed picture graphs in which one picture represented one object and bar graphs that were scaled by single units. Here, students encounter picture graphs in which each picture represents more than one object and bar graphs that were scaled by 2 or 5 units. The idea that one picture can represent multiple objects helps to introduce the idea of equal-size groups.Students learn that multiplication can mean finding the total number of objects in a groups of b objects each, and can be represented by a×bThey then relate the idea of equal groups and the expression a×b to the rows and columns of an array. In working with arrays, students begin to notice the commutative property of multiplication. In all cases, students make sense of the meaning of multiplication expressions before finding their value, and before writing equations that relate two factors and a product.Later in the unit, students see situations in which the total number of objects is known but either the number of groups or the size of each group is not known. Problems with a missing factor offer students a preview to division.Throughout the unit, provide access to connecting cubes or counters, as students may choose to use them to represent and solve problems.

Throughout the unit
Students work toward fluency in multiplying by 2, 5, and 10. The How Many Do You See routine is used to encourage students to look for equal groups. It prompts students to subitize a group of dots as one unit, see the iterations of the groups, and skip-count to say the total number of dots they see in the image. This routine progresses from dots to drawings of equal groups to array formations.

EXPLICIT ASPECTS OF RIGOR

Conceptual Understanding
- Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of
  7 objects each. For example, describe a context in which a total number of objects can be expressed as 5× 7.
- Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?
- Apply properties of operations as strategies to multiply and divide.2 Examples: If 6 × 4 = 24 is known,then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 =15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)
- Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.
- Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends

operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

NJSLS.MATH.CONTENT.3.OA.D.9
Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.

NJSLS.MATH.CONTENT.3.DL.B.3
Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

Content Connections
3-LS3-1
Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS3-2
Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4-1
Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

3-LS4-2
Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

3-LS4-3
Construct an argument with evidence that in a

Procedural Fluency

- Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

Application

- Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

MEANING

Enduring Understandings	Essential Questions
U1. Some questions can be answered by collecting and analyzing data. **U2.** Pictographs and bar graphs make it easy to compare data. **U3.** Scaled pictographs can be used in word problems to indicate comparisons between different sets of data. **U4.** Patterns and known facts can be used to find unknown facts.	**Q1.** Why do we make graphs? **Q2.** What are ways we can collect and organize data? **Q3.** How can drawing a diagram help us solve a problem? **Q4.** What is an array? **Q5.** How can we use an array to show the commutative property of multiplication? **Q6.** How can I use arrays to model multiplication?

WHAT STUDENTS WILL KNOW AND BE ABLE TO DO

Knowledge	Skills
K1. Interpret scaled picture and bar graphs. **K2.** Represent data using scaled pictures and bar graphs. **K3.** Solve one- and two-step story problems using addition and subtraction.	**S1.** Interpret picture graphs and bar graphs to generate questions (orally and in writing) about the data. [Lesson 1] **S2.** Represent data using bar graphs and picture graphs. [Lesson 2] **S3.** Solve one- and two-step problems using addition

particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. **3-ESS2-1** Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. **INTEGRATION OF 21st CENTURY SKILLS** **9.1.4.A.1** Recognize a problem and brainstorm ways to solve the problem individually or collaboratively. **9.1.4.A.5** Apply critical thinking and problem-solving skills in classroom and family settings. **9.1.4.B.1** Participate in brainstorming sessions to seek information, ideas, and strategies that foster creative thinking. **9.1.4.C.1** Practice collaborative skills in groups, and explain how these skills assist in completing tasks in different settings (at home, in school, and during play). **CAREER EDUCATION** **9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success. **9.3.ST-SM.2** Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems. **9.3.ST-SM.4** Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.	**K4.** Represent and solve multiplication problems involving equal groups. **K5.** Understand multiplication in terms of equal groups. **K6.** Represent and solve multiplication problems involving arrays.	and subtraction within 20. [Lesson 2] **S4.** Interpret scaled picture graphs to generate questions (orally and in writing) about the data. [Lesson 3] **S5.** Represent data using scaled picture graphs. [Lessons 4,5] **S6.** Choose an appropriate scale for a bar graph that represents a given data set. [Lesson 6] **S7.** Solve one-step "how many more" and "how many fewer" problems within 100, based on the data presented in scaled bar graphs. [Lessons 7,8]

CULTURALLY RESPONSIVE TEACHING in PRACTICE	SOCIAL EMOTIONAL LEARNING in PRACTICE
● Encourage collaborative learning in diverse groups. ● Recognize and value multiple problem-solving approaches. ● Be mindful of language barriers and use simple language and visuals. ● Contextualize abstract concepts in real-life situations. ● Tailor instruction to individual interests and strengths. ● Involve families and the community in math-related activities. ● Include diverse mathematicians and scientists in lessons. ● Use multicultural resources and materials. ● Use math problems and examples that relate to students' cultures and experiences.	● Create a positive classroom environment. ● Encourage communication and collaboration. ● Model emotional regulation. ● Connect math to real-life situations. ● Validate effort and persistence. ● Use cooperative learning. ● Model growth mindset. ● Incorporate reflective practices. ● Integrate SEL activities such as use of affirmations. ● Foster positive teacher-student relationships.

STAGE 2 - EVIDENCE

SUMMATIVE ASSESSMENT

Illustrative Mathematics

- 3.1-Section-A-Checkpoint-Assessment.pdf
- 3.1-Section-B-Checkpoint-Assessment.pdf
- 3.1-Section-C-Checkpoint-Assessment.pdf
- 3.1 End-of-Unit-Assessment.pdf
- 3.1 End-of-Unit-Assessment SP.pdf

PRE-ASSESSMENT

Illustrative Mathematics

-

FORMATIVE ASSESSMENT

Illustrative Mathematics Curriculum	*Illustrative Mathematics* Tasks	NJSLA Released Items
● 3.1.1 Cool Down.pdf ● 3.1.2 Cool Down.pdf ● 3.1.3 Cool Down.pdf ● 3.1.4 Cool Down.pdf ● 3.1.5 Cool Down.pdf	● Unit 1 Student Task Lesson 1.pdf ● Unit 1 Student Task Lesson 2.pdf ● Unit 1 Student Task Lesson 3.pdf ● Unit 1 Student Task Lesson 4.pdf ● Unit 1 Student Task Lesson 5.pdf	3.OA.A.1 ● Item UIN - M00903 ● Item UIN - M00905 ● Item UIN - M02035 ● Item UIN - M03102

● 3.1.6 Cool Down.pdf ● 3.1.7 Cool Down.pdf ● 3.1.8 Cool Down.pdf ● 3.1.9 Cool Down.pdf ● 3.1.10 Cool Down.pdf ● 3.1.11 Cool Down.pdf ● 3.1.12 Cool Down.pdf ● 3.1.13 Cool Down.pdf ● 3.1.14 Cool Down.pdf ● 3.1.15 Cool Down.pdf ● 3.1.16 Cool Down.pdf ● 3.1.17 Cool Down.pdf ● 3.1.18 Cool Down.pdf ● 3.1.19 Cool Down.pdf ● 3.1.20 Cool Down.pdf ● 3.1.21 Cool Down.pdf	● Unit 1 Student Task Lesson 6.pdf ● Unit 1 Student Task Lesson 7.pdf ● Unit 1 Student Task Lesson 8.pdf ● Unit 1 Student Task Lesson 9.pdf ● Unit 1 Student Task Lesson 10.pdf ● Unit 1 Student Task Lesson 11.pdf ● Unit 1 Student Task Lesson 12.pdf ● Unit 1 Student Task Lesson 13.pdf ● Unit 1 Student Task Lesson 14.pdf ● Unit 1 Student Task Lesson 15.pdf ● Unit 1 Student Task Lesson 16.pdf ● Unit 1 Student Task Lesson 17.pdf ● Unit 1 Student Task Lesson 18.pdf ● Unit 1 Student Task Lesson 19.pdf ● Unit 1 Student Task Lesson 20.pdf ● Unit 1 Student Task Lesson 21.pdf	● Item UIN - M03428 ● Item UIN - VH093469 ● Item UIN - VH093469_SP ● Item UIN - VF491797 ● Item UIN - VF491797_SP ● Item UIN - VH044334 3.OA.A.3 ● Item UIN - M00003 ● Item UIN - M00042 ● Item UIN - M00042SP ● Item UIN - M00342 ● Item UIN - M01083 ● Item UIN - VF822882 ● Item UIN - VF888777 ● Item UIN - VF653237 ● Item UIN - VH054401 ● Item UIN - 0083-M00453 ● Item UIN4508-M05031 ● Item UIN - M00819 ● Item UIN - M01418 ● Item UIN - M01418_SP ● Item UIN - M05158 ● Item UIN - M05158_SP ● Item UIN - M00042 ● Item UIN - M01083 ● Item UIN - M01186 ● Item UIN - M01386 ● Item UIN - M01789 ● Item UIN - M03017 ● Item UIN - M300165 ● Item UIN - VF819705 ● Item UIN - VH094028 ● Item UIN - VF909889 ● Item UIN - M300030 ● Item UIN - M300030_AT ● Item UIN - M300030_SP ● Item UIN - M02243 ● Item UIN - M02243_SP ● Item UIN - M01387 ● Item UIN - VF497886 3.OA.A.4

		• Item UIN - M00631 • Item UIN - M00631SP • Item UIN - M01790 • Item UIN - VF497937 • Item UIN - VF906806 • Item UIN - VH044339 • Item UIN - VH096061 **3.OA.B.5** • Item UIN - M01039P • Item UIN - M01039P_SP • Item UIN - VH094030 • Item UIN - VH094030 **3.OA.C.9** • Item UIN - 4085-M03369P • Item UIN - VF558613 **3.DL.B.3** • Item UIN - 0523-M00063 • Item UIN - 0530-M00067 • Item UIN - 0217-M00823P • Item UIN -0217-M00823P_SP • Item UIN - M00006 • Item UIN - M03613P • Item UIN - M03613P_SP • Item UIN - VH034734 • Item UIN - VH101159 • Item UIN - 0533-M00524 • Item UIN - 0533-M00524_SP • Item UIN - VH055575 • Item UIN - VH096259 • Item UIN - VH118077
STAGE 3 - LEARNING PLAN		
MATH WORKSHOP		
***Illustrative Mathematics* Centers** • Sort and Display ○ Stage 2: Picture or Bar Graphs (supporting)	***Building Thinking Classrooms* Tasks** • Lesson 1 Activity 1: Making Sense of Data Explore (10 minutes) • Lesson 2 Activity 1: How We Get Home (15	**Open Middle** • Interpreting Graphs • Multiplying Multiples Of Ten 2 • Missing Digits

<table>
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Capture Square
Stage 3: Add within 20 (supporting)
Sort and Display
Stage 3: Scaled Graphs (addressing)
Five in a Row: Addition and Subtraction
Stage 6: Add within 100 with Composing (supporting)
Capture Squares
Stage 4: Subtract within 20 (supporting)
Five in a Row: Addition and Subtraction
Stage 7: Add within 1,000 without Composing (supporting)
Capture Squares
Stage 5: Multiply with 2, 5, and 10 (Addressing)
Five in a Row: Addition and Subtraction
Stage 8: Add within 1,000 with Composing (Supporting)
Five in a Row: Multiplication
Stage 1: Factors 1–5 and 10 (Addressing)

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minutes)

Lesson 3 Activity 1: So Many Responses (15 minutes)
Lesson 4 Activity 1: Ways to Travel (15 minutes)
Lesson 5 Activity 2: Create a Scaled Bar Graph (25 minutes)
Lesson 6 Activity 1: Represent Pattern Blocks (20 minutes)
Lesson 7 Activity 2: Questions About Bugs in the Garden (20 minutes)
Lesson 8 Activity 1: New School Year (20 minutes)
Lesson 9 Activity 1: From Scaled Graphs to Equal Groups (15 minutes)
Lesson 10 Activity 1: Scaled Picture Graph to Diagram (15 minutes)
Lesson 11 Activity 2: Expressions to Drawings and Diagrams (15 minutes)
Lesson 12 Activity 2: Solve Equal Groups Problems (20 minutes)
Lesson 13 Activity 1: Multiplication Equation Match (20 minutes)
Lesson 14 Activity 2: Write Equations with an Unknown Number (20 minutes)
Lesson 15 Activity 2: Multiplication Mashup (20 minutes)
Lesson 16 Activity 1: Compare Equal Groups and Arrays (15 minutes)
Lesson 17 Activity 2: Draw Arrays (15 minutes)
Lesson 18 Activity 1: Represent Array Situations (20 minutes)
Lesson 19 Activity 1: Array of Colors (25 minutes)
Lesson 20 Activity 1: Learn More About Multiplication (20 minutes)
Lesson 21 Activity 1: Game Night (25 minutes)

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Planting Carrots 1
Multiplying Multiples Of Ten 1
Subtracting 3-Digit Numbers 2
Adding 3-Digit Numbers

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<td>Slow Reveal Graphs

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<td>Bootstrap (to be added Summer 2025)</td>
<td>Other Resources
IM Talking Math
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PHYSICAL MANIPULATIVES & RESOURCES	VIRTUAL MANIPULATIVES & RESOURCES	VOCABULARY
• colored pencils • connecting cubes • crayons • coins • cut out inch squares from grid paper • markers • inch tiles • sticky notes	**Polypad** • Numbers **Didax** • Virtual connecting cubes • Virtual Counters • Virtual Inch Tiles **Toy Theater** • Two Color Counters | Teaching Tools • Base ten block **Math Learning Center** • Base Ten Blocks	• bar graph • key • picture graph • scaled picture graph • multiplication • expression

SUMMARY OF KEY LEARNING
Pacing This unit has been assigned 25 days in the Pacing Guide. The 25 days are allotted as follows: 2 lesson days as outlined below, 3 flexible days, and 1 assessment day. Lesson 21 is optional in this unit. **Teacher Resources** Unit 1 Teacher's Guide (English) (Spanish) Unit 1 Teacher's Resource Pack (English) (Spanish) **Student Resources** Unit 1 Student Workbook (English) (Spanish) **A: Interpret and Represent Data on Scaled Graphs** Lesson 1 Make Sense of Data Lesson 2 Represent Data and Solve Problems Lesson 3 Scaled Picture Graphs Lesson 4 Create Scaled Picture Graphs Lesson 5 Represent Data in Scaled Bar Graphs Lesson 6 Choose a Scale Lesson 7 Answer Questions about Scaled Bar Graphs Lesson 8 More Questions about Scaled Bar Graphs **B: From Graphs to Multiplication**

Lesson 9 Multiplication as Equal Groups Lesson 10 Drawings, Situations, and Diagrams, Oh My! Lesson 11 Multiplication Expressions Lesson 12 Represent and Solve Multiplication Problems Lesson 13 Multiplication Equations Lesson 14 Write and Solve Equations with Unknowns Lesson 15 More Factors, More Problems **C: Represent Multiplication with Arrays and the Commutative Property** Lesson 16 Arrange Objects Into Arrays Lesson 17 Match and Draw Arrays Lesson 18 Represent Arrays with Expressions Lesson 19 Solve Problems Involving Arrays Lesson 20 The Commutative Property Lesson 21 Game Night Seating Plan (optional)
LESSON 1: MAKE SENSE OF DATA (Teacher Guide)

Teacher-Facing Learning Intention ● Students are interpreting picture graphs and bar graphs to generate questions (orally and in writing) about the data. **Student-Facing Learning Intention** ● Let's read and ask questions about data. **Success Criteria** ● I can interpret a picture graph and bar graph to produce written and oral questions about the data.	**Lesson Purpose** ● The purpose of this lesson is to elicit students' prior understandings of single-unit scale picture graphs and bar graphs in preparation for upcoming work with scaled bar graphs. **Lesson Narrative** ● In grade 2, students learned how to draw and label single-unit scale bar graphs and picture graphs and used categorical data presented in graphs to solve simple problems. In this lesson, students revisit the structure of picture graphs and bar graphs, the features of graphs that help communicate information clearly, and the information they can learn by analyzing a graph. Students learn that a key is the part of a picture graph that tells what each picture represents. Students contextualize and make sense of the data based on the title, the given values, and their own experiences (MP2). **Vocabulary** ● bar graph ● key ● picture graph **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT. 2.DL.B.4** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together,	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.DA.1** Design investigations to address a question and consider how data-collection methods affect the nature of the data set. ● **NCTM.MATH.CONTENT.3-5.DA.3**

take-apart, and compare problems using information presented in a bar graph.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.

Represent data using tables and graphs such as line plots, bar graphs, and line graphs.

National Council of Teachers of Mathematics Process Standards

- **PR5.** Representation

Warm-up: Notice and Wonder: Making Sense of Data (15 minutes)

- The purpose of this warm-up is to elicit students' prior understandings about categorical data representations, which will be useful when students engage with single-unit scale picture and bar graphs in later activities. While students may notice and wonder many things about this graph, it is important to pay attention to the ways in which students make sense of a picture graph, the questions they have about the categorical data, and the contexts that make sense for the categorical data shown. For all warm-up routines, consider establishing a small, discreet hand signal that students can display to indicate they have an answer they can support with reasoning. This signal could be a thumbs-up, a certain number of fingers that tells the number of responses they have, or another subtle signal. This is a quick way to see if students have had enough time to think about the problem. It also keeps students from being distracted or rushed by hands being raised around the class. Since this is the first warm-up of the year, we allocated 15 minutes, instead of 10, to establish the structure of a routine.

Activity 1: Making Sense of Data Explore (10 minutes)

- The purpose of this activity is to elicit students' prior understandings about essential parts of a picture graph. The graph in this activity is the same as the one in the warm-up, but includes a title. Students are encouraged to consider what categories could be in the graph. Students contextualize and make sense of the data based on the title, the given values, and their own experiences (MP2). This is an opportunity for students to connect their lived experience to mathematics, supporting the development of their math identities.
    - **Access for Students with Disabilities:**Representation: Develop Language and Symbols. Activate or supply background knowledge to help students recall the terms "picture graph" and "key." Ask, "Why do we call this graph a picture graph?", "What kind of information does a key show?" Supports accessibility for: Memory, Language

Activity 2: Picture Graphs and Bar Graphs (20 minutes)

- The purpose of this activity is to prepare students for work with scaled bar graphs in upcoming lessons. Now that students have reasoned about the parts of a picture graph, they look at how picture graphs and bar graphs are alike and how they are different. Students use the information presented on the axes of the bar graph to read the graph, interpret the categorical data presented in the graphs, and generate questions that can be answered using the graphs.
    - **Access for Multilingual Learners:** Representation: Develop Language and Symbols. Activate or supply background knowledge to help students recall the terms "picture graph" and "key." Ask, "Why do we call this graph a picture graph?", "What kind of information does a key show?" Supports accessibility for: Memory, Language

Supplemental Resources

- Suggested Centers
    - Sort and Display (1–3) Stage 2: Picture or Bar Graphs (pdf)
    - Capture Squares (1–3) Stage 3: Add within 20 (gameboard) (spinner)

Assessment Resources

- 3.1.1 Cool Down.pdf

LESSON 2: REPRESENT DATA AND SOLVE PROBLEMS (Teacher Guide)

Teacher-Facing Learning Intention	Lesson Purpose

- Students are solving one- and two-step problems using addition and subtraction within 20.

Student-Facing Learning Intention

- Let's create graphs and answer questions.

Success Criteria

- I can create graphs and answer questions.

- The purpose of this lesson is for students to solve one- and two-step problems about data represented in bar graphs.

Lesson Narrative

- Students solved one-step problems about data in grade 2. In this lesson, students first create a picture graph and bar graph that represent how they get home from school. Then, they solve one- and two-step "how many more" and "how many fewer" problems using data presented in a bar graph. Consider launching the lesson with a read-a-loud of Last Stop on Market Street by Matt de la Peña and Christian Robinson.

Vocabulary

-

Materials

- Sticky notes

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT. 2.DL.B.4**
  Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems using information presented in a bar graph.
- **NJSLS.MATH.CONTENT. 3.DL.B.3**
  Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.D.1**
  Design investigations to address a question and consider how data-collection methods affect the nature of the data set.
- **NCTM.MATH.CONTENT.3-5.D.3**
  Represent data using tables and graphs such as line plots, bar graphs, and line graphs.

National Council of Teachers of Mathematics Process Standards

- **PR2.** Reasoning and Proof
- **PR5.** Representation

Warm-up: How Many Do You See: Dots in Groups (10 minutes)

- The purpose of this How Many Do You See is for students to subitize or use grouping strategies to describe the number of dots they see. They also make connections between the images to determine the number of dots. Grouping strategies and skip-counting by 2, 5, and 10 offer a review of grade 2 work and build toward multiplication in future lessons. In the synthesis, students revisit the language of "how many more" to prepare them to use data from a bar graph to solve "how many more" problems throughout this lesson.

Activity 1: How We Get Home (15 minutes)

- The purpose of this activity is for students to answer one- and two-step "how many more" questions using data represented in a bar graph. Students decide if statements about the data in the bar graph from the previous activity are true or false and then answer questions about the data. When students use expression, equations, or describe adding or subtracting to find how many more or less, they show they can decontextualize and recontextualize the data to make sense of and solve the problems (MP2). You will generate the questions students answer in this task from the class graph.

- **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Some students may benefit from the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking

Activity 2: Questions About a Bar Graph (20 minutes)

- The purpose of this activity is for students to answer one- and two-step "how many more" questions using data represented in a bar graph. Students decide if statements about the data in the bar graph from the previous activity are true or false and then answer questions about the data. When students use expression, equations, or describe adding or subtracting to find how many more or less, they show they can decontextualize and recontextualize the data to make sense of and solve the problems (MP2). You will generate the questions students answer in this task from the class graph.
    - **Access for Students with Disabilities:** Representation: Access for Perception. Read the directions and statements aloud. Students who both listen to and read the information will benefit from extra processing time. Supports accessibility for: Language

Supplemental Resources

- Suggested Centers
    - Sort and Display (1–3) Stage 2: Picture or Bar Graphs (pdf)
    - Capture Squares (1–3) Stage 3: Add within 20 (gameboard) (spinner)

Assessment Resources

- 3.1.2 Cool Down.pdf

LESSON 3: SCALED PICTURE GRAPHS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are interpreting scaled picture graphs to generate questions (orally and in writing) about the data.

Student-Facing Learning Intention

- Let's explore scaled picture graphs.

Success Criteria

- I can interpret scaled picture graphs and generate questions about the data.

Lesson Purpose

- The purpose of this lesson is for students to read and answer questions about scaled picture graphs.

Lesson Narrative

- In previous lessons, students reviewed how to create and interpret single-unit scale picture graphs. In this lesson, students learn that a scaled picture graph is a picture graph where each picture represents an amount other than 1. They read, interpret, and answer questions about scaled picture graphs with a scale of 2 and 5, and generate questions that can be answered by these graphs.

Vocabulary

- scaled picture graph

Materials

-

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.DL.B.3**
  Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.C.2**
  Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving

Mathematical Practice Standards ● **MP7.** Look for and make use of structure.	● **PR2.** Reasoning and Proof

Warm-up: Number Talk: Addition (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for adding within 100. These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to add up the total number of students represented in a picture graph. When students use strategies based on place value to add they look for and make use of structure (MP7).

Activity 1: So Many Responses (15 minutes)

- The purpose of this activity is for students to read a scaled picture graph. A scale of 5 is used to encourage skip-counting because students skip-counting by 5 in grade 2. The questions in the task focus on the structure of a scaled picture graph and strategies for reading them.

Activity 2: Questions about Scaled Picture Graphs (20 minutes)

- The purpose of this activity is for students to interpret a scaled picture graph and write questions that can be asked based on the data represented in a scaled picture graph.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Use multimodal examples to show the meaning of a symbol. Use verbal descriptions along with gestures, drawings, or concrete objects to show how each flower on the graph is a symbol that represents five flowers that were seen in the park.
  - **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were needed to solve the problem. Display the sentence frame, "The next time I read a scaled picture graph I will pay attention to . . . ." Supports accessibility for: Conceptual Processing

Supplemental Resources ● Suggested Centers ○ Sort and Display (1–3) Stage 2: Picture or Bar Graphs (pdf) ○ Capture Squares (1–3) Stage 3: Add within 20 (gameboard) (spinner)	**Assessment Resources** ● 3.1.3 Cool Down.pdf

LESSON 4: CREATE SCALED PICTURE GRAPHS (Teacher Guide)

Teacher-Facing Learning Intention ● Students are representing data using scaled picture graphs. **Student-Facing Learning Intention** ● Let's make a scaled picture graph. **Success Criteria** ● I can represent data using a scaled picture graph.	**Lesson Purpose** ● The purpose of this lesson is for students to create a scaled picture graph to represent categorical data. **Lesson Narrative** ● In a previous lesson, students interpreted and answered questions about scaled picture graphs. In this lesson, they gather and organize data about ways that students would like to travel and represent the data in a scaled picture graph with a scale of 2. Students make sense of how to represent a single student on a scaled picture graph that has a scale of 2. **Vocabulary** ●

	Materials ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.M.B.3** Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by unit squares is said to have an area of square units. **Mathematical Practice Standards** ●	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.DA.A.3** Represent data using tables and graphs such as line plots, bar graphs, and line graphs. ● **NCTM.MATH.CONTENT.3-5.DA.A.1** Design investigations to address a question and consider how data-collection methods affect the nature of the data set. **National Council of Teachers of Mathematics Process Standards** ● **PR2.** Reasoning and Proof ● **PR5.** Representation

Warm-up: How Many Do You See: More Groups of Dots (10 minutes)

- The purpose of this activity is for students to subitize or use grouping strategies to describe the number of dots they see. Although the dots have been deliberately grouped by 5 to elicit counting by 5 as a strategy, students may see 2 groups of 5 as 10. Grouping strategies and skip-counting by 2, 5, and 10 offer a review of grade 2 work and build toward multiplication in future lessons.

Activity 1: Ways to Travel (15 minutes)

- The purpose of this activity is for students to gather and organize categorical data about their classmates. Students record their classmates' preferred way to travel and discuss advantages and disadvantages of displaying categorical data in a table. To make the data collection process faster, students can collect their responses within their group first and then each group can share out how many students chose each way of travel. Their names can be pre-printed in a table for them or they could only write the person's first name and way of travel abbreviation (given in the task statement) in the table. In the next activity, students create a scaled picture graph for this categorical data.

Activity 2: Create a Scaled Picture Graph (20 minutes)

- The purpose of this activity is for students to apply understanding from previous lessons to create a picture graph with a scale of 2 from the categorical data they gathered. Students are guided to use a scale of 2 but can choose their own symbol. Depending on the data, students may need to use a half symbol in order to represent an odd number of students choosing a specific method of travel. This idea is discussed in the synthesis.
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: When students compare graphs, display the following sentence frames: "The symbol I chose to represent ____ is ____, because . . . ", "One way our graphs are the same is . . .", and "One way our graphs are different is . . . ." Advances: Speaking, Representing
  - **Access for Students with Disabilities:** *Representation: Internalize Comprehension.* Invite students to begin by creating a physical model of a picture graph. Provide access to physical objects, such as connecting cubes, that students can use to represent each person, and then organize into groups of 2. Supports accessibility for: Visual-spatial processing, Conceptual processing

Supplemental Resources ● Suggested Centers ○ Sort and Display (1–3) Stage 2: Picture or Bar Graphs (pdf) ○ Capture Squares (1–3) Stage 3: Add within 20 (gameboard)	**Assessment Resources** ● 3.1.4 Cool Down.pdf

(spinner)	

LESSON 5: REPRESENT DATA IN SCALED BAR GRAPHS (Teacher Guide)

Teacher-Facing Learning Intention ● Students are representing data using scaled bar graphs. **Student-Facing Learning Intention** ● Let's make a scaled bar graph. **Success Criteria** ● I can represent data using a scaled bar graph.	**Lesson Purpose** ● The purpose of this lesson is for students to create a scaled bar graph. **Lesson Narrative** ● In a previous lesson, students collected categorical class data and learned how to create a scaled picture graph. Students now make connections between scaled picture graphs and scaled bar graphs, and expand the idea of a scale that is more than one to bar graphs. In this lesson students choose a scale of 2 or 5 for their bar graph. **Vocabulary** ● scaled bar graph **Materials** ● Activity 2: Materials from a previous lesson

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.DL.B.3** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. **Mathematical Practice Standards** ● **MP6.** Attend to precision. ● **MP7.** Look for and make use of structure. ● **MP8.** Look for and express regularity in repeated reasoning.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.DA.A.3** Represent data using tables and graphs such as line plots, bar graphs, and line graphs. ● **NCTM.MATH.CONTENT.3-5.DA.A.1** Design investigations to address a question and consider how data-collection methods affect the nature of the data set. **National Council of Teachers of Mathematics Process Standards** ● **PR2.** Reasoning and Proof ● **PR5.** Representation

Warm-up: Number Talk: Twos and Fives (10 minutes)

- The purpose of this Number Talk is to elicit strategies students have for counting by 2 and 5. These understandings help students develop fluency and will be used later in this lesson when students will need to be able to scale bar graphs. When students notice the number of equal addends are doubled in the second expression, they are looking for and making sense of structure (MP7). When they notice the pattern repeats in the second pair of expressions and use the pattern to find the value of the sum, they are also looking for and expressing regularity in repeated reasoning (MP8).

Activity 1: Compare Bar Graphs (10 minutes)

- The purpose of this activity is to introduce students to a scaled bar graph. Students consider a single-unit scale bar graph next to a bar graph with a scale of 2, both representing the same set of categorical data. They discuss similarities and differences between a single-unit scale bar graph and a bar graph with a scale of 2.

Activity 2: Create a Scaled Bar Graph (25 minutes)

- The purpose of this activity is for students to create a scaled bar graph. Students decide on a scale of 2 or 5, so it will be important to ask students why they chose their scale and how accurately they can tell the exact number the bar represents (MP6). In the activity synthesis, students discuss how they represented an odd number of students with a scale of 2 and a number of students that was not a multiple of 5 on a scale of 5. This question should be adjusted based on the data your class collects.
  - **Access for Multilingual Learners:** MLR7 Compare and Connect. Synthesis: Give students time to study the student work displayed with both scales. During the whole-class discussion, ask students, "What do the graphs have in common?", "How are they different?", "Why do the different graphs lead to the same outcome?" Advances: Representing, Speaking
  - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after they have represented one method of travel on a graph. Supports accessibility for: Organization, Attention

Supplemental Resources	**Assessment Resources**
Suggested Centers ○ Sort and Display (1–3) Stage 3: Scaled Graphs (pdf) ○ Five in a Row: Addition and Subtraction (1–2) Stage 6: Add within 100 with Composing (pdf)	• 3.1.5 Cool Down.pdf

LESSON 6: CHOOSE A SCALE (Teacher Guide)

Teacher-Facing Learning Intention
- Students are choosing an appropriate scale for a bar graph that represents a given data set.

Student-Facing Learning Intention
- Let's choose a scale for our bar graph.

Success Criteria
- I can choose a scale for a bar graph and represent the given data set.

Lesson Purpose
- The purpose of this lesson is for students to consider the advantages and disadvantages of various bar graph scales.

Lesson Narrative
- In previous lessons, students created scaled picture and bar graphs with a given scale of 2 or 5. This lesson extends this work to allow students to choose the scale for their bar graph and reflect on the advantages or disadvantages of their choices. Through the work of the lesson, students notice that they can choose a scale based on the numbers in the data set and that the scale can make a graph easier or more difficult to read (MP6).

Vocabulary
-

Materials
-

New Jersey State Learning Standards	**National Council of Teachers of Mathematics Content Standards**
• **NJSLS.MATH.CONTENT.3.DL.B.3** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar	• **NCTM.MATH.CONTENT.3-5.DA.A.3** Represent data using tables and graphs such as line plots, bar graphs, and line graphs. • **NCTM.MATH.CONTENT.3-5.DA.A.1**

<table>
<tr><td>graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

Mathematical Practice Standards
MP3. Construct viable arguments and critique the reasoning of others.
MP6. Attend to precision.</td><td>Design investigations to address a question and consider how data-collection methods affect the nature of the data set.

National Council of Teachers of Mathematics Process Standards
PR2. Reasoning and Proof
PR5. Representation</td></tr>
<tr><td colspan="2">Warm-up: Notice and Wonder: Bar Graph Scales (10 minutes)
The purpose of this warm-up is to elicit the idea that adjusting the scale changes the size of the bars in a bar graph and can make it easier or more difficult to interpret. While students may notice and wonder many things about these graphs, the different scales in the bar graphs are the most important discussion points.</td></tr>
<tr><td colspan="2">Activity 1: Represent Pattern Blocks (20 minutes)
The purpose of this activity is for students to analyze a scale and create a scaled bar graph. Students consider a large collection of pattern blocks and decide which scale will work best to represent the categorical data. They consider three students' ideas, choose a scale of 2, 5, or 10, and create a scaled bar graph to represent the categorical data. Students must justify why they agree that a particular scale would be best. During the activity and whole-class discussion, students share their thinking and have opportunities to listen to and critique the reasoning of their peers (MP3). Providing a variety of scales for students to choose from allows for discussion about the benefits of using larger scales for larger groups of objects and the effect of a scale on how easy it may be to read and interpret data in a graph.
Access for Students with Disabilities: Representation: Access for Perception. Provide access to pattern blocks to model the collection of pattern blocks in the student-facing task statement. Supports accessibility for: Organization, Visual-Spatial Processing</td></tr>
<tr><td colspan="2">Activity 2: Represent More Data in a Scaled Bar Graph (15 minutes)
The purpose of this activity is for students to represent data in a scaled bar graph. In this activity, the categorical data is presented in a table. Students choose a scale and make a scaled bar graph of the categorical data. Students have prior experience with scales of 2, 5, and 10, and are not directed to a specific scale in this activity. However, due to the larger numbers, it is likely that students choose a scale of 5 or 10. If students struggle to get started, you could suggest a scale of 5 or 10. In the whole-class discussion, students share how their choice of scale affected their graph.
Access for Multilingual Learners:MLR8 Discussion Supports. During small-group discussion, invite students to take turns sharing their responses. Ask students to restate what they heard using precise mathematical language and their own words. Display the sentence frame: "I heard you say . . . ." Original speakers can agree or clarify for their partner. Advances: Listening, Speaking</td></tr>
<tr><td>Supplemental Resources
Suggested Centers
Sort and Display (1–3) Stage 3: Scaled Graphs (pdf)
Five in a Row: Addition and Subtraction (1–2) Stage 6: Add within 100 with Composing (pdf)</td><td>Assessment Resources
3.1.6 Cool Down.pdf</td></tr>
<tr><td colspan="2">LESSON 7: ANSWER QUESTIONS ABOUT SCALED BAR GRAPHS (Teacher Guide)</td></tr>
<tr><td>Teacher-Facing Learning Intention</td><td>Lesson Purpose</td></tr>
</table>

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<tr><td>

- Students are solving one-step "how many more" and "how many fewer" problems within 100, based on the data presented in scaled bar graphs.

Student-Facing Learning Intention
- Let's solve problems based on data represented in bar graphs.

Success Criteria
- I can solve one step problems based on the data represented on the bar graph.

</td><td>

- The purpose of this lesson is for students to solve one-step "how many more" and "how many fewer" problems based on data presented in a scaled bar graph.

Lesson Narrative
- In grade 2, students solved simple Put Together, Take Apart, and Compare problems using data represented in a single-unit scaled bar graph. In this lesson, students solve one-step Compare problems using data represented in scaled bar graphs.

Vocabulary
-

Materials
- Activity 1: Materials from a previous lesson

</td></tr>
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New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.DL.B.3**
Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

Mathematical Practice Standards
- **MP7.** Look for and make use of structure.

</td><td>

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.DA.A.3**
Represent data using tables and graphs such as line plots, bar graphs, and line graphs.
- **NCTM.MATH.CONTENT.3-5.DA.A.1**
Design investigations to address a question and consider how data-collection methods affect the nature of the data set.

National Council of Teachers of Mathematics Process Standards
- **PR2.** Reasoning and Proof
- **PR5.** Representation

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Warm-up: How Many Do You See: Groups of Dots (10 minutes)
- The purpose of this How Many Do You See is for students to subitize or use grouping strategies to describe the images they see. When students notice that some of the dots are in equal groups and skip-count to find the total number of dots they are looking for and making use of structure (MP7).

Activity 1: Questions about Favorite Time of the Year (15 minutes)
- The purpose of this activity is for students to use data presented in scaled bar graphs to solve one-step "how many more" and "how many fewer" problems. Students use scaled bar graphs that they created in the previous lesson that contain data about the favorite time of the year. Answering questions about a graph with which they are familiar prepares them for the next task in which they answer questions about a new graph. This activity provides an opportunity for formative assessment of students' addition and subtraction methods. In grade 2, students were expected to fluently add and subtract within 100.

Activity 2: Questions About Bugs in the Garden (20 minutes)
- The purpose of this activity is for students to use data presented in scaled bar graphs to solve one-step "how many more" and "how many fewer" problems. The graph in the previous activity was familiar to students since they had created it in the previous lesson, but the graph used in this activity is new to students. Because the graph has a scale of 10, students need to estimate values that do not show an exact multiple of 10. As a result, answers may vary slightly. Accept all answers that align to reasonable estimates.

- **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Involve both students in sharing their response with the whole class. While one student speaks, invite the other student to follow along and point to the corresponding parts of the bar graph on the display. Advances: Speaking, Representing, Listening
- **Access for Students with Disabilities:** Representation: Internalize Comprehension. Begin by asking, "Does this situation remind anyone of something we have seen, read, or done before?" Supports accessibility for: Social-Emotional Functioning

Supplemental Resources

- Suggested Centers
  - Sort and Display (1–3) Stage 3: Scaled Graphs (pdf)
  - Five in a Row: Addition and Subtraction (1–2) Stage 6: Add within 100 with Composing (pdf)

Assessment Resources

- 3.1.7 Cool Down.pdf

LESSON 8: MORE QUESTIONS ABOUT SCALED BAR GRAPHS (Teacher Guide)

Teacher-Facing Learning Intention:

- Students are solving one- and two-step "how many more" and "how many fewer" problems within 100, based on the data presented in scaled bar graphs.

Student-Facing Learning Intention

- Let's solve problems using data shown on bar graphs.

Success Criteria

- I can solve one and two step problems based on data presented in scaled bar graphs.

Lesson Purpose

- The purpose of this lesson is for students to solve one- and two-step "how many more" and "how many fewer" problems, based on data presented in a scaled bar graph.

Lesson Narrative

- This lesson introduces Three Reads (MLR 6) to support students in making sense of and solving situations. In this lesson students continue to interpret graphs that represent quantities that are not exact multiples of the scale and require students to estimate values. As a result, answers may vary slightly. Accept all answers that align to reasonable estimates.

Vocabulary

-

Materials

-

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.DL.B.3**
  Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

Mathematical Practice Standards

- **MP1.** Make sense of problems and persevere in solving them.
- **MP7.** Look for and make use of structure.
- **MP8.** Look for and express regularity in repeated reasoning.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.DA.A.3**
  Represent data using tables and graphs such as line plots, bar graphs, and line graphs.
- **NCTM.MATH.CONTENT.3-5.DA.A.1**
  Design investigations to address a question and consider how data-collection methods affect the nature of the data set.

National Council of Teachers of Mathematics Process Standards

- **PR2.** Reasoning and Proof
- **PR5.** Representation

Warm-up: Number Talk: Repeated Addition (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for adding groups of 2 and groups of 5. These understandings help students develop fluency and will be helpful later in this lesson when students need to be able to use data in scaled bar graphs to solve one- and two-step "how many more" and "how many fewer" problems. Students use the structure of the expressions and repeated reasoning when they use methods based on skip-counting by 2 or 5 or counting on 2 or 5 from a previous known value (MP7, MP8).

Activity 1: New School Year (20 minutes)

- The purpose of this activity is to introduce MLR6, Three Reads, and solve a two-step "how many fewer" problem using data presented in a scaled bar graph. The routine prompts students to read a problem three times for different purposes to support them in making sense of the problem (MP1).

Activity 2: Use Bar Graphs to Solve Problems (15 minutes)

- The purpose of this activity is for students to practice the Three Reads math language routine on their own and use data presented in a scaled bar graph to solve a two-step "how many more" situation. The Three Reads routine has students read a problem three times for different purposes to support them to make sense of the problem and persevere in solving it (MP1).
    - **Access for Multilingual Learners:** The purpose of this activity is for students to practice the Three Reads math language routine on their own and use data presented in a scaled bar graph to solve a two-step "how many more" situation. The Three Reads routine has students read a problem three times for different purposes to support them to make sense of the problem and persevere in solving it (MP1).
    - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Provide choice. Invite students to decide which problem to start with or decide the order to complete the task. Supports accessibility for: Social-Emotional Functioning

Supplemental Resources

- Suggested Centers
    - Sort and Display (1–3) Stage 3: Scaled Graphs (pdf)
    - Five in a Row: Addition and Subtraction (1–2) Stage 6: Add within 100 with Composing (pdf)

Assessment Resources

- 3.1.8 Cool Down.pdf

LESSON 9: MULTIPLICATION AS EQUAL GROUPS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are building an understanding of multiplication as equal groups.
- Students are representing a situation involving equal groups in a way that makes sense to students.

Student-Facing Learning Intention

- Let's work with equal groups of things.

Success Criteria

- I can represent equal groups.

Lesson Purpose

- The purpose of this lesson is for students to use scaled picture graphs as an introduction to multiplication as equal groups.

Lesson Narrative

- Scaled picture graphs provide an equal grouping context that naturally elicits multiplication. Multiplication expressions aren't introduced in this lesson so that students spend more time with concrete representations of multiplication before being introduced to the more abstract representation. The next few lessons focus on the meaning and representations of multiplication, not the product. While students may want to go right to finding the product, it is important to focus on the meaning of multiplication as equal groups and the ways in which it can be represented in the discussions. Throughout this section, make connecting cubes or counters available to students who need them.

Vocabulary

	- multiplication **Materials** - Connecting cubes or counters

New Jersey State Learning Standards - **NJSLS.MATH.CONTENT.3.OA.A.1** Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7. **Mathematical Practice Standards** - **MP4.** Model with mathematics. - **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** - **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. - **NCTM.MATH.CONTENT.3-5.NUM.B.2** Understand the effects of multiplying and dividing whole numbers. **National Council of Teachers of Mathematics Process Standards** - **PR1.** Problem Solving - **PR5.** Representation

Warm-up: Number Talk: More Addition (10 minutes)
- The purpose of this Number Talk is to elicit strategies and understandings students have for addition within 100. It also provides an opportunity to observe student strategies as they work toward becoming fluent in addition within 1,000. When students use strategies based on place value to add they look for and make use of structure (MP7).

Activity 1: From Scaled Graphs to Equal Groups (15 minutes)
- The purpose of this activity is for students to connect scaled picture graphs to situations involving equal groups. The scale of the picture graph will be used to help students think about a category of the graph as a situation involving equal groups. The launch of the activity is an opportunity for students to share their experiences and ask questions about the graph to ensure each student has access to the context. If it is helpful, display a few images of different types of signs students may see in their community.
  - **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were important or most useful to solve the problem. Display the sentence frame, "The next time I read a scaled picture graph, I will pay attention to . . . " Supports accessibility for: Visual-Spatial Processing

Activity 2: Equal Group Situations (20 minutes)
- The purpose of this activity is for students to represent situations involving equal groups in a way that makes sense to them. Have connecting cubes available for students to use to represent the situation, if they would like. Students may also draw a picture. One partner could use the objects while one draws and then switch for each problem. The focus of the discussion is on the important quantities of each situation and how students used their representation to model each quantity (MP4).
- In the launch of the activity, it may be helpful to ask students to tell their partner a quick story or ask any questions about the focus of each of the three contexts to ensure each student has access. It may also be helpful to display images for students to reference.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Involve both partners in sharing their response with the whole class. While one student speaks, invite the other student to follow along and point to where the numbers are in their representations. Advances: Representing, Listening

Supplemental Resources - Suggested Centers - Capture Squares (1–3) Stage 4: Subtract within 20 (gameboard)	**Assessment Resources** - 3.1.9 Cool Down.pdf - NJSLA: Item UIN - M03102

(spinner)
- Five in a Row: Addition and Subtraction (1–2) Stage 6: Add within 100 with Composing (pdf)

LESSON 10: DRAWINGS, SITUATIONS, AND DIAGRAMS, OH MY! (Teacher Guide)

Teacher-Facing Learning Intention
- Students are interpreting a situation involving equal groups and represent it with a diagram.
- Students are making sense of tape diagrams that represent multiplication.

Student-Facing Learning Intention
- Let's represent equal groups.

Success Criteria
- I can represent equal groups.

Lesson Purpose
- The purpose of this lesson is for students to connect situations involving equal groups to tape diagrams.

Lesson Narrative
- This lesson introduces tape diagrams as a way to represent equal groups and multiplication, building on students' work with scaled picture graphs and discrete drawings of equal groups. Students deepen their understanding of multiplication as they connect tape diagrams to situations that involve equal groups. They are then introduced to multiplication expressions as a way to represent the quantities and situations encountered in the lesson. This happens at the end to allow students to work with other representations of multiplication before they learn about abstract symbols that represent multiplication.

Vocabulary
- expression

Materials
- Materials to Copy Card Sort Equal Groups

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.OA.A.1**
  Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7.

Mathematical Practice Standards
- **MP2.** Reason abstractly and quantitatively.
- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.NUM.B.2**
  Understand the effects of multiplying and dividing whole numbers.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR5.** Representation

Warm-up: Notice and Wonder: Socks (10 minutes)
- The purpose of this warm-up is to elicit different strategies for counting objects arranged in groups of 2, which will be useful when students multiply by 2 in a later activity. While students may notice and wonder many things about these images, flexible ways of seeing the groups and strategies for finding the total number of objects are the important discussion points.When students see the socks are grouped by 2 and use that to find the total, they are looking for and making use of structure (MP7).

Activity 1: Scaled Picture Graph to Diagram (15 minutes)

- The purpose of this activity is for students to build on the work they have done with scaled picture graphs to use the tape diagram as a new representation of multiplication. The scale of the picture graph will be used to help students think about a category of the graph as a situation involving equal groups. To add movement to this activity, students could find someone in the class who represented a different category than they did or represented the same category in a different way. When they find a person, they can describe what is the same and what is different about their representations.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: When students compare the diagram and the scaled picture graph, display sentence frames to support whole-class discussion: "_____ and _____ are the same because . . .", and "_____ and _____ are different because . . . ." Advances: Speaking, Representing

Activity 2: Card Sort: Equal Groups (20 minutes)

- The purpose of this activity is for students to connect situations involving equal groups to drawings and tape diagrams. A sorting task gives students opportunities to analyze representations, statements, and structures closely and make connections (MP2, MP7). Students explain why two cards match and have opportunities to critique and question their peers' reasoning (MP3). When explaining, students have opportunities to revise their language to make their explanations more precise and clear (MP6). After sorting and describing their sort, students notice that all of the representations reinforce the meaning of multiplication as a way to express equal groups. Students will spend all of the next lesson working with expressions. Keep the equal groups cards for the next lesson.
    - **Access for Students with DisabilitiesEngagement:** Develop Effort and Persistence. Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce the remaining cards once students have completed their initial set of matches. Supports accessibility for: Attention, Organization

Supplemental Resources

- Card Sort Equal Groups (pdf)
- Suggested Centers
    - Capture Squares (1–3) Stage 4: Subtract within 20 (gameboard) (spinner)
    - Five in a Row: Addition and Subtraction (1–2) Stage 7: Add within 1,000 without Composing (pdf)

Assessment Resources

- 3.1.10 Cool Down.pdf

LESSON 11: MULTIPLICATION EXPRESSIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are writing multiplication expressions to represent situations involving equal groups and diagrams.

Student-Facing Learning Intention

- Let's write multiplication expressions.

Success Criteria

- I can write multiplication expressions.

Lesson Purpose

- The purpose of this lesson is for students to use multiplication expressions to represent equal groups.

Lesson Narrative

- In previous lessons, students represented situations involving equal groups with drawings and tape diagrams. Students were also shown how to represent equal groups as an expression. In this lesson, students connect the structure of drawings, tape diagrams, and multiplication situations to the structure of multiplication expressions (MP7). Students create diagrams and drawings to represent multiplication expressions and ultimately write their own expressions to represent drawings, diagrams, and situations (MP2).When generating multiplication expressions, consider using the convention of the number of groups as the first factor and the size of the groups as the second factor. However, it is not necessary for students to write the factors in this order. It is important that students connect their expressions to the corresponding situations and representations. They should

	be able to correctly explain what each factor represents in their expressions. If students ask questions about the idea of commutativity, consider recording the questions publicly for future investigation. To allow time for students to focus on the meaning of multiplication, it is not an expectation that students find the product of each expression in this lesson. In subsequent lessons, students will work on strategies for finding the product. If students mention the product in today's lesson, it is okay to note that, but try to maintain focus on the connections between the expression and the diagrams. **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.A.1** Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP7.** Look for and make use of structure. ● **MP8.** Look for and express regularity in repeated reasoning.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. ● **NCTM.MATH.CONTENT.3-5.NUM.B.2** Understand the effects of multiplying and dividing whole numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR5.** Representation

Warm-up: Choral Count: Twos and Fives (10 minutes)

- The purpose of this Choral Count is for students to practice counting by 5 and 2 and notice patterns in the count. These understandings help students begin to develop fluency and will be helpful later in this lesson when students write multiplication expressions. When students notice patterns in the count, such as in the count by 5 that the ones place alternates between 0 and 5, they look for and express regularity in repeated reasoning (MP8).

Activity 1: Multiplication Expression Match (10 minutes)

- The purpose of this activity is for students to match drawings, tape diagrams, and situations to multiplication expressions (MP2). Students build on their understanding of how the structure of drawings, tape diagrams, and multiplication situations show equal groups and connect this to the structure of a multiplication expression (MP7). This will be helpful later in the lesson when students create drawings or diagrams to match expressions and write expressions that represent drawings, diagrams, and situations.

Activity 2: Expressions to Drawings and Diagrams (15 minutes)

- The purpose of this activity is for students to demonstrate a conceptual understanding of multiplication expressions by creating drawings of equal groups or tape diagrams that match expressions. Drawings of equal groups and tape diagrams are familiar representations to students from previous lessons and support students as they make sense of multiplication expressions. Three expressions are given, but the focus of the synthesis is the second expression. This provides an opportunity to support students on the first problem as you monitor and then let them try the second and third expressions on their own. To keep things simple and allow ideas about commutativity to develop over time, in this activity we suggest you display student responses that follow the convention of groups as the first factor and the size of the groups as the second factor.If there is time, and you want to include more movement, this activity could be done as a gallery walk.

- **Access for Multilingual Learners:** MLR2 Collect and Display. Collect the language students use to describe the diagrams for each of the expressions. Display words and phrases such as: “5 groups of 2”, “there are 5 groups, and 2 in each group”, and “there are 5 equal groups”. During the synthesis, invite students to suggest ways to update the display and to borrow language from the display as needed. Advances: Conversing, Reading
- **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Provide access to a variety of tools: mini-whiteboards and counters. Supports accessibility for: Conceptual Processing, Visual-Spatial Processing

Supplemental Resources
- Suggested Centers
  - Capture Squares (1–3) Stage 4: Subtract within 20 (gameboard) (spinner)
  - Five in a Row: Addition and Subtraction (1–2) Stage 7: Add within 1,000 without Composing (pdf)

Assessment Resources
- 3.1.11 Cool Down.pdf
- NJSLA: Item UIN - M00903

LESSON 12: REPRESENT AND SOLVE MULTIPLICATION PROBLEMS (Teacher Guide)

Teacher-Facing Learning Intention
- Students are representing and solving multiplication problems.

Student-Facing Learning Intention
- Let’s represent and solve problems involving equal groups.

Success Criteria
- I can represent and solve multiplication problems.

Lesson Purpose
- The purpose of this lesson is for students to represent and solve multiplication problems.

Lesson Narrative
- In previous lessons, students learned different ways to represent equal group situations with drawings, tape diagrams, and expressions. The purpose of this lesson is for students to solve problems involving equal groups with a representation of their choice.

Vocabulary
-

Materials
- Activity 1: Materials from a previous lesson

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.OA.A.1**
  Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7.
- **NJSLS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Mathematical Practice Standards
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.NUM.B.2**
  Understand the effects of multiplying and dividing whole numbers.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR5.** Representation

Warm-up: How Many Do You See: Lots of Dots (10 minutes) ● The purpose of this warm-up is for students to subitize or use grouping strategies to describe the images they see. When students decompose the images into groups of 10 to count efficiently, they are looking for and making use of structure (MP7). For these images, students may need them displayed for a longer amount of time in order to see the structure.
Activity 1: Tyler's Boxes (15 minutes) ● The purpose of this activity is for students to use the Co-craft Questions math language routine to make sense of a multiplication situation before solving. Students are first asked to generate questions they could ask about part of a problem. Then, students are given the full problem and asked to solve it. The activity concludes with students reflecting on the representations they used. In this activity, students will need to see the full problem to solve. Before the lesson, record the problem and have it hidden until the appropriate time in the lesson or write it for all to see at that point during the activity. This activity uses MLR5 Co-craft Questions. Advances: writing, reading, representing
Activity 2: Solve Equal Groups Problems (20 minutes) ● The purpose of this activity is for students to use what they've learned about multiplication to solve and represent situations that involve equal groups. Students now have experience with multiple representations and have the opportunity to choose which representation is most helpful to represent multiplication situations.The launch of the activity is an opportunity for students to share their experiences and ask questions about the objects to ensure each student has access to the context. If it is helpful, display images of the items for students to reference. ○ **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: As students describe their representations of the problems, use gestures to emphasize the number of groups and how many are in each group. For example, trace with your finger around each group, and point to each object in each group to show how many there are. Advances: Listening, Representing ○ **Access for Students with Disabilities:** Representation: Access for Perception. Provide access to connecting cubes. Ask students to identify correspondences between the concrete and visual representation used. Supports accessibility for: Conceptual Processing

Supplemental Resources	**Assessment Resources**
● Suggested Centers ○ Capture Squares (1–3) Stage 5: Multiply with 2, 5, and 10 (gameboard) (spinner) ○ Five in a Row: Addition and Subtraction (1–2) Stage 7: Add within 1,000 without Composing (pdf)	● 3.1.12 Cool Down.pdf ● NJSLA: Item UIN - VH044334

LESSON 13: MULTIPLICATION EQUATIONS (Teacher Guide)	
Teacher-Facing Learning Intention ● Students are relating equations to multiplication situations and diagrams. ● Students are writing equations for multiplication situations and diagrams using a symbol for the unknown number. **Student-Facing Learning Intention** ● Let's learn about multiplication equations. **Success Criteria**	**Lesson Purpose** ● The purpose of this lesson is for students to relate multiplication equations to situations and diagrams and write equations. **Lesson Narrative** ● In previous lessons students represented situations and diagrams with multiplication expressions. In this lesson, students learn the meaning of factor and product. Students do not have to use the vocabulary in this lesson as they will continue to have opportunities to do so throughout the year. In future lessons, students will represent situations and diagrams with equations that use a symbol for the unknown number, which may be either a factor or the product. Consider continuing to use the convention of groups as the first factor and the size of the groups as the second factor when writing

- I can relate equations to multiplication and write multiplication equations using symbols for unknown numbers.

equations. However, it is not necessary for students to write the factors in this order. It is important that students connect their equations to the corresponding situations and representations (MP2). They should be able to correctly explain what each factor represents in their equations. If students ask questions about the idea of commutativity, consider recording the questions publicly for future investigation.

Vocabulary

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Materials

-

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.A.1**
  Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.
- **NJSLS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.NUM.B.2**
  Understand the effects of multiplying and dividing whole numbers.
- **NCTM.MATH.CONTENT.3-5.NUM.B.4**
  Understand and use properties of operations, such as the distributivity of multiplication over addition.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Which One Doesn't Belong: Representations (10 minutes)

- This warm-up prompts students to carefully analyze and compare features of expressions and equations. When students compare the drawing, expression, and equations, they must use language precisely to describe how each is the same or different (MP6). Listen to the language students use to describe the different characteristics of each expression and equation and connect students' language to the new terms, factor and product, that are introduced in the synthesis.

Activity 1: Multiplication Equation Match (20 minutes)

- The purpose of this activity is for students to match multiplication equations to situations and representations. Students make explicit connections between the factors and the number of groups or the number of objects in each group and between the product and the total number of objects. These connections are brought out explicitly during the synthesis. When students make explicit connections between multiplication situations and equations, they are reasoning abstractly and quantitatively (MP2).

Activity 2: Write Multiplication Equations (15 minutes)

- The purpose of this activity is for students to write equations that match situations and diagrams. Students use what they learned in the last activity to use multiplication equations to represent situations and diagrams. In the lesson synthesis, use the words factor and product to help students connect the vocabulary to the concepts.

- Access for Multilingual Learners: MLR7 Compare and Connect. Synthesis: Invite groups to prepare a visual display that shows their reasoning for one of the equations using details such as different colors, arrows, labels, diagrams or drawings. Give students time to investigate each others' work. Ask, "Which details or language helped you understand the displays?", "Did anyone create the same equation, but would explain it differently?" Advances: Representing, Conversing
- **Access for Students with Disabilities** Engagement: Provide Access by Recruiting Interest. Provide choice. Invite students to decide which problem to start with or decide the order to complete the task. Supports accessibility for: Social-Emotional Functioning

Supplemental Resources
- Suggested Centers
  - Capture Squares (1–3) Stage 5: Multiply with 2, 5, and 10 (gameboard) (spinner)
  - Five in a Row: Addition and Subtraction (1–2) Stage 7: Add within 1,000 without Composing (pdf)

Assessment Resources
- 3.1.13 Cool Down.pdf
- NJSLA: Item UIN - M00905

LESSON 14: WRITE AND SOLVE EQUATIONS WITH UNKNOWNS (Teacher Guide)

Teacher-Facing Learning Intention
- Students are relating equations to multiplication situations and diagrams using a symbol for the unknown number.
- Students are writing equations for multiplication situations and diagrams using a symbol for the unknown number.

Student-Facing Learning Intention
- Let's work with equations with unknown numbers.

Success Criteria
- I can relate and write equations to multiplication situations and diagrams.

Lesson Purpose
- The purpose of this lesson is for students to relate equations to and write equations for multiplication situations and diagrams using a symbol for the unknown number.

Lesson Narrative
- Students have worked with addition and subtraction equations with a symbol to represent the unknown number in grades 1 and 2. Students build on that work and the work with multiplication equations in the previous lesson as they encounter multiplication equations that have a symbol for the unknown number for the first time.

Vocabulary
-

Materials
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New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.OA.A.1**
  Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7.
- **NJSLS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- **NJSLS.MATH.CONTENT.3.OA.A.4**

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.NUM.B.2**
  Understand the effects of multiplying and dividing whole numbers.
- **NCTM.MATH.CONTENT.3-5.NUM.B.4**
  Understand and use properties of operations, such as the distributivity of multiplication over addition.

National Council of Teachers of Mathematics Process Standards

Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ? ● **NJSLS.MATH.CONTENT.3.OA.D.9** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP4.** Model with mathematics. ● **MP6.** Attend to precision. ● **MP7.** Look for and make use of structure. ● **MP8.** Look for and express regularity in repeated reasoning.	● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Number Talk: Fives (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for multiplying by 5. These understandings help students develop fluency and will be helpful later in this lesson when students represent and solve a problem involving groups of 5.When students reason why as one factor increases by 1, the product increases by 5, they are looking for and expressing the regularity they notice in the expressions (MP8).

Activity 1: Card Sort: Unknown Numbers (15 minutes)

- The purpose of this activity is for students to relate equations to multiplication situations and diagrams using a symbol for the unknown number. A sorting task gives students opportunities to analyze representations, statements, and structures closely and make connections (MP2, MP7). Students explain their matches to their peers and revise their language for precision and clarity when they describe how the numbers and symbols in the equations match the representations (MP3, MP6). In the synthesis, students explain the meaning of the factors and products, and what a symbol in an equation represents.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Invite students to take turns finding a match and explaining their reasoning to their partner. Display the following sentence frames for all to see: “I noticed ___ , so I matched . . .” Encourage students to challenge each other when they disagree. Advances: Conversing, Representing

Activity 2: Write Equations with an Unknown Number (20 minutes)

- The purpose of this activity is for students to write equations for multiplication situations and diagrams using a symbol for the unknown number. When students write an equation to represent a situation, including a symbol for the unknown number, they model a situation with mathematics (MP4). Students find an unknown factor or unknown product in multiplication problems. In this task, the unknown factor diagrams and situations only include the “how many groups” problem type and the factors 2, 5, and 10. This sets students up to skip-count to find the unknown number.This problem type will be revisited extensively in future lessons and will be related to division. It is not necessary to make the connection to division now. In the synthesis students explain how the equations they wrote represent the diagram or situation.
    - **Access for Students with Disabilities** Engagement: Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were important or most useful to pay attention to. Display the sentence frame, “The next time I write an equation with an unknown number, I will . . . .“ Supports accessibility for: Visual-Spatial Processing

Supplemental Resources	Assessment Resources
● Card Sort Unknown Numbers (pdf) ● Suggested Centers ○ Capture Squares (1–3) Stage 5: Multiply with 2, 5, and 10 (gameboard) (spinner) ○ Five in a Row: Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)	● 3.1.14 Cool Down.pdf ● NJSLA: Item UIN - M02035

LESSON 15: MORE FACTORS, MORE PROBLEMS (Teacher Guide)

Teacher-Facing Learning Intention ● Students are solving multiplication problems. **Student-Facing Learning Intention** ● Let's solve more multiplication problems. **Success Criteria** ● I can solve multiplication problems accurately.	**Lesson Purpose** ● The purpose of this lesson is for students to solve multiplication problems. **Lesson Narrative** ● Students write equations with a symbol for the unknown to represent multiplication problems and then solve the problems. As in the previous lesson, some problems are unknown factor problems which students do not relate to division until a future unit. Students put together what they have learned about drawings, diagrams, expressions, and equations to solve multiplication problems. **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards	National Council of Teachers of Mathematics Content Standards
● **NJSLS.MATH.CONTENT.3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. ● **NJSLS.MATH.CONTENT.3.OA.A.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ? ● **NJSLS.MATH.CONTENT.3.OA.D.9** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.	● **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. ● **NCTM.MATH.CONTENT.3-5.NUM.B.2** Understand the effects of multiplying and dividing whole numbers. ● **NCTM.MATH.CONTENT.3-5.NUM.B.4** Understand and use properties of operations, such as the distributivity of multiplication over addition. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Mathematical Practice Standards ● **MP8.** Look for and express regularity in repeated reasoning.	

Warm-up: Number Talk: Tens (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for multiplication by 10. These understandings help students develop fluency and will be helpful later in this lesson when students need to be able to represent and solve a problem involving groups of 10. When students reason why as one factor increases by 1, the product increases by 10, they look for and express the regularity they notice in the expressions (MP8).

Activity 1: Represent Situations with Equations (15 minutes)

- The purpose of this activity is for students to represent a situation with a multiplication equation including a symbol for the unknown, and find the number that makes the equation true. Students are able to use an earlier representation to help them solve the problem, however some students may just write the equation and skip-count to find the product. Either is okay. In the synthesis, share different ways students represented the problem beyond the equation. If students use repeated addition, avoid saying 'multiplication is repeated addition' because while repeated addition is one way to find the product, it is not the meaning of multiplication.To add movement to this activity, students can work in groups of 4 to make a poster for one of the problems. After each group is done, they can do a gallery walk to look for things that are the same or different in the posters.
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after each chunk. Supports accessibility for: Attention, Memory

Activity 2: Multiplication Mashup (20 minutes)

- The purpose of this activity is for students to practice solving multiplication problems in which the unknown amount can be the number of groups, the number in each group, or the total. The first three problems have the unknown in each of those locations. The sequence of these problems, the context, and the use of the same factors and product encourages students to use a known fact to find the unknown factor in the "how many in each group" problem. Students will make the connection between this problem type and division in a future unit. Students are able to choose the representation they use to represent and solve the problems.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Monitor and clarify any questions about the context. As students look over the problems, ask, "Are there any words that are unfamiliar or that you have questions about?" Advances: Reading, Representing

Supplemental Resources ● Suggested Centers ○ Capture Squares (1–3) Stage 5: Multiply with 2, 5, and 10 (gameboard) (spinner) ○ Five in a Row: Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)	**Assessment Resources** ● 3.1.15 Cool Down.pdf

LESSON 16: ARRANGE OBJECTS INTO ARRAYS (Teacher Guide)

Teacher-Facing Learning Intention ● Students build arrays with physical objects and describe them in terms of multiplication. ● Students are describing an array as an arrangement of objects into rows with an equal number of objects in each row and into columns with an equal number in each	**Lesson Purpose** ● The purpose of this lesson is for students to describe arrays and arrange objects into arrays. **Lesson Narrative** ● In grade 2, students were introduced to arrays and related them to addition expressions and equations. In this lesson, students deepen their understanding of arrays as they arrange physical objects and relate arrays to multiplication and equal groups. Students use connecting cubes to

column.

Student-Facing Learning Intention

- Let's make some arrays.

Success Criteria

- I can build an array using physical objects and describe the equal rows and equal columns.

represent arrays in Activity 2 and in the cool-down. When working with array situations, students may see the equal groups in an array in either the rows or the columns. For example, when representing 3 rows of 5 chairs, they may create a 3 by 5 array or a 5 by 3 array. This is fine as long as students can correctly describe where the "3 rows of 5 chairs" are in their array. Students will learn about commutativity in the last lesson in this section, so if questions about commutativity arise, record them publicly for discussion in that lesson.

Vocabulary

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Materials

- Connecting cubes

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.A.1**
  Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.

Mathematical Practice Standards

- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP7.** Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.NUM.B.2**
  Understand the effects of multiplying and dividing whole numbers.
- **NCTM.MATH.CONTENT.3-5.NUM.B.4**
  Understand and use properties of operations, such as the distributivity of multiplication over addition.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR5.** Representation

Warm-up: Notice and Wonder: Eggs (10 minutes)

- The purpose of this warm-up is to elicit ideas students have about objects arranged in an array, which will be useful when students arrange equal groups into arrays in a later activity. While students may notice and wonder many things about this image, ideas around arrangement and equal groups are the important discussion points. When students notice the arrangement of the eggs they look for and make use of structure (MP7).

Activity 1: Compare Equal Groups and Arrays (15 minutes)

- The purpose of this activity is for students to describe an array as an arrangement of objects into rows with an equal number of objects in each row and into columns with an equal number in each column. This will be helpful in the next activity when students arrange objects into arrays and describe arrays in terms of multiplication. When students decide whether or not they agree with Noah about seeing equal groups in the array and explain their reasoning, they construct a viable argument and critique the reasoning of others (MP3).

Activity 2: Arrange Into Arrays (20 minutes)

- The purpose of this activity is for students to build arrays with physical objects and describe the arrays in terms of multiplication. Students focus on where equal groups can be seen in arrays. Students will write expressions and equations to represent arrays in future lessons. In the activity, students are asked to create different arrays with 24 cubes. It is not an expectation of grade 3 for students to find all the arrays for a given number. When students notice that the rows or columns in an array have the same number of objects and relate this to equal groups, they look for and make use of structure (MP7).

- Access for Multilingual Learners: MLR8 Discussion Supports. Synthesis: Create a visual display of the various arrays created by the students. As students discuss each array, annotate the display with the language used, such as “array”, “rows”, “columns”, and “equal groups”. Advances: Speaking, Representing
- **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify what is important or most useful to pay attention to. Display the sentence frame, “The next time I arrange objects in an array, I will remember to . . . .“ Supports accessibility for: Conceptual Processing, Visual-Spatial Processing, Memory

Supplemental Resources	Assessment Resources
Suggested Centers - Capture Squares (1–3) Stage 5: Multiply with 2, 5, and 10 (gameboard) (spinner) - Five in a Row: Multiplication (3–5) Stage 1: Factors 1–5 and 10 (pdf)	3.1.16 Cool Down.pdf

LESSON 17: MATCH AND DRAW ARRAYS (Teacher Guide)

Teacher-Facing Learning Intention
- Students are relating arrays to drawings of equal groups and describing them in terms of multiplication.

Student-Facing Learning Intention
- Let’s match arrays to equal groups and draw arrays.

Success Criteria
- I can relate arrays to drawings of equal groups and explain them in terms of multiplication.

Lesson Purpose
- The purpose of this lesson is for students to relate arrays to drawings of equal groups and describe arrays in terms of multiplication.

Lesson Narrative
- Students first match arrays to drawings of equal groups. Then, they redraw drawings of equal groups as arrays. The work of this lesson connects to upcoming lessons when students represent arrays with expressions and equations. Make connecting cubes or counters available to students who need them. Keep collecting ideas that arise about commutativity.

Vocabulary
- NA

Materials
- Connecting cubes or counters

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.OA.A.1**
  Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.

Mathematical Practice Standards
- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.NUM.B.2**
  Understand the effects of multiplying and dividing whole numbers.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR5.** Representation

Warm-up: Which One Doesn't Belong: Arrangements (10 minutes)

- The purpose of this warm-up is for students to compare four arrangements of dots to elicit the attributes, or structure, of an array. It gives students a reason to use language precisely (MP6). It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the items in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as rows, corners, groups, and array.

Activity 1: Card Sort: Arrays (20 minutes)

- The purpose of this activity is for students to relate drawings of equal groups to arrays. Specifically, students look for arrays that have the same number of objects in each row or column as each drawing has in each group. In some arrays, the equal groups in the drawing are represented as rows, and in some, they are represented in columns. Students have the opportunity to explain the connections they see between the drawings and arrays, receive feedback from their peers, and revise their explanation for precision and clarity (MP3, MP6). This will be useful in future lessons when students record multiplication expressions and equations to represent arrays. This activity uses MLR1 Stronger and Clearer Each Time. Advances: reading, writing.
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce the remaining cards once students have completed their initial set of matches. Supports accessibility for: Attention, Organization

Activity 2: Draw Arrays (15 minutes)

- The purpose of this activity is for students to draw arrays from a given arrangement of dots. Students draw an array from dots in equal groups to reinforce the definition of an array and then draw as many arrays as they can from 16 randomly placed dots. Having cubes or counters for students to physically rearrange would be helpful in this activity.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. To support partner discussion, display the following sentence frames: "This array matches the diagram because . . .", and "This array shows multiplication because . . . ." Advances: Conversing, Representing

Supplemental Resources

- Card Sort Arrays (pdf)
- Suggested Centers
    - Capture Squares (1–3) Stage 5: Multiply with 2, 5, and 10 (gameboard) (spinner)
    - Five in a Row: Multiplication (3–5) Stage 1: Factors 1–5 and 10 (pdf)

Assessment Resources

- 3.1.17 Cool Down.pdf

LESSON 18: REPRESENT ARRAYS WITH EXPRESSIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are representing multiplication situations with arrays and multiplication expressions.

Student-Facing Learning Intention

- Let's represent situations with arrays and expressions.

Success Criteria

- I can represent multiplication problems with

Lesson Purpose

- The purpose of this lesson is for students to represent multiplication situations with arrays and multiplication expressions.

Lesson Narrative

- In a previous lesson, students arranged objects into arrays and described the arrays in terms of equal groups. In this lesson, students write expressions to represent arrays to further connect arrays and multiplication (MP2). As students connect arrays to expressions, they may write or to represent 3 rows of 5 chairs. This is fine as long as students can correctly describe where the "3 rows of 5 chairs" are in their array or expression. Keep collecting ideas that arise about commutativity.

arrays and expressions.	**Vocabulary** ● **Materials** ● Connecting cubes or counters

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.A.1** Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. ● **NCTM.MATH.CONTENT.3-5.NUM.B.2** Understand the effects of multiplying and dividing whole numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR5.** Representation

Warm-up: How Many Do You See: An Array of Shapes (10 minutes)
- The purpose of this How Many Do You See is for students to subitize or use grouping strategies to describe the images they see. When students use the structure of the array to figure out how many objects are shown, they look for and make use of structure (MP7).

Activity 1: Represent Array Situations (20 minutes)
- The purpose of this activity is for students to represent multiplication situations with arrays and multiplication expressions. Students should have the option to use math tools, such as counters or connecting cubes, to create the arrays before they draw them. Connecting situations, arrays, and expressions reinforces the idea that multiplication can be used to express the total number of objects in equal groups (MP2).
    - **Access for Multilingual Learners:** MLR2 Collect and Display. Amplify language used to describe arrays. On a visible display, record words, phrases and expressions such as: row, column, each, for every, 3 by 5, 5 by 3, , and . Include diagrams and annotations. Invite students to borrow language from the display as needed, and update it throughout the lesson. Advances: Representing, Reading, Speaking
    - **Access for Students with Disabilities:** Representation: Internalize Comprehension. Make connections between representations visible. Invite students to use gestures or drawings as they verbally describe correspondences between their arrays and expressions. For example, “The 4 in my expression shows the number of rows, and the 5 shows that there are 5 cars in each row.” Supports accessibility for: Conceptual Processing, Memory

Activity 2: Connect Arrays to Expressions (15 minutes)
- The purpose of this activity is for students to apply their knowledge from previous activities to draw arrays to match multiplication expressions. Have connecting cubes or counters available for students who need them. In the launch, students use their bodies to make an array for the expression . Feel free to adjust this expression to better fit the number of students in your class.

Supplemental Resources ● Suggested Centers ○ Capture Squares (1–3) Stage 5: Multiply with 2, 5, and 10 (gameboard) (spinner) ○ Five in a Row: Multiplication (3–5) Stage 1: Factors 1–5 and 10 (pdf)	**Assessment Resources** ● 3.1.18 Cool Down.pdf ● NJSLA: Item UIN - M03428

LESSON 19: SOLVE PROBLEMS INVOLVING ARRAYS (Teacher Guide)	
Teacher-Facing Learning Intention ● Students are representing an array situation with an equation with a symbol for the unknown number. ● Students are solving multiplication problems involving arrays. **Student-Facing Learning Intention** ● Let's solve problems involving arrays. **Success Criteria** ● I can represent and solve an array with an equation and symbol for the unknown number.	**Lesson Purpose** ● The purpose of this lesson is for students to represent an array situation using an equation with a symbol for the unknown number and solve. **Lesson Narrative** ● In previous lessons, students represented multiplication situations using arrays and multiplication expressions with an emphasis on equal groups. Equal groups continue to be emphasized in this lesson as students learn that finding the product in a multiplication equation gives the total number of objects in the related array. As students connect arrays to equations, they may write or to represent 3 rows of 5 chairs. This is fine as long as students can correctly describe where the "3 rows of 5 chairs" are in their array or equation. Keep collecting ideas that arise about commutativity. **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.A.1** Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7. ● **NJSLS.MATH.CONTENT.3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. ● **NJSLS.MATH.CONTENT.3.OA.C.7** Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. ● **NJSLS.MATH.CONTENT.3.OA.D.9** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. **Mathematical Practice Standards** ● **MP8.** Look for and express regularity in repeated reasoning.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. ● **NCTM.MATH.CONTENT.3-5.NUM.B.2** Understand the effects of multiplying and dividing whole numbers. ● **NCTM.MATH.CONTENT.3-5.NUM.B.4** Understand and use properties of operations, such as the distributivity of multiplication over addition. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Number Talk: One Less Group (10 minutes) ● The purpose of this Number Talk is to elicit strategies and understandings students have about equal groups in multiplication expressions and see a pattern as one factor is decreased. These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to use multiplication to answer questions about array situations. When students notice that as the number being multiplied by 2 decreases the product decreases by a group of 2, they look for and express regularity in repeated reasoning (MP8).
Activity 1: Array of Colors (25 minutes) ● The purpose of this activity is for students to use the Co-craft math language routine to write questions that can be asked about array situations and to relate array situations to equations. Students should be encouraged to use whatever strategy or representation feels appropriate to them. Given their prior experiences, they may represent the situation with an array and skip-count or consider equal groups in other ways to find the total. This activity uses MLR5 Co-craft Questions. Advances: writing, reading, representing.
Activity 2: Tyler's Trees (10 minutes) ● The purpose of this activity is for students to write an equation with a symbol for the unknown to represent an array situation. Then, they answer the question in the multiplication situation. Encourage students to use whatever strategy or representation feels appropriate to them. Given their prior experiences, they might represent the situation with an array and skip-count or consider equal groups in other ways to find the total. In the launch of the activity, it may be helpful to ask students to tell their partner a quick story or ask any questions about the context of the first problem. To ensure all students have access, it may also be helpful to display images for students to reference about coconut trees or Mexico. ○ Access for Multilingual Learners: MLR8 Discussion Supports. Synthesis: If necessary, invite students to repeat their question using mathematical language. For example, "Can you say that again, using the word array?" Advances: Listening, Speaking ○ Access for Students with Disabilities Action and Expression: Develop Expression and Communication. Activity: Invite students to show thinking using connecting cubes or counters. Supports accessibility for: Conceptual Processing

Supplemental Resources ● Suggested Centers ○ Capture Squares (1–3) Stage 5: Multiply with 2, 5, and 10 (gameboard) (spinner) ○ Five in a Row: Multiplication (3–5) Stage 1: Factors 1–5 and 10 (pdf)	**Assessment Resources** ● 3.1.19 Cool Down.pdf ● NJSLA: Item UIN - VH093469, Item UIN - VH093469_SP, Item UIN - VF491797, Item UIN - VF491797_SP

LESSON 20: THE COMMUTATIVE PROPERTY (Teacher Guide)

Teacher-Facing Learning Intention ● Students are describing the commutative property of multiplication using arrays. **Student-Facing Learning Intention** ● Let's learn about the commutative property. **Success Criteria** ● I can describe the commutative property of multiplication using arrays.	**Lesson Purpose** ● The purpose of this lesson is for students to describe the commutative property of multiplication using arrays. **Lesson Narrative** ● In previous lessons, students used drawings of equal groups and arrays to represent multiplication situations. They also connected multiplication expressions and equations to these representations. In this lesson, students are introduced to the commutative property. Students will notice that the same product can be represented by different situations, arrays, or equations. Re-organizing the arrays or reversing the order of the factors in a multiplication expression does not change the total number of objects. It is important that students connect their equations to the corresponding situations and

representations. They should be able to correctly explain what each factor and the product represents in their equations. Note that students are not expected to use the name of the property. They should, however, be able to rely on their conceptual understanding of multiplication to explain why the product does not change when the order of the factors changes.

Vocabulary

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Materials

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.B.5**
  Apply properties of operations as strategies to multiply and divide.2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.
- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.NUM.B.2**
  Understand the effects of multiplying and dividing whole numbers.
- **NCTM.MATH.CONTENT.3-5.NUM.B.4**
  Understand and use properties of operations, such as the distributivity of multiplication over addition.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Number Talk: Subtraction (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for subtracting within 100. It also provides an opportunity to observe student strategies as they work toward becoming fluent in addition within 1,000. When students use strategies based on place value to subtract, they look for and make use of structure (MP7).

Activity 1: Learn More About Multiplication (20 minutes)

- The purpose of this activity is to introduce the commutative property. Students write array situations for a pair of arrays and discuss similarities and differences. While the situations will have the same total number of objects, how the objects are grouped should be different. Then, students write equations to go with the arrays and situations, and make connections between the representations (MP2). Students notice that, while the order of the factors in the multiplication equation changes, the product does not change (MP7).
  - Access for Multilingual Learners: MLR8 Discussion Supports. Synthesis: Create a visual display of the equations and corresponding arrays. As students describe their connections between the equations and the situations, annotate the display to illustrate the connections. For example, below each number, write either rows, columns, or total. Advances: Speaking, Representing
  - Access for Students with Disabilities: Representation: Access for Perception. Students may benefit from the opportunity to observe a demonstration that shows the grouping of dots in the arrays. For example, prepare a display of Image A and Image B showing only the dots. Then, invite students to watch as you circle the groups accordingly. Supports accessibility for: Conceptual Processing, Visual-Spatial Processing

Activity 2: Revisit Arrays (15 minutes)

- The purpose of this activity is to reinforce the idea of the commutative property. In this activity, students write two equations to match an array to show again that reversing the order of the factors does not change the product. If students do not immediately see how they might write different equations for the array, encourage them to consider different ways of grouping the dots in the array, similar to the previous activity. Students use the vocabulary they have learned for describing arrays and multiplication to explain why both equations match an array with their partner. The Stronger and Clearer Each Time routine allows students to receive feedback and revise their explanation for clarity (MP3, MP6).

Supplemental Resources

- Suggested Centers
  - Capture Squares (1–3) Stage 5: Multiply with 2, 5, and 10 (gameboard) (spinner)
  - Five in a Row: Multiplication (3–5) Stage 1: Factors 1–5 and 10 (pdf)

Assessment Resources

- 3.1.20 Cool Down.pdf

LESSON 21: GAME NIGHT SEATING PLAN (Teacher Guide)

Teacher-Facing Learning Intention

- Students are making choices and assumptions.
- Students are representing data using scaled bar graphs to communicate results.
- Students are solving real-world problems involving equal groups.

Student-Facing Learning Intention

- Let's plan a game night.

Success Criteria

- I can represent data using a scaled bar graph and solve real-world problems involving equal groups.

Lesson Purpose

- The purpose of this lesson is for students to use their understanding of equal groups to solve a design problem.

Lesson Narrative

- This lesson is optional because it does not address any new mathematical content standards. It does provide students with an opportunity to apply precursor skills of mathematical modeling. In previous lessons, students created scaled bar graphs and solved problems involving equal groups. In this lesson, they use these ideas as they make a seating arrangement. Students first examine a diagram showing equal groups and consider the situations it could represent. Upon learning that the diagram represents a seating chart, they consider the information needed to set up the seating arrangement for a game night. Students then plan a seating arrangement given some constraints—the total number of game tables and a combination of games that each involve a certain number of players—and create a display to present their solution. Finally, students create a scaled bar graph to represent the number of players that can play each game in their seating solution. Throughout the lesson, students make sense of problems and persevere in solving them (MP1). Students model with mathematics as they define quantities and variables that are relevant in the situation, communicate their solution, and translate a mathematical solution back into context (MP4).

Vocabulary

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Materials

- Connecting cubes or counters
- Inch tiles
- Tools for creating a visual display

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.DL.B.3** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. ● **NJSLS.MATH.CONTENT.3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **Mathematical Practice Standards** ● **MP1.** Make sense of problems and persevere in solving them. ● **MP4.** Model with mathematics.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. ● **NCTM.MATH.CONTENT.3-5.NUM.B.2** Understand the effects of multiplying and dividing whole numbers. ● **NCTM.MATH.CONTENT.3-5.NUM.B.4** Understand and use properties of operations, such as the distributivity of multiplication over addition. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation
Warm-up: Notice and Wonder: Squares and Circles (10 minutes) ● This warm-up serves two goals: to elicit observations about equal groups in seating arrangements, and to identify variables that might be important when solving a real-world problem in which limited information is given. These conversations prepare students to design seating arrangements given some constraints later in the lesson. During the synthesis, highlight observations about equal groups and reveal that the image shows a seating chart. Ask students to identify the information they may need if they were to be in charge of planning the seating arrangement for a game night. As students brainstorm questions to help them gather necessary information and clarify the problem, they engage in aspects of mathematical modeling (MP4).	
Activity 1: Game Night (25 minutes) ● The purpose of this activity is for students to plan a seating arrangement. Students are only given the information of the number of players required for each game and the total number of tables. The numbers 2, 4, 5, and 10 have been chosen to reflect the multiplication work students have done in previous lessons. Students make their own decisions about other aspects of the scenario before planning their seating arrangement and also choose how to represent their seating arrangement (MP4). Students may want answers from the teacher before making the arrangement. Encourage them to make their own assumptions as long as it does not contradict the given information. ○ **Access for Multilingual Learners:** MLR8 Discussion Supports. Clarify any questions about the context. Give students 1–2 minutes to read and make sense of the task. Ask, "Are there any words that are unfamiliar or that you have questions about?" Advances: Reading, Representing ○ **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Differentiate the degree of difficulty or complexity. Some students may benefit from the opportunity to complete the task with fewer game types. Supports accessibility for: Organization, Attention	
Activity 2: Game Night on a Graph (10 minutes) ● The purpose of this activity is for students to represent their game night plans on a scaled bar graph. In the synthesis, students consider how their graph communicates information about their game night plan.	
Supplemental Resources ● Centimeter Grid Paper - Standard (pdf) ● Suggested Centers ○ Capture Squares (1–3) Stage 5: Multiply with 2, 5, and 10 (gameboard) (spinner)	**Assessment Resources** ● 3.1.21 Cool Down.pdf

○ Five in a Row: Multiplication (3–5) Stage 1: Factors 1–5 and 10 (pdf)	

Unit 2 : Area and Multiplication

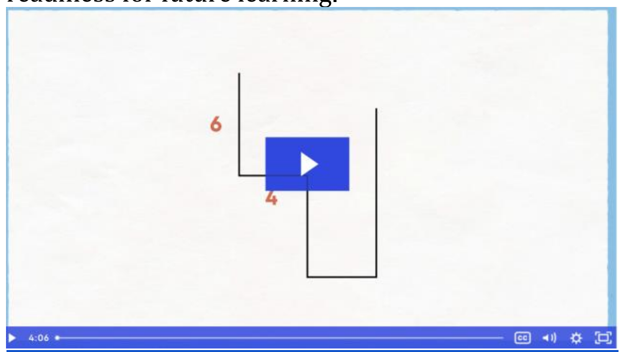
PEDAGOGICAL CONTENT KNOWLEDGE RESOURCES FOR TEACHERS

Learning Narrative Video

The Unit Launch: Learning Narrative video for Grade 3, Unit 2 gives insight into the unit objectives, models and representations, possible student errors and misconceptions, and tips that might be used to help support student understanding.

Learning Progressions Video

The Unit Launch: Learning Progressions video for Grade 3, Unit 2 details how the content of a unit builds upon prior knowledge, and how the understanding of the content provides students with readiness for future learning.



Learning Supports Video

The Unit Launch: Learning Supports video for Grade 3, Unit 2 gives an in-depth look into the models and representations used in this unit to help support student understanding.

STAGE 1 - DESIRED RESULTS

Assessed Focus Standards

NJSLS.MATH.CONTENT.3.OA.A.1
Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7.

NJSLS.MATH.CONTENT.3.OA.B.5
Apply properties of operations as strategies to multiply and divide.2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$.

UNIT DESCRIPTION

In this unit, students encounter the concept of area, relate the area of rectangles to multiplication, and solve problems involving area. In grade 2, students explored attributes of shapes, such as number of sides, number of vertices, and length of sides. They measured and compared lengths (including side lengths of shapes). In this unit, students make sense of another attribute of shapes: a measure of how much a shape covers. They begin informally, by comparing two shapes and deciding which one covers more space. Later, they compare more precisely by tiling shapes with pattern blocks and square tiles. Students learn that the area of a flat figure is the number of square units that cover it without gaps or overlaps. Students then focus on the area of rectangles. They notice that a rectangle tiled with squares forms an array, with the rows and columns as equal-size groups. This observation allows them to connect the area of rectangles to multiplication—as a product of the number of rows and number of squares per row. To transition from counting to multiplying side lengths, students reason about area using increasingly more abstract representations. They begin with tiled or gridded rectangles, move to partially gridded rectangles or those with marked sides, and end with rectangles labeled with their side lengths. Students also learn some standard units of area—square inches, square centimeters, square feet, and square meters—and solve real-world problems involving area of

(Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.) **NJSLS.MATH.CONTENT.3.OA.D.9** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. **NJSLS.MATH.CONTENT.3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **NJSLS.MATH.CONTENT.3.M.B.3** Recognize area as an attribute of plane figures and understand concepts of area measurement. **NJSLS.MATH.CONTENT.3.M.B.4** Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units). **NJSLS.MATH.CONTENT.3.M.B.5** Relate area to the operations of multiplication and addition. **Content Connections** **3-LS1-1** Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. **3-LS2-1** Construct an argument that some animals form groups that help members survive.	rectangles. Later in the unit, students find the area and missing side lengths of figures composed of non-overlapping rectangles. This work includes cases with two non-overlapping rectangles sharing one side of the same length, which lays the groundwork for understanding the distributive property of multiplication in a later unit. **Throughout the unit** The warm-ups in this unit support students' work toward fluency with multiplication. Students experience the idea of the distributive property as they use dot images showing groups of 2, 5, and 10 to find products that have 1 more in each group or 1 more group. For example, they can find the total number of dots in 6 groups by adding 1 more group to the total in 5 equal groups. Later in the unit, they encounter a Number Talk that also elicits this property. Toward the end of the unit, students practice reasoning mentally about addition in preparation for the next unit, which focuses on addition and subtraction within 1,000. **EXPLICIT ASPECTS OF RIGOR** **Conceptual Understanding** ● Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7. ● Apply properties of operations as strategies to multiply and divide.2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 =15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.) ● Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. ● Recognize area as an attribute of plane figures and understand concepts of area measurement. ● Relate area to the operations of multiplication and addition. ● Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. ● Multiply side lengths to find areas of rectangles with whole- number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. ● Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning. **Procedural Fluency** ● Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. **3-5-ETS1-2** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. **3-5-ETS1-3** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. **INTEGRATION OF 21st CENTURY SKILLS** **9.1.4.A.1** Recognize a problem and brainstorm ways to solve the problem individually or collaboratively. **9.1.4.A.5** Apply critical thinking and problem-solving skills in classroom and family settings. **9.1.4.B.1** Participate in brainstorming sessions to seek information, ideas, and strategies that foster creative thinking. **9.1.4.C.1** Practice collaborative skills in groups, and explain how these skills assist in completing tasks in different settings (at home, in school, and during play). **CAREER EDUCATION** **9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.	• <u>Measure</u> areas <u>by counting</u> unit squares (square cm, square m, square in, square ft, and improvised units). • <u>Find</u> the area of a rectangle with whole-number side lengths <u>by tiling</u> it, and <u>show</u> that the area is the same as would be found by multiplying the side lengths. • Multiply side lengths to find areas of rectangles with whole- number side lengths in the context of solving <u>real-world and mathematical problems</u>, and <u>represent</u> whole-number products as rectangular areas in mathematical reasoning. **Application** • Multiply side lengths to find areas of rectangles with whole- number side lengths in the context of solving <u>real-world and mathematical problems</u>, and <u>represent</u> whole-number products as rectangular areas in mathematical reasoning. **MEANING** **Enduring Understandings** **U1.** Some real-world problems involving joining or separating equal groups or comparison can be solved using multiplication. **U2.** An array involves joining equal groups and is one way to think about multiplication. **U3.** Repeated addition involving joining equal groups is one way to think about multiplication. **U4.** For a given set of numbers, there are relationships that are always true called properties. Properties are the rules that govern arithmetic. (ie. The Commutative Property, the Associative Property and the Distributive Property of multiplication are three such properties.) **U5.** Patterns and known facts can be used to find unknown facts. **Essential Questions** **Q1.** What strategies can be used to solve multiplication and division word problems? **Q2** What are different meanings for multiplication? **Q3.** What are the properties of multiplication and how can they be Applied? **Q4.** How can patterns and known facts be used to find unknown facts? **WHAT STUDENTS WILL KNOW AND BE ABLE TO DO**

9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems. **9.3.ST-SM.4** Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.	**Knowledge** **K1.** Describe area as the number of unit squares that cover a plane figure without gaps and overlaps. **K2.** Measure the area of rectangles by counting unit squares. **K3.** Measure the area of rectangles by counting unit squares. **K4.** Measure the area of rectangles by counting unit squares. **K5.** Measure the area of rectangles by counting unit squares.	**Skills** **S1.** Describe the relative size of plane figures in their own language. [Lesson 1] **S2.** Explore area by building shapes with unit squares Use unit squares to measure area. [Lesson 2] **S3.** Explain that rectangles that can be covered by the same number of unit squares without gaps or overlaps have the same area. Find the area of rectangles (within 24 square units) by counting unit squares. [Lesson 3] **S4.** Describe and represent the area of a rectangle as the total number of unit squares arranged in equal groups of rows and columns. Find the area of rectangles (within 60 square units) by counting unit squares. [Lesson 4] **S5.** Relate multiplication to finding the area of rectangles. [Lesson 5] **S6.** Describe square units based on different linear units of measurement. [Lesson 6] **S7.** Use square inches and square centimeters to measure the area of a rectangle. [Lesson 7] **S8.** Determine the area of rectangles not displayed on a grid. [Lesson 8] **S9.** Find the area of rectangles by measuring and multiplying the side lengths. {Lesson 9] **S10.** Solve real-world and mathematical problems involving area. [Lesson 10] **S11.** Explore connections between area and the multiplication table. [Lesson 11] **S12.** Find the area of figures composed of rectangles. Recognize that area is additive.[Lesson 12]

		S13. Calculate the area of ungridded figures made of rectangles using multiplication and addition. [Lessons 13, 14] S14. Solve problems involving the area of ungridded figures composed of rectangles, including figures with missing side lengths. [Lesson 15]

CULTURALLY RESPONSIVE TEACHING in PRACTICE	SOCIAL EMOTIONAL LEARNING in PRACTICE
• Encourage collaborative learning in diverse groups. • Recognize and value multiple problem-solving approaches. • Be mindful of language barriers and use simple language and visuals. • Contextualize abstract concepts in real-life situations. • Tailor instruction to individual interests and strengths. • Involve families and the community in math-related activities. • Include diverse mathematicians and scientists in lessons. • Use multicultural resources and materials. • Use math problems and examples that relate to students' cultures and experiences.	• Create a positive classroom environment. • Encourage communication and collaboration. • Model emotional regulation. • Connect math to real-life situations. • Validate effort and persistence. • Use cooperative learning. • Model growth mindset. • Incorporate reflective practices. • Integrate SEL activities such as use of affirmations. • Foster positive teacher-student relationships.

STAGE 2 - EVIDENCE

SUMMATIVE ASSESSMENT

Illustrative Mathematics

- 3.2 Section-A-Checkpoint-Assessment.pdf
- 3.2 Section-B-Checkpoint-Assessment.pdf
- 3.2 Section-C-Checkpoint-Assessment.pdf
- 3.2-End-of-Unit-Assessment.pdf
- 3.2-End-of-Unit-Assessment SP.pdf

PRE-ASSESSMENT

Illustrative Mathematics

-

FORMATIVE ASSESSMENT		
Illustrative Mathematics Curriculum ● 3.2.1 Cool Down.pdf ● 3.2.2 Cool Down.pdf ● 3.2.3 Cool Down.pdf ● 3.2.4 Cool Down.pdf ● 3.2.5 Cool Down.pdf ● 3.2.6 Cool Down.pdf ● 3.2.7 Cool Down.pdf ● 3.2.8 Cool Down.pdf ● 3.2.9 Cool Down.pdf ● 3.2.10 Cool Down.pdf ● 3.2.11 Cool Down.pdf ● 3.2.12 Cool Down.pdf ● 3.2.13 Cool Down.pdf ● 3.2.14 Cool Down.pdf ● 3.2.15 Cool Down.pdf	*Illustrative Mathematics* Tasks ● Unit 2 Student Task Lesson 1.pdf ● Unit 2 Student Task Lesson 2.pdf ● Unit 2 Student Task Lesson 3.pdf ● Unit 2 Student Task Lesson 4.pdf ● Unit 2 Student Task Lesson 5.pdf ● Unit 2 Student Task Lesson 6.pdf ● Unit 2 Student Task Lesson 7.pdf ● Unit 2 Student Task Lesson 8.pdf ● Unit 2 Student Task Lesson 9.pdf ● Unit 2 Student Task Lesson 10.pdf ● Unit 2 Student Task Lesson 11.pdf ● Unit 2 Student Task Lesson 12.pdf ● Unit 2 Student Task Lesson 13.pdf ● Unit 2 Student Task Lesson 14.pdf ● Unit 2 Student Task Lesson 15.pdf	NJSLA Released Items **3.M.B.3** ● Item UIN - 1749-M23082 ● Item UIN - VF647230 ● Item UIN - VH055538 ● Item UIN - 0640-M20679 **3.M.B.3.b** ● Item UIN - M00046 **3.M.B.4** ● Item UIN - M00016 ● Item UIN - M00017 ● Item UIN - M00017_SP ● Item UIN - M00911P ● Item UIN - M00911P_SP ● Item UIN - VH055558 **3.MB.5.a** ● Item UIN - VF643129 **3.M.B.5.b** ● Item UIN - M20668P ● Item UIN - M20668P_SP ● Item UIN - 0158-M00816 ● Item UIN - M00025P ● Item UIN - M00025P_SP ● Item UIN - M00065 ● Item UIN - M01071 ● Item UIN - VH046472 ● Item UIN - VH096036 **3.MB.5.d** ● Item UIN - 0233-M01161 ● Item UIN - 0233-M01161_SP ● Item UIN - VF525289

STAGE 3 - LEARNING PLAN		
MATH WORKSHOP		

***Illustrative Mathematics* Centers**
• Can You Build It?
  ○ Stage 1: Rectangles (Addressing)
• Five in a Row: Multiplication
  ○ Stage 1: Factors 1–5 and 10 (Supporting)
• Capture Squares
  ○ Stage 6: Multiply with 1–5 (Addressing)
• Rectangle Rumble
  ○ Stage 1: Factors 1, 2, 5, and 10 (Addressing)
• Five in a Row: Addition and Subtraction
  ○ Stage 6: Add within 100 with Composing (Supporting)
• Capture Squares
  ○ Stage 6: Multiply with 1–5 (Addressing)
• Rectangle Rumble
  ○ Stage 2: Factors 1–5 (Addressing)
• Five in a Row: Addition and Subtraction
  ○ Stage 7: Add within 1,000 without Composing (Supporting)
• Five in a Row: Multiplication
  ○ Stage 2: Factors 1–9 (Addressing)
• Five in a Row: Addition and Subtraction
  ○ Stage 8: Add within 1,000 with Composing (Supporting)
	***Building Thinking Classrooms* Tasks**
	• Lesson 1 Activity 1: Compare Shapes (15 minutes)
	• Lesson 2 Activity 1: Create and Compare (20 minutes)
	• Lesson 4 Activity 1: What Did I Create? (20 minutes)
	• Lesson 5 Activity 1: Match Expressions and Areas (15 minutes)
	• Lesson 6 Activity 1: Same Rectangle, Different Units (15 minutes)
	• Lesson 7 Activity 2: Which Square Unit? (15 minutes)
	• Lesson 8 Activity 1: Partially Tiled (15 minutes)
	• Lesson 9 Activity 2: Create a Rectangle (20 minutes)
	• Lesson 10 Activity 2: Create a Garden (25 minutes)
	• Lesson 11 Activity 1: Area and the Multiplication Table (15 minutes)
	• Lesson 12 Activity 1: Rectangles in Rectangles (15 minutes)
	• Lesson 13 Activity 1: Bye-Bye Squares (20 minutes)
	• Lesson 14 Activity 2: Practice with Mystery Sides (25 minutes)
	• Lesson 15 Activity 1: Floor Plans (10 minutes)
		Open Middle
		• Missing Digits
		• Marble Madness 2
		• Marble Madness 1
		• Close to 1000
		• Subtraction to Get the Smallest Difference
		• Building Shelves 2
		• Perimeter
		• Rectangles: Maximizing Area
		• Multiply and Divide Within A Hundred 1
		• Baking Cookies

Slow Reveal Graphs •	**Bootstrap (to be added Summer 2025)**	**Other Resources** • IM Talking Math
PHYSICAL MANIPULATIVES & RESOURCES	**VIRTUAL MANIPULATIVES & RESOURCES**	**VOCABULARY**
• scissors	**Didax**	• area

- pattern blocks - inch tiles - folders - rulers - patty paper - straightedges - tape - yardstick - grid paper - colored pencils	- Base ten blocks - Two Color Counters - Color Tiles **Toy Theaters** - Base ten blocks - Area **Math Learning Center** - Base Ten Blocks	- parentheses - square centimeter - square foot - square inch - square meter

SUMMARY OF KEY LEARNING

Pacing
This unit has been assigned 19 days in the Pacing Guide. The 19 days are allotted as follows: 15 lesson days as outlined below, 3 flexible days, and 1 assessment day. Lessons 11 and 15 are optional in this unit.

Teacher Resources
Unit 2 Teacher's Guide (English) (Spanish)
Unit 2 Teacher's Resource Pack (English)(Spanish)

Students Resources:
Unit 2 Student Workbook (English) (Spanish)

Section A: Concepts of Area Measurement
Lesson 1: What is Area?
Lesson 2 How Do We Measure Area?
Lesson 3 Tile Rectangles
Lesson 4 Area of Rectangles

Section B: Relate Area to Multiplication
Lesson 5 Represent Products as Areas
Lesson 6 Different Square Units (Part 1)
Lesson 7 Different Square Units (Part 2)
Lesson 8 Area of Rectangles Without a Grid
Lesson 9 Measure to Find the Area
Lesson 10 Solve Area Problems
Lesson 11 Area and the Multiplication Table (optional)

Section C: Find Area of Figures Composed of Rectangles
Lesson 12 Area and Addition
Lesson 13 Find the Area of Figures
Lesson 14 Find the Area of Figures with Missing Sides

Lesson 15 New Room (optional)

LESSON 1: WHAT IS AREA? (**Teacher Guide**)

Teacher-Facing Learning Intention
- Students are describing the relative size of plane figures in their own language.

Student-Facing Learning Intention
- Let's compare the size of shapes.

Success Criteria
- I can describe the relative size of a plane figure in my own words.

Lesson Purpose
- The purpose of this lesson is for students to recognize that different shapes cover different amounts of space.

Lesson Narrative
- In grade 2, students estimated, measured, and compared lengths using standard units. They learned how the length of the unit affects measurements. This lesson introduces the concept of area as students
  compare the size of different shapes. Students consider what it means for two-dimensional shapes to be larger or cover more space. They measure and describe relative area with increasing precision as they participate in the activities in this lesson.

Vocabulary
- NA

Materials
- Pattern blocks
- Scissors

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.M.B.3**
  Recognize area as an attribute of plane figures and understand concepts of area measurement.
  a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.
  b. A plane figure which can be covered without gaps or overlaps by unit squares is said to have an area of   square units.
- **NJSLS-MATH.CONTENT.3.OA.A.1**
  Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.

Mathematical Practice Standards
- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: How Many Do You See: Arrays (10 minutes)

- The purpose of this How Many Do You See is for students to subitize or use grouping strategies to describe the images they see. Students may see equal groups in the rows or the columns of the array. Recording the equations for each way of seeing the groups is an opportunity to reinforce the commutative property. When students use different ways to group dots within the same array to find the total number of dots they look for and make use of structure (MP7).

Activity 1: Compare Shapes (15 minutes)

- The purpose of this activity is for students to compare shapes to decide which is larger. Given their prior experiences with length, students may initially use length to reason about what it means for a shape to be larger than another shape. The synthesis should bring out the idea that length alone is not enough to compare two-dimensional shapes. Ideas around how much space the shapes cover should be emphasized. If students disagree about which shape is larger, encourage them to share their reasoning so that the class can consider multiple ideas and come to a resolution together (MP3).

Activity 2: Pattern Blocks to Compare Shapes (20 minutes)

- The purpose of this activity is for students to compare shapes by covering them with pattern blocks. Students experience tiling as a way to see which shape covers the most space. There are several ways to tile the shapes, but it may prove most useful to use the same units, such as triangles. The rectangle can only be fully tiled with square pattern blocks. To compare shapes B and C, students will need to notice that the rectangle and parallelogram can be made the same length, but the square pattern blocks used to tile the rectangle are taller than the blocks used to tile the parallelogram.
    - **Access For Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Create a visual display of shapes A, B, and C. As students discuss their comparisons, annotate the display with their observations. For example, when comparing shape B to C, write “same length, but taller.” Advances: Speaking, Listening
    - **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches. Supports accessibility for: Conceptual Processing

Supplemental Resources	**Assessment Resources**

• Suggested Centers
  ◦ Can You Build It? (3–5) Stage 1: Rectangles (pdf)
  ◦ Five in a Row: Multiplication (3–5) Stage 1: Factors 1–5 and 10 (pdf)
  ◦ Pattern Blocks to Compare Shapes (pdf)
	• 3.2.1 Cool Down.pdf

LESSON 2: HOW DO WE MEASURE AREA? (Teacher Guide)

Teacher-Facing Learning Intention:

- Students are exploring area by building shapes with unit squares.
- Students are using unit squares to measure area.

Student-Facing Learning Intention

- Let’s use square tiles to measure the area.

Success Criteria

- I can explore shapes by building with unit squares.

Lesson Purpose

- The purpose of this lesson is for students to use square tiles to build shapes and measure area.

Lesson Narrative

- Previously, students compared the area of shapes informally—by cutting out and overlaying the shapes, by observing whether one shape would fit into another, and by covering the shapes with pattern blocks and comparing the number of blocks used.In this lesson, students learn that squares can be used to measure area: by tiling all of the shape. Each square represents one unit of area, or one square unit. Inch tiles are used, but are referred to as “square tiles” with students to emphasize how the tiles are used to measure square units. Students learn that shapes that don’t have specific names can be referred to as “figures.” In the next lesson, students will take a closer look at square tiles that overlap. Provide inch tiles for students to use during the cool-down.

Vocabulary

-

Materials

- Inch tiles

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.MB.3**
  Recognize area as an attribute of plane figures and understand concepts of area measurement.
  a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.
  b. A plane figure which can be covered without gaps or overlaps by unit squares is said to have an area of square units.

Mathematical Practice Standards

- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Which One Doesn't Belong: Shapes with Squares (10 minutes)

- The purpose of this warm-up is to elicit observations about tiled squares by comparing four images. The work here prepares students to reason about unit squares later in the lesson and gives students a reason to use language precisely (MP6). It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the shapes in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as longest, largest, and area.

Activity 1: Create and Compare (20 minutes)

- The purpose of this activity is for students to explore area by making shapes out of square tiles and ordering the shapes from smallest to largest. Students may consider the size of the shapes in a variety of ways. A shape made of square tiles. A shape made of square tiles. For example, they may see the first shape as larger than the second shape because the squares in the former are more spread out than in the latter, which is completely filled with tiles. If needed, encourage students not to stack the tiles. In the synthesis, students learn they can count the square tiles to determine the amount of space a shape covers.

Activity 2: Use Square Tiles to Measure Area (15 minutes)

- The purpose of this activity is for students to use square tiles to measure area. Students are given square tiles and a variety of figures. Students learn that they can use the term "figure" to describe a shape that doesn't have a specific name. Students cover the figures completely with square tiles and use the number of tiles to describe the area of the figure. In the synthesis, students share ideas about how to tile shapes in any way that makes sense to them. They also consider why it's important to make sure they don't leave gaps when they use square tiles to measure area (MP6).
  - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to complete questions that will be discussed during the synthesis. Supports accessibility for: Organization, Attention, Social-emotional skills

Supplemental Resources

- Suggested Centers
  - Can You Build It? (3–5) Stage 1: Rectangles (pdf)

Assessment Resources

- 3.2.2 Cool Down.pdf

- Five in a Row: Multiplication (3–5) Stage 1: Factors 1–5 and 10 (pdf)
- Use Square Tiles to Measure Area (pdf)

LESSON 3: TILE RECTANGLES (Teacher Guide)

Teacher-Facing Learning Intention
- Students are explaining that rectangles that can be covered by the same number of unit squares without gaps or overlaps have the same area.

Student-Facing Learning Intention
- Let's count square tiles.

Success Criteria
- I can find the area of rectangles (within 24 square units) by counting unit squares.

Lesson Purpose
- The purpose of this lesson is for students to measure area by counting square tiles and create rectangles with a given area.

Lesson Narrative
- In previous lessons, students learned that counting square tiles that cover a figure gives the area of the figure in square units. In this lesson, students further explore tiling and learn that, when measuring area, squares that are used to tile a figure can't overlap. They learn that the area is the number of square units that cover a flat figure with no gaps or overlaps. Students also create rectangles of a specific area on grids to demonstrate they understand that rectangles covered by the same number of square units without gaps or overlaps have the same area. Students should have access to square tiles throughout the lesson and also be encouraged to draw the partitioned rectangles they create with the tiles.

Vocabulary
-

Materials
- Inch tiles
- Card Sort: Rectangles

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.MB.3**
  Recognize area as an attribute of plane figures and understand concepts of area measurement.
  b. A plane figure which can be covered without gaps or overlaps by unit squares is said to have an area of square units.

Mathematical Practice Standards
- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Which One Doesn't Belong: Tiles (10 minutes)

- The purpose of this warm-up is to draw students' attention to different ways of covering a plane figure with squares and reinforce the idea that tiling involves covering a region without gaps and overlaps. It gives students a reason to use language precisely (MP6). It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the items in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as rows, columns, area, gaps, overlap, and tiling.

Activity 1: Time to Tile (15 minutes)

- The purpose of this activity is for students to use square tiles to find the area of rectangles. They use their knowledge of tiling to complete the tiling that is started in each rectangle. Students may use physical tiles on copies of the blackline master or reason directly on the images in the student book, which may not be the right size for physical tiles. The synthesis focuses on solidifying the idea that area is the number of square units that cover a flat figure with no gaps or overlaps. This activity uses MLR1 Stronger and Clearer Each Time. Advances: reading, writing

Activity 2: Card Sort: Rectangles (20 minutes)

- The purpose of this activity is for students to recognize that different shapes can have the same area. Students first sort the cards in any way that makes sense to them and then by area. After the cards are sorted by area, students create another rectangle that would fit into one of the categories (by having a particular area). A sorting task prompts students to look for structure and make connections across the representations and statements being analyzed (MP7). Students may start to notice that the organization of the squares in rectangles makes it efficient to count: The squares can be grouped by row, column, or in other ways. As students sort and create rectangles with certain areas, monitor for students who leverage the structure of a rectangle to find area. Invite them to share in the synthesis.In this activity, the squares on the gridded rectangles are not the same size as the square tiles, but students could still use tiles as a support. Provide students access to square tiles if they would like to use them, but encourage them to draw what they create on the grid provided.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Students should take turns finding a match and explaining their reasoning to their partner. Display the following sentence frames for all to see: “I noticed _____ , so I matched . . . .” Encourage students to challenge each other when they disagree. Advances: Conversing
  - **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: On chart paper, record students’ rectangles with justifications in each category. Record students’ efficient ways for counting to find the area of rectangles. Supports accessibility for: Memory

Supplemental Resources

- Card Sort: Rectangles (pdf)
- Suggested Centers
  - Can You Build It? (3–5) Stage 1: Rectangles (pdf)
  - Five in a Row: Multiplication (3–5) Stage 1: Factors 1–5 and 10 (pdf)
  - Time to Tile (pdf)

Assessment Resources

- 3.2.3 Cool Down.pdf

LESSON 4: AREA OF RECTANGLES (Teacher Guide)

Teacher-Facing Learning Intention

- Students are describing and representing the area of a rectangle as the total number of unit squares arranged in equal groups of rows and columns.
- Students are finding the area of rectangles (within 60 square units) by counting unit squares.

Lesson Purpose

- The purpose of this lesson is for students to continue to count squares to create rectangles and to find the area of rectangles with larger numbers than in the previous lesson.

Lesson Narrative

- In previous lessons, students identified equal groups in the rows and columns of arrays. In this lesson, students describe rectangles in terms of the rows and columns. They find the area of rectangles that have rows or columns of 2, 5, or 10 squares to encourage students to skip-count to find the total

Student-Facing Learning Intention ● Let's find the area of more rectangles. **Success Criteria** ● I can represent the area of a rectangle, with unit squares, arranged in equal rows and columns.	number of squares. Students should be encouraged to use the term "square units" in preparation for working with more specific units like square centimeters in future lessons. For example, if students find that a rectangle has 12 squares, they should say the area is 12 square units. In the next section, students formally relate area to multiplication. **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.M.B.4** Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units). **Mathematical Practice Standards** ● **MP6.** Attend to precision. ● **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. ● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Which One Doesn't Belong: Area and Arrays (10 minutes)

- The purpose of this warm-up is to elicit strategies for quantifying the number of objects arranged in rows and columns and the language used to describe such arrangements. It gives students a reason to use language precisely (MP6). During the synthesis, ask students to explain the meaning of any terminology they use, such as row, column, array, group, line, grid, and rectangle.

Activity 1: What Did I Create? (20 minutes)

- The purpose of this activity is for students to create and describe rectangles of a certain area. Students work in groups of 2. One partner creates a rectangle and describes it, and the other partner creates a matching rectangle based on the description. Then students compare how their rectangles are the same and different. Students should describe their rectangle to their partner without revealing the total number of squares they used, so that the focus is on understanding the rectangular structure. In the synthesis, students share language that helped them understand the rectangle their partner built. When students revise their language to be more precise in the descriptions of their rectangle, they attend to precision (MP6).
    - **Access for Students with Disabilities:** Representation: Access for Perception. Begin by enacting a physical demonstration of how to accurately describe a drawn rectangle without telling them the total number of squares.

Activity 2: Find the Area (15 minutes)

- The purpose of this activity is for students to find the area of rectangles by counting squares. Larger rectangles provide more opportunities for students to practice counting strategies using the structure of the rectangles to group the individual squares (MP7). Rectangles in this activity lend themselves to show groups of twos, fives, or tens in rows or columns. Students may also see other ways to create equal groups within rectangles. For example, the second rectangle with an area of 30 square units can be seen as 3 groups of ten. If students finish quickly, encourage them to confirm the area by counting another way. Emphasize that each area is in square units.

- **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: For each observation that is shared, invite students to turn to a partner and restate what they heard, using precise mathematical language, such as area or square units. Advances: Listening, Speaking

Supplemental Resources

- Suggested Centers
  - Can You Build It? (3–5) Stage 1: Rectangles (pdf)
  - Five in a Row: Multiplication (3–5) Stage 1: Factors 1–5 and 10 (pdf)

Assessment Resources

- 3.2.4 Cool Down.pdf

LESSON 5: REPRESENT PRODUCTS AS AREAS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are relating multiplication to finding the area of rectangles.

Student-Facing Learning Intention

- Let's connect multiplication expressions to area.

Success Criteria

- I can connect multiplication to finding the area of a rectangle.

Lesson Purpose

- The purpose of this lesson is for students to connect multiplication expressions to rectangular areas.

Lesson Narrative

- In previous lessons, students counted unit squares to find the area of rectangles. In this lesson they explicitly connect multiplication to rectangular areas. Students match multiplication expressions to rectangular areas, specifically relating the factors of the expressions to the rows and columns of squares in the rectangle. Then, students are given multiplication expressions and create matching rectangles with inch tiles and drawings on grids.

Vocabulary

-

Materials

-

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.M.B.5**
  Relate area to the operations of multiplication and addition.
  b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: How Many Do You See: One More (10 minutes)

- The purpose of this How Many Do You See is for students to subitize or use grouping strategies to describe the images they see. The arrangement of the groups of dots encourages students to see 5 groups of dots in the first image and then 6 groups of dots in the next image. When students use equal groups and a known quantity to find an unknown quantity, they are looking for and making use of structure. (MP7).

Activity 1: Match Expressions and Areas (15 minutes)

- The purpose of this activity is for students to directly connect multiplication expressions to equal groups they see within rectangular areas. Students may decompose the rectangular areas in various ways to see equal groups, but they should relate the rows and columns to the factors of a multiplication expression. This will be helpful in future activities when students multiply side lengths to find the area.

Activity 2: Create from Expressions (20 minutes)

- The purpose of this activity is for students to represent multiplication expressions as rectangular areas. Students use a grid to draw the rectangular area that represents a multiplication expression. In the synthesis, students explain how they interpret the multiplication expression, specifically how they see the equal groups in the rows and columns of the rectangular area. Give students access to square tiles if needed. When students draw and relate area diagrams to multiplication expressions they are reasoning abstractly and quantitatively (MP2).
    - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to select at least 3 of the 5 problems to complete.

Supplemental Resources	Assessment Resources
● Suggested Centers ○ Capture Squares (1–3) Stage 6: Multiply with 1–5 (gameboard) (spinner) ○ Rectangle Rumble (3–5) Stage 1: Factors 1, 2, 5, and 10 (grid) (spinner) ○ Match Expressions and Areas (pdf)	● 3.2.5 Cool Down.pdf

LESSON 6: DIFFERENT SQUARE UNITS (PART 1) (Teacher Guide)

Teacher-Facing Learning Intention

- Students are describing square units based on different linear units of measurement.
- Students are using square inches and square centimeters to measure the area of a rectangle.

Student-Facing Learning Intention

- Let's learn about different units we can use to measure area.

Success Criteria

- I can use square inches and centimeters to measure the area of a rectangle.

Lesson Purpose

- The purpose of this lesson is for students to learn that there are different units that can be used to measure area, specifically square centimeters and square inches.

Lesson Narrative

- In previous lessons, students learned the meaning of area and measured area in square units. In this lesson, students work with standard units of area, based on linear measurement units they worked with in grade 2. Students consider the difference in size between the same amount of square inches and square centimeters, then they measure the area of a rectangle with both square inches and square centimeters.

Vocabulary

- square centimeter
- square inch

<table>
<tr><td></td><td>Materials
Activity 1 and 2: Same Rectangle, Different Units (groups of 2)
Patty paper
Scissors</td></tr>
<tr><td>New Jersey State Learning Standards
NJSLS-.MATH.CONTENT.3.M.B.4
Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).
Mathematical Practice Standards
MP6. Attend to precision.</td><td>National Council of Teachers of Mathematics Content Standards
NCTM.MATH.CONTENT.3-5.ME.A.1
Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
NCTM.MATH.CONTENT.3-5.ME.A.1
Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.
National Council of Teachers of Mathematics Process Standards
PR1. Problem Solving
PR4. Connections
PR5. Representation</td></tr>
<tr><td colspan="2">Warm-up: Notice and Wonder: Squares, Squares (10 minutes)
This warm-up elicits the idea that squares of different sizes can be used to measure area, which will be useful when students encounter different square units later. While students may notice and wonder many things, focus the discussion on how different-size squares could be used to tile the rectangle.</td></tr>
<tr><td colspan="2">Activity 1: Same Rectangle, Different Units (15 minutes)
The purpose of this activity is for students to see that there are different types of square units that can be used to measure area and that an area with the same number of square units can be larger or smaller depending on the unit that is used. To facilitate comparison, one partner works on inch grid paper and one works on centimeter grid paper. In the synthesis, students are introduced to square inches and square centimeters.
Access for Multilingual Learners: MLR8 Discussion Supports. Synthesis: For each observation that is shared, listen for the appropriate use of the word area, and invite students to turn to a partner and restate what they heard using precise mathematical language.</td></tr>
<tr><td colspan="2">Activity 2: What's the Area? (20 minutes)
The purpose of this activity is for students to estimate and then find the area of a square using different standard units of area (square inches and square centimeters). Students discuss why using square inches and square centimeters gives different measurements for the same area. To measure the area of the square, students trace the square or cut it out, place the traced or cut square on the grids from the previous activity, and determine the number of squares covered on each
grid. The measurement in square centimeters is not exactly 25 square centimeters because the square is 2 inches by 2 inches. The main idea is that it takes more of a smaller unit than a larger unit to cover the same area. When students reference units in their area measurements they are attending to precision in language (MP6). This activity uses MLR2 Collect and Display. Advances: conversing, reading, writing.
Access for Students with Disabilities: Action and Expression: Develop Expression and Communication. Give students access to a square centimeter cube and a square inch tile to support their estimation. Supports accessibility for: Conceptual Processing, Visual-Spatial Processing</td></tr>
<tr><td>Supplemental Resources
Same Rectangle, Different Units (grid 1)</td><td>Assessment Resources
3.2.6 Cool Down.pdf</td></tr>
</table>

- Same Rectangle, Different Units (grid 2)
- Suggested Centers
  - Capture Squares (1–3) Stage 6: Multiply with 1–5 (gameboard) (spinner)
  - Rectangle Rumble (3–5) Stage 1: Factors 1, 2, 5, and 10 (grid) (spinner)
  - Five in a Row: Addition and Subtraction (1–2) Stage 6: Add within 100 with Composing (pdf)

LESSON 7: DIFFERENT SQUARE UNITS (PART 2) (Teacher Guide)

Teacher-Facing Learning Intention
- Students are using square feet and square meters to measure the area of a rectangle.

Student-Facing Learning Intention
- Let's learn about larger square units.

Success Criteria
- I can use square feet and square meters to measure the area of a rectangle.

Lesson Purpose
- The purpose of this lesson is for students to learn about square feet and square meters, and consider when these larger units can be helpful to measure area.

Lesson Narrative
- In a previous lesson, students learned about the difference between square inches and square centimeters. In this lesson, students work with square feet and square meters, building on their work with feet and meters in grade 2. Students consider different areas in real-world situations and choose a square unit that would be the most useful to measure each given area.

Vocabulary
- square foot
- square meter

Materials
- Materials from a previous activity
- Materials from a previous lesson

New Jersey State Learning Standards
- **NJSLS-.MATH.CONTENT.3.M.B.4**
  Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).

Mathematical Practice Standards
- **MP4.** Model with mathematics.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Notice and Wonder: A Bigger Square (10 minutes)

- The purpose of this warm-up is to elicit the idea that larger square units, specifically the square meter, can be useful in situations involving large areas. While students may notice and wonder many things about the image, the idea of tiling a large area with larger square units is the important discussion point.

Activity 1: Square Feet and Square Meters (10 minutes)

- The purpose of this activity is for students to encounter larger squares units, specifically the square meter and the square foot. There are two options for introducing square meters and square feet for the first time. Students get a sense of the size of a square meter and a square foot from the images in the activity. Also, you could construct and display a square foot and a square meter using rubber bands, 4 meter sticks, and 4 rulers.

Activity 2: Which Square Unit? (15 minutes)

- The purpose of this activity is for students to consider the units to use to measure given areas. Students choose from square inches, square centimeters, square feet, and square meters. Students have not spent much time with these square units, so examples should be displayed during this activity to support them in choosing the unit that makes the most sense in the given situation.
    - Access for Multilingual Learners MLR8 Discussion Supports. Before partner work time, remind students to use words and phrases such as area, square centimeters, square inches, square feet, and square meters.
    - Access for Students with Disabilities Engagement: Provide Access by Recruiting Interest. Synthesis: Invite students to generate a list of additional examples that connect to their personal backgrounds and interests of items to measure with square inches, square centimeters, square feet, and square meters.

Supplemental Resources

- Suggested Centers
    - Capture Squares (1–3) Stage 6: Multiply with 1–5 (gameboard) (spinner)
    - Rectangle Rumble (3–5) Stage 1: Factors 1, 2, 5, and 10 (grid) (spinner)
    - Five in a Row: Addition and Subtraction (1–2) Stage 6: Add within 100 with Composing (pdf)

Assessment Resources

- 3.2.7 Cool Down.pdf

LESSON 8: AREA OF RECTANGLES WITHOUT A GRID (Teacher Guide)

Teacher-Facing Learning Intention

- Students are determining the area of rectangles not displayed on a grid.

Student-Facing Learning Intention

- Let's solve area problems without a grid.

Success Criteria

- I can determine the area of rectangles not displayed on a grid.

Lesson Purpose

- The purpose of this lesson is for students to determine the area of rectangles that are not fully gridded with squares.

Lesson Narrative

- In previous lessons, students used gridded rectangles to relate area to multiplication. They were also introduced to standard units of square inches, square centimeters, square feet, and square meters. In this lesson, students work with rectangles where the squares are less and less visible to encourage students to multiply the side lengths to find the area. This takes the form of partially tiled rectangles and
rectangles with side lengths marked off in linear units. Students will consider strategies they use and discuss multiplying side lengths to find area. When students use multiplication to find the area of rectangles, they are using the structure of equal rows or columns and relating this to the operation of

	multiplication (MP7).In this lesson, students see diagrams of rectangles that are described with standard units, such as square inches and square meters, but are not to scale. They will gain experience working with such diagrams throughout the unit. Students should understand that shapes and figures may not always be the size the units indicated because drawing a picture can help us understand a situation even if we cannot draw the actual size. **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.M.B.5** Relate area to the operations of multiplication and addition. b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. ● **NJSLS-.MATH.CONTENT.3.OA.B.5** Apply properties of operations as strategies to multiply and divide.2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.) **Mathematical Practice Standards** ● **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. ● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: How Many Do You See: One More, One Less (10 minutes)

- The purpose of this How Many Do You See is for students to subitize or use grouping strategies to describe the images they see. When students use equal groups and a known quantity to find an unknown quantity, they are looking for and making use of structure (MP7).

Activity 1: Partially Tiled (15 minutes)

- The purpose of this activity is for students to solve an area problem with a partially tiled rectangle. This encourages students to multiply to solve problems involving area, but still provides some visual support to see the arrangement of the rows and columns. This problem includes a product of ten, with which students should be increasingly comfortable. The number of square inches is large in order to discourage one-by-one counting.
    - Access for Multilingual Learners MLR8 Discussion Supports. Synthesis: Revoice student ideas to demonstrate and amplify mathematical language use. For example, revise the student statement, “I saw a complete row, and if I tiled all the rows, then they are all the same” as “I saw a complete row, and if you tiled the rest of the rows, each row would be an equal group.”

- Access for Students with Disabilities Engagement: Develop Effort and Persistence: Differentiate the degree of difficulty or complexity. Some students may benefit from starting with a rectangle with more accessible value. For example, display a partially tiled rectangle with fewer rows.

Activity 2: No More Squares (20 minutes)

- In this activity, students find the area of rectangles that are not tiled but whose sides are marked with equally spaced tick marks. The tick marks give students the side lengths of the rectangle, help students visualize a tiled region, and enable them to confirm that multiplying the side lengths gives the number of square units in the rectangle. The work here serves to transition students to using only side lengths to find the area.

Supplemental Resources

- Suggested Centers
  - Capture Squares (1–3) Stage 6: Multiply with 1–5 (gameboard) (spinner)
  - Rectangle Rumble (3–5) Stage 1: Factors 1, 2, 5, and 10 (grid) (spinner)
  - Five in a Row: Addition and Subtraction (1–2) Stage 6: Add within 100 with Composing (pdf)

Assessment Resources

- 3.2.8 Cool Down.pdf

LESSON 9: MEASURE TO FIND THE AREA (Teacher Guide)

Teacher-Facing Learning Intention

- Students are finding the area of rectangles by measuring and multiplying the side lengths.

Student-Facing Learning Intention

- Let's measure the sides of rectangles and find the area.

Success Criteria

- I can find the area of rectangles by measuring and multiplying the side lengths.

Lesson Purpose

- The purpose of this lesson is for students to measure side lengths of rectangles to find their area.

Lesson Narrative

- In grade 2, students measured length in centimeters and feet. In earlier lessons, they found the area of rectangles in standard units. Here, students measure side lengths of rectangles and multiply them to find the area. They also find side lengths that would result in a rectangle with a given area.

Vocabulary

-

Materials

- Rulers (centimeters)
- Rulers (inches)
- Tape (painter's or masking)
- Yardsticks

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.M.B.5**
  Relate area to the operations of multiplication and addition.
  b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**

● **NJSLS-.MATH.CONTENT.3.OA.B.5** Apply properties of operations as strategies to multiply and divide.2 Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.) **Mathematical Practice Standards** ● **MP7.** Look for and make use of structure.	Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: Groups and Arrays (10 minutes)

- In this warm-up, students observe two dot images that show the same number of dots in groups of 3 but arranged in different ways. The purpose is to elicit observations about the similarities in their structure (5 groups of 3 dots, plus 1 more group of 3 dots) and to prepare students to make sense of expressions with a similar structure in an upcoming lesson. When students notice that there is an additional group of 3 in the equal groups diagram and the array, they are looking for and making use of structure (MP7).

Activity 1: Measure to Find Area (15 minutes)

- The purpose of this activity is for students to measure the side lengths of a rectangle and multiply them to find the area. Students may use the ruler to create tick marks along the sides of the rectangle to help them visualize square units or multiply the side lengths. Either strategy is fine as students work towards finding the area of rectangles with labeled side lengths.

Activity 2: Create a Rectangle (20 minutes)

- The purpose of this activity is for students to create a rectangle with a given area. Students use what they know about area and the structure of rectangles to decide on the side lengths of the rectangle. Students use tape (painter's or masking) to create the rectangles. They should have enough tape to create square feet within the rectangle, but should be encouraged to mark the 1 foot intervals to help them visualize the square feet inside the rectangle, if needed. In the synthesis, each group shares strategies for creating a rectangle and how they know the area is the given number of square feet. When students think about the structure of a rectangle and use it to create a rectangle with a given area they are looking for and making use of structure (MP7).
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: At the appropriate time, give students 2–3 minutes to make sure that everyone in their group can explain their approach. Invite groups to rehearse what they will say when they share with the whole class.
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence: Check in and provide each group with feedback that encourages collaboration and community. For example, make sure all students are participating. Elicit from each group such things as what is your strategy, what is your first step, how do you know your rectangle is correct.

Supplemental Resources ● Suggested Centers ○ Capture Squares (1–3) Stage 6: Multiply with 1–5 (gameboard) (spinner) ○ Rectangle Rumble (3–5) Stage 2: Factors 1–5 (grid) (spinner) ○ Five in a Row: Addition and Subtraction (1–2) Stage 7: Add within 1,000 without Composing (pdf)	**Assessment Resources** ● 3.2.9 Cool Down.pdf

LESSON 10: SOLVE AREA PROBLEMS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are solving real-world and mathematical problems involving area.

Student-Facing Learning Intention

- Let's solve area problems.

Success Criteria

- I can solve real-world and mathematical problems involving area.

Lesson Purpose

- The purpose of this lesson is for students to solve problems involving area.

Lesson Narrative

- In previous lessons, students found the area of rectangles with tiles, grids, partial grids, or linear measurements marked along the sides of the rectangle. Students also used rulers to find the area of rectangles. The problems in this lesson are about a community garden. Consider launching the lesson with a read-aloud of City Green by DyAnne DiSalvo-Ryan to get students thinking about different aspects of a community garden. Students might draw squares within rectangles, draw tick marks on side lengths, count groups, or multiply to find area in this lesson. Any reasoning that makes sense to them is acceptable.

Vocabulary

- NA

Materials

- Inch tiles

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.M.B.5**
  Relate area to the operations of multiplication and addition.
  b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.
- **NJSLS-.MATH.CONTENT.3.OA.B.5**
  Apply properties of operations as strategies to multiply and divide.2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)

Mathematical Practice Standards

- **MP1.** Make sense of problems and persevere in solving them.
- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Number Talk: One More Group (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for multiplying within 100. These understandings help students develop fluency and will be helpful later in this lesson when students are to multiply side lengths to find area. While recording students' thinking, consider using equal groups or arrays as in the images in the warm-up of the previous lesson.

Activity 1: Paint a Wall (10 minutes)

- The purpose of this activity is for students to solve a real-world problem involving area. The activity includes a rectangle where the side lengths are labeled. When students solve problems with multiple solutions and have to choose and justify a solution, they make sense of problems and persevere in solving them (MP1). In their small groups and in the class discussion students have an opportunity to explain and defend their choices (MP3).
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Create a visual display of the diagram. As students share their strategies, annotate the display to illustrate connections. For example, as students share the number of columns and rows, draw them on the diagram, and write "3 rows and 6 columns."

Activity 2: Create a Garden (25 minutes)

- The purpose of this activity is for students to solve an area problem that involves missing side lengths. The problem has multiple solutions, as the area of the garden could be between 20 square feet to 30 square feet. The launch serves to familiarize students with the ideas involved in designing a garden before they solve the problem. When students share with other groups and describe what others did that was different they are making and understanding mathematical arguments (MP3).
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence: Invite students to generate a list of shared expectations for group work. Record responses on a display and keep visible during the activity.

Supplemental Resources

- Centimeter Grid Paper - Standard (pdf)
- Suggested Centers
    - Capture Squares (1–3) Stage 6: Multiply with 1–5 (gameboard) (spinner)
    - Rectangle Rumble (3–5) Stage 2: Factors 1–5 (grid) (spinner)
    - Five in a Row: Addition and Subtraction (1–2) Stage 7: Add within 1,000 without Composing (pdf)

Assessment Resources

- 3.2.10 Cool Down.pdf

LESSON 11: AREA AND THE MULTIPLICATION TABLE (Teacher Guide)

Teacher-Facing Learning Intention

- Students are exploring connections between area and the multiplication table.

Student-Facing Learning Intention

- Let's explore area and the multiplication table.

Success Criteria

- I can identify connections between the area and the multiplication table.

Lesson Purpose

- The purpose of this lesson is for students to explore connections between area and the multiplication table.

Lesson Narrative

- This lesson introduces students to the multiplication table as a way to organize and find products of two whole-number factors (up to 10). Students begin by marking rectangles on blank multiplication tables, always starting from the upper left corner, and finding their areas. They see that the area of each rectangle is the product of the numbers at the right and bottom boundaries of the rectangle. Through repeated reasoning, students see that finding the value of each cell in the table is like finding the area of a rectangle whose side lengths are a number from the top of the table and one from the left. Along the way, students notice patterns in the table and make use of them to complete the rest of the table (MP8). This lesson is optional because it gives students more time to take a deeper look at the relationship between multiplication and area, and make addition connections.

Vocabulary

-

Materials

-

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.M.B.5**
  Relate area to the operations of multiplication and addition.
  b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.
- **NJSLS-.MATH.CONTENT.3.OA.B.5**
  Apply properties of operations as strategies to multiply and divide.2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)
- **NJSLS-.MATH.CONTENT.3.OA.D.9**
  Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.

Mathematical Practice Standards

- **MP7.** Look for and make use of structure
- **MP8.** Look for and express regularity in repeated reasoning.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: How Many Do You See: Arrays that Grow (10 minutes)

- The purpose of this warm-up is for students to notice that figures composed of multiple arrays can be decomposed into smaller arrays, and that this is a strategy to determine the total number of dots. This will be helpful in later lessons when students decompose figures into rectangles to find the total area. When students find ways to decompose the given arrangements of dots to find the number of dots, they practice looking for and making use of structure (MP7).

Activity 1: Area and the Multiplication Table (15 minutes)

- The purpose of this activity is for students to find missing products in the multiplication table as they consider the rectangular structure of how products are organized in the table.

- **Access for Students with Disabilities:** Representation: Internalize Comprehension: Record students' notices and wonderings about the multiplication table on a piece of chart paper.

Activity 2: Products in the Multiplication Table (20 minutes)

- The purpose of this activity is for students to find products in the multiplication table. Students are encouraged to find familiar products before working on less-familiar ones. They do not need to fill in all of the products in the table. The synthesis focuses on patterns students find in the table and how they can show the patterns with equations.
  - **Access for Multilingual Learners:** The purpose of this activity is for students to find products in the multiplication table. Students are encouraged to find familiar products before working on less-familiar ones. They do not need to fill in all of the products in the table. The synthesis focuses on patterns students find in the table and how they can show the patterns with equations.

Supplemental Resources

- Suggested Centers
  - Capture Squares (1–3) Stage 6: Multiply with 1–5 (gameboard) (spinner)
  - Rectangle Rumble (3–5) Stage 2: Factors 1–5 (grid) (spinner)
  - Five in a Row: Addition and Subtraction (1–2) Stage 7: Add within 1,000 without Composing (pdf)

Assessment Resources

- 3.2.11 Cool Down.pdf

LESSON 12: AREA AND ADDITION (Teacher Guide)

Teacher-Facing Learning Intention

- Students are finding the area of figures composed of rectangles. Recognize that area is additive.

Student-Facing Learning Intention

- Let's find the area of figures made up of rectangles.

Success Criteria

- I can find the area of figures composed of rectangles.
- I can recognize that area is additive.

Lesson Purpose

- The purpose of this lesson is for students to use gridded rectangles to learn that area is additive.

Lesson Narrative

- Students first decompose a rectangle into parts to see that area is additive. Then, students decompose a figure composed of rectangles into rectangles in any way that makes sense to them, find the area of those rectangles, and add them together to find the area. Students learn that parentheses are grouping symbols that can be used in expressions or equations, and use them to represent how they decompose the figure into rectangles. The work of this lesson connects to previous work because students find the area of rectangles within the figure before adding to find the total area of the figure.

Vocabulary

- parentheses

Materials

- NA

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.M.B.5**
  Relate area to the operations of multiplication and addition.
  d. Recognize the area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.

of the non-overlapping parts, applying this technique to solve real world problems. **Mathematical Practice Standards** ● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP7.** Look for and make use of structure.	● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation
Warm-up: Number Talk: So Close (10 minutes) ● The purpose of this Number Talk is to elicit strategies and understandings students have for adding two numbers when one number is close to a multiple of ten. These understandings help students develop fluency and will be helpful later in this lesson when students add the area of parts of a figure to determine the area of the whole figure. When students use the fact that one number is close to 10 to find the sum, they look for and make use of structure (MP7).	
Activity 1: Rectangles in Rectangles (15 minutes) ● The purpose of this activity is for students to learn that area is additive. Students decompose a rectangle into two smaller ones and find the sum of their areas in order to find the area of the whole rectangle. They can find the area of the two smaller rectangles by counting or by multiplying the side lengths. When students consider how to decompose a larger rectangle into smaller ones to facilitate the process of finding area, they look for and make use of structure (MP7). ○ **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication: Identify connections between strategies that result in the same outcomes but use differing approaches. When students share different ways that they found the area, elicit from students how the strategies vary but result in the same answer.	
Activity 2: Find the Rectangles (20 minutes) ● The purpose of this activity is for students to find the area of a figure by decomposing it into two non-overlapping rectangles. The synthesis should emphasize different strategies and also encourage students to directly link expressions and the use of parentheses to the way they decompose the figure. If students drew gardens in the shape of the image in the launch, display those drawings as well during the notice and wonder. Some students may partition diagonally to split the figure into what looks like 2 symmetrical parts, or cut the figure up into more than 2 parts. These are both acceptable ways of finding the area. Ask students who partition diagonally to find the area in the way they partitioned, but then encourage them to find a second way that has partitions on one of the grid lines. As students look through each others' work, they discuss how the representations are the same and different and can defend different points of view (MP3). When students notice that the smaller parts of the figure can be added to find the total area of the figure they are looking for and make use of structure (MP7).	
Supplemental Resources ● Suggested Centers ○ Five in a Row ■ Multiplication (3–5) Stage 2: Factors 1–9 (pdf) ■ Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)	**Assessment Resources** ● 3.2.12 Cool Down.pdf

LESSON 13: FIND THE AREA OF FIGURES (Teacher Guide)

Teacher-Facing Learning Intention:
- Students are calculating the area of ungridded figures made of rectangles using multiplication and addition.

Student-Facing Learning Intention
- Let's find the area of figures.

Success Criteria
- I can calculate the area of ungridded figures made of rectangles using multiplication and addition.

Lesson Purpose
- The purpose of this lesson is for students to calculate the area of ungridded figures made of rectangles using multiplication and addition.

Lesson Narrative
- Students continue to find the area of figures composed of rectangles by decomposing them into non-overlapping rectangles. In this lesson, the square tiling is slowly removed to focus students on multiplying side lengths to find area.

Vocabulary
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Materials
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New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.M.B.5**
  Relate area to the operations of multiplication and addition.
    d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.
- **NJSLS-.MATH.CONTENT.3.NBT.A.2**
  Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Mathematical Practice Standards
- **MP2.** Reason abstractly and quantitatively.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Number Talk: Extend Make a Ten (10 minutes)
- The purpose of this Number Talk is to elicit strategies students have for adding two numbers when one number is close to a whole number of tens. These understandings help students develop fluency in addition. Students may look for and make use of structure (MP7) in a number of ways. For example, they may add 1 to the first addend to make a full ten and subtract 1 from the second addend to find each sum. They may also notice how the addends compare to those in the previous expression and use the change to find the new sum. In this string, students may also add the tens and ones separately to find the sum. Adding by place value is the focus of upcoming work. This Number Talk also enables the teacher to learn the strategies students currently have for addition.

Activity 1: Bye-Bye Squares (20 minutes)

- The purpose of this activity is for students to find the area of figures that are composed of rectangles but are not fully gridded with squares. Partially gridded figures help to prepare students to find the area of figures with only side length measurements. Students should be encouraged to find side lengths and multiply, rather than rely on counting, as the grids disappear. If students continue to draw in the squares, ask them if there is another way to find the area.
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence: Differentiate the degree of difficulty or complexity. Some students may benefit from starting with a smaller figure, one with more accessible values.

Activity 2: How Many Pavers Do We Need? (15 minutes)

- The purpose of this activity is for students to find the area of a figure composed of rectangles given only their side lengths. The context of paving a patio provides students a link to their experience with squares of various sizes and should help them imagine how the diagram of the patio could be covered with squares. Students decompose the patio into rectangles and can multiply to find the area of the patio, but they should make the connection that the number of pavers needed to cover the patio is the same as the area of the patio. When students connect the quantities in the story problem to an equation, they reason abstractly and quantitatively (MP2).
    - **Access for Multilingual Learners:** MLR7 Compare and Connect. Synthesis: Invite groups to prepare a visual display that shows the strategy they used to figure out the number of tiles and the area of the floor. Encourage students to include details that will help others interpret their thinking. Give students time to investigate each others' work. During the whole-class discussion, ask students, "How did the same area show up in each method?" "Why did the different approaches lead to the same outcome?" "Did anyone solve the problem the same way, but would explain it differently?"

Supplemental Resources

- Suggested Centers
    - Five in a Row
        - Multiplication (3–5) Stage 2: Factors 1–9 (pdf)
        - Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)

Assessment Resources

- 3.2.13 Cool Down.pdf

LESSON 14: FIND THE AREA OF FIGURES WITH MISSING SIDES (Teacher Guide)

Teacher-Facing Learning Intention

- Students are calculating the area of ungridded figures composed of rectangles, including figures with missing side lengths.

Student-Facing Learning Intention

- Let's find the area of figures with missing side lengths.

Success Criteria

- I can calculate the area of ungridded figures composed of rectangles, including figures with missing side lengths.

Lesson Purpose

- The purpose of this lesson is for students to calculate the area of ungridded figures made of rectangles, including figures with missing side lengths.

Lesson Narrative

- In previous lessons, students found the area of figures that were fully gridded with squares and moved toward figures without a grid but had all their side lengths labeled. In this lesson, students use the strategies they have learned to decompose the figures into non-overlapping rectangles. They realize that not all measurements need to be given, and that some lengths can be determined given the rectangular structure of these figures.

Vocabulary

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Materials

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New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.M.B.5** Relate area to the operations of multiplication and addition. d. Recognize the area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. **Mathematical Practice Standards** ● **MP3.** Construct viable arguments and critique the reasoning of others.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. ● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: Mystery Sides (10 minutes)

- The purpose of this warm-up is to elicit the idea that we can find the area of figures even though not all side lengths are given, which will be useful when students find missing side lengths and areas in a later activity. While students may notice and wonder many things about this figure, the missing side lengths are the important discussion points.

Activity 1: The Mystery Side (10 minutes)

- The purpose of this activity is for students to consider a strategy to find a missing side length of a figure composed of rectangles. They find the missing side length by decomposing the figure into non-overlapping rectangles.

Activity 2: Practice with Mystery Sides (25 minutes)

- The purpose of this activity is for students to find the area of a figure composed of rectangles with missing sides by decomposing it into two non-overlapping rectangles. There are several ways to approach these problems and students are given freedom to choose their own strategy to find the area. They share their reasoning with a student who has used a different method and prepare to share this new method during the class discussion (MP3). The synthesis should focus on ways to find missing side lengths and emphasize different ways to find the area of the figure. At this point, students should be comfortable multiplying side lengths of rectangles to find the area. Discussion should focus on how students decompose the figures and how they find the missing side lengths.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports: Before students explain their strategies to each other, remind them to restate what they hear using precise mathematical language and their own words. Display the sentence frame: "I heard you say . . . ." Original speakers can agree or clarify for their partner.
  - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest: Use timers, alerts, or previews to help learners anticipate and prepare to transition between activities.

Supplemental Resources ● Suggested Centers ○ Five in a Row ■ Multiplication (3–5) Stage 2: Factors 1–9 (pdf) ■ Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)	**Assessment Resources** ● 3.2.14 Cool Down.pdf

LESSON 15: NEW ROOM (OPTIONAL) (Teacher Guide)

Teacher-Facing Learning Intention
- Students are solving problems involving the area of ungridded figures composed of rectangles, including figures with missing side lengths.

Student-Facing Learning Intention
- Let's fit furniture into a room.

Success Criteria
- I can solve problems involving the area of figures composed of rectangles, including figures with missing side lengths.

Lesson Purpose
- The purpose of this lesson is for students to use their experience with areas of figures composed of rectangles to solve problems.

Lesson Narrative
- This lesson is optional because it does not address any new mathematical content standards. This lesson does provide students with an opportunity to apply precursor skills of mathematical modeling. In previous lessons, students solved rectangular area problems. They connected area problems to multiplication. They learned that area is additive as they found the area of figures composed of rectangles by decomposing them into non-overlapping rectangles.In this lesson, students find missing side lengths of a room and use their knowledge about areas of rectangles to solve a problem about fitting a bed and desk into a room. As students make decisions, they consider what space is really usable in the room or what is the best spot in the room for each piece of furniture. There are several ways to approach this problem and students are given freedom to choose their own strategy to make a decision (MP1). When students make choices and translate mathematics to real world contexts, they model with mathematics (MP4).

Vocabulary
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Materials
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New Jersey State Learning Standards
- **NJSLS-.MATH.CONTENT.3.M.B.3**
  Recognize area as an attribute of plane figures and understand concepts of area measurement.
- **NJSLS-.MATH.CONTENT.3.M.B.4**
  Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).
- **NJSLS-.MATH.CONTENT.3.M.B.5**
  Relate area to the operations of multiplication and addition.
  b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.
  d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Mathematical Practice Standards ● **MP1.** Make sense of problems and persevere in solving them. ● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP4.** Model with mathematics.	
Warm-up: Notice and Wonder: Floor Plan (10 minutes) ● The purpose of this warm-up is to familiarize students with the context of floor plans and the mathematics that might be involved. This will be useful when students design a layout for a bedroom in a later activity. While students may notice and wonder many things about this image such as the familiar shape of the diagram that can be broken up into rectangles, the features that make this a floor plan such as windows and the door, are the important discussion points.	
Activity 1: Floor Plans (10 minutes) ● The purpose of this activity is for students to make sense of floor plans. In the launch, students make sense of how different features of the floor plan such as windows, doors, and furniture are visually represented. Students analyze the plan and consider what is usable floor space and where it makes sense to put the furniture. Students may give both aesthetic and practical reasons for furniture placement. This short activity prepares students to make similar considerations in the next activity. In the synthesis, students work to explain their reasoning and construct viable arguments (MP3). ○ **Access for Multilingual Learners:** MLR5 Co-Craft Questions. Display the image of the floor plan, and invite students to write a list of possible mathematical questions they could ask about the situation. Invite students to compare their questions, “What do these questions have in common? How are they different?” Amplify questions related to comparison and areas of rectangles. ○ **Access for Students with Disabilities:** Action and Expression: Provide Access for Physical Action. Provide access to a variety of pre-cut materials to reduce barriers for students who need support with fine motor skills and students who benefit from extra processing time.	
Activity 2: New Bed and Desk (25 minutes) ● The purpose of this activity is for students to apply their understanding of the area of rectangles to design a floor plan for a room. Students use their experience from the previous activity and consider what space is usable as they arrange the furniture. When students think about the dimensions of the different objects, the constraints of the space available, and the way things in a bedroom are usually arranged, they model with mathematics (MP4).	
Supplemental Resources ● New Bed and Desk (pdf) ● Suggested Centers ○ Five in a Row ■ Multiplication (3–5) Stage 2: Factors 1–9 (pdf) ■ Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)	**Assessment Resources** ● 3.2.15 Cool Down.pdf

Unit 3: Wrapping Up Addition and Subtraction Within 1,000

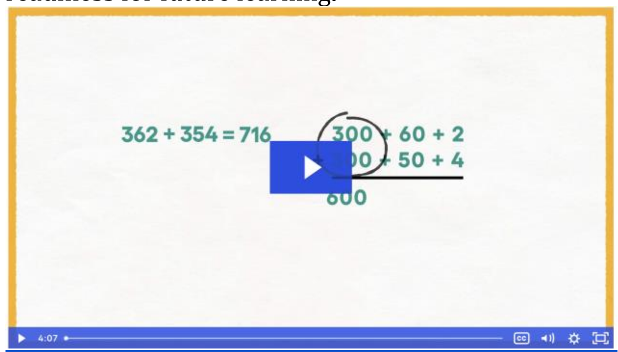
PEDAGOGICAL CONTENT KNOWLEDGE RESOURCES FOR TEACHERS

Learning Narrative Video

The Unit Launch: Learning Narrative video for Grade 3, Unit 3 gives insight into the unit objectives, models and representations, possible student errors and misconceptions, and tips that might be used to help support student understanding.

Learning Progressions Video

The Unit Launch: Learning Progressions video for Grade 3, Unit 3 details how the content of a unit builds upon prior knowledge, and how the understanding of the content provides students with readiness for future learning.



Learning Supports Video

The Unit Launch: Learning Supports video for Grade 3, Unit 3 gives an in-depth look into the models and representations used in this unit to help support student understanding.

STAGE 1 - DESIRED RESULTS

Assessed Focus Standards

NJSLS.MATH.CONTENT.3.OA.B.5
Apply properties of operations as strategies to multiply and divide.2 Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)

NJSLS.MATH.CONTENT.3.OA.C.7
With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship

UNIT DESCRIPTION

In this unit, students work toward the goal of fluently adding and subtracting within 1,000. They use mental math strategies developed in grade 2 and learn algorithms based on place value. In grade 2, students added and subtracted within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction. When students combine hundreds, tens, and ones, they use place value understanding. When they decompose numbers to add or subtract, they rely on the commutative and associative properties. When students count up to subtract, they use the relationship between addition and subtraction. To move toward fluency, students learn a few different algorithms that work with any numbers and are generalizable to larger numbers and decimals. Students work with a variety of algorithms, starting with those that show expanded form, and moving toward algorithms that are more streamlined and closer to the standard algorithm. Students explore various algorithms but are not required to use a specific one. They should, however, move from strategy-based work of grade 2 to algorithm-based work to set the stage for using the standard algorithm in grade 4. If students begin the unit with knowledge of the standard algorithm, it is still important for them to make sense of the place-value basis of the algorithm. Understanding of place value also comes into play as students round numbers to the nearest multiple of 10 and 100. Students

between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **NJSLS.MATH.CONTENT.3.OA.D.8** Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations) **NJSLS.MATH.CONTENT.3.OA.D.9** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. **NJSLS.MATH.CONTENT.3.NBT.A.1** Use place value understanding to round whole numbers to the nearest 10 or 100. **NJSLS.MATH.CONTENT.3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Content Connections** **3-PS2-1** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.	do not need to know a formal definition of "multiples" until grade 4. At this point, it is enough to recognize that a multiple of 10 is a number called out when counting by 10, or the total in a whole-number of tens (such as 8 tens). Likewise, a multiple of 100 is a number called out when counting by 100, or the total in a whole-number of hundreds (such as 6 hundreds). Students use rounding to estimate answers to two-step problems and determine if answers are reasonable. **Throughout the unit** In the first part of the unit, the focus of the warm-ups is on the use of place value to support the work with addition and subtraction. Students use strategies based on place value and properties of operations to add and subtract within 1,000. Later in the unit, students come back to multiplication and build on the work of multiplying by 2, 5, and 10. Students apply properties of operations as strategies to multiply and represent these strategies using visual representations and expressions. This work prepares students to solve two-step word problems using addition, subtraction, and multiplication at the end of the unit. **EXPLICIT ASPECTS OF RIGOR** Conceptual Understanding ● Use place value understanding to round whole numbers to the nearest 10 or 100. ● Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. ● Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. ● Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends ● Apply properties of operations as strategies to multiply and divide.2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.) ● Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. ● Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. **Procedural Fluency** ● Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

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<td rowspan="4">
3-PS2-2
Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

3.PS2-3
Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.

3-PS2-4
Define a simple design problem that can be solved by applying scientific ideas about magnets.*

3-5-ETS1-1
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

INTEGRATION OF 21st CENTURY SKILLS
9.1.4.A.1
Recognize a problem and brainstorm ways to solve the problem individually or collaboratively.

9.1.4.A.5
Apply critical thinking and problem-solving skills in classroom and family settings.

9.1.4.B.1
Participate in brainstorming sessions to seek information, ideas, and strategies that foster creative thinking.
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<u>Fluently</u> multiply and divide within 100, <u>using strategies</u> such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, <u>know from memory</u> all products of two one-digit numbers.
Application
Solve two-step <u>word problems</u> using the four operations. <u>Represent</u> these problems using equations with a letter standing for the unknown quantity. <u>Assess</u> the reasonableness of answers using mental computation and estimation strategies including rounding.
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<tr><td colspan="2">MEANING</td></tr>
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Enduring Understandings

U1. Place value can be used to round numbers and place value relationships can be used to add and subtract numbers.

U2. Computation involves taking apart and combining numbers using a variety of approaches.

U3. Numerical calculations can be approximated by replacing numbers with other numbers that are close and easy to compute. This is called estimation.

U4. There is more than one way to estimate a sum, difference, product or quotient. Rounding is a one strategy for estimating.

U5. Some real-world problems involving joining or separating equal groups or comparison can be solved using multiplication.
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Essential Questions

Q1. How do I know the value of a digit?

Q2. How can I show the value of a number in different ways?

Q3. How does finding a pattern help us find all the ways to show a number within its place value?

Q4. How can I use models, graphs or charts to show the value of a number in different ways?

Q5. How does place value help us identify and extend counting patterns?

Q6. What problem-solving strategies are most helpful for particular problems?

Q7. What strategies can be used to assess the reasonableness of an answer?

Q8. How can identifying patterns in the addition and multiplication table be helpful in finding answers?
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<tr><td colspan="2">WHAT STUDENTS WILL KNOW AND BE ABLE TO DO</td></tr>
</table>

9.1.4.C.1 Practice collaborative skills in groups, and explain how these skills assist in completing tasks in different settings (at home, in school, and during play). **CAREER EDUCATION** **9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success. **9.3.ST-SM.2** Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems. **9.3.ST-SM.4** Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.	**Knowledge** **K1.** Fluently add within 1,000 using algorithms based on place value and properties of operations. **K2.** Fluently subtract within 1,000 using algorithms based on place value, properties of operations, and the relationship between addition and subtraction. **K3.** Round whole numbers to the nearest multiple of 10 and 100. **K4.** Assess the reasonableness of answers. Solve two-step word problems using addition, subtraction, and multiplication. **K5.** Use place value understanding to compose and decompose numbers.	**Skills** **S1.** Represent numbers to 1,000 in different ways using place value understanding. [Lesson 1] **S2.** Solve addition and subtraction problems within 1,000 in a way that makes sense to them. Relate base-ten diagrams to written algorithms for addition. [Lesson 2, 3, 4] **S3.** Relate written algorithms to each other using place value understanding. [Lesson 5] **S4.** Add within 1,000 using an algorithm or another strategy based on the numbers being added. [Lesson 6] **S5.** Subtract Within 1,000 [Lesson 7] **S6.** Relate base-ten diagrams to written algorithms for subtraction. [Lesson 8] **S7.** Analyze and use a subtraction algorithm with the numbers written in expanded form. [Lesson 9] **S8.** Relate subtraction algorithms to one another using place value understanding. Subtract numbers within 1,000 using another algorithm based on place value. [Lesson 10, 11] **S9.** Subtract within 1,000 using algorithms or other strategies based on the numbers in the problem. [Lesson 12] **S10.** Recognize that numbers are often approximated by their closest multiples of 10 or 100. Understand the meaning of the nearest multiple of 100. [Lessons 13, 14, 15] **S11.** Recognize and generalize patterns in the rounding of whole numbers within 1,000. [Lesson 16] **S12.** Assess the reasonableness of answers using

		mental computation and estimation strategies including rounding. [Lessons 17, 18, 19, 20, 21] **S13.** Solve two-step word problems using addition and subtraction in a way that makes sense to them. [Lessons 17, 18, 19, 20, 21]

CULTURALLY RESPONSIVE TEACHING in PRACTICE	SOCIAL EMOTIONAL LEARNING in PRACTICE
• Encourage collaborative learning in diverse groups. • Recognize and value multiple problem-solving approaches. • Be mindful of language barriers and use simple language and visuals. • Contextualize abstract concepts in real-life situations. • Tailor instruction to individual interests and strengths. • Involve families and the community in math-related activities. • Include diverse mathematicians and scientists in lessons. • Use multicultural resources and materials. • Use math problems and examples that relate to students' cultures and experiences.	• Create a positive classroom environment. • Encourage communication and collaboration. • Model emotional regulation. • Connect math to real-life situations. • Validate effort and persistence. • Use cooperative learning. • Teach growth mindset. • Incorporate reflective practices. • Integrate SEL activities such as use of affirmations. • Foster positive teacher-student relationships.

STAGE 2 - EVIDENCE

SUMMATIVE ASSESSMENT

Illustrative Mathematics

- 3.3-Section-A-Checkpoint-Assessment.pdf
- 3.3-Section-B-Checkpoint-Assessment.pdf
- 3.3-Section-C-Checkpoint-Assessment.pdf
- 3.3-Section-D-Checkpoint-Assessment.pdf
- 3.3-End-of-Unit-Assessmentpdf

PRE-ASSESSMENT

Illustrative Mathematics

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FORMATIVE ASSESSMENT		
Illustrative Mathematics Curriculum • 3.3.1 Cool Down.pdf • 3.3.2 Cool Down.pdf • 3.3.3 Cool Down.pdf • 3.3.4 Cool Down.pdf • 3.3.5 Cool Down.pdf • 3.3.6 Cool Down.pdf • 3.3.7 Cool Down.pdf • 3.3.8 Cool Down.pdf • 3.3.9 Cool Down.pdf • 3.3.10 Cool Down.pdf • 3.3.11 Cool Down.pdf • 3.3.12 Cool Down.pdf • 3.3.13 Cool Down.pdf • 3.3.14 Cool Down.pdf • 3.3.15 Cool Down.pdf • 3.3.16 Cool Down.pdf • 3.3.17 Cool Down.pdf • 3.3.18 Cool Down.pdf • 3.3.19 Cool Down.pdf • 3.3.20 Cool Down.pdf	*Illustrative Mathematics* Student Tasks • Unit 3 Student Task Lesson 1.pdf • Unit 3 Student Task Lesson 2.pdf • Unit 3 Student Task Lesson 3.pdf • Unit 3 Student Task Lesson 4.pdf • Unit 3 Student Task Lesson 5.pdf • Unit 3 Student Task Lesson 6.pdf • Unit 3 Student Task Lesson 7.pdf • Unit 3 Student Task Lesson 8.pdf • Unit 3 Student Task Lesson 9.pdf • Unit 3 Student Task Lesson 10.pdf • Unit 3 Student Task Lesson 11.pdf • Unit 3 Student Task Lesson 12.pdf • Unit 3 Student Task Lesson 13.pdf • Unit 3 Student Task Lesson 14.pdf • Unit 3 Student Task Lesson 15.pdf • Unit 3 Student Task Lesson 16.pdf • Unit 3 Student Task Lesson 17.pdf • Unit 3 Student Task Lesson 18.pdf • Unit 3 Student Task Lesson 19.pdf • Unit 3 Student Task Lesson 20.pdf • Unit 3 Student Task Lesson 21.pdf	NJSLA Released Items 3.OA.C.7 • Item UIN - M01389 • Item UIN - M02431 • Item UIN - VF479832 • Item UIN - VF479832_SP • Item UIN - VF653291 • Item UIN - VH078172 • Item UIN - VH095667 3.OA.C.7 • Item UIN - 4508-M05031 • Item UIN - M01424 • Item UIN - M02369 • Item UIN - M02370 • Item UIN - VF522153 • Item UIN - VF541130 • Item UIN - VF906869 • Item UIN - VH011663 • Item UIN - VH011893 • Item UIN - VH120275 • Item UIN - M01888 • Item UIN - M01888_SP • Item UIN - M01391 • Item UIN - M01391_SP • Item UIN - VF885888 • Item UIN - VH078126 • Item UIN - VH078162 • Item UIN - VH095636 • Item UIN - VH095643 • Item UIN - VF885888P • Item UIN - VH056174 • Item UIN - VH056174_SP • Item UIN - VH095622 3.OA.D.8 • Item UIN - M00819 • Item UIN - VF442639 • Item UIN - VF812742 • Item UIN - 0456-M00013

		● Item UIN - VF654116 ● Item UIN - VF656717 ● Item UIN - M01633 ● Item UIN - 0427-M01405 ● Item UIN - M00189 ● Item UIN - VF909877 ● Item UIN - 0429-M01408 ● Item UIN - VF888795 ● Item UIN - VF558622 ● Item UIN - VF558545
STAGE 3 - LEARNING PLAN		
MATH WORKSHOP		

***Illustrative Mathematics* Centers**
● Target Numbers (1–5)
  ○ Stage 6: Add Hundreds, Tens, or Ones (addressing)
  ○ Stage 7: Subtract Hundreds, Tens, or Ones (addressing)
● Five in a Row: Addition and Subtraction (1–2)
  ○ Stage 8: Add within 1,000 with Composing (addressing)
● Rectangle Rumble (3–5)
  ○ Stage 2: Factors 1–5 (supporting)
● How Close? (1–5)
  ○ Stage 4: Add to 1,000 (addressing)
● Number Puzzles: Addition and Subtraction (1–4)
  ○ Stage 5: Within 1,000 (addressing)
  ○ Stage 5: Within 1,000 (supporting)
● Five in a Row: Multiplication (3–5)
  ○ Stage 2: Factors 1–9 (supporting)
● Capture Squares (1–3)
  ○ Stage 6: Multiply with 1–5 (supporting)
● Tic Tac Round (3–5)
  ○ Stage 1: Nearest Ten or Hundred (addressing)
	***Building Thinking Classrooms* Tasks**
	● Lesson 1: Activity 2: Numbers in Different Forms Round Table
	● Lesson 2: Activity 1: Monuments and Falls
	● Lesson 3: Activity 1: Strategies to Add
	● Lesson 4: Activity 1: What is an Algorithm?
	● Lesson 5: Activity 1: A New Addition Algorithm
	● Lesson 6: Activity 2: How Would You Add?
	● Lesson 7: Activity 1: Strategies to Subtract
	● Lesson 8: Activity 1: From Drawings to an Algorithm
	● Lesson 9: Activity 1: Revise Subtraction Work
	● Lesson 10: Activity 1: A New Subtraction Algorithm
	● Lesson 11: Activity 1: Compare Two Subtraction Algorithms
	● Lesson 12: Activity 2: Greatest Difference, Smallest Difference
	● Lesson 13: Activity 2: Close to Multiples of 100
	● Lesson 14: Activity 1: Close to Multiples of 10
	● Lesson 15: Activity 1: Can the Nearest Ten and Hundred be the Same?
	● Lesson 16: Activity 2: What's My Mystery Number?
		Open Middle
		● Subtracting 3-Digit Numbers 2
		● Adding 3-Digit Numbers
		● Subtracting 3-Digit Numbers 1
		● Rounding 1
		● Rounding 2
		● Closest Difference to 200 – Problem 2
		● Subtraction with Zeros
		● Closest Difference to 200
		● Missing Digits
		● Marble Madness 1
		● Marble Madness 2
		● Close to 1000
		● Greatest Difference of Two Rounded Numbers
		● Subtraction to Get the Smallest Difference

	• Lesson 17: Activity 1: Quick Estimates • Lesson 19: Activity 1: Mai's Beads • Lesson 21: Activity 1: Make a Wish List	
Slow Reveal Graphs •	**Bootstrap (to be added Summer 2025)**	**Other Resources** • IM Talking Math
PHYSICAL MANIPULATIVES & RESOURCES	**VIRTUAL MANIPULATIVES & RESOURCES**	**VOCABULARY**
• Base-ten blocks • Card Sort: Numbers in Their Different Forms (groups of 2) • Numbers in Different Forms Round Table (groups of 1) • Tools for creating a visual display • Diagrams and Algorithms (groups of 2) • Paper clips • Pencils • Greatest Difference, Smallest Difference (groups of 2) • Index cards • Sticky notes	**Didax** • Two Color Counters - Didax • Two Color Counters | Teaching Tools **Toy Theatre** • Two Color Counters | Teaching Tools **Math Learning Center** • Number Frames • White Board • Base Ten Blocks	• algorithm • expanded form • rounding
SUMMARY OF KEY LEARNING		
Pacing This unit has been assigned 26 days in the Pacing Guide. The 26 days are allotted as follows: 21 lesson days as outlined below, 4 flexible days, and 1 assessment day. Lesson 21 is optional in this unit. **Teacher Resources:** Unit 3 Teacher's Guide (English) (Spanish) Unit 3 Teacher's Resource Pack (English) (Spanish) **Student Resources:** Unit 3 Student Workbook (English) (Spanish) **Section A: Add Within 1,000**		

LESSON 1: REPRESENT NUMBERS IN DIFFERENT WAYS (Teacher Guide)

Teacher-Facing Learning Intention
- Students are representing numbers to 1,000 in different ways using place value understanding.

Student-Facing Learning Intention
- Let's use place value to show numbers in different ways.

Success Criteria
- I can represent numbers to 1,000 in different ways using place value understanding

Lesson Purpose
- The purpose of this lesson is for students to represent numbers using base-ten blocks, base-ten diagrams, expanded form, numerals, and word form.

Lesson Narrative
- Prior to this grade, students represented numbers within 1,000 using number names, base-ten blocks and diagrams, and expanded form. They used place value to compose and decompose numbers within 1,000. In this lesson, students revisit these familiar representations and ways of reasoning about numbers as they work to build fluency with addition and subtraction within 1,000. The base-ten diagrams and the
expanded form will continue to be used to support students throughout this unit. Give students access to base-ten blocks, in case requested.

	Vocabulary ● expanded form **Materials** ● Base-ten blocks

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Mathematical Practice Standards** ● **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.A.1** Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals. ● **NCTM.MATH.CONTENT.3-5.NUM.A.2** Recognize equivalent representations for the same number and generate them by decomposing and composing numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof ● **PR5.** Representation

Warm-up: Which One Doesn't Belong: Numbers within 1,000 (10 minutes)

- This warm-up prompts students to compare numbers represented in different ways. It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the items in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as place value, hundreds, tens, ones, sum, or base-ten diagram.

Activity 1: Introduce Connecting Cubes, Explore (15 minutes)

- The purpose of this activity is for students to revisit numbers that are written in different forms. Students match numbers represented in different forms: base-ten numerals, base-ten diagrams, number names, and expanded form. As they make matches, students use their understanding of base-ten structure represented in many different ways
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Students should take turns finding a match and explaining their reasoning to their partner. Display the following sentence frames for all to see: "I noticed ___ , so I matched . . ." Encourage students to challenge each other when they disagree. Advances: Listening, Speaking
  - **Access for Students with Disabilities**: Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce the remaining cards once students have completed their initial set of matches. Supports accessibility for: Attention, Visual-Spatial Processing

Activity 2: Numbers in Different Forms Round Table (20 minutes)

- The purpose of this activity is for students to use place value understanding from grade 2 to decompose numbers in different ways. In small groups, students start by writing a three-digit number, and then pass their number to the group member to their right. Each time students receive the number, they decompose it in a different way. In the synthesis, students look for connections in the ways their number was decomposed, and in all the recording sheets in their group. Highlight connections that show that place value can be used to represent a number as different combinations of hundreds, tens, and ones. This will be helpful later in the unit when students add and subtract using strategies and algorithms based on place value.

Supplemental Resources ● Card Sort: Numbers in Their Different Forms (pdf)	**Assessment Resources** ● 3.3.1 Cool Down.pdf

• Suggested Centers
  ◦ Target Numbers (1–5) Stage 6: Add Hundreds, Tens, or Ones (pdf)
  ◦ Five in a Row: Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)	

LESSON 2: ADDITION AND SUBTRACTION SITUATIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are solving addition and subtraction problems within 1,000 in a way that makes sense to them.

Student-Facing Learning Intention

- Let's solve problems using addition and subtraction.

Success Criteria

- I can solve addition and subtraction problems within 1,000 in different ways.

Lesson Purpose

- The purpose of this lesson is for students to use addition and subtraction to solve problems within 1,000.

Lesson Narrative

- Prior to this grade, students used various strategies and representations to solve problems involving addition and subtraction of multi-digit numbers (first within 100, and then within 1,000). This lesson enables the teacher to see the strategies and representations that students use, which may include base-ten blocks or diagrams, number lines, or equations. It also elicits what students know about using place value to add or subtract (for instance, combining hundreds and hundreds, tens and tens, and ones and ones). The work here prepares students to learn algorithms for addition and subtraction, which are also grounded in the same ideas.

Vocabulary

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Materials

- Activity 1: Base-ten block

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
- **NJSLS.MATH.CONTENT.3.OA.D.9**
  Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.1**
  Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.
- **NCTM.MATH.CONTENT.3-5.NUM.A.2**
  Recognize equivalent representations for the same number and generate them by decomposing and composing numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof
- **PR5.** Representation

Warm-up: Notice and Wonder: Two Curious Tables (10 minutes) The purpose of this warm-up is to elicit observations about patterns in addition to tables containing sums of two-digit addends that are multiples of 10. Each table is partially filled out to show certain behaviors of the sums and highlight some properties of operations. For example, the sums in the first table can illustrate the commutative property (10+30 and 30+10 both give 40). The sums in the second table can help students to intuit the associative property (50+10=(40+10)+10=40+(10+10)=40+20, though students are not expected to generate equations as shown here). While students may notice and wonder many things about the additional tables, focus the discussion on the patterns in the tables and possible explanations for them. When students make sense of patterns in sums and try to explain them in terms of the features of the addends and how they are added, they look for and make use of structure (MP7).
Activity 1: Monuments and Falls (25 minutes) ● The purpose of this activity is for students to solve word problems that involve adding or subtracting numbers within 1,000, using strategies they are familiar with from earlier grades. The goal is to elicit and highlight strategies that rely on place value understanding, in preparation for upcoming work on addition and subtraction algorithms, which also rely on place value. Monitor for the following strategies as students work on the last problem about the Eiffel Tower: Starting at 328 and counting on by place to 674. This could be represented on a number line or a series of equations. Starting at 674 and counting back to 328. This could be represented on a number line or as a series of equations. Subtracting 328 from 674 using base-ten blocks, subtracting hundreds from hundreds, tens from tens, and ones from ones, trading a ten for more ones as needed. As students interpret quantities in context, reason about ways to represent them, and consider the solutions in terms of the situation, they practice reasoning quantitatively and abstractly (MP2).
Activity 2: Journal About Connections (10 minutes) ● The purpose of this activity is for students to reflect on the strategies they used in the first activity. This is an opportunity to check in with students about the strategies from grade 2 they are comfortable using and those they find more challenging. ○ **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Invite students to begin partner interactions by repeating the question, "What math did you do today that connected to something you did in an earlier grade? Describe something you really understand after today's lesson." Advances: Conversing ○ **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Provide students with alternatives to writing on paper: students can share their response to the prompt orally, with the option of using manipulatives, instead of writing it on paper. Supports accessibility for: Fine Motor Skills, Social-Emotional Functioning

Supplemental Resources	**Assessment Resources**
● Numbers In Different Forms Roundtable (pdf) ● Suggested Centers ○ Target Numbers (1–5) Stage 6: Add Hundreds, Tens, or Ones (pdf) ○ Five in a Row: Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf) ○ Rectangle Rumble (3–5) ■ Stage 2: Factors 1–5 Grid (pdf) ■ Stage 2: Factors 1–5 Spinner (pdf)	● 3.3.2 Cool Down.pdf

LESSON 3: ADD YOUR WAY (Teacher Guide)	
Teacher-Facing Learning Intention	**Lesson Purpose**

• Students are adding within 1,000 in a way that makes sense to them. **Student-Facing Learning Intention** • Let's add numbers within 1,000. **Success Criteria** • I can add within 1,000 in a way that makes sense to them.	• The purpose of this lesson is for students to use strategies to add within 1,000. **Lesson Narrative** • In this lesson, students review a variety of strategies used to add within 1,000 with an emphasis on adding hundreds and hundreds, tens and tens, and ones and ones. Students should have access to base-ten blocks. **Vocabulary** • **Materials** • Activity 1: Base-ten blocks

New Jersey State Learning Standards • **NJSLS.MATH.CONTENT.3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Mathematical Practice Standards** • **MP5.** Use appropriate tools strategically.	**National Council of Teachers of Mathematics Content Standards** • **NCTM.MATH.CONTENT.3-5.NUM.A.1** Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals. • **NCTM.MATH.CONTENT.3-5.NUM.A.2** Recognize equivalent representations for the same number and generate them by decomposing and composing numbers. **National Council of Teachers of Mathematics Process Standards** • **PR1.** Problem Solving • **PR2.** Reasoning & Proof • **PR5.** Representation

Warm-up: Number Talk: Hundreds, Tens, and Ones (10 minutes)
The purpose of this Number Talk is to elicit strategies and understandings students have for adding three-digit numbers. These understandings help students develop fluency and will be helpful later in this lesson when students are to use strategies based on place value and properties of operations to add within 1,000.

Activity 1: Strategies to Add (25 minutes)
- The purpose of this activity is for students to add within 1,000 using any strategy that makes sense to them. The expressions in this activity give students a chance to use different strategies, such as adding hundreds to hundreds, tens to tens, and ones to ones, reasoning with numbers close to a hundred, or using a variety of representations. Students who use base-ten blocks or draw number line diagrams choose appropriate tools strategically (MP5).
  - **Access for Students with Disabilities:** *Engagement: Provide Access by Recruiting Interest.* Leverage choice around perceived challenge. Invite students to select 3 of the 4 expressions to complete. Encourage the completion of the last two expressions, as they will be the focus of the synthesis. Supports accessibility for: Organization, Attention, Social-emotional skills

Activity 2: Two Ways to Add (10 minutes)
- The purpose of this activity is for students to see that they can start adding from the largest place-value unit or from the smallest and still get the same sum. This understanding prepares students to use the standard algorithm for addition, which calls for starting with the ones.
  - **Access for Multilingual Learners:** MLR6 Three Reads: Keep books or devices closed. Display only the problem stem, without revealing the question. "We are going to read this problem 3 times." After the 1st Read: "Tell your partner what this situation is about." After the 2nd Read: "List the

quantities. What can be counted or measured?" Reveal the question(s). After the 3rd Read: "What strategies can we use to solve this problem?" Advances: Reading, Representing

Supplemental Resources
- Suggested Centers
  - Target Numbers (1–5) Stage 6: Add Hundreds, Tens, or Ones (pdf)
  - Five in a Row: Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)
  - Rectangle Rumble (3–5)
    - Stage 2: Factors 1–5 Grid (pdf)
    - Stage 2: Factors 1–5 Spinner (pdf)

Assessment Resources
- 3.3.3 Cool Down.pdf

LESSON 4: INTRODUCTION TO ADDITION ALGORITHMS (**Teacher Guide**)

Teacher-Facing Learning Intention
- Students are adding within 1,000 and relating base-ten diagrams to written algorithms for addition.

Student-Facing Learning Intention
- Let's learn new ways to add.

Success Criteria
- I can add within 1,000 and relate base-ten diagrams to written algorithms for addition.

Lesson Purpose
- The purpose of this lesson is for students to use their knowledge of base-ten diagrams to make sense of two written addition algorithms.

Lesson Narrative
- In a previous lesson, students revisited addition within 1,000 using strategies based on place value, and properties of operations. An algorithm is different from a strategy because it is a set of steps that works every time as long as the steps are carried out correctly. The algorithms introduced in this lesson draw on the grade 2 work within 1,000 in that they show the addition of ones to ones, tens to tens, and hundreds to hundreds. Students should have access to base-ten blocks if they choose to use them.

Vocabulary
- algorithm

Materials
- Base-ten blocks

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Mathematical Practice Standards
- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.C.2**
  Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Which One Doesn't Belong: 247 (10 minutes)

- This warm-up prompts students to compare three expressions and one three-digit number. During the synthesis, ask students to explain the meaning of any terminology they use, such as the value of each expression and ways that place value was used to write the number 247 in different ways.

Activity 1: What is an Algorithm? (20 minutes)

- In this activity, students use their knowledge of base-ten representations and place value to make sense of two addition algorithms. One algorithm shows the addends in expanded form. Both algorithms show the sums of ones, tens, and hundreds separately, but display these partial sums differently. Students notice that both algorithms show hundreds added to hundreds, tens to tens, and ones to ones, regardless of order. In the synthesis, introduce the term "algorithm."
  - **Access for Multilingual Learners:** *MLR7 Compare and Connect.* Synthesis: Invite groups to prepare a visual display that shows the strategy they used to find the value of the sums. Encourage students to include details that will help others interpret their thinking. For example, specific language, using different colors, shading, arrows, labels, notes, diagrams or drawings. Give students time to investigate each others' work. During the whole-class discussion, ask students, "What did the representations have in common?", "How were they different?", "How did the total sum show up in each method?" Advances: Representing, Conversing

Activity 2: Try an Algorithm (15 minutes)

- The purpose of this activity is for students to try the algorithms they saw earlier in the lesson. The important thing is that they combine hundreds and hundreds, tens and tens, and ones and ones, which should be a familiar idea from grade 2. The synthesis provides an opportunity to show a different way of recording newly composed tens and hundreds when compositions are required, which will be discussed in more detail in subsequent lessons. Provide access to base-ten blocks for students to use to support their reasoning about the algorithms, in case requested. Students analyze and improve a given explanation of how to find a sum, filling in details and using more precise language to explain the calculation more fully (MP3, MP6). This activity uses MLR3 Clarify, Critique, Correct. Advances: reading, writing, representing
  - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after each chunk. Supports accessibility for: Organization, Social-Emotional Functioning

Supplemental Resources

- Suggested Centers
  - Target Numbers (1–5) Stage 6: Add Hundreds, Tens, or Ones (pdf)
  - Five in a Row: Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)
  - Rectangle Rumble (3–5)
    - Stage 2: Factors 1–5 Grid (pdf)
    - Stage 2: Factors 1–5 Spinner (pdf)

Assessment Resources

- 3.3.4 Cool Down.pdf

LESSON 5: ANOTHER ADDITION ALGORITHM (Teacher Guide)

Teacher-Facing Learning Intention

- Students are relating written algorithms to each other using place value understanding.

Student-Facing Learning Intention

- Let's learn another algorithm to add.

Lesson Purpose

- The purpose of this lesson is for students to use an addition algorithm that records a single digit for the sum for each place value position and a 10 or 100 for a newly composed ten or hundred.

Lesson Narrative

- In this lesson, students learn an addition algorithm in which a single digit is recorded for the sum of each place value position. Students relate this algorithm to an algorithm they worked with in the

Success Criteria ● I can relate written algorithms to each other using place value understanding.	previous lesson. Students also learn a method for recording a newly composed ten or hundred as a 10 or 100 above the addends. Students recognize that the new algorithm and new method of recording newly composed tens or hundreds are based on the idea of adding units by place value. **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Mathematical Practice Standards** ● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP6.** Attend to precision.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.C.2** Develop fluency in adding, subtracting, multiplying, and dividing whole numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof

Warm-up: Notice and Wonder: Another Curious Table (10 minutes)

- The purpose of this warm-up is to elicit observations about patterns in sums of two- and three-digit addends in an addition table. The table is partially filled out to highlight some properties of operations. For example, the sums in the table can illustrate the commutative property (and both give 197). The numbers also prompt students to notice patterns in sums of odd and even numbers. For example, the sum of an odd number and an even one is always odd.
- While students may notice and wonder many things about the addition table, focus the discussion on the patterns in the table and possible explanations for them. When students make sense of patterns in sums and explain them in terms of the features of the addends and how they are added, they notice and use regularity in repeated reasoning (MP7).

Activity 1: A New Addition Algorithm (15 minutes)

- The purpose of this activity is for students to learn an algorithm in which a single digit is recorded as each place value position is added. Students use an algorithm from a prior lesson to make sense of the new algorithm. They learn that single digits can be used to represent the sum in each place value position because of what we know about place value.
    - **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches. Supports accessibility for: Conceptual Processing

Activity 2: Compose New Units (20 minutes):

- The purpose of this activity is for students to consider how the composition of new tens and hundreds are recorded in the algorithm they saw in the previous activity. Students interpret the work and thinking of others and discuss the similarities and differences in two different strategies for finding a sum (MP3). Students see that in Elena's algorithm, when the sum of the digits in a place has more than one digit, a newly composed ten or hundred is recorded as "10" or "100" above the addends, while the remaining value is recorded as a single digit below the addends. The synthesis focuses on clarifying how to record newly composed units when adding two numbers.
    - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: Some students may benefit from the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking

Supplemental Resources

- Suggested Centers
  - Target Numbers (1–5) Stage 6: Add Hundreds, Tens, or Ones (pdf)
  - Five in a Row: Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)
  - Rectangle Rumble (3–5)
    - Stage 2: Factors 1–5 Grid (pdf)
    - Stage 2: Factors 1–5 Spinner (pdf)

Assessment Resources

- 3.3.5 Cool Down.pdf

LESSON 6: USE STRATEGIES AND ALGORITHMS TO ADD (Teacher Guide)

Teacher-Facing Learning Intention

- Students are adding within 1,000 using an algorithm or another strategy based on the numbers being added.

Student-Facing Learning Intention

- Let's decide when to use algorithms and when to use other strategies to add.

Success Criteria

- I can add within 1,000 using an algorithm or another strategy based on the numbers being added.

Lesson Purpose

- The purpose of this lesson is for students to record newly composed tens and hundreds with a single digit and to consider when they might use algorithms or other strategies to add.

Lesson Narrative

- In previous lessons, students learned how to use an algorithm that records a single digit for the sum in each place value position, but records 10 or 100 for a newly composed ten or hundred. The purpose of
  this lesson is for students to continue to work with algorithms, but see that newly composed tens or hundreds can be recorded as a single digit at the top of the tens column or hundreds column. Students also take time to consider when it makes sense to use an algorithm and when it makes sense to use another strategy, such as those learned in grade 2. Students will consider how thinking about the numbers in the problem can help them use their knowledge of addition flexibly to add within 1,000.

Vocabulary

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Materials

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Mathematical Practice Standards

- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.C.2**
  Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Number Talk: Little More, Little Less (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for adding within 1,000. These understandings help students develop fluency and will be helpful later in this lesson when students decide whether to use an algorithm or another strategy to add.
- When students notice that a number is close to a multiple of 100 and use this to add, they are looking for and making use of structure (MP7).

Activity 1: Just Ones (15 minutes)

- The purpose of this activity is for students to compare two methods to record newly composed tens and hundreds when using the same algorithm. The first method, which students saw in a previous lesson, records the newly composed tens and hundreds as a 10 or 100 at the top of the problem. The second method records the newly composed tens and hundreds as a single digit of 1 at the top of the tens and hundreds column. It is important that students understand that an additional 1 in the tens column represents a newly composed ten and an additional 1 in the hundreds column represents a newly composed hundred. Students interpret the work and thinking shown in the different methods, and discuss the similarities and differences (MP3).
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: Revoice student ideas to demonstrate and amplify mathematical language use. For example, revise the student statement "because when you add 7 and 6, that's 13, so you have 1 more" as "because when you add 7 and 6, that's 13, so now we have three ones and one new ten." Advances: Speaking

Activity 2: How Would You Add? (20 minutes)

- The purpose of this activity is for students to choose an algorithm or other strategy to add within 1,000. Students should attend to the details of numbers in the problems that could indicate whether a particular strategy or algorithm is most useful. The important thing is that students choose an algorithm or strategy that they can use efficiently and accurately for the given problem.
  - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Check in and provide each group with feedback that encourages collaboration and community. For example, check that students are staying on task, using math vocabulary, and sharing how they solved the problem. Supports accessibility for: Social-Emotional Functioning

Supplemental Resources	**Assessment Resources**

• Suggested Centers
  ◦ Numbers (1–5) Stage 6: Add Hundreds, Tens, or Ones (pdf)
  ◦ Five in a Row: Addition and Subtraction (1–2) Stage 8: Add within 1,000 with Composing (pdf)
  ◦ Rectangle Rumble (3–5)
    ▪ Stage 2: Factors 1–5 Grid (pdf)
    ▪ Stage 2: Factors 1–5 Spinner (pdf)
	• 3.3.6 Cool Down.pdf

LESSON 7: SUBTRACT YOUR WAY (Teacher Guide)

Teacher-Facing Learning Intention	**Lesson Purpose**
• Students are subtracting within 1,000 in a way that makes sense to them. **Student-Facing Learning Intention** • Let's use different strategies to subtract within 1,000. **Success Criteria**	• The purpose of this lesson is to activate the strategies students have for subtracting numbers within 1,000. **Lesson Narrative** • In grade 2, students subtracted numbers within 1,000 using various strategies based on place value and the associative and commutative properties of addition. They used base-ten blocks, base-ten diagrams, equations, and number lines to represent their reasoning. In this lesson, they review a

• I can subtract within 1,000 in a way that makes sense to them.	variety of strategies with an emphasis on subtracting hundreds and hundreds, tens and tens, and ones and ones. Students should have access to base-ten blocks. **Vocabulary** ● **Materials** ● Activity 1: Base-ten blocks ● Activity 1: Tools for creating a visual display

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Mathematical Practice Standards** ● **MP5.** Use appropriate tools strategically.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.A.2** Recognize equivalent representations for the same number and generate them by decomposing and composing numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof

Warm-up: Number Talk: Subtract Two-Digit Numbers (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for subtracting numbers within 1,000. These understandings help students develop fluency and will be helpful as students relate subtraction algorithms to strategies they have used to subtract within 1,000.

Activity 1: Strategies to Subtract (25 minutes)

- The purpose of this activity is for students to subtract numbers within 1,000 using any strategy that makes sense to them to find the difference of two numbers within 1,000. The expressions in this activity give students a chance to use different strategies, such as subtracting hundreds from hundreds, tens from tens, and ones from ones, or adding up. Students may also use a variety of representations, which will be the focus of the activity synthesis. Students who choose to use base-ten blocks or number lines to represent their thinking use tools strategically (MP5).
  - **Access for Students with Disabilities:** Representation: Develop Language and Symbols. Synthesis: Invite students to explain their thinking orally instead of through a visual display. Supports accessibility for: Social-Emotional Functioning and Fine Motor Skills

Activity 2: Base-ten Drawings (10 minutes)

- The purpose of this activity is for students to make sense of drawings of base-ten blocks. Students compare two base-ten drawings. The first drawing is the same as what they saw in grade 2, where the tens block is decomposed into 10 individual ones and moved over to the ones place before subtracting the ones. In the second drawing, the tens block is moved over and partitioned into 10 parts but not decomposed into individual ones. The subtraction of ones is shown directly on the ten that was moved over. Students then match base-ten diagrams to subtraction expressions and subtract to find the value of each expression. This will be helpful in later lessons when students relate base-ten diagrams to written algorithms.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Some students may benefit from the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking

Supplemental Resources ● Suggested Centers	**Assessment Resources** ● [3.3.7 Cool Down.pdf]

◦ How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards) ◦ Number Puzzles: Addition and Subtraction (1–4) Stage 5: Within 1,000 (pdf)	

LESSON 8: SUBTRACTION ALGORITHMS (PART 1) (Teacher Guide)

Teacher-Facing Learning Intention ● Students are relating base-ten diagrams to written algorithms for subtraction. **Student-Facing Learning Intention** ● Let's use base-ten diagrams to learn a new way to subtract. **Success Criteria** ● I can relate base-ten diagrams to written algorithms for subtraction.	**Lesson Purpose** ● The purpose of this lesson is for students to use their knowledge of base-ten diagrams to make sense of a written subtraction algorithm. **Lesson Narrative** ● In previous lessons, students revisited subtraction within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction. In this lesson, students are introduced to a subtraction algorithm that clearly shows the subtraction of ones from ones, tens from tens, and hundreds from hundreds, and is similar to one of the initial addition algorithms in a prior lesson. Students should have access to base-ten blocks as needed. **Vocabulary** ● **Materials** ● Activity 2: Diagrams and Algorithms (groups of 2) ● Activity 2: Create a set of cards from the blackline master for each group of 2.

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Mathematical Practice Standards** ● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP6.** Attend to precision.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.A.2** Recognize equivalent representations for the same number and generate them by decomposing and composing numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof

Warm-up: Number Talk: Subtraction Strategies (10 minutes)
- The purpose of this Number Talk is to elicit strategies students have for subtracting within 1,000. These understandings help students develop fluency and will be helpful later when students choose between using an algorithm or another strategy to subtract.

Activity 1: From Drawings to an Algorithm (15 minutes)
- The purpose of this activity is for students to use their knowledge of base-ten diagrams and place value to make sense of a subtraction algorithm. Students notice that in both the base-ten drawing and the algorithm, the subtraction happens by place. We can find the difference of two numbers by subtracting ones from ones, tens from tens, and hundreds from hundreds, and adding these partial differences to find the overall difference. Students also recall that sometimes

a place value unit needs to be decomposed before subtracting. For example, a ten may first need to be decomposed into 10 ones. This decomposition can be seen in both the base-ten drawing and in the algorithm. In the synthesis, students interpret the work and reasoning of others (MP3).

Activity 2: Card Sort: Diagrams and Algorithms (20 minutes)

- The purpose of this activity is for students to analyze the connections between algorithms and base-ten diagrams that represent subtraction. In particular, students relate how the two strategies show a hundred decomposed into tens and a ten into ones in order to facilitate subtraction. As students work, encourage them to refine their descriptions of what is happening in both the diagrams and the algorithms using more precise language and mathematical terms (MP6).
    - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Students should take turns finding a match and explaining their reasoning to their partner. Display the following sentence frames for all to see: “I noticed _____ , so I matched . . . .” Encourage students to challenge each other when they disagree. Advances: Listening, Speaking, Representing
    - **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence.* Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce remaining cards once students have completed their initial set of matches. Supports accessibility for: Organization, Social-Emotional Functioning

Supplemental Resources

- Diagrams and Algorithms (pdf)
- Suggested Centers
    - How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards)
    - Number Puzzles: Addition and Subtraction (1–4) Stage 5: Within 1,000 (pdf)
    - Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)

Assessment Resources

- 3.3.8 Cool Down.pdf

LESSON 9: SUBTRACTION ALGORITHMS (PART 2) (Teacher Guide)

Teacher-Facing Learning Intention

- Students are analyzing and using a subtraction algorithm with the numbers written in expanded form.

Student-Facing Learning Intention

- Let’s learn more about our first subtraction algorithm.

Success Criteria

- I can analyze and use a subtraction algorithm with the numbers written in expanded form.

Lesson Purpose

- The purpose of this lesson is for students to subtract within 1,000 using a subtraction algorithm that records numbers in expanded form.

Lesson Narrative

- Previously, students learned to record subtraction using an algorithm in which the numbers are written in expanded form. They made connections between the structure and steps of the algorithm to those of base-ten diagrams that represent the same subtraction. In this lesson, students take a closer look at the algorithm and use it to find differences. They also examine a common error in subtracting numbers when decomposition of a place value unit is required. When students discuss shown work, they construct viable arguments and critique the reasoning of others (MP3).

Vocabulary

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Materials

- Activity 1 & 2: Base-ten blocks

New Jersey State Learning Standards	National Council of Teachers of Mathematics Content Standards
New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Mathematical Practice Standards** ● **MP3.** Construct viable arguments and critique the reasoning of others.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.A.2** Recognize equivalent representations for the same number and generate them by decomposing and composing numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof

Warm-up: True or False: Does It Commute? (10 minutes)

- The purpose of this True or False is to elicit insights students have about how the commutative property applies to addition and multiplication, but not subtraction. The reasoning students do here helps to deepen their understanding of the properties of operations and how they apply to subtracting within 1,000. It will also be helpful later when students need to recognize the need to decompose hundreds or tens to get more tens or ones.

Activity 1: Revise Subtraction Work (15 minutes)

- The purpose of this activity is for students to examine an error in an algorithm in which a larger digit is subtracted from a smaller digit in the same place value position. In such a case, it is common for students to subtract the smaller digit from the larger digit instead, not realizing that subtraction is not commutative. The given algorithm here shows the numbers in expanded form to help students see that it is necessary to first decompose a hundred into tens before the 50 can be subtracted from 20. When students make sense of and correct Lin's mistake, they construct viable arguments and critique the reasoning of others (MP3).

Activity 2: Try the Algorithm (20 minutes)

- The purpose of this activity is for students to practice using the subtraction algorithm introduced in a previous lesson. Provide base-ten blocks for students who choose to use them to support their reasoning about the algorithm.
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports:* Synthesis: Before students share their reasoning, remind them to use words such as decompose, ones, tens, and hundreds. Advances: Speaking, Representing
  - **Access for Students with Disabilities:** *Engagement: Provide Access by Recruiting Interest.* Leverage choice around perceived challenge. Invite students to select at least 3 of 5 problems to complete. Supports accessibility for: Organization, Attention, Social-emotional skills

Supplemental Resources	Assessment Resources
Supplemental Resources ● Suggested Centers ○ How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards) ○ Number Puzzles: Addition and Subtraction (1–4) Stage 5: Within 1,000 (pdf) ○ Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)	**Assessment Resources** ● 3.3.9 Cool Down.pdf

LESSON 10: SUBTRACTION ALGORITHMS (PART 3) (Teacher Guide)

Teacher-Facing Learning Intention	Lesson Purpose
Teacher-Facing Learning Intention ● Students are relating subtraction algorithms to one another using place value understanding for numbers within 1,000.	**Lesson Purpose** ● The purpose of this lesson is for students to use a subtraction algorithm that records a single digit for the difference between the numbers in each place value position and a condensed notation for a decomposed hundred or ten.

Student-Facing Learning Intention

- Let's use another algorithm to subtract.

Success Criteria

- I can relate subtraction algorithms to one another using place value understanding.

Lesson Narrative

- In this lesson, students continue to learn how to use algorithms to subtract within 1,000. The new algorithm in this lesson draws attention to how place value can be used to record less digits in each place value position. This condensed notation also changes the steps of the algorithm because students don't write the numbers in expanded form to start or add up the partial differences at the end.

Vocabulary

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Materials

- Warm-up Activity
- Base-ten blocks

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Mathematical Practice Standards

- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.2**
  Recognize equivalent representations for the same number and generate them by decomposing and composing numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Notice and Wonder: Digits that Disappear (10 minutes)

- The purpose of this warm-up is to elicit the observation that a hundred that has been decomposed into more tens can be recorded using a condensed notation, which will be useful later in the lesson when students decompose hundreds and tens to facilitate subtraction. While students may notice and wonder many things about these numbers, how the decomposition is recorded is the important discussion point. Base-ten blocks or diagrams can be used during the discussion if students need additional support in making sense of the condensed notation.

Activity 1: A New Subtraction Algorithm (20 minutes)

- The purpose of this activity is for students to learn a subtraction algorithm that records the difference in each place value position as a single digit. The algorithm also records a decomposed hundred as a single digit in the hundreds place and as two digits in the tens place. Students carefully analyze and discuss two different ways to subtract, highlighting similarities and differences and explaining how and why they work (MP6).

Activity 2: Try Clare's Algorithm (15 minutes)

- The purpose of this activity is for students to practice using the algorithm they learned in the previous activity, in which the difference in each place value position is recorded with one digit and the decomposition of a place value unit is recorded using one or two digits.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Display sentence frames to support partner discussion: "First, I ____ because . . . .", and "Then, I ____ because . . . ." Advances: Speaking, Listening
  - **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were most important/needed to solve the problems. Display the sentence frame: "The next time I subtract using Clare's algorithm, I will look for . . . ." Supports accessibility for: Conceptual Processing

Supplemental Resources

- Suggested Centers
  - How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards)
  - Number Puzzles: Addition and Subtraction (1–4) Stage 5: Within 1,000 (pdf)
  - Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)

Assessment Resources

- 3.3.10 Cool Down.pdf

LESSON 11: ANALYZE SUBTRACTION ALGORITHMS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are analyzing different steps in subtraction algorithms and reason about when certain steps might be more productive.

Student-Facing Learning Intention

- Let's think about subtraction algorithms in more detail.

Success Criteria

- I can analyze different steps in subtraction algorithms and reason about when certain steps might be more productive.

Lesson Purpose

- The purpose of this lesson is for students to consider subtraction algorithms in more detail, with a focus
  on decomposing as needed and on cases when it is necessary to decompose multiple units to subtract across zeros.

Lesson Narrative

- In a previous lesson, students used a subtraction algorithm in which single digits were used to record the result of subtraction in any place value position and one or two digits were used to record any decompositions. They did any necessary decompositions before beginning to subtract. In this lesson, students make sense of and use an algorithm in which subtraction begins with the ones, decomposing units as needed as they work from right to left. Students also consider a case in which it is necessary to decompose a hundred and a ten in order to get more ones because there is a zero in the tens place.

Vocabulary

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Materials

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Mathematical Practice Standards

- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.2**
  Recognize equivalent representations for the same number and generate them by decomposing and composing numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Number Talk: Subtract within 1,000 (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for subtracting multi-digit numbers. These understandings help students develop fluency and will be helpful later in a subsequent lesson when students are to use strategies flexibly to subtract within 1,000.

Activity 1: Compare Two Subtraction Algorithms (20 minutes)

- The purpose of this activity is for students to consider two subtraction algorithms. In the first algorithm, students first look for any place value units where they need to decompose to get more units, then subtract right to left. In the second algorithm, subtraction occurs right to left, and units are decomposed as the need arises. Students try each algorithm and consider potential advantages and disadvantages of each algorithm. In the synthesis, students carefully analyze and discuss the two algorithms, explaining the motivation behind them and how they are the same and different (MP3, MP6).
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: For each idea that is shared, invite students to turn to a partner and restate what they heard using precise mathematical language.
  - **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence.* Some students may benefit from feedback that emphasizes effort, and time on task. For example, check in with students after completing the problem using the first algorithm. Supports accessibility for: Attention

Activity 2: Use an Algorithm? (15 minutes)

- The purpose of this activity is for students to make sense of an algorithm in which a number with non-zero digits is subtracted from a number with a zero in the tens place. In the given problem, it is necessary to decompose a larger unit to have enough ones to subtract. There are no tens to decompose, however, prompt students to consider whether subtraction is possible, and if so, how it could be done. When students make sense of Elena's reasoning, they construct viable arguments and critique the reasoning of others (MP3).

Supplemental Resources

- Suggested Centers
  - How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards)
  - Number Puzzles: Addition and Subtraction (1–4) Stage 5: Within 1,000 (pdf)
  - Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)

Assessment Resources

- 3.3.11 Cool Down.pdf

LESSON 12: SUBTRACT STRATEGICALLY (Teacher Guide)

Teacher-Facing Learning Intention

- Students are subtracting within 1,000 using algorithms or other strategies based on the numbers in the problem.

Student-Facing Learning Intention

- Let's consider when to use algorithms and when to use other strategies to subtract.

Success Criteria

- I can subtract within 1,000 using algorithms or other strategies based on the numbers in the problem.

Lesson Purpose

- The purpose of this lesson is for students to consider when they might use algorithms or other strategies to subtract.

Lesson Narrative

- Students have learned several subtraction algorithms in prior lessons. Now students take time to consider when it makes sense to use an algorithm and when it makes sense to use another strategy, such as those learned in grade 2. Students will consider how thinking about the numbers in the problem can help them use their knowledge of subtraction to flexibly subtract within 1,000.

Vocabulary

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Materials

- Activity 2:
  - Paper clips
  - Pencils

	● Activity 2: Each group of 2 will need a paper clip.

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
- **NJSLS.MATH.CONTENT.3.OA.B.5**
  Apply properties of operations as strategies to multiply and divide.2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)

Mathematical Practice Standards

- **MP7.** Look for and make use of structure.
- **MP8.** Look for and express regularity in repeated reasoning.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.2**
  Recognize equivalent representations for the same number and generate them by decomposing and composing numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Number Talk: Threes (10 minutes)

- The purpose of this Number Talk is to elicit strategies students have for finding products of single-digit factors. These reasoning strategies help students develop fluency and will be helpful later in this unit when students solve two-step word problems.
- When students use strategies based on the properties of multiplication to find unknown products, they look for and make use of structure (MP7). Students may reverse the order of the factors to create a multiplication fact they know. Students may think about “one more group” as they move from the first expression to the second expression (or the third to the fourth). Also, students may say that they “just know” the product. All of these responses are acceptable because students will be in different stages as they progress toward fluency.

Activity 1: How Would You Subtract? (20 minutes)

- The purpose of this activity is for students to choose a strategy or algorithm to subtract within 1,000. Students should attend to the details of numbers in the problems that could indicate whether a particular strategy or algorithm is most useful. The important thing is that students choose an algorithm or another strategy that they can use efficiently and accurately for the given problem. As students choose strategies to find the values of each expression, they look for common structure and observe regularity in repeated reasoning (MP7, MP8).
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Display sentence frames to support partner discussion: “Can you say more about . . .?” and
    “Why did you . . .?” Advances: Conversing, Representing
  - **Access for Students with Disabilities:** *Engagement: Provide Access by Recruiting Interest.* Revisit math community norms to prepare students for the activity in which they will be finding partners, sharing problem solving, and repeating with new partners. Supports accessibility for: Social-Emotional Functioning

Activity 2: Greatest Difference, Smallest Difference (15 minutes)

- The purpose of this activity is for students to play a game that enables them to practice using strategies and algorithms to subtract within 1,000. Students decide whether they will try to make the smallest or greatest difference, then spin a paper clip on a spinner to generate two three-digit numbers. Students use

their choice of strategy or algorithm to subtract the numbers. When students use place value to create a pair of numbers with a specific type of difference, they are looking for and making use of structure (MP7).

Supplemental Resources ● Greatest Difference, Smallest Difference (pdf) ● Suggested Centers ○ How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards) ○ Number Puzzles: Addition and Subtraction (1–4) Stage 5: Within 1,000 (pdf)	**Assessment Resources** ● 3.3.12 Cool Down.pdf

LESSON 13: MULTIPLES OF 100 (Teacher Guide)

Teacher-Facing Learning Intention ● Students are recognizing that numbers are often approximated by their closest multiples of 10 or 100. ● Students are learning the meaning of the nearest multiple of 100. **Student-Facing Learning Intention** ● Let's explore multiples of 100 and how other numbers relate to them. **Success Criteria** ● I can recognize that numbers are often approximated by their closest multiples of 10 or 100.	**Lesson Purpose** ● The purpose of this lesson is for students to reason about the position of numbers relative to their immediate multiples of 100, using number lines to do so. **Lesson Narrative** ● In grade 2, students learned to represent whole numbers within 1,000 and make sense of their relative sizes on a number line. They also used number lines to represent addition and subtraction, and they often and intuitively relied on multiples of 10 and 100 as benchmarks to reason about sums and differences. (For example, to find 105—17, they may start at 105, move 5 to the left to 100, move 10 more to the left to 90 and then move 2 more to land at 88.). In this lesson, students take a closer look at the relationship between numbers within 1,000 and multiples of 100. The lesson begins by eliciting students' informal ideas about what it means for numbers to be "close to" multiples of 100. Then, they use number lines to identify the multiples of 100 between which a two- or three-digit number lies and examine their relative distance from the number. The work with number lines here allows students to reason visually about proximity to multiples of 100, preparing them to reason numerically about nearest multiples of 100 and about the idea of rounding in upcoming lessons. **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.NBT.A.1** Use place value understanding to round whole numbers to the nearest 10 or 100. **Mathematical Practice Standards** ● **MP1.** Make sense of problems and persevere in solving them.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.C.2** Develop fluency in adding, subtracting, multiplying, and dividing whole numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving

● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP4.** Model with mathematics. ● **MP6.** Attend to precision. ● **MP7.** Look for and make use of structure.	● **PR2.** Reasoning & Proof

Warm-up: Estimation Exploration: Marching Band (10 minutes)

- The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. It gives students a low-stakes opportunity to share a mathematical claim and the thinking behind it (MP3). Asking yourself "Does this make sense?" is a component of making sense of problems (MP1), and making an estimate or a range of reasonable answers with incomplete information is a part of modeling with mathematics (MP4).

Activity 1: About 100? Close to 100? (10 minutes)

- The purpose of this activity is for students to think about what it means for numbers to be close to multiples of 100. There is no definition given about what "close to" means during the activity, so students may interpret the term in different ways.
  - **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches. Supports accessibility for: Memory

Activity 2: Close to Multiples of 100 (25 minutes)

- The purpose of this activity is for students to locate two- and three-digit numbers on a series of number lines. The endpoints of each number line are multiples of 100, and the space between them is partitioned into ten equal intervals. As they locate the numbers, students recognize each tick mark as a multiple of 10. Later in the activity, students use a number line to name the closest multiple of 100 to a given number. When students choose the correct number line and accurately place each number on the number line they attend to precision and show an understanding of place value (MP6, MP7).
  - **Access for Multilingual Learners:** MLR8 Discussion Supports: Create a visual display of the number lines. As students share their strategies, annotate the display to illustrate connections. For example, as students talk about their numbers and number lines, write the number below the appropriate tick mark, and draw arrows to show the closest multiple of 100 they identified. Advances: Speaking, Representing

Supplemental Resources	**Assessment Resources**
● Suggested Centers ○ Target Numbers (1-5) Stage 7: Subtract Hundreds, Tens, or Ones (pdf) ○ How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards)	● 3.3.13 Cool Down.pdf

LESSON 14: NEAREST MULTIPLES OF 10 AND 100 (Teacher Guide)

Teacher-Facing Learning Intention	**Lesson Purpose**
● Students are learning to identify the closest multiples of 10 and 100 for numbers within 1,000. ● Students are learning that rounding is a formal way to say which number a given number is closer to, and that number is often a multiple of 10 or 100.	● The purpose of this lesson is for students to reason about the position of numbers relative to their immediate multiples of 10 and 100, using number lines to do so. **Lesson Narrative** ● In a previous lesson, students reasoned about the nearest multiple of 100 to a given number. In this lesson, students extend this work to include multiples of 10. The work here prepares students to round numbers to the nearest ten and hundred in upcoming lessons. Number lines are still a central

Student-Facing Learning Intention

- Let's find the closest multiple of 100 and the closest multiple of 10.

Success Criteria

- I can model and explain how and why we round to the nearest ten or hundred.

representation early in the lesson. Later in the lesson, students begin to reason numerically and think about how they could find the nearest multiple of 10 or 100 if a number line is not provided. Students should be encouraged to consider alternative strategies and use what they know about place value, but can still draw a number line if it is needed. In the lesson synthesis, students learn that rounding is a formal way to say which number a given number is closer to, and that number is often a multiple of 10 or 100.

Vocabulary

- rounding

Materials

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NBT.A.1**
  Use place value understanding to round whole numbers to the nearest 10 or 100.

Mathematical Practice Standards

- **MP8.** Look for and express regularity in repeated reasoning.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.C.2**
  Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Estimation Exploration: What Number Could this Be? (10 minutes)

- The purpose of this Estimation Exploration is for students to think about what value a point on the number line could represent. The only labeled tick marks are hundreds so students need to reason about what numbers are in between and how far the point is from the labeled numbers.

Activity 1: Close to Multiples of 10 (20 minutes)

- Previously, students identified two multiples of 100 that border a given number, reasoned about their relative distance from the number, and then named the nearest multiple of 100. The purpose of this activity is for students to practice naming the nearest multiple of 100 and apply the same reasoning to identify the nearest multiple of 10. They determine two multiples of 10 that are closest to a given number (two intermediate tick marks on the number line) and then identify the multiple of 10 that is closer.
  - **Access for Students with Disabilities:** *Engagement: Provide Access by Recruiting Interest.* Leverage choice around perceived challenge. Invite students to select at least 3 of the 5 problems to complete. Supports accessibility for: Organization, Attention, Social-emotional skills

Activity 2: The Nearest Multiples (15 minutes)

- In this activity, students identify the nearest multiples of 10 and 100 for given three-digit numbers. They may do so by using the number lines from earlier, but they may also start to notice a pattern in the relationship between the numbers and the nearest multiples and decide not to use number lines. The work here prepares students to reason numerically in the next lesson. When students notice and describe patterns in the relationship between the numbers and the nearest multiples of 10 or 100, they look for and express regularity in repeated reasoning (MP8).
  - **Access for Multilingual Learners:** *MLR2 Collect and Display:* Circulate, listen for, and collect the language students use as they make sense of "close to" and "about." On a visible display, record words and phrases such as: "almost 100, but not exactly," "only 1 away from 100," "less than 5 away." Invite students to borrow language from the display as needed, and update it throughout the lesson. Advances: Conversing, Reading

Supplemental Resources

- Suggested Centers
  - Target Numbers (1-5) Stage 7: Subtract Hundreds, Tens, or Ones (pdf)
  - How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards)
  - Capture Squares (1–3) Stage 6: Multiply with 1–5 (Gameboard) (Spinner)

Assessment Resources

- 3.3.14 Cool Down.pdf

LESSON 15: ROUND TO THE NEAREST TEN AND HUNDRED (Teacher Guide)

Teacher-Facing Learning Intention

- Students are rounding whole numbers within 1,000 to the nearest ten and hundred, using the convention of rounding up when the number is halfway between two multiples of 10 or 100.

Student-Facing Learning Intention

- Let's round to the nearest ten and hundred.

Success Criteria

- I can round whole numbers within 1,000 to the nearest ten and hundred, using the convention of rounding up when the number is halfway between two multiples of 10 or 100.

Lesson Purpose

- The purpose of this lesson is for students to round whole numbers within 1,000 to the nearest ten or hundred.

Lesson Narrative

- Before this lesson, students named multiples of 10 and 100 that are near given numbers and identified the multiple of 10 or 100 that was closest. They located numbers on a number line and approximated their distance from adjacent tick marks that indicate tens, or from endpoints that mark hundreds. Here, students learn that sometimes, when we round to the nearest ten and the nearest hundred, we round to the same number. Students also learn that when numbers are right in the middle of two multiples of 10 or 100, the convention is to round up. Students use rounding to estimate the number of students in a school and see that rounding to the nearest ten and the nearest hundred can give different estimates for the same situation.

Vocabulary

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Materials

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NBT.A.1**
  Use place value understanding to round whole numbers to the nearest 10 or 100.

Mathematical Practice Standards

- **MP3.** Construct viable arguments and critique the reasoning of others.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.C.2**
  Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Choral Count: Tens and Hundreds (10 minutes)

- The purpose of this Choral Count is for students to practice counting by 10 and 100 and notice patterns in the count. These understandings help students develop fluency and will help students see that multiples of 100 are also multiples of 10, and prepare them to round large numbers to the nearest ten and hundred.

Activity 1: Can the Nearest Ten and Hundred be the Same? (20 minutes)

- The purpose of this activity is for students to round given numbers to the nearest ten and hundred and see that the result can be the same for some numbers. Students think about what it means to round a number that is exactly halfway between two tens or two hundreds and are introduced in the synthesis to the convention that these numbers are rounded up (MP3).
    - **Access for Multilingual Learners:** *MLR1 Stronger and Clearer Each Time:* Before the whole-class discussion, give students time to meet with 2–3 partners to share and get feedback on their response to “What does 97 round to when we are rounding to the nearest 10? To the nearest hundred? Why does that happen?” Invite listeners to ask questions, to press for details and to suggest mathematical language. Give students 2–3 minutes to revise their written explanation based on the feedback they receive. Advances: Writing, Speaking, Listening
    - **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were most useful to solve the problems. Display the sentence frame, “The next time I round numbers to the nearest ten and nearest hundred, I will pay attention to . . . .“ Supports accessibility for: Conceptual Processing

Activity 2: Round to Estimate (15 minutes)

- The purpose of this activity is for students to practice rounding to the nearest ten and hundred in context. Students work with numbers from a previous lesson to estimate the total number of students in a school. They learn that how you round (to the nearest ten or hundred) can give different estimates for the same situation.

Supplemental Resources	Assessment Resources

- Suggested Centers
  ○ Target Numbers (1-5) Stage 7: Subtract Hundreds, Tens, or Ones (pdf)
  ○ How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards)
  ○ Capture Squares (1–3) Stage 6: Multiply with 1–5 (Gameboard) (Spinner)
	- 3.3.15 Cool Down.pdf

LESSON 16: ROUND AND ROUND AGAIN (Teacher Guide)

Teacher-Facing Learning Intention

- Students are recognizing and generalizing patterns in the rounding of whole numbers within 1,000.

Student-Facing Learning Intention

- Let’s look for patterns in rounding.

Success Criteria

- I can recognize and generalize patterns in the rounding of whole numbers within 1,000.

Lesson Purpose

- The purpose of this lesson is for students to use their understanding of rounding to consider all the numbers that round to a given number.

Lesson Narrative

- Students deepen their understanding of rounding to go beyond accurately rounding individual numbers as they think about what numbers round to a given number. Working backward from a multiple of 10 or 100 allows students to think about the relative distance of numbers and the range of numbers that round to the given multiple of 10 or 100. Students then use this understanding to write clues to help their classmates guess a mystery number. What a number rounds to becomes a useful way to describe a number in this game.

	Vocabulary - **Materials** - Activity 2: Index cards

New Jersey State Learning Standards - **NJSLS.MATH.CONTENT.3.NBT.A.1** Use place value understanding to round whole numbers to the nearest 10 or 100. - **NJSLS.MATH.CONTENT.3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Mathematical Practice Standards** - **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** - **NCTM.MATH.CONTENT.3-5.NUM.A.3** Represent and analyze patterns and functions, using words, tables, and graphs. **National Council of Teachers of Mathematics Process Standards** - **PS1.** Problem Solving - **PS2.** Reasoning & Proof - **PS5.** Representation

Warm-up: Number Talk: More Groups, Fewer Groups (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for products of 4 and 6 as they relate to products of 5. These understandings help students develop fluency and will be helpful later when students consider solutions for and solve two-step word problems.
- When students use products of 5 to determine products of 4 by thinking of them as one fewer group or one fewer object in each group, or work from products of 5 to determine products of 6 by thinking of them as one more group or one more object in each group, they look for and make use of structure (MP7).

Activity 1: All the Numbers (15 minutes)

- The purpose of this activity is for students to apply what they learned about rounding in prior lessons to think about all the numbers that would round to a given number. Students should be encouraged to use whatever representations make sense to them. Although the number line is often used to represent rounding, it is also worth sharing other ways that students are representing or thinking about rounding.
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: Some students may benefit from the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking

Activity 2: What's My Mystery Number? (20 minutes)

- The purpose of this activity is for students to apply what they've learned about rounding to play a game in which each student generates a mystery number with three clues. The three clues describe whether the mystery number is even or odd, what it rounds to, and two numbers that it's between. It is possible that more than one number can fit the clues provided. In the synthesis, students reflect on which clues were most helpful for determining the mystery number.
  - **Access for Students with Disabilities:** Action and Expression: Internalize Executive Functions. Check for understanding by inviting students to rephrase directions in their own words. Keep a display of directions visible throughout the activity. Supports accessibility for: Memory, Organization

Supplemental Resources - Suggested Centers - Target Numbers (1-5) Stage 7: Subtract Hundreds, Tens, or Ones (pdf)	**Assessment Resources** - 3.3.16 Cool Down.pdf

- How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards)
- Capture Squares (1–3) Stage 6: Multiply with 1–5 (Gameboard) (Spinner)

LESSON 17: DOES IT MAKE SENSE? (Teacher Guide)

Teacher-Facing Learning Intention

- Students are assessing the reasonableness of answers using mental computation and estimation strategies including rounding.
- Students are solving two-step word problems using addition and subtraction in a way that makes sense to them.

Student-Facing Learning Intention

- Let's decide if my answers make sense.

Success Criteria

- I can solve two-step word problems and assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Lesson Purpose

- The purpose of this lesson is for students to use mental computation and estimation strategies such as rounding to decide if answers to two-step word problems make sense.

Lesson Narrative

- Previously, students extended their understanding of addition and subtraction within 1,000 and learned how to round to the nearest ten and hundred. In this lesson, students work with two-step word problems and decide if a given answer for a two-step problem is reasonable. Students estimate answers to two-step problems and determine if each other's solutions make sense after they solve two-step word problems in a way that makes sense to them.

Vocabulary

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Materials

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.D.8**
  Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations)

Mathematical Practice Standards

- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.C.4**
  Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results.

National Council of Teachers of Mathematics Process Standards

- **PS1.** Problem Solving
- **PS2.** Reasoning & Proof
- **PS5.** Representation

Warm-up: True or False: Is it Greater? (10 minutes)

- The purpose of this True or False is to elicit strategies students have for estimating. The reasoning students do here helps to deepen their understanding of how rounding can be used to estimate. It will also be helpful later when students are to determine a reasonable estimate.

Activity 1: Quick Estimates (15 minutes) ● The purpose of this activity is for students to consider what it means for an answer to make sense. They see that rounding is a useful strategy to estimate the answer to a problem and determine if an answer makes sense. The quantities chosen are close to multiples of 100 and 10 to encourage students to round as they decide if an answer makes sense. The first problem also says that "Priya makes an estimate" and "about 400 beads." If students begin computing the exact numbers of beads, remind them of the situation and that they do not need to solve to determine if the answer makes sense. As students work, prompt them to explain their strategies for making estimates and relate them to the idea of rounding (MP3). When students use language such as "about 600 beads" to convey that they are estimating, they practice communicating with precision (MP6).
Activity 2: Solve and Reason (20 minutes) ● The purpose of this activity is for students to solve two-step word problems involving addition and subtraction. After students solve the problems, they trade answers with a partner to decide if their answer makes sense. When students assess the reasonableness of each other's answers and communicate their assessment, they construct logical arguments and critique the reasoning of others (MP3). ○ **Access for Multilingual Learners:** *MLR8 Discussion Supports:* Prior to solving the problems, invite students to make sense of the situations and take turns sharing their understanding with their partner. Listen for and clarify any questions about the context. Advances: Reading, Representing ○ **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Differentiate the degree of difficulty or complexity. Some students may benefit from starting with a familiar example or one with more accessible values. Supports accessibility for: Conceptual Processing, Social-Emotional Functioning

Supplemental Resources ● Suggested Centers ○ Tic Tac Round (3–5) Stage 1: Nearest Ten or Hundred (Gameboard) (Spinner)	**Assessment Resources** ● 3.3.17 Cool Down.pdf

LESSON 18: DIAGRAMS AND EQUATIONS FOR WORD PROBLEMS (Teacher Guide)

Teacher-Facing Learning Intention ● Students are relating diagrams and equations to two-step word problems. **Student-Facing Learning Intention** ● Let's connect diagrams and equations to situations. **Success Criteria** ● I can relate diagrams and equations to two-step word problems.	**Lesson Purpose** ● The purpose of this lesson is for students to relate diagrams and equations to two-step word problems. **Lesson Narrative** ● In grade 2, students interpreted tape diagrams for one- and two-step problems involving addition and subtraction. Earlier this year, they did the same with one-step word problems involving multiplication. They also learned that a question mark, a blank line, or a box could be used to represent an unknown quantity in an equation. In this lesson, students connect tape diagrams and equations with a symbol standing for the unknown quantity to two-step word problems. The work of this lesson prepares students to write equations with a letter standing for the unknown quantity and solve two-step problems, using a diagram if it helps them. **Vocabulary** ● **Materials** ● Activity 2:

	- Sticky notes - Tools for creating a visual display - Activity 1: Create a set of cards from the blackline master for each group of 4.

New Jersey State Learning Standards - **NJSLS.MATH.CONTENT.3.OA.D.8** Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations) **Mathematical Practice Standards** - **MP2.** Reason abstractly and quantitatively. - **MP3.** Construct viable arguments and critique the reasoning of others.	**National Council of Teachers of Mathematics Content Standards** - **NCTM.MATH.CONTENT.3-5.ALG.C.1** Model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions. **National Council of Teachers of Mathematics Process Standards** - **PS1.** Problem Solving - **PS2.** Reasoning & Proof - **PS5.** Representation

Warm-up: Notice and Wonder: Diagrams (10 minutes)

- The purpose of this warm-up is to elicit the idea that diagrams can represent many operations, which will be useful when students connect diagrams to situations and equations in a later activity. While students may notice and wonder many things about these images, what operations the diagrams could represent is the important discussion point.

Activity 1: Card Sort: Situations, Equations, and Diagrams (15 minutes)

- The purpose of this activity is for students to connect two-step word problems, diagrams, and equations with a symbol for the unknown quantity. Interpreting and relating given representations prepare students to use these as tools for reasoning when they solve two-step word problems. As students analyze written statements and other representations and make connections among them, they reason quantitatively and abstractly (MP2).
    - **Access for Multilingual Learners:** *MLR8 Discussion Supports:* Students should take turns finding a match and explaining their reasoning to their partner. Display the following sentence frames for all to see: “I noticed _____ , so I matched . . . .” Encourage students to challenge each other when they disagree. Advances: Listening, Speaking
    - **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence.* Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce the remaining cards once students have completed their initial set of matches. Supports accessibility for: Visual-Spatial Processing, Attention

Activity 2: Makes Sense to Me: A Gallery Walk (20 minutes)

- The purpose of this activity is for students to solve one of the problems from the card sort in the previous activity and examine their classmates' solutions to other problems. Students work in groups to create a poster of their solution. As students visit the posters, they leave comments about how they know the solution on the poster makes sense. As students make comments on the work of others, they critique the reasoning of others (MP3).

Supplemental Resources - Card Sort: Situations, Equations and Diagrams (pdf) - Suggested Centers	**Assessment Resources** - 3.3.18 Cool Down.pdf

○ Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf) ○ Tic Tac Round (3–5) Stage 1: Nearest Ten or Hundred (Gameboard) (Spinner)	

LESSON 19: SITUATIONS AND EQUATIONS (Teacher Guide)

Teacher-Facing Learning Intention ● Students are representing and solving two-step word problems using equations with a letter standing for the unknown quantity. **Student-Facing Learning Intention** ● Let's represent and solve problems. **Success Criteria** ● I can represent and solve two-step word problems using equations with a letter standing for the unknown quantity.	**Lesson Purpose** ● The purpose of this lesson is for students to represent and solve two-step word problems. **Lesson Narrative** ● In this lesson, students are able to apply what they have learned in this section to write equations that represent two-step word problems using a letter for the unknown quantity. They persevere to solve two-step word problems, and decide if their answer makes sense (MP1). **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.D.8** Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations) **Mathematical Practice Standards** ● **MP1.** Make sense of problems and persevere in solving them. ● **MP2.** Reason abstractly and quantitatively. ● **MP4.** Model with mathematics. ● **MP6.** Attend to precision.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.ALG.B.2** Represent the idea of a variable as an unknown quantity using a letter or a symbol. **National Council of Teachers of Mathematics Process Standards** ● **PS1.** Problem Solving ● **PS2.** Reasoning & Proof ● **PS5.** Representation

Warm-up: Notice and Wonder: The Unknown (10 minutes)

- The purpose of this warm-up is to elicit the idea that letters can be used to represent an unknown quantity in a tape diagram and an equation, which will be useful when students represent unknown quantities in word problems later in the lesson. While students may notice and wonder many things about these images, the fact that a letter can be used to represent an unknown in the same way as a question mark, line, or box is the important discussion point.

- When students articulate what they notice and wonder, they have an opportunity to attend to precision in the language they use to describe what they see (MP6). They might first propose less formal or imprecise language, and then restate their observation with more precise language in order to communicate more clearly.

Activity 1: Mai's Beads (20 minutes)

- The purpose of this activity is for students to match tape diagrams, equations, and descriptions of situations and explain the connection to model with mathematics (MP4). The situations share the same context and numbers. Students consider how different unknown quantities are reflected in the diagrams, depending on what's happening in the situations. When students relate the quantities and relationships in situations to the equations and diagrams that represent them, they reason quantitatively and abstractly (MP2).

Activity 2: Represent, Solve, Explain (15 minutes)

- Previously, students matched diagrams and equations to situations with an unknown quantity. Here, they generate such equations, using a letter for the unknown quantity, solve problems, and explain how they know their answers make sense. Students should be encouraged to use any solving strategy they feel comfortable with. If not yet addressed, mention that any letter can be used for the unknown quantity in their equation. While this activity is focused on independent practice, encourage students to discuss the problem with a partner if needed. Though the task asks students to write an equation first, students may complete the task in any order that makes sense to them. Students reason abstractly and quantitatively when they write an equation that represents the situation (MP2). They also practice making sense of a problem and its solution in terms of the context (MP1).
  - **Access for Multilingual Learners:** *MLR5 Co-Craft Questions:* Keep books or devices closed. Display only the problem stem, without revealing the question, and ask students to write down possible mathematical questions that could be asked about the situation. Invite students to compare their questions before revealing the task. Ask, "What do these questions have in common? How are they different?" Reveal the intended questions for this task and invite additional connections. Advances: Reading, Writing
  - **Access for Multilingual Learners:** *Engagement: Develop Effort and Persistence.* Differentiate the degree of difficulty or complexity. Some students may benefit from starting with a familiar example or one with more accessible values before working independently on the three parts to the activity. Supports accessibility for: Social-Emotional Functioning, Conceptual Processing

Supplemental Resources	**Assessment Resources**
• Suggested Centers ◦ Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf) ◦ Tic Tac Round (3–5) Stage 1: Nearest Ten or Hundred (Gameboard) (Spinner)	• 3.3.19 Cool Down.pdf

LESSON 20: MORE PRACTICE TO REPRESENT AND SOLVE (Teacher Guide)

Teacher-Facing Learning Intention • Students are representing and solving two-step word problems. **Student-Facing Learning Intention** • Let's represent and solve more problems. **Success Criteria** • I can represent and solve two-step word problems.	**Lesson Purpose** • The purpose of this lesson is for students to continue to represent and solve two-step word problems, including problems in which not all necessary information is given up front. **Lesson Narrative** • In this lesson, students continue to solve problems but encounter those that cannot be solved right away because of missing information. They learn the Information Gap routine, which prompts them to consider the information that is needed to solve a problem and ways to ask for it. The first activity introduces students to the routine. In the second activity, students are given more time to solve two-step word problems as they engage in the routine.

	Vocabulary
	●
	
	Materials
	● Activity 2:
	  ● Create a set of cards from the blackline master for each group of 2.
	  ● Keep set 1 separate from set 2.

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. ● **NJSLS.MATH.CONTENT.3.OA.D.8** Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations) **Mathematical Practice Standards** ● **MP1.** Make sense of problems and persevere in solving them. ● **MP6.** Attend to precision. ● **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.PS.3** Apply and adapt a variety of appro-priate strategies to solve problems **National Council of Teachers of Mathematics Process Standards** ● **PS1.** Problem Solving

Warm-up: Number Talk: Two Steps (10 minutes)

- The purpose of this Number Talk is to elicit strategies students have for multiplying single-digit factors and adding two-digit numbers. The expressions involve two operations. They encourage students to look for and make use of structure as they use their understanding of equal-size groups and properties of operations to find products and sums (MP7). The reasoning here will be helpful later when students solve two-step word problems.

Activity 1: Info Gap: Introduction (15 minutes)

- The purpose of this activity is to introduce students to the structure of the MLR4 Information Gap routine. This routine facilitates meaningful interactions by positioning some students as holders of information that is needed by other students.

Activity 2: Info Gap: Bake Sale (20 minutes)

- This Info Gap activity gives students an opportunity to determine and request information needed to solve a two-step problem that involves multiplication. The Info Gap structure requires students to make sense of problems by determining what information is necessary, and then to ask for information they need to solve it. This may take several rounds of discussion if their first requests do not yield the information they need (MP1). It also allows them to refine the language they use and ask increasingly more precise questions until they get the information they need (MP6).

- **Access for Students with Disabilities:** *Representation: Access for Perception.* Begin by giving a physical demonstration of the activity's procedure to support understanding of the activity and understanding of the context. Supports accessibility for: Social-Emotional Functioning, Memory

Supplemental Resources

- Info Gap Bake Sale (pdf)
- Suggested Centers
  - Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)
  - Tic Tac Round (3–5) Stage 1: Nearest Ten or Hundred (Gameboard) (Spinner)

Assessment Resources

- 3.3.20 Cool Down.pdf

LESSON 21: CLASSROOM SUPPLIES (OPTIONAL) (Teacher Guide)

Teacher-Facing Learning Intention

- Students are adding and subtract within 1,000 to solve real-world problems
- Students are rounding whole numbers to the nearest ten or hundred to solve problems.

Student-Facing Learning Intention

- Let's make a wish list for class supplies.

Success Criteria

- I can add, subtract and round whole number within 1,000 to solve real-world problems

Lesson Purpose

- The purpose of this lesson is for students to use their understanding of estimation, rounding, and addition within 1,000 to solve a problem about a class wish list.

Lesson Narrative

- This lesson is optional because it does not address any new mathematical content standards. It does provide students with an opportunity to apply precursor skills of mathematical modeling. In this lesson, students put together a wish list of supplies they would like to get for their classroom given a large collection of choices and their costs. They are given a budget and freedom to decide how to spend the money. As they make choices, students round the costs before they check the total amount they are spending. Students then compare their wish list with a partner group. Groups compare their wish lists and how much they spent in each category. When students make decisions and choices, adhere to mathematical constraints, interpret a mathematical answer in context, organize data, make revisions, and report results, they model with mathematics (MP4).

Vocabulary

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Materials

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NBT.A.1**
  Use place value understanding to round whole numbers to the nearest 10 or 100.
- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

National Council of Teachers of Mathematics Content Standards

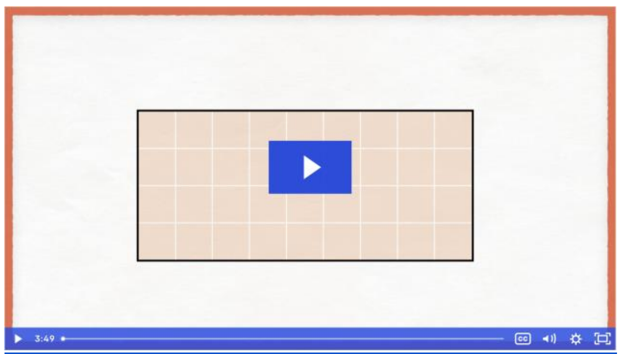
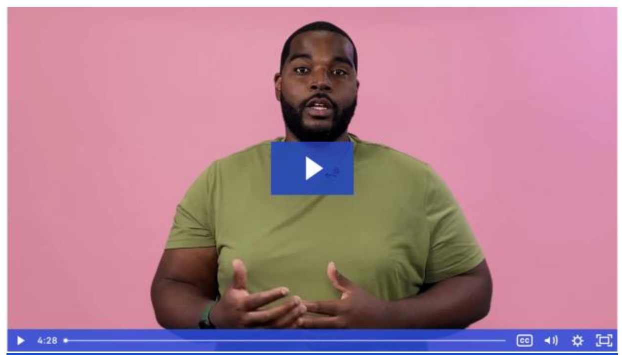
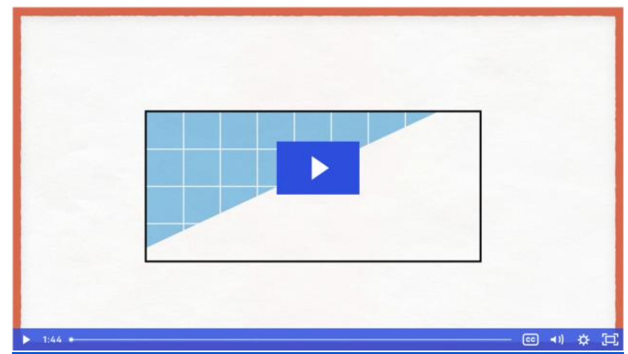
- **NCTM.MATH.CONTENT.3-5.PS3**
  Apply and adapt a variety of appro-priate strategies to solve problems

National Council of Teachers of Mathematics Process Standards

- **PS1.** Problem Solving

Mathematical Practice Standards ● **MP4** Model with mathematics.	
Warm-up: Notice and Wonder: School Supplies List (10 minutes) ● The purpose of this warm-up is to elicit observations about school supplies in different categories and with varying prices, familiarizing students with the context for upcoming work. While students may notice and wonder many things, focus the discussion on the large selection and wide range of prices.	
Activity 1: Make a Wish List (25 minutes) ● The purpose of this activity is for students to make a wish list of items for the classroom with a $1,000 budget. As they make their selections, they keep an estimate of the total by rounding, and use estimation and addition strategies to remain within the budget. To make their wish list, students use a supply list that is longer than shown in the warm-up. ○ **Access for Students with Disabilities:** Representation: Internalize Comprehension. Chunk this task into more manageable parts. Some students may benefit from adding a third column to the supply lists that they can use to record rounded costs before they begin selecting items. Supports accessibility for: Organization, Conceptual Processing	
Activity 2: What's on Your List? (15 minutes) ● In this activity, students present their selections to a partner group. They explain their choices and compare how much money they plan to spend in each category. They make comparisons using "how much more" and "how much less" statements. ○ **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: Display sentence frames to support whole-class discussion: "Can you say more about . . .?" "Why did you . . .?" Advances: Speaking, Representing	
Supplemental Resources ● Suggested Centers ○ Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf) ○ Tic Tac Round (3–5) Stage 1: Nearest Ten or Hundred (Gameboard) (Spinner)	**Assessment Resources** ●

Unit 4: Relating Multiplication to Division

PEDAGOGICAL CONTENT KNOWLEDGE RESOURCES FOR TEACHERS		
Learning Narrative Video The Unit Launch: Learning Narrative video for Grade 3, Unit 4 gives insight into the unit objectives, models and representations, possible student errors and misconceptions, and tips that might be used to help support student understanding. The Learning Narrative video is ideal for teachers to study prior to teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 	**Learning Progressions Video** The Unit Launch: Learning Progressions video for Grade 3, Unit 4 details how the content of a unit builds upon prior knowledge, and how the understanding of the content provides students with readiness for future learning. The Learning Progressions video is ideal for teachers to study before teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 	**Learning Supports Video** The Unit Launch: Learning Supports video for Grade 3, Unit 4 gives an in-depth look into the models and representations used in this unit to help support student understanding. The Learning Supports video is ideal for teachers to study prior to teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 
STAGE 1 - DESIRED RESULTS		
Assessed Focus Standards	UNIT DESCRIPTION	

NJSLS.MATH.CONTENT.3.OA.A.2 Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as. **NJSLS.MATH.CONTENT.3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **NJSLS.MATH.CONTENT.3.OA.A.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8x?=48, 5=? ÷ 3, 6x6=?. **NJSLS.MATH.CONTENT.3.OA.B.5** Apply properties of operations as strategies to multiply and divide. Examples: If is known, then is also known. (Commutative property of multiplication.) can be found by , then , or by , then. (Associative property of multiplication.) Knowing that 8 × 5= 40 and 8 × 2= 16, one can find 8 × 7 as. (Distributive property.) {Clarification: Students need not use formal terms for these properties). **NJSLS.MATH.CONTENT.3.OA.B.6** Understand division as an unknown-factor problem. For example, find by finding the number that makes 32 when multiplied by 8. **NJSLS.MATH.CONTENT.3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship	In this unit, students are introduced to the concept of division and its relationship to multiplication. Previously, students learned that multiplication can be understood in terms of equal-size groups. The expression 5×2 can represent the total number of objects when there are 5 groups of 2 objects, or when there are 2 groups of 5 objects. Here, students make sense of division also in terms of equal-size groups. For instance, the expression 30÷5 can represent putting 30 objects into 5 equal groups, or putting 30 objects into groups of 5. They see that, in general, dividing can mean finding the size of each group, or finding the number of equal groups. ● 30 objects put into 5 equal groups ● 30 objects put into 5 equal groups ● 30 objects put into groups of 5 ● 30 objects put into groups of 5 Students use the relationship between multiplication and division to develop fluency with single-digit multiplication and division facts. They continue to reason about products of two numbers in terms of the area of rectangles whose side lengths represent the factors, decomposing side lengths and applying properties of operations along the way. As they multiply numbers greater than 10, students see that it is helpful to decompose the two-digit factor into tens and ones and distribute the multiplication. For instance, to find the value of 26×3, they can decompose the 26 into 20 and 6, and then multiply each by 3. Toward the end of the unit, students solve two-step problems that involve all four operations. In some situations, they work with expressions that use parentheses to indicate which operation is completed first (for example: 276+(45÷5)=?). **Throughout the unit** Some of the warm-ups early in the unit continue to address fluent addition and subtraction within 1,000. The rest of the warm-ups are designed to develop fluency with multiplying and dividing within 100. Students initially work visually with multiplication of a multiple of ten by a single-digit whole number, then transition to working with expressions and equations. Warm-ups in the unit are also used to introduce and reinforce important ideas like the relationship between multiplication and division and using properties of operations as strategies to multiply and divide.

between multiplication and division (e.g., knowing that , one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **NJSLS.MATH.CONTENT.3.OA.D.8** Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations) **NJSLS.MATH.CONTENT.3.OA.D.9** Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. **NJSLS.MATH.CONTENT.3.M.B.5** Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths and is the sum of and . Use area	**EXPLICIT ASPECTS OF RIGOR** **Conceptual Understanding** ● Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8 ● Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ? ● Apply properties of operations as strategies to multiply and divide.2 Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.) ● Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8. ● Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. ● Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. ● Relate area to the operations of multiplication and addition. ● Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. ● Multiply side lengths to find areas of rectangles with whole- number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. ● Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning. ● Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. **Procedural Fluency** ● Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. ● Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. ● Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

models to represent the distributive property in mathematical reasoning. d. Recognize the area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. **NJSLS.MATH.CONTENT.3.NBT.A.2** With accuracy and efficiency, add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **NJSLS.MATH.CONTENT.3.NBT.A.3** Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9x80, 5x60) using strategies based on place value and properties of operations. **Content Connections** **3-PS2-1** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. **3-PS2-2** Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. **3.PS2-3** Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. **3-PS2-4** Define a simple design problem that can be solved by applying scientific ideas about magnets.* **3-5-ETS1-1** Define a simple design problem reflecting a need or a want that includes specified criteria for success and	● Multiply side lengths to find areas of rectangles with whole- number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. ● Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. **Application** ● Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. ● Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. ● Multiply side lengths to find areas of rectangles with whole- number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. **MEANING**

constraints on materials, time, or cost. **3-5-ETS1-2** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. **INTEGRATION OF 21st CENTURY SKILLS** **9.1.4.A.1** Recognize a problem and brainstorm ways to solve the problem individually or collaboratively. **9.1.4.A.5** Apply critical thinking and problem-solving skills in classroom and family settings. **9.1.4.B.1** Participate in brainstorming sessions to seek information, ideas, and strategies that foster creative thinking. **9.1.4.C.1** Practice collaborative skills in groups, and explain how these skills assist in completing tasks in different settings (at home, in school, and during play). **CAREER EDUCATION** **9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success. **9.3.ST-SM.2** Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems. **9.3.ST-SM.4**	**Enduring Understandings** **U1.** Computation involves taking apart and combining numbers using a variety of approaches. **U2.** Repeated addition involving joining equal groups is one way to think about multiplication. **U3.** An array involves joining equal groups and is one way to think about multiplication. **U4.** Some real-world problems involving joining or separating equal groups or comparison can be solved using multiplication. **U5.** Multiplication and division problems with whole numbers can be solved by using drawings as well as equations. **U6.** Division can be represented by fair share or equal group situations. **U7.** Unknowns can be used in all positions when solving problems. **U8.** Multiplication and division have an inverse relationship and can be used to solve problems and check answers.	**Essential Questions** **Q1.** What are different meanings for multiplication? **Q2.** What are different meanings for division? **Q3.** What strategies can I use to solve multiplication and division word problems? **Q4.** How can multiplication and division situations be represented in equations using a symbol for the unknown? **Q5.** How are multiplication and division related?
	WHAT STUDENTS WILL KNOW AND BE ABLE TO DO	

Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.	**Knowledge** **K1.** Fluently add within 1,000 using algorithms based on place value and properties of operations. **K2.** Use place value understanding to compose and decompose numbers. **K3.** Fluently subtract within 1,000 using algorithms based on place value, properties of operations, and the relationship between addition and subtraction. **K4.** Round whole numbers to the nearest multiple of 10 and 100. **K5.** Assess the reasonableness of answers. **K6.** Solve two-step word problems using addition, subtraction, and multiplication.	**Skills** **S1.** Represent numbers to 1,000 in different ways using place value understanding. [Lesson 1] **S2.** Solve addition and subtraction problems within 1,000 in a way that makes sense to them. [Lesson 2] **S3.** Add within 1,000 in a way that makes sense to them. [Lessons 3, 4] **S4.** Relate written algorithms to each other using place value understanding. [Lessons 5, 6] **S5.** Subtract within 1,000 in a way that makes sense to them. [Lesson 7] **S6.** Relate base-ten diagrams to written algorithms for subtraction. [Lesson 8] **S7.** Analyze and use a subtraction algorithm with the numbers written in expanded form. [Lesson 9] **S8.** Relate subtraction algorithms to one another using place value understanding. Subtract numbers within 1,000 using another algorithm based on place value. [Lessons 10, 11] **S9.** Subtract within 1,000 using algorithms or other strategies based on the numbers in the problem. [Lesson 12] **S10.** Recognize that numbers are often approximated by their closest multiples of 10 or 100. Understand the meaning of the nearest multiple of 100. [Lesson 13] **S11.** Identify the closest multiples of 10 and 100 for numbers within 1,000. Understand that rounding is a formal way to say which number a given number is closer to, and that number is often a multiple of 10 or 100. Understand the meaning of "the closest multiple of 10." [Lesson 14]

		S12. Round whole numbers within 1,000 to the nearest ten and hundred, using the convention of rounding up when the number is halfway between two multiples of 10 or 100. [Lesson 15] **S13.** Recognize and generalize patterns in the rounding of whole numbers within 1,000. [Lesson 16] **S14.** Assess the reasonableness of answers using mental computation and estimation strategies including rounding. Solve two-step word problems using addition and subtraction in a way that makes sense to them. [Lessons 17, 18, 19 , 20] **S15.** Add and subtract within 1,000 to solve real-world problems. Round whole numbers to the nearest ten or hundred to solve problems. [Lesson 21]

CULTURALLY RESPONSIVE TEACHING in PRACTICE	SOCIAL EMOTIONAL LEARNING in PRACTICE
● Encourage collaborative learning in diverse groups. ● Recognize and value multiple problem-solving approaches. ● Be mindful of language barriers and use simple language and visuals. ● Contextualize abstract concepts in real-life situations. ● Tailor instruction to individual interests and strengths. ● Involve families and the community in math-related activities. ● Include diverse mathematicians and scientists in lessons. ● Use multicultural resources and materials. ● Use math problems and examples that relate to students' cultures and experiences.	● Create a positive classroom environment. ● Encourage communication and collaboration. ● Model emotional regulation. ● Connect math to real-life situations. ● Validate effort and persistence. ● Use cooperative learning. ● Teach growth mindset. ● Incorporate reflective practices. ● Integrate SEL activities such as use of affirmations. ● Foster positive teacher-student relationships.

STAGE 2 - EVIDENCE

SUMMATIVE ASSESSMENT

Illustrative Mathematics

- 3.4-Section-A-Checkpoint-Assessment.pdf
- 3.4-Section-B-Checkpoint-Assessment.pdf
- 3.4-Section-C-Checkpoint-Assessment.pdf

- 3.4-Section-D-Checkpoint-Assessment.pdf
- 3.4-End-of-Unit-Assessment.pdf
- 3.4-End-of-Unit-Assessment SP.pdf

PRE-ASSESSMENT		
Illustrative Mathematics •		
FORMATIVE ASSESSMENT		
Illustrative Mathematics Curriculum • 3.4.1 Cool Down.pdf • 3.4.2 Cool Down.pdf • 3.4.3 Cool Down.pdf • 3.4.4 Cool Down.pdf • 3.4.5 Cool Down.pdf • 3.4.6 Cool Down.pdf • 3.4.7 Cool Down.pdf • 3.4.8 Cool Down.pdf • 3.4.9 Cool Down.pdf • 3.4.10 Cool Down.pdf • 3.4.11 Cool Down.pdf • 3.4.12 Cool Down.pdf • 3.4.13 Cool Down.pdf • 3.4.14 Cool Down.pdf • 3.4.15 Cool Down.pdf • 3.4.16 Cool Down.pdf • 3.4.17 Cool Down.pdf • 3.4.18 Cool Down.pdf • 3.4.19 Cool Down.pdf • 3.4.20 Cool Down.pdf • 3.4.21 Cool Down.pdf	*Illustrative Mathematics* Tasks • Unit 4 Student Task Lesson 1.pdf • Unit 4 Student Task Lesson 2.pdf • Unit 4 Student Task Lesson 3.pdf • Unit 4 Student Task Lesson 4.pdf • Unit 4 Student Task Lesson 5.pdf • Unit 4 Student Task Lesson 6.pdf • Unit 4 Student Task Lesson 7.pdf • Unit 4 Student Task Lesson 8.pdf • Unit 4 Student Task Lesson 9.pdf • Unit 4 Student Task Lesson 10.pdf • Unit 4 Student Task Lesson 11.pdf • Unit 4 Student Task Lesson 12.pdf • Unit 4 Student Task Lesson 13.pdf • Unit 4 Student Task Lesson 14.pdf • Unit 4 Student Task Lesson 15.pdf • Unit 4 Student Task Lesson 16.pdf • Unit 4 Student Task Lesson 17.pdf • Unit 4 Student Task Lesson 18.pdf • Unit 4 Student Task Lesson 19.pdf • Unit 4 Student Task Lesson 20.pdf • Unit 4 Student Task Lesson 21.pdf • Unit 4 Student Task Lesson 22.pdf	NJSLA Released Items **3.OA.A.2** • Item UIN - M01875 • Item UIN - M02037 • Item UIN - M03682 • Item UIN VF556062 • Item UIN - M01737 • Item UIN - VH054394 **3.OA.B.6** • Item UIN - VH004904 • Item UIN - VF658050 • Item UIN - M00346 • Item UIN - VF658050 • Item UIN - M00346 • Item UIN - VF556076 • Item UIN - VF812718 • Item UIN - VH00490 **3.NBT.A.3** • Item UIN - 0108-M00557 • Item UIN - 0374-M01644 • Item UIN - 0523-M00063 • Item UIN - M01639 • Item UIN - M03591 • Item UIN - M03618 • Item UIN - M03643 • Item UIN - M03986 • Item UIN - VF525281 • Item UIN - VF647323

<table>
<tr><td></td><td></td><td>• Item UIN - VH012290
• Item UIN - VH079766
• Item UIN - VH055442
• Item UIN - VH061494
• Item UIN-4088-M03378</td></tr>
<tr><td colspan="3">STAGE 3 - LEARNING PLAN</td></tr>
<tr><td colspan="3">MATH WORKSHOP</td></tr>
<tr><td>Illustrative Mathematics Centers
• Rectangle Rumble (3–5)
    ○ Stage 2: Factors 1–5 (supporting)
    ○ Stage 3: Factors 1–10 (addressing)
• Five in a Row: Multiplication (3–5)
    ○ Stage 2: Factors 1–9 (supporting)
• Capture Squares (1–3)
    ○ Stage 6: Multiply with 1–5 (supporting)
    ○ Stage 7: Multiply with 6–9 (addressing)
• Compare (1–5)
    ○ Stage 2: Add and Subtract within 20 (supporting)
    ○ Stage 3: Multiply within 100 (addressing)
    ○ Stage 4: Divide within 100 (addressing)
• How Close? (1–5)
    ○ Stage 4: Add to 1,000 (supporting)
    ○ Stage 5: Multiply to 100 (supporting)
• Can You Draw It? (1–5)
    ○ Stage 2: Grade 2 Shapes</td>
<td>Building Thinking Classrooms Tasks
• Lesson 1: Activity 1: How Many Apples?
• Lesson 2: Activity 1: How Many Apples?
• Lesson 3: Activity 2: Elena’s Colored Pencils
• Lesson 4: Activity 3: Stacks of Blocks
• Lesson 5: Activity 2: Solve a Buggy Problem
• Lesson 6: Activity 2: At the Farmers' Market
• Lesson 7: Activity 1:Division Round Table
• Lesson 8: Activity 2: If I Know, Then I Know
• Lesson 9: Activity 1: Products in the Table
• Lesson 10: Activity 1: Introduce Connecting Cubes, Explore
• Lesson 11: Activity 1: Mark, then Express
• Lesson 12: Activity 1: A Whole Lot of Dollars
• Lesson 13: Activity 1: Problems with Teen Numbers
• Lesson 14: Activity 2: Ways to Represent
• Lesson 15: Activity 1: Equal Groups, Larger Numbers
• Lesson 16: Activity 1: 4 x 23 , Represented
• Lesson 17: Activity 2: Party Problems
• Lesson 18: Activity 1: Groups on a Field Trip
• Lesson 19: Activity 2: Different Ways to Show Division
• Lesson 20: Activity 1: Ways to Divide
• Lesson 21: Activity 2: Apple Days
• Lesson 22: Activity 2: Plan the Garden</td>
<td>Open Middle
• Multiplying Multiples Of Ten 2
• Multiplying Multiples Of Ten 1
• Multiply and Divide Within A Hundred 1
• Multiply and Divide Within A Hundred 2
• Multiplying a Two-Digit Number by a Single-Digit Number
• Baking Cookies
• Planting Carrots 1</td></tr>
<tr><td>Slow Reveal Graphs
•</td><td>Bootstrap (to be added Summer 2025)</td><td>Other Resources
• IM Talking Math</td></tr>
</table>

PHYSICAL MANIPULATIVES & RESOURCES	VIRTUAL MANIPULATIVES & RESOURCES	VOCABULARY
• Connecting cubes or counters • Tools for creating a visual display • Colored pencils, crayons, or markers • Base-ten blocks • Sticky notes	**Didax** • Two Color Counters - Didax • Two Color Counters | Teaching Tools **Toy Theater** • Two Color Counters | Teaching Tools	• division • divisor • quotient

SUMMARY OF KEY LEARNING

Pacing
This unit has been assigned 27 days in the Pacing Guide. The 27 days are allotted as follows: 22 lesson days as outlined below, 4 flexible days, and 1 assessment day. Lesson 22 is optional in this unit.

Teacher Resources:
Unit 4 Teacher's Guide (English) (Spanish)
Unit 4 Teacher's Resource Pack (English) (Spanish)

Student Resources:
Unit 4 Student Workbook (English) (Spanish)

Section A: What is Division?
Lesson 1: How Many Groups?
Lesson 2: How Many in Each Group?
Lesson 3: Division Situation Drawings
Lesson 4: Interpret Division Expressions
Lesson 5: Write Division Expressions

Section B: Relate Multiplication and Division
Lesson 6: Division as an Unknown Factor
Lesson 7: Relate Multiplication and Division
Lesson 8: Relate Quotients to Familiar Products
Lesson 9: Patterns in the Multiplication Table
Lesson 10: Explore Multiplication Strategies with Rectangles
Lesson 11: Multiplication Strategies on Ungridded Rectangles

Section C: Multiplying Larger Numbers
Lesson 12: Multiply Multiples of Ten
Lesson 13: Solve Problems With Equal Groups
Lesson 14: Ways to Represent Multiplication of Teen Numbers

Lesson 15: Equal Groups, Larger Numbers
Lesson 16: Multiply Numbers Larger than 20
Lesson 17: Use the Four Operations to Solve Problems

Section D: Dividing Larger Numbers
Lesson 18: Larger Numbers in Equal Groups
Lesson 19: Ways to Divide Larger Numbers
Lesson 20: Strategies for Dividing
Lesson 21: Solve Problems Using the Four Operations
Lesson 22: School Community Garden

LESSON 1: HOW MANY GROUPS? (Teacher Guide)

Teacher-Facing Learning Intention
- Students are solving "how many groups?" problems in a way that makes sense to them.

Student-Facing Learning Intention
- Let's represent and solve problems.

Success Criteria
- I can solve "how many groups?" problems in a way that makes sense to me.

Lesson Purpose
- The purpose of this lesson is for students to solve "how many groups?" problems in a way that makes sense to them.

Lesson Narrative
- In a previous unit, students were introduced to multiplication. They interpreted products as the total number of objects in a given number of groups of equal size. Students represented groups of equal size using drawings, tape diagrams, and arrays. The purpose of this lesson is to introduce problems that involve putting objects into groups of equal size, starting with "how many groups?" problems. Even though the structure of the problems suggests division, students may use their understanding of multiplication or any strategy that makes sense to them to solve the problems. If students use connecting cubes, encourage them to draw a picture to match their work. In the lesson synthesis, students have a chance to think about how they would define division. The definition and symbol for division will be introduced in subsequent lessons.

Vocabulary
-

Materials
- Activity 1:
  - Connecting cubes or counters
- Tools for creating a visual display

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.OA.A.2**
  Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards

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groups can be expressed as.
● NJSLS.MATH.CONTENT.3.OA.A.3
Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Mathematical Practice Standards
● MP2. Reason abstractly and quantitatively.
</td><td>
● PR2. Reasoning and Proof
● PR5. Representation
</td></tr>
<tr><td colspan="2">
Warm-up: How Many Do You See: Apples (10 minutes)
● The purpose of this How Many Do You See is for students to subitize or use grouping strategies to describe the images they see.
</td></tr>
<tr><td colspan="2">
Activity 1: How Many Apples? (20 minutes)
● The purpose of this activity is for students to represent and solve “how many groups?” problems. Encourage students to use whatever strategy and visual representation that make sense to them. Students create a poster of their solution to the first problem with a partner. In the next activity, students participate in a gallery walk of the posters.
Monitor for students who represent the situation with:
■ concrete objects: putting 24 cubes into groups of 8
■ drawings of objects: drawing 24 apples and then splitting them into groups of 8 or circling groups of 8
■ arrays: drawing 3 rows of 8 apples in each to reach 24
■ When students represent the situation with objects, concrete drawings, or abstract drawings they are reasoning abstractly and quantitatively (MP2).
○ Access for Students with Disabilities: Representation: Access for Perception. Begin by showing a physical demonstration of what the poster might look like, using a different problem, to support understanding of the context. Supports accessibility for: Social-Emotional Functioning
</td></tr>
<tr><td colspan="2">
Activity 2: Gallery Walk: Apples in Boxes (15 minutes)
● The purpose of this activity is for students to consider what is the same and what is different about the ways that they solved a “how many groups?” problem in the previous activity. As students visit the posters, identify 2–3 students who show particularly well that this problem is about finding how many groups are made. Select them to share their explanations in the next lesson.
○ Access for Multilingual Learners: MLR8 Discussion Supports: Display sentence frames to support student writing: “One thing I noticed was the same . . .”, “One thing I noticed was different . . .”, “One thing that was the same . . .”, “One difference was . . . .” Advances: Writing, Speaking
</td></tr>
<tr><td>
Supplemental Resources
● Suggested Centers
○ Rectangle Rumble (3–5)
■ Stage 2: Factors 1–5 Grid (pdf)
■ Stage 2: Factors 1–5 Spinner (pdf)
○ Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)
</td><td>
Assessment Resources
● 3.4.1 Cool Down.pdf
</td></tr>
</table>

LESSON 2: HOW MANY IN EACH GROUP? (Teacher Guide)

Teacher-Facing Learning Intention

- Students are solving "how many in each group?" problems in a way that makes sense to them.

Student-Facing Learning Intention

- Let's represent and solve more problems.

Success Criteria

- I can solve "how many in each group?" problems in a way that makes sense to me.

Lesson Purpose

- The purpose of this lesson is for students to solve "how many in each group?" problems in a way that makes sense to them.

Lesson Narrative

- Previously, students solved "how many groups?" problems in a way that made sense to them. In this lesson students extend problems involving sharing into groups of equal size to include "how many in each group?" problems. Students again have the flexibility to represent and solve problems using any strategy that makes sense to them in this lesson. If students use connecting cubes, encourage them to draw a picture to match their work. At the end of this lesson, division is defined as finding the number of groups or finding the size of each group when we share into groups of equal size.

Vocabulary

- division

Materials

- Activity 1
    - Connecting cubes or counters
    - Tools for creating visual display

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.A.2**
  Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as.
- **NJSLS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Mathematical Practice Standards

- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication

Warm-up: Notice and Wonder: More Apples (10 minutes)

- The purpose of this warm-up is to elicit the idea that many different questions could be asked about a situation, which will be useful when students solve problems in a later activity.

Activity 1: How Many Apples? (15 minutes)

- The purpose of this activity is for students to represent and solve "how many in each group?" problems using whatever strategy and visual representation make sense to them. Students create a poster of their solution to the first problem with a partner. In the next activity, they participate in a gallery walk of the posters.
  - **Access for Students with Disabilities:** Engagement: *Develop Effort and Persistence.* Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after each chunk (problem). Supports accessibility for: Attention

Activity 2: Gallery Walk (10 minutes)

- The purpose of this activity is for students to consider what is the same and what is different about the ways that they solved a "how many in each group?" problem in the previous activity. As students visit the posters, identify 2–3 students who show particularly well that this problem is about finding how many there are in each group. Select them to share in the next activity.

Activity 3: All the Apples (10 minutes)

- The purpose of this activity is for students to consider what is the same and what is different about the "how many groups?" and "how many in each group?" problems they solved in a previous lesson and in this lesson. The discussion should highlight that in "how many groups?" problems we know the size of each group and in "how many in each group?" problems we know how many groups there are. In order to describe how the problems are the same and how they are different, students attend to the structure of the problems, that is what is given in each situation and what is unknown (MP7).
  - **Access for Multilingual Learners**: *MLR7 Compare and Connect.* Synthesis: Lead a discussion comparing, contrasting, and connecting the different representations. Ask, "What specific words or language helped you understand how to solve the problems? Are there any additional details or language that you have questions about?" To amplify student language, and illustrate connections, follow along and point to the relevant parts of the displays as students speak. Advances: Representing, Conversing

Supplemental Resources

- Suggested Centers
  - Rectangle Rumble (3–5)
    - Stage 2: Factors 1–5 Grid (pdf)
  - Stage 2: Factors 1–5 Spinner (pdf)
- Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)

Assessment Resources

- 3.4.2 Cool Down.pdf

LESSON 3: DIVISION SITUATION DRAWINGS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are interpreting and relating drawings and descriptions of division situations.
- Students are gaining understanding of division situations that may involve finding an unknown number of groups or finding an unknown number of objects in each group.

Student-Facing Learning Intention

- Let's represent division situations with drawings.

Lesson Purpose

- The purpose of this lesson is for students to interpret descriptions or drawings of division situations and recognize whether they involve finding an unknown number of groups or finding an unknown number of objects in each group.

Lesson Narrative

- Students see the two types of division situations side-by-side in this lesson. They understand that division is finding the number in each group or the size of each group and can match division situations to drawings. Students learn that the same drawing can match either type of division situation. This is because the drawings represent the end result after division has occurred. From the drawing, we cannot tell whether the number of groups or the number of objects in each group was known. The division symbol, ÷, is introduced in the lesson synthesis.

Success Criteria

- I can interpret and relate drawings and descriptions of division situations.

Vocabulary

-

Materials

-

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.A.2**
  Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as.
- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  With accuracy and efficiency, add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.
- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication

Warm-up: Number Talk: The More Things Change... (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for adding within 1,000, particularly around adjusting numbers in a sum to make them easier to add. These understandings help students develop fluency for adding within 1,000. When students notice that the same value is being removed from one addend and added to the other and the value of the sum does not change, they look for and make use of structure (MP7).

Activity 1: Groups of Students (10 minutes)

- The purpose of this activity is for students to physically represent the difference between making 2 groups and making groups of 2. Ten students will put themselves into 2 groups and then groups of 2. The rest of the students observe how the groups were made to highlight the difference between "how many groups?" problems and "how many in each group?" problems.

Activity 2: Elena's Colored Pencils (10 minutes)

- The purpose of this activity is for students to match a division situation to a drawing of equal groups. Students should be able to explain why the situation matches drawing A, which shows 2 groups of 6, and why it does not match drawing B, which shows 6 groups of 2. This activity uses MLR1 Stronger and Clearer Each Time. Advances: reading, writing

Activity 3: Which Drawing Matches? (15 minutes)

- The purpose of this activity is for students to relate division situations and drawings of equal groups (MP2). Each given drawing matches two different situations. Students learn that the same drawing can represent both a "how many groups?" problem and a "how many in each group?" problem because the drawing shows the end result, not how the groups were made. When students interpret one diagram as representing two different story types they state clearly how each part of the diagram corresponds to the story, including what corresponds to the unknown in the story (MP6).

- **Access for Multilingual Learners:** MLR8 Discussion Supports. Students should take turns finding a match and explaining their reasoning to their partner. Display the following sentence frame for all to see: "I noticed ___ , so I matched . . . ." Encourage students to challenge each other when they disagree. Advances: Listening, Speaking, Representing
- **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to select at least 3 of the 6 problems to complete. Supports accessibility for: Organization, Attention, Social-emotional skills

Supplemental Resources

- Suggested Centers
  - Rectangle Rumble (3–5)
    - Stage 2: Factors 1–5 Grid (pdf)
    - Stage 2: Factors 1–5 Spinner (pdf)
  - Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)

Assessment Resources

- 3.4.3 Cool Down.pdf

LESSON 4: INTERPRET DIVISION EXPRESSIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are interpreting division expressions.
- Students are understanding that the same division expression can be used to represent both types of division situations.

Student-Facing Learning Intention

- Let's make sense of division expressions.

Success Criteria

- I can interpret division expressions and explain the two types of situations division can represent.

Lesson Purpose

- The purpose of this lesson is for students to interpret division expressions and understand that the same division expression can be used to represent both types of division situations.

Lesson Narrative

- Students first match a division expression to a situation that it could represent. Then, students learn that the same division expression can match both "how many groups?" and "how many in each group?" problems depending on how the divisor, the number we are dividing by, is interpreted. Students then have a chance to match drawings and expressions to situations before they write their own division expressions in a subsequent lesson.

Vocabulary

- divisor

Materials

-

- **NJSLS.MATH.CONTENT.3.OA.A.2**
  Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as.
- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  With accuracy and efficiency, add and subtract within 1000 using

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards

strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Mathematical Practice Standards
- **MP2.** Reason abstractly and quantitatively.
- **MP6.** Attend to precision.

- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication

Warm-up: Number Talk: More or Less? (10 minutes)
- The purpose of this Number Talk is to elicit strategies and understandings students have for subtracting within 1,000, particularly around adding up to find differences. These understandings help students develop fluency for subtracting within 1,000.

Activity 1: Spinning Tops (10 minutes)
- The purpose of this activity is for students to match division expressions to division situations. Students should justify their matches by articulating how the numbers in the expression connect to what is happening in the situation (MP2).
  - **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were needed to solve the problem. Display the sentence frame, "The next time I match division expressions to division situations, I will look for . . . ." Supports accessibility for: Attention, Memory

Activity 2: Cars in Boxes (10 minutes)
- The purpose of this activity is for students to understand that the same division expression can be used to represent both types of division situations. Students are given two situations and asked to match a division expression to one of the situations, but the expression matches both situations given. It is okay if students do not recognize that the expression matches both situations in the activity, because it will be discussed in the activity synthesis. Students learn that the number we are dividing by is called the divisor and understand that the divisor can represent the size of the groups or the number of groups. When students explain that a divisor can be interpreted differently based on the situation it represents, they reason abstractly and quantitatively (MP2).
  - **Access for Multilingual Learners**: *MLR2 Collect and Display.* Circulate and collect the language students use as they consider the two situations. Listen for and clarify any questions about the context. On a visible display, record words and phrases such as: put in groups, split, divide, number of groups, etc. During the synthesis, add "divisor" to the display and highlight connections to any related language. Advances: Conversing, Reading

Activity 3: Stacks of Blocks (15 minutes)
- The purpose of this activity is for students to apply what they have learned about representations of division to match drawings and expressions to division situations (MP2). In doing so, they solidify their understanding that the same division expression can represent both types of division situations. The given drawings enable students to see the number of groups and how many objects are in each group. The work here helps students make connections across the three representations before they write their own division expressions and solve division problems in a subsequent lesson. When students describe how one equation can represent different stories they attend to precision in the language they use and the correspondence that they establish between the equation and the stories (MP6).

Supplemental Resources
- Suggested Centers
  - Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)
  - Capture Squares (1–3) Stage 6: Multiply with 1–5 (Gameboard) (Spinner)

Assessment Resources
- 3.4.4 Cool Down.pdf

LESSON 5: WRITE DIVISION EXPRESSIONS (Teacher Guide)	
Teacher-Facing Learning Intention ● Students are solving “how many groups?” and “how many in each group?” problems. ● Students are writing division expressions to represent division situations. **Student-Facing Learning Intention** ● Let’s write division expressions and solve “how many groups?” and “how many in each group?” problems. **Success Criteria** ● I can solve “how many groups?” and “how many in each group?” problems by using division expressions.	**Lesson Purpose** ● The purpose of this lesson is for students to write division expressions to represent division situations and solve “how many groups?” and “how many in each group?” problems. **Lesson Narrative** ● Students sort division situations for whether the number of groups is unknown or the number of objects in each group is unknown and write division expressions to represent each situation (MP2). Students then have a chance to use the representations they have learned in this section to solve division problems. **Vocabulary** ● NA **Materials** ● Activity 2: Tools for creating a visual display ● Activity 1: Card Sort: All About Bugs (groups of 2) ● Activity 1: Create a set of cards from the blackline master for each group of 2.
New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.A.2** Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8. ● **NJSLS.MATH.CONTENT.3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. ● **NJSLS.MATH.CONTENT.3.NBT.A.2** With accuracy and efficiency, add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP3.** Construct viable arguments and critique the reasoning of others.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. ● **NCTM.MATH.CONTENT.3-5.ALG.B.3** Express mathematical relationships using equations. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication

Warm-up: Number Talk: What's the Same? (10 minutes) ● The purpose of this Number Talk is to elicit strategies and understandings students have for subtracting within 1,000, particularly with expressions with a constant difference. These understandings help to develop fluency for subtracting within 1,000. Consider drawing number lines as students share their strategies to emphasize that the difference of the two numbers in each expression is not changing.
Activity 1: Card Sort: All about Bugs (15 minutes) ● The purpose of this activity is for students to determine whether a situation is about an unknown number of groups or an unknown number of objects in each group. After sorting the situations, students write a division expression to represent each situation. The fact that the structure of the expressions is the same for representing an unknown number of groups or an unknown number of objects in each group further emphasizes that division expressions can be interpreted two ways. As students discuss and justify their decisions, they share a mathematical claim and the thinking behind it (MP3). ○ **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis. Display a sentence frame to support whole-class discussion: "We noticed ____ so we . . . ." Advances: Speaking, Representing ○ **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence.* Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce the remaining cards once students have completed their initial set of matches. Supports accessibility for: Organization, Attention
Activity 2: Solve a Buggy Problem (20 minutes) In this activity, students consolidate their understanding of the types of division situations and their representations to solve division problems. During the synthesis, arrange and display students' posters by type, as sorted in the previous activity. This activity uses MLR7 Compare and Connect. Advances: representing, conversing

Supplemental Resources	**Assessment Resources**
● Card Sort All About Bugs (pdf) ● Suggested Centers ○ Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf) ○ Capture Squares (1–3) Stage 6: Multiply with 1–5 (Gameboard) (Spinner)	● 3.4.5 Cool Down.pdf

LESSON 6: DIVISION AS AN UNKNOWN FACTOR (Teacher Guide)

Teacher-Facing Learning Intention ● Students are explaining the relationship between multiplication and division equations. ● Students are interpreting division equations and multiplication equations with a missing factor. **Student-Facing Learning Intention** ● Let's connect division equations to multiplication equations. **Success Criteria** ● I can interpret and explain the relationship	**Lesson Purpose** ● The purpose of this lesson is for students to relate multiplication and division and recognize division as an unknown factor problem. **Lesson Narrative** ● Previously, students learned to interpret and write division expressions. They connected division to multiplication informally, recognizing that both operations involved equal groups. In this lesson, students analyze related multiplication and division equations to formalize the relationship between multiplication and division. In the lesson synthesis, students learn that the result in a division equation is called a quotient. **Vocabulary** ● quotient

between multiplication and division equations.	**Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.A.2** Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as. ● **NJSLS.MATH.CONTENT.3.OA.B.6** Understand division as an unknown-factor problem. For example, find by finding the number that makes 32 when multiplied by 8. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP3.** Construct viable arguments and critique the reasoning of others.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. ● **NCTM.MATH.CONTENT.3-5.ALG.B.3** Express mathematical relationships using equations. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication

Warm-up: Notice and Wonder: Missing Numbers (10 minutes)

- The purpose of this warm-up is to elicit the idea that multiplication and division are related, which will be useful as students learn to understand division as an unknown factor problem. While students may notice and wonder many things about these equations, ideas about how multiplication and division are alike and different are the important discussion points.

Activity 1: Equations about Onions (15 minutes)

- The purpose of this activity is for students to formalize the relationship between multiplication and division equations. They see that the unknown quantity in a division situation can be represented as a missing factor in a multiplication equation or as a quotient in a division equation. The synthesis should emphasize that both equations are appropriate ways to represent a situation that involves equal groups. This activity gives students an opportunity to make sense of each quantity and how it relates to the situation (MP2). As students discuss and justify their decisions, they share a mathematical claim and the thinking behind it (MP3).
    - **Access for Multilingual Learners:** *MLR7 Compare and Connect. S*ynthesis: Create a visual display of the problem. "What did Lin and Mai's approaches have in common? How were they different?" As students share their reasoning, annotate the display to illustrate connections. For example, below each equation, write the words total, number of groups, and number in each group depending on the equation and student input. Advances: Listening, Representing

Activity 2: At the Farmers' Market (20 minutes)

- The purpose of this activity is for students to understand how multiplication equations correspond to diagrams and equations they have used to represent division situations. The focus should be on relating the unknown factor to the unknown number of groups or the unknown number of objects in each group. In their explanations, students should make direct connections between the situations, representations, and equations (MP2).
    - **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence.* Some students may benefit from feedback that emphasizes effort and time on task. For example, give feedback after each row or encourage students to work on the next row if they have difficulty with a specific row on the chart. Supports accessibility for: Attention, Social-Emotional Functioning

Supplemental Resources

- Suggested Centers
  - Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)
  - Capture Squares (1–3) Stage 6: Multiply with 1–5 (Gameboard) (Spinner)

Assessment Resources

- 3.4.6 Cool Down.pdf

LESSON 7: RELATE MULTIPLICATION AND DIVISION (Teacher Guide)

Teacher-Facing Learning Intention

- Students are representing situations involving equal groups using multiplication and division equations with a symbol for the unknown quantity.
- Students are using multiplication and division within 100 to solve problems involving equal groups.

Student-Facing Learning Intention

- Let's make more connections between multiplication and division.

Success Criteria

- I can represent problems involving equal groups using multiplication and division equations with a symbol for the unknown quantity.

Lesson Purpose

- The purpose of this lesson is for students to use the relationship between multiplication and division to write equations and solve problems.

Lesson Narrative

- In previous lessons, students built a foundation of division understanding and connected multiplication and division equations. Here, they use a variety of representations to show how multiplication and division are related and write multiplication or division equations to represent division situations.

Vocabulary

-

Materials

- Activity 1: Division Round Table (groups of 1)

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.A.2**
  Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as.
- **NJSLS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- **NJSLS.MATH.CONTENT.3.OA.B.6**
  Understand division as an unknown-factor problem. For example, find

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR3.** Communication
- **PR4.** Connections
- **PR5.** Representation

<table>
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by finding the number that makes 32 when multiplied by 8.
NJSLS.MATH.CONTENT.3.NBT.A.3
Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., ,) using strategies based on place value and properties of operations.
Mathematical Practice Standards
MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP7. Look for and make use of structure.
</td><td></td></tr>
<tr><td colspan="2">Warm-up: How Many Do You See: Tens (10 minutes)
The purpose of this How Many Do You See is for students to use grouping strategies to describe the images they see. When students use grouping to find the total in a multiple of tens, they look for and make use of structure (MP7).</td></tr>
<tr><td colspan="2">Activity 1:Division Round Table (20 minutes)
The purpose of this activity is for students to solidify what they have learned about the relationship between multiplication and division. Students start by creating a drawing of equal groups. They then get a drawing created by another student in their group and write a division situation to match it. Then, they pass their paper and use the drawing of equal groups and the situation to write a multiplication equation. In the final round of this “carousel” structure, students write a division equation to match the other representations. When students relate drawings, situations, and equations they reason abstractly and quantitatively (MP2). As students look through each other’s work, they add to the representations and can defend different points of view. Students are able to critique the work of others and construct viable arguments (MP3).
Access for Students with Disabilities: Engagement: Develop Effort and Persistence. Check in and provide each group with feedback that encourages collaboration and community. For example, supporting students in participating, passing the paper to the right, and writing the symbol. Supports accessibility for: Social-Emotional Functioning, Language</td></tr>
<tr><td colspan="2">Activity 2: Sets of School Supplies (15 minutes):
The purpose of this activity is for students to represent and solve problems involving equal groups. Students can solve the problem first or write the equation first, depending on the order that makes the most sense to them. Students write equations with a symbol standing for the unknown quantity to represent each problem, but can write either a multiplication equation or a division equation. A multiplication equation and a division equation that represent the same problem are highlighted in the synthesis.
Access for Multilingual Learners: MLR8 Discussion Supports: Prior to writing the equations, invite students to make sense of the situations and take turns sharing their understanding with their partner. Listen for and clarify any questions about the context. Advances: Reading, Representing</td></tr>
<tr><td>Supplemental Resources
Suggester Centers
Rectangle Rumble (3–5) Stage 3: Factors 1–10 (Spinner) (Grid)
Capture Squares (1–3) Stage 7: Multiply with 6–9 (Spinner) (Gameboard)
Division Round Table (pdf)</td><td>Assessment Resources
3.4.7 Cool Down.pdf</td></tr>
</table>

LESSON 8: RELATE QUOTIENTS TO FAMILIAR PRODUCTS (Teacher Guide)

Teacher-Facing Learning Intention
- Students are identifying known single-digit multiplication facts and their related division facts.

Student-Facing Learning Intention
- Let's consider the products and quotients we know right away or can find quickly.

Success Criteria
- I can identify known single-digit multiplication facts and their related division facts.

Lesson Purpose
- The purpose of this lesson is for students to practice identifying multiplication facts within 100 and to use products they know to determine unknown quotients.

Lesson Narrative
- In this lesson, students check in on their progress towards fluent multiplication within 100 and sort their facts into categories. Then, students use the multiplication facts they know to generate related division facts. Knowing related facts will help students multiply and divide in future lessons.

Vocabulary
-

Materials
- Activity 2: Materials from a previous activity
- Activity 1:
    - Create a set of cards from the blackline master for each group of 2.
    - Activity 1: Card Sort: Multiplication (groups of 2)
    - Activity 1: Card Sort: Multiplication Recording Sheet (groups of 2)
- Activity 2: Each group of 2 needs a set of cards from the previous activity.

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.OA.B.6**
  Understand division as an unknown-factor problem. For example, find by finding the number that makes 32 when multiplied by 8.
- **NJSLS.MATH.CONTENT.3.OA.C.7**
  With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that , one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Mathematical Practice Standards
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR3.** Communication
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Number Talk: Multiplication and Division (10 minutes)
- The purpose of this Number Talk is to elicit strategies and understandings students have for multiplying and dividing within 100. These understandings help students develop fluency and identify division facts that are related to known products. When students use the relationship between multiplication and division to find division facts they don't know, they are looking for and making use of structure (MP7).

Activity 1: Card Sort: Multiplication (20 minutes)
- The purpose of this activity is for students to check-in on their progress towards fluent multiplication within 100. Students work in groups of 2 to sort products into groups they know right away, can find quickly, or don't know yet. The launch provides time for a class discussion about what it means to know a

fact quickly. Students identify five products with which they'd like to be more proficient, share their strategies, and practice finding the products they choose. The cards from this activity will be used in the next activity. ○ **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: Display a sentence frame to support whole-class discussion: "The next time I multiply ____ and ____, I will . . . ." Advances: Listening, Speaking ○ **Access for Students with Disabilities:** *Representation: Internalize Comprehension*. To support working memory, provide students with sticky notes or mini whiteboards. Supports accessibility for: Memory, Organization
Activity 2: If I Know, Then I Know (15 minutes) ● The purpose of this activity is for students to identify division facts that are related to multiplication facts that they know. Students complete "If I know, then I know" statements using their multiplication fact cards from the previous activity. Give students time, if needed, to determine the product before generating the related division equation. Some students may generate 4 related division equations for each product by moving the quotient to the left side of the equal sign. If this comes up, recognize that this is possible, but keep the emphasis on generating two related division facts, one for each of the factors as the unknown number. When students use the relationship between multiplication and division to identify two division facts from a multiplication fact, they look for and make use of structure (MP7).

Supplemental Resources	Assessment Resources
● Card Sort: Multiplication (Recording Sheet) (Cards) ● Suggested Centers ○ Rectangle Rumble (3–5) Stage 3: Factors 1–10 (Spinner) (Grid) ○ Capture Squares (1–3) Stage 7: Multiply with 6–9 (Spinner) (Gameboard)	● 3.4.8 Cool Down.pdf

LESSON 9: PATTERNS IN THE MULTIPLICATION TABLE (Teacher Guide)

Teacher-Facing Learning Intention	Lesson Purpose
● Students are identifying arithmetic patterns in the multiplication table and use them to find unknown multiplication facts. ● Students are recognizing that multiplication is commutative. **Student-Facing Learning Intention** ● Let's find patterns in the multiplication table and use them to multiply. **Success Criteria** ● I can identify arithmetic patterns in the multiplication table and use them to find unknown multiplication facts.	● The purpose of this lesson is for students to identify and explain patterns in the multiplication table. **Lesson Narrative** ● Students may have worked with the multiplication table in an optional lesson in a previous unit. In this lesson, they observe patterns and structures in the multiplication table that highlight properties of multiplication and are helpful for multiplying numbers. Although there is an opportunity to highlight multiple properties, the focus of this lesson is the commutative property (though students are not expected to name the property). Students notice that multiplying two numbers in any order gives the same product and make use of this observation to find unknown products (MP8). **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards	National Council of Teachers of Mathematics Content Standards
● NJSLS.MATH.CONTENT.3.OA.C.7	● NCTM.MATH.CONTENT.3-5.NUM.2

With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that , one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. ● **NJSLS.MATH.CONTENT.3.OA.D.9** Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. **Mathematical Practice Standards** ● **MP7.** Look for and make use of structure. ● **MP8.** Look for and express regularity in repeated reasoning.	Understand meanings of operations and how they relate to one another. ● **NCTM.MATH.CONTENT.3-5.ALG.B.3** Express mathematical relationships using equations. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: Multiplication Table (10 minutes)

- The purpose of this warm-up is to elicit the idea that the product of two factors on the multiplication table is found where the row and column of each factor intersect. While students may notice and wonder many things about these products, the patterns in the multiplication table and how the table is structured are the important discussion points.

Activity 1: Products in the Table (20 minutes)

- The purpose of this activity is for students to apply multiplication strategies based on properties of operations to find products in a multiplication table. While students may use various strategies based on properties of operations, look for opportunities to highlight strategies based on the commutative property. Students consider how known products that are already in the table can help find an unknown product in the multiplication table. When students use a multiplication fact that they know to determine a multiplication fact that they don't know, they look for and make use of structure (MP7).
  - **Access for Multilingual Learners:** *MLR2 Collect and Display.* Circulate, listen for and collect the language students use as they find the missing products on the table and describe the strategies they used. On a visible display, record words and phrases such as: add one more group, the same factors, switch the order, take one group away, double. Invite students to borrow language from the display as needed, and update it throughout the lesson. Advances: Conversing, Reading

Activity 2: If I Know, Then I Know: Multiplication (15 minutes)

- The purpose of this activity is for students to articulate how they use known products to find unknown products, using a structure similar to that used in an earlier lesson. Students may describe strategies that are based on any property of operations. The focus should be on the description of the strategy (such as "multiplying two numbers in any order gives the same product") rather than remembering the property on which the strategy is based (such as "commutative property").
  - **Access for Students with Disabilities:** *Action and Expression: Develop Expression and Communication.* Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches. Supports accessibility for: Memory, Conceptual Processing

Supplemental Resources ● Suggested Centers ○ Rectangle Rumble (3–5) Stage 3: Factors 1–10 (Spinner) (Grid) ○ Capture Squares (1–3) Stage 7: Multiply with 6–9 (Spinner) (Gameboard)	**Assessment Resources** ● 3.4.9 Cool Down.pdf

LESSON 10: EXPLORE MULTIPLICATION STRATEGIES WITH RECTANGLES (Teacher Guide)

Teacher-Facing Learning Intention

- Students are using area diagrams to explore strategies based on properties of multiplication.

Student-Facing Learning Intention

- Let's use rectangles to explore multiplication strategies.

Success Criteria

- I can use area diagrams to explore strategies based on properties of multiplication.

Lesson Purpose

- The purpose of this lesson is for students to use area diagrams to explore multiplication strategies based on properties of operations.

Lesson Narrative

- Previously, students examined patterns in the multiplication table and used them to find products within 100 and to notice properties of multiplication—the commutative property, in particular. In this lesson, they analyze strategies for finding the area of rectangles to explore distributive and associative properties. They study gridded rectangles that have been decomposed into smaller parts and expressions that represent how the decomposition could help us find the area. Students see how the strategies, along with the diagrams and the expressions that represent them—can help us find the product of two numbers. As students make sense of expressions and interpret them in terms of parts of area diagrams (MP1), they practice reasoning quantitatively and abstractly (MP2).

Vocabulary

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Materials

- Activity 2: Colored pencils, crayons, or markers

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.B.5**
  Apply properties of operations as strategies to multiply and divide. Examples: If is known, then is also known. (Commutative property of multiplication.) can be found by , then , or by , then. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as. (Distributive property.) {Clarification: Students need not use formal terms for these properties).
- **NJSLS.MATH.CONTENT.3.M.B.5**
  Relate area to the operations of multiplication and addition.
  c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths and is the sum of and . Use area models to represent the distributive property in mathematical reasoning.

Mathematical Practice Standards

- **MP1.** Make sense of problems and persevere in solving them.
- **MP2.** Reason abstractly and quantitatively.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.2**
  Understand meanings of operations and how they relate to one another.
- **NCTM.MATH.CONTENT.3-5.ALG.B.1**
  Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication
- **PR4.** Connections
- **PR5.** Representation

Warm-up: How Many Do You See: Squares (10 minutes)

- The purpose of this How Many Do You See is for students to use grouping strategies to describe the quantities they see.

Activity 1: Introduce Connecting Cubes, Explore (15 minutes)

- The purpose of this activity is for students to analyze different ways of decomposing a gridded rectangle to find the total number of squares in a rectangle. For example, they see that the area of a rectangle that is 3 units by 6 units can be found by adding 3x5 and 3x1 and relate that strategy to the expression (3x5) + (3x1). The area can also be found by decomposing the rectangle into two halves or finding 3x3 twice, which is represented by 2 x (3x3). The reasoning here allows students to visually make sense of strategies for multiplication that are based on the associative and distributive properties of multiplication. The focus is not on naming the properties, but rather on interpreting the expressions and relating them to the quantities in the diagrams (MP7).

Activity 2: From Expressions to Diagrams (15 minutes)

- In this activity, students are given expressions that represent strategies for finding the area of rectangles. The strategies are based on the distributive property and the associative property of multiplication. Students interpret the expressions by marking or shading area diagrams and connect each expression to the product of two factors (MP2). For instance, they see that to find the value of 2 x (2x6) is to find the value of 4x6 or 6x4.
    - **Access for Multilingual Learners:** *MLR8 Discussion Supports:* Synthesis: Create a visual display of the diagrams. As students share their strategies, annotate the display to illustrate connections. For example, trace the area showing 5 columns of 3, and write . Advances: Speaking, Representing
    - **Access for Students with Disabilities:** *Engagement: Provide Access by Recruiting Interest.* Leverage choice around perceived challenge. Invite students to select at least 2 of the 3 problems to complete. Supports accessibility for: Organization, Attention, Social-emotional skills

Supplemental Resources

- Suggested Centers
    - Rectangle Rumble (3–5) Stage 3: Factors 1–10 (Spinner) (Grid)
    - Capture Squares (1–3) Stage 7: Multiply with 6–9 (Spinner) (Gameboard)

Assessment Resources

- 3.4.10 Cool Down.pdf

LESSON 11: MULTIPLICATION STRATEGIES ON UNGRIDDED RECTANGLES (Teacher Guide)

Teacher-Facing Learning Intention:

- Students are applying associative and distributive properties of multiplication to find products within 100.
- Students are recognizing that multiplication is associative and can be distributed over addition.

Student-Facing Learning Intention

- Let's use different strategies to find the area of rectangles not on a grid.

Success Criteria

- I can apply properties of multiplication to find products and explain or show what those properties mean.

Lesson Purpose

- The purpose of this lesson is for students to represent multiplication strategies on an ungridded rectangle.

Lesson Narrative

- Previously, students used gridded rectangles to represent strategies based on the distributive and associative properties. Here, they use the same strategies, but represent them on an area diagram without a grid. Then, students match expressions that could represent the area of the same rectangle, without using diagrams. The reasoning helps students work toward fluent multiplication within 100.

Vocabulary

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Materials

- Activity 2: Card Sort: Different Expressions, Same Rectangle (groups of 2)
- Activity 2: Centimeter Grid Paper - Standard (groups of 2)
    - Create a set of cards from the blackline master for each group of 2 or 4.

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.C.7**
  With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that , one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.
- **NJSLS.MATH.CONTENT.3.M.B.5**
  Relate area to the operations of multiplication and addition.
  c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths and is the sum of and . Use area models to represent the distributive property in mathematical reasoning.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.2**
  Understand meanings of operations and how they relate to one another.
- **NCTM.MATH.CONTENT.3-5.ALG.B.1**
  Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Which One Doesn't Belong: Multiplication in Many Forms (10 minutes)

- This warm-up prompts students to compare four representations of multiplication. It gives students a reason to use language precisely as they talk about characteristics of the items being compared. During the synthesis, ask students to explain the meaning of any terminology they use, such as strategies, area, and parts.

Activity 1: Mark, then Express (15 minutes)

- The purpose of this activity is for students to find the area of ungridded rectangles using strategies based on the distributive and associative properties. Students represent these strategies on rectangles with no grid. This will be helpful in future lessons as students use area diagrams to represent the multiplication of large numbers.
  - **Access for Multilingual Learners:** *MLR2 Collect and Display.* Direct attention to words collected and displayed from the previous lesson. Invite students to borrow language from the display as needed, and update it throughout the lesson. Advances: Reading, Representing, Conversing

Activity 2: Card Sort: Different Expressions, Same Rectangle (20 minutes)

- In this sorting activity, students identify expressions that could represent the area of the same rectangle and explain their reasoning. To do so, they apply their understanding of properties of multiplication and draw rectangles as needed as they interpret parts of the expressions. Some students may sort expressions based only on the value of the expressions. Encourage them to explain or show how they know, for instance, that 8x6 and 3x6 + 5x6 can represent the area of the same rectangle (MP2, MP7). Some of the expressions from this activity are used in the synthesis to highlight the commutative, distributive, and associative properties of multiplication.
  - **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence.* Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce the remaining cards once students have completed their initial set of matches. Supports accessibility for: Attention, Focus

Supplemental Resources

- Card Sort Different Expressions, Same Rectangle (Cards) (Grid Paper)
- Suggested Centers
  - Rectangle Rumble (3–5) Stage 3: Factors 1–10 (Spinner) (Grid)
  - Capture Squares (1–3) Stage 7: Multiply with 6–9 (Spinner)

Assessment Resources

- 3.4.11 Cool Down.pdf

(Gameboard)	

LESSON 12: MULTIPLY MULTIPLES OF TEN (Teacher Guide)

Teacher-Facing Learning Intention ● Students are multiplying one-digit whole numbers by multiples of 10 using strategies based on place value and the properties of operations. **Student-Facing Learning Intention** ● Let's multiply one-digit numbers times multiples of 10. **Success Criteria** ● I can multiply one-digit whole numbers by multiples of 10 using strategies based on place value and the properties of operations.	**Lesson Purpose** ● The purpose of this lesson is for students to multiply one-digit numbers by multiples of 10. **Lesson Narrative** ● The work of this lesson connects to previous work because students have used strategies based on properties of operations to multiply within 100. Now, students extend this work and consider place value to multiply one-digit numbers by multiples of 10. Students complete a problem in context in which they explore how 180 can be grouped into multiples of ten in different ways. Students analyze two strategies for multiplying a single-digit number by a multiple of ten, then complete similar problems using the strategy of their choice. Throughout the lesson the associative property is used as a strategy to think of problems like 3×60 as 18 tens or 18×10. When students decompose multiples of ten in different ways as a strategy to multiply, they are looking for and making use of structure (MP7). **Vocabulary** ● **Materials** ● Activity 1 & 2: Base-ten blocks ● Activity 1 & 2: Centimeter Grid Paper (groups of 2)

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.NBT.A.3** Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9x80, 5x60) using strategies based on place value and properties of operations. **Mathematical Practice Standards** ● **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.2** Understand meanings of operations and how they relate to one another. ● **NCTM.MATH.CONTENT.3-5.ALG.B.1** Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers. ● **NCTM.MATH.CONTENT.3-5.ALG.B.3** Express mathematical relationships using equations. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: Tens (10 minutes)

- The purpose of this warm-up is to elicit the idea that 3 groups of 40 can also be seen as 12 groups of 10, which will be useful when students multiply one-digit whole numbers by multiples of 10 in a later activity. While students may notice and wonder about many things, seeing that the total can be decomposed into rows of 30 and further decomposed into units of 10 are the important discussion points.

Activity 1: A Whole Lot of Dollars (15 minutes)

- The purpose of this activity is for students to work with products of whole numbers and multiples of 10 in a concrete and familiar context before reasoning more abstractly about them. Given some numbers of dollar bills (for instance, four $20 bills), students write expressions to represent the amount (4x20) and then find its value using strategies that make sense to them. For example, they may count by 20 four times, think of $20 in terms of two $10 bills and find 4x2x10 (or 8x10). Consider giving students access to play money, if available, to help them visualize the quantities and support their reasoning. The reasoning here prompts students to use strategies based on place value and properties of operations (especially the associative property). It prepares students to work more flexibly with products involving factors and multiples of 10 in which the product is greater than 100.
  - **Access for Multilingual Learners**: *MLR8 Discussion Supports.* Prior to solving the problems, invite students to make sense of the situations and take turns sharing their understanding with their partner. Listen for and clarify any questions about the context. Advances: Reading, Representing
  - **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence.* Check in and provide each group with feedback that encourages collaboration and community. For example, ensuring each member of the group has a chance to share their solution and thinking. Supports accessibility for: Social-Emotional Functioning

Activity 2: Two Strategies (20 minutes)

- The purpose of this activity is for students to continue to reason about products of a whole number and a multiple of 10, this time using base-ten blocks to support their thinking. They analyze two strategies for multiplying. Both strategies are based on place value, but the second strategy also uses the associative property to think about 8x30 as 8x3x10 or 24x10.

Supplemental Resources

- Centimeter Grid Paper - Standard (pdf)
- Suggested Centers
  - Compare (1–5) Stage 3: Multiply within 100 (Directions) (Cards)
  - How Close? (1–5) Stage 5: Multiply to 100 (pdf)

Assessment Resources

- 3.4.12 Cool Down.pdf

LESSON 13: SOLVE PROBLEMS WITH EQUAL GROUPS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are multiplying within 100, where one factor is a teen number, in a way that makes sense to them.

Student-Facing Learning Intention

- Let’s multiply some teen numbers.

Success Criteria

- I can multiply up to 100, where one factor is a number between 11 and 19.

Lesson Purpose

- The purpose of this lesson is for students to solve problems involving multiplication within 100, where one factor is a teen number, in a way that makes sense to them.

Lesson Narrative

- The work of this lesson connects to previous work because students have used strategies to multiply one-digit factors. Now, they have the opportunity to extend these strategies to the multiplication of teen numbers. Students may use area diagrams and expressions to represent multiplication strategies, which they used in the previous section. Students solve problems involving the multiplication of teen numbers, then make a poster of their work with a student who solved in a similar way. During the gallery walk, students see a variety of ways to represent and solve the

	problem (MP2). This will be helpful in the next lesson where students make sense of specific representations of multiplying within 100 when one factor is a teen number.
	
	Vocabulary
	●
	
	Materials
	● Activity 1:
	    ● Base-ten blocks
	    ● Connecting cubes or counters
	    ● Tools for creating a visual display
	    ● Centimeter Grid Paper - Standard (groups of 2)

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. ● **NJSLS.MATH.CONTENT.3.OA.B.5** Apply properties of operations as strategies to multiply and divide. Examples: If is known, then is also known. (Commutative property of multiplication.) can be found by , then , or by , then. (Associative property of multiplication.) Knowing that 8 × 5= 40 and 8 × 2= 16, one can find 8 × 7 as. (Distributive property.) {Clarification: Students need not use formal terms for these properties). **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP5.** Use appropriate tools strategically.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.2** Understand meanings of operations and how they relate to one another. ● **NCTM.MATH.CONTENT.3-5.ALG.B.1** Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers. ● **NCTM.MATH.CONTENT.3-5.ALG.B.3** Express mathematical relationships using equations. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Estimation Exploration: Multiply Teens (10 minutes)

- The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information.

Activity 1: Problems with Teen Numbers (20 minutes)

- The purpose of this activity is for students to work with problems that involve multiplication within 100 where one factor is a teen number. This is the first time students have worked with problems with numbers in this range, so they should be encouraged to use the tools provided to them during the lesson if they choose (MP5). Students should also be encouraged to use strategies and representations from the previous section. As students are paired to create posters for the next activity, try to include a variety of approaches for students to see during the gallery walk in the next activity such as:
    - Counting by the teen number.
    - Counting by the single digit number.
    - Use the distributive property to decompose the teen number to multiply in parts.
    - Use the distributive property and place value understanding to decompose the teen number into tens and ones to multiply in parts.

Activity 2: Gallery Walk: Problems with Teen Numbers (15 minutes)

- The purpose of this activity is for students to consider what is the same and what is different about the ways that students solved problems involving multiplication of a teen number. Students may notice representations that were used, as well as different strategies that were used to find the total in the problem. The important thing is that students see a variety of ways to represent and solve the problem.
    - **Access for Multilingual Learners:** *MLR7 Compare and Connect. Synthesis:* After the Gallery Walk, lead a discussion comparing, contrasting, and connecting the different representations. "How did the number of chairs show up in each method? Why did the different approaches lead to the same outcome?" To amplify student language, and illustrate connections, follow along and point to the relevant parts of the displays as students speak. Advances: Representing, Conversing
    - **Access for Students with Disabilities.** *Engagement: Develop Effort and Persistence.* Invite students to generate a list of shared expectations for group work. Record responses on a display and keep visible during the activity. Supports accessibility for: Social-Emotional Functioning

Supplemental Resources

- Centimeter Grid Paper - Standard (pdf)
- Suggested Centers
    - Compare (1–5) Stage 2: Add and Subtract within 20 (Addition) (Subtraction)
    - How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards)

Assessment Resources

- 3.4.13 Cool Down.pdf

LESSON 14: WAYS TO REPRESENT MULTIPLICATION OF TEEN NUMBERS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are making sense of representations of multiplication (base-ten blocks and area diagrams) where one factor is a teen number.

Student-Facing Learning Intention

- Let's make sense of some ways to represent the multiplication of teen numbers.

Success Criteria

- I can make sense of representations of multiplication where one factor is a teen number.

Lesson Purpose

- The purpose of this lesson is for students to make sense of representations of the multiplication of teen numbers.

Lesson Narrative

- The work of this lesson connects to previous work because students have solved problems involving multiplication of teen numbers in ways that make sense to them. In the previous section they also used the distributive property to find products of single-digit factors using facts they know. In this lesson, students consider and connect different representations of a strategy used in the previous section that can also be used to multiply a teen number. This will be helpful in the next lesson when students solve these types of problems and choose how to represent the problem.

Vocabulary

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Materials

- Activity 1: Base-ten blocks

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.B.5**
  Apply properties of operations as strategies to multiply and divide. Examples: If is known, then is also known. (Commutative property of

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.2**
  Understand meanings of operations and how they relate to one another.
- **NCTM.MATH.CONTENT.3-5.ALG.B.1**

multiplication.) can be found by , then , or by , then. (Associative property of multiplication.) Knowing that 8 × 5= 40 and 8 × 2= 16, one can find 8 × 7 as. (Distributive property.) {Clarification: Students need not use formal terms for these properties). **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP7.** Look for and make use of structure.	Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers. ● **NCTM.MATH.CONTENT.3-5.ALG.B.3** Express mathematical relationships using equations. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: Seeing Groups (10 minutes)

- The purpose of this warm-up is to elicit the idea that while there are multiple ways to represent 2 groups of 12, some ways are more useful than others. While students may notice and wonder many things about the images, how 2 images show the groups of 12 have been organized using place value and how this type of decomposition can be helpful in finding the total are the important discussion points.

Activity 1: A Factor Greater than Ten (20 minutes)

- The purpose of this activity is for students to see how, when multiplying a number larger than ten, the distributive property can be used to decompose the factor into tens and ones, creating two smaller products. Base-ten blocks are used to help students visualize what is happening when a factor is decomposed to make two more easily known products. Factors slightly larger than ten can be naturally decomposed into a ten and some ones using place value. This will be useful in subsequent lessons as students progress towards fluent multiplication and division within 100. When students see that you can decompose a teen number into tens and ones and use this to multiply teen numbers, they look for and make use of structure (MP7).

Activity 2: Ways to Represent (15 minutes)

- The purpose of this activity is for students to make sense of different ways of representing multiplication of a teen number. Students analyze a gridded area diagram, base-ten blocks, and an area diagram labeled with side lengths. When they discuss how the different diagrams represent the same product, students reason abstractly and quantitatively (MP2).
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: Show a visual display of the diagrams. As students share their observations, annotate the display to illustrate connections. For example, on each diagram, annotate the decomposition of 15 into 10 and 5 by circling the groups of 10 and the groups of 5. Advances: Listening, Representing
  - **Access for Students with Disabilities:** *Representation: Access for Perception.* Begin by showing a demonstration explaining how you see the product in each of the 3 different models using a different problem to support understanding of the context. Supports accessibility for: Conceptual Processing, Visual-Spatial Processing

Supplemental Resources ● Suggested Centers ○ Compare (1–5) Stage 2: Add and Subtract within 20 (Addition) (Subtraction) ○ How Close? (1–5) Stage 4: Add to 1,000 (Recording Sheet) (Cards)	**Assessment Resources** ● 3.4.14 Cool Down.pdf

LESSON 15: EQUAL GROUPS, LARGER NUMBERS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are multiplying within 100, where one factor is a teen number.

Student-Facing Learning Intention

- Let's solve some problems with equal groups that have larger numbers.

Success Criteria

- I can multiply within 100, where one factor is a teen number.

Lesson Purpose

- The purpose of this lesson is for students to multiply within 100, where one factor is a teen number.

Lesson Narrative

- The work of this lesson connects to previous work because students have seen a variety of ways to represent and solve problems in which one of the factors is a teen number. In this lesson students use their choice of strategy and representation to solve these types of problems. Students participate in a gallery walk to highlight different ways that they solved problems with a synthesis that highlights the area diagram to represent one of the problems. Students' attention is drawn to scaling of area diagrams during the warm-up. While it's not important that student representations are exact, it is important that any area diagrams presented to students are to scale.

Vocabulary

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Materials

- Activity 1:
  - Base-ten blocks
  - Tools for creating a visual display
- Activity 2: Sticky notes

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- **NJSLS.MATH.CONTENT.3.OA.B.5**
  Apply properties of operations as strategies to multiply and divide. Examples: If   is known, then   is also known. (Commutative property of multiplication.) can be found by , then , or by , then. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as. (Distributive property.) {Clarification: Students need not use formal terms for these properties).
- **NJSLS.MATH.CONTENT.3.M.B.5**
  Relate area to the operations of multiplication and addition.
  c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths and is the sum of and . Use area models to represent the distributive property in mathematical reasoning.

Mathematical Practice Standards

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.2**
  Understand meanings of operations and how they relate to one another.
- **NCTM.MATH.CONTENT.3-5.ALG.B.1**
  Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR5.** Representation

- **MP2.** Reason abstractly and quantitatively.
- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP6.** Attend to precision.

Warm-up: Which One Doesn't Belong: Rectangles (10 minutes)

- This warm-up prompts students to compare four area diagrams that have been decomposed into two areas, each representing a product. It gives students a reason to use language precisely (MP6). It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the items in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as side lengths, area, parts, and decompose.

Activity 1: Equal Groups, Larger Numbers (20 minutes)

- The purpose of this activity is for students to solve problems that involve multiplication where one factor is a teen number. Students may solve and represent the problem any way they choose. In problem 3, look for different ways in which students are using area diagrams to highlight in the posters for the gallery walk in the next activity. Students reason abstractly and quantitatively when they interpret the stories and represent them with diagrams, expressions, or equations (MP2).
    - **Access for Students with Disabilities:** *Engagement: Provide Access by Recruiting Interest.* Leverage choice around perceived challenge. Invite students to select at least 2 of the 4 problems to complete. Supports accessibility for: Organization, Attention, Social-emotional Skills

Activity 2: Gallery Walk: Equal Groups, Larger Numbers (15 minutes)

- The purpose of this activity is for students to see how other students solved one of the problems that involves a factor of a teen number. While students look at each other's work, they will leave sticky notes describing why they think the answer does or does not make sense (MP3). The synthesis will look specifically at examples of how students used the area diagram to represent the problem.
    - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: As students share their observations about the selected posters, annotate the poster to illustrate connections. For example, circle the factors and the product and write "factors" and "product" respectively. Advances: Listening, Representing

Supplemental Resources

- Centimeter Grid Paper - Standard (pdf)
- Suggested Centers
    - Compare (1–5) Stage 3: Multiply within 100 (Directions) (Cards)
    - How Close? (1–5) Stage 5: Multiply to 100 (pdf)

Assessment Resources

- 3.4.15 Cool Down.pdf

LESSON 16: MULTIPLY NUMBERS LARGER THAN 20 (Teacher Guide)

Teacher-Facing Learning Intention

- Students are multiplying within 100, where one factor is greater than 20.
- Students are using properties based on place value and properties of operations to multiply.

Student-Facing Learning Intention

- Let's multiply numbers that are larger than

Lesson Purpose

- The purpose of this lesson is for students to multiply within 100, where one factor is greater than 20.

Lesson Narrative

- Previously, students have used strategies based on place value and properties of operations to find products of a whole-number and a teen number. Here, students extend this work to larger two-digit numbers. Students first analyze different strategies and then apply one or more of them to find the value of other products. The lesson also includes an optional game students can play to apply what they've learned to multiply larger numbers.

20. **Success Criteria** ● I can use place value to help me multiply within 100, where one factor is greater than 20.	**Vocabulary** ● **Materials** ● Activity 1 & 2: Base-ten blocks ● Activity 1 & 2: Centimeter Grid Paper - Standard (groups of 2) ● Activity 3: Number Cards (0-10) (groups of 2) ● Activity 3: Create a set of cards from the blackline master for each group of 2.

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.B.5** Apply properties of operations as strategies to multiply and divide. Examples: If is known, then is also known. (Commutative property of multiplication.) can be found by , then , or by , then. (Associative property of multiplication.) Knowing that 8 × 5= 40 and 8 × 2= 16, one can find 8 × 7 as. (Distributive property.) {Clarification: Students need not use formal terms for these properties). **Mathematical Practice Standards** ● **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. ● **NCTM.MATH.CONTENT.3-5.NUM.B.2** Understand the effects of multiplying and dividing whole numbers. ● **NCTM.MATH.CONTENT.3-5.NUM.B.4** Understand and use properties of operations, such as the distributivity of multiplication over addition. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Number Talk: Three Times Some Numbers (10 minutes)

- This Number Talk encourages students to think about the multiplication of one-digit numbers and multiples of 10 and to rely on place value to mentally solve problems. The strategies elicited here will be helpful later in the lesson when students multiply numbers larger than 20.

Activity 1: 4 x 23 , Represented (15 minutes)

- Previously, students multiplied two factors where one factor was a whole number and the other a teen number. The purpose of this activity is for students to make sense of multiplication of a one-digit number and a two-digit number greater than 20. Students analyze representations used to find and articulate reasons for using strategies that are based on the distributive property and place value to find products (MP7). Along the way, they see that decomposing the two-digit factors into tens and ones is particularly helpful for multiplying. They also reinforce what they know about the connections between area diagrams and multiplication expressions.
  - **Access for Students with Disabilities:** *MLR8 Discussion Supports.* Before partner work, remind students to use words such as decompose, tens, and ones. Advances: Speaking, Representing

Activity 2: Some Fine Products (15 minutes)

- The purpose of this activity is for students to continue to multiply single-digit whole numbers and numbers greater than 20. The opening problem encourages students to apply place value reasoning (decomposing two-digit numbers into tens and ones) and properties of operations to reason numerically about products. Because one of the factors is small, however, students may use repeated addition (such as 43+43) to find subsequent products. In the synthesis, emphasize strategies that are based on place value, connecting the numerical expressions with diagrams as needed.

Activity 3: Play Close to 100, Multiplication [OPTIONAL] (10 minutes)

- The purpose of this activity is for students to play a game in which they are able to apply the strategies they've learned for multiplying teen numbers and numbers over 20. Students use digits to create an expression that has a value as close to 100 as possible. The first game includes teen numbers and the second game includes numbers over 20. This activity is optional because it provides extra practice for multiplying by factors that are teen numbers and factors greater than 20. Depending on the time available, students can play 1 or 2 games.
    - **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence*. Check in and provide each group with feedback that encourages collaboration and community. Supports accessibility for: Social-Emotional Functioning

Supplemental Resources	Assessment Resources

- Centimeter Grid Paper - Standard (pdf)
- Number Cards (0-10) (pdf)
- Suggested Centers
  ○ Compare (1–5) Stage 3: Multiply within 100 (Directions) (Cards)
  ○ How Close? (1–5) Stage 5: Multiply to 100 (pdf)
	- 3.4.16 Cool Down.pdf

LESSON 17: USE THE FOUR OPERATIONS TO SOLVE PROBLEMS (Teacher Guide)

Teacher-Facing Learning Intention
- Students are representing two-step word problems using equations with a letter standing for the unknown quantity.
- Students are solving two-step word problems using the four operations.

Student-Facing Learning Intention
- Let's use the four operations to solve problems.

Success Criteria
- I can solve a two-step word problem using equations that contain a letter to represent the unknown number.

Lesson Purpose
- The purpose of this lesson is for students to solve two-step problems using all four operations.

Lesson Narrative
- Previously, students have solved two-step problems involving addition, subtraction, and multiplication. Here they consider what mathematical questions could be asked about a situation and then solve two-step problems that include division where the factors are limited to single-digit numbers. Parentheses are revisited as a tool students can use to specify which operation happens first in the equation so that it matches the situation they are representing.

Vocabulary
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Materials
- Activity 2: Base-ten blocks
- Activity 2: Grid Paper Standard (groups of 2)

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.OA.B.5**
  Apply properties of operations as strategies to multiply and divide. Examples: If is known, then is also known. (Commutative property of multiplication.) can be found by , then , or by , then. (Associative property of multiplication.) Knowing that 8 × 5= 40 and 8 × 2= 16, one can find 8 × 7 as. (Distributive property.) {Clarification: Students need not use formal terms for these properties).
- **NJSLS.MATH.CONTENT.3.OA.D.8**

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.NUM.B.2**
  Understand the effects of multiplying and dividing whole numbers.
- **NCTM.MATH.CONTENT.3-5.NUM.B.4**
  Understand and use properties of operations, such as the distributivity of multiplication over addition.

Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations) ● **NJSLS.MATH.CONTENT.3.NBT.A.3** Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9x80, 5x60) using strategies based on place value and properties of operations. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively.	**National Council of Teachers of Mathematics Process Standards** ● PR1. Problem Solving ● PR3. Communication ● PR4. Connections ● PR5. Representation

Warm-up: True or False: Multiply by 10 (10 minutes)

- The purpose of this True or False is to elicit strategies and understandings students have for multiplying one-digit whole numbers by multiples of 10. The reasoning students do here helps to deepen their understanding of the associative property as they decompose multiples of ten to make multiplying easier.

Activity 1: Questions about a Situation (15 minutes)

- The purpose of this activity is for students to consider a situation and think about all the mathematical questions they could ask about it. This gives students a chance to make sense of the situation before they are asked to solve problems. Students might choose to write a multiplication equation like (gx6) + 94=142. Acknowledge that this represents this situation, but focus the discussion in the synthesis on division to connect to the work in the next section.

Activity 2: Party Problems (20 minutes)

- The purpose of this activity is for students to solve two-step word problems using all four operations. Students should be encouraged to solve the problem first or write the equation first, depending on their preference. Encourage students to use parentheses if needed to show what is being done first in their equations. When students make sense of situations to solve two-step problems they reason abstractly and quantitatively (MP2).
    - **Access for Multilingual Learners:** *MLR5 Co-Craft Questions.* Keep books or devices closed. Display only the problem stem, without revealing the question. Give students 2–3 minutes to write a list of mathematical questions that could be asked about this situation, before comparing their questions with a partner. Invite each group to contribute one written question to a whole-class display. Ask the class to make comparisons among the shared questions and their own. Reveal the intended questions for this task and invite additional connections. Advances: Reading, Writing
    - **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence.* Some students may benefit from feedback that emphasizes effort and time on task. For example, check in and give feedback after each party planning problem. Supports accessibility for: Attention

Supplemental Resources ● Centimeter Grid Paper - Standard (pdf) ● Suggested Centers ○ Compare (1–5) Stage 3: Multiply within 100 (Directions) (Cards) ○ How Close? (1–5) Stage 5: Multiply to 100 (pdf)	**Assessment Resources** ● 3.4.17 Cool Down.pdf

LESSON 18: LARGER NUMBERS IN EQUAL GROUPS (Teacher Guide)

Teacher-Facing Learning Intention
- Students are solving problems involving division within 100, with quotients over 10, in a way that makes sense to them.

Student-Facing Learning Intention
- Let's divide with larger numbers.

Success Criteria
- I can solve division problems within 100, with quotients over 10, in a way that makes sense to me.

Lesson Purpose
- The purpose of this lesson is for students to solve problems involving division within 100, with quotients over 10, in a way that makes sense to them.

Lesson Narrative
- In previous lessons, students learned how multiplication and division are related. They also used strategies based on properties of operations to multiply larger numbers. In this lesson, students use a strategy of their choice to solve division problems with larger quotients than in previous lessons. Students should be encouraged to use whatever strategy and representation makes sense to them. The problem allows teachers an opportunity to see how students apply their learning from the unit to a new problem.

Vocabulary
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Materials
- Activity 1 & 2:
  - Base-ten blocks
  - Connecting cubes or counter
  - Activity 1: Centimeter Grid Paper - Standard (groups of 2)
  - Activity 2: Centimeter Grid Paper - Standard (groups of 2)

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.OA.A.2**
  Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as.
- **NJSLS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Mathematical Practice Standards
- **MP2.** Reason abstractly and quantitatively.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.B.1**
  Understand various meanings of multiplication and division.
- **NCTM.MATH.CONTENT.3-5.NUM.B.2**
  Understand the effects of multiplying and dividing whole numbers.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: What Do You Know About Division? (10 minutes)

- The purpose of this What Do You Know About ____ is to invite students to share what they know and how they can represent division.

Activity 1: Groups on a Field Trip (20 minutes)

- The purpose of this 5 Practices activity is to elicit students' existing strategies for finding the value of quotients with larger numbers. Students should be encouraged to use whatever strategy or representation makes sense to them.
  - **Access for Multilingual Learners:** *MLR7 Compare and Connect.* Synthesis: Invite students to prepare a visual display that shows the strategy they used to figure out the number of groups. Encourage students to include details that will help others interpret their thinking. For example, specific language, using different colors, shading, arrows, labels, notes, diagrams, or drawings. Give students time to investigate each other's work. During the whole-class discussion, ask students, "Did anyone solve the problem the same way, but would explain it differently? How did the groups of 4 show up in each method? Why did the different approaches lead to the same outcome?" Advances: Representing, Conversing
  - **Access for Students with Disabilities:** *Representation: Access for Perception.* Synthesis: As students identify correspondences between strategies, follow along and point to the relevant parts of each strategy to amplify student thinking and illustrate connections. Supports accessibility for: Conceptual Processing, Visual-Spatial Processing

Activity 2: Bus Ride and Lunch Groups (15 minutes)

- The purpose of this activity is for students to consider their strategies as they solve two other division problems involving equal groups with larger numbers. The divisor in the first problem is a low one-digit number. Students can see from the given situation that it is the number of groups. In the second problem, the divisor is a teen number, and the context suggests that it is the size of one group. Students are likely to adjust their strategy based on these observations. Focus the discussion on how students may have reasoned differently given a larger divisor or given what they understand about the situation.

Supplemental Resources	Assessment Resources

- Centimeter Grid Paper - Standard (pdf)
- Suggested Centers
  ○ Compare (1–5) Stage 4: Divide within 100 (Directions) (Cards)
  ○ How Close? (1–5) Stage 5: Multiply to 100 (pdf)
	- 3.4.18 Cool Down.pdf

LESSON 19: WAYS TO DIVIDE LARGER NUMBERS (Teacher Guide)

Teacher-Facing Learning Intention	Lesson Purpose
- Students are recognizing that division of larger numbers can still mean finding the number of groups or finding the size of each group. - Students are using base-ten blocks to represent division where the quotient is more than 10. **Student-Facing Learning Intention** - Let's make sense of representations of division. **Success Criteria**	- The purpose of this lesson is for students to recognize that the two interpretations of division still apply when dividing larger numbers and to use base-ten diagrams to interpret and represent division within 100. **Lesson Narrative** - Prior to this lesson, students have interpreted and represented division in terms of making equal-size groups. In this lesson, they revisit the two interpretations of division and recall that the divisor can be seen as either the number of groups or the size of each group. Students use base-ten blocks and diagrams to analyze and represent division expressions such as 55÷5 and 84÷7. They see that, depending on the numbers involved, one interpretation of division may be more useful or productive than the other. Students also recognize that it is helpful to use tens and ones to make equal groups (for example, to think of 84 as 8 tens and 4 ones, rather than 84 ones), and to decompose tens into ones as needed.

I can use base-ten blocks to solve division of larger numbers or finding the size of each group.	**Vocabulary** **Materials** - Activity 1 & 2: Base-ten blocks

New Jersey State Learning Standards **NJSLS.MATH.CONTENT.3.OA.A.2** Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as. **NJSLS.MATH.CONTENT.3.OA.B.5** Apply properties of operations as strategies to multiply and divide. Examples: If is known, then is also known. (Commutative property of multiplication.) can be found by , then , or by , then. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as. (Distributive property.) {Clarification: Students need not use formal terms for these properties). **NJSLS.MATH.CONTENT.3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that , one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **NJSLS.MATH.CONTENT.3.NBT.A.3** Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9x80, 5x60) using strategies based on place value and properties of operations. **Mathematical Practice Standards** **MP2.** Reason abstractly and quantitatively.	**National Council of Teachers of Mathematics Content Standards** **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. **National Council of Teachers of Mathematics Process Standards** **PR3.** Communication **PR4.** Connections **PR5.** Representation

Warm-up: True or False: Ones, Tens, Twenties (10 minutes)   The purpose of this True or False is to reinforce the relationship between tens and ones (that 1 ten is equal to 10 ones, or 1 group of 10 is 10 groups of 1). This will be helpful when students use base-ten blocks to represent division and decompose tens into ones to facilitate the process of dividing. It also allows students to practice finding the product of a one-digit whole number and a multiple of 10.
Activity 1: Divide with Base-Ten Blocks (20 minutes)   The purpose of this activity is for students to use strategies based on place value to find quotients greater than 10. Students use base-ten blocks to represent quotients with single-digit divisors, for which it is intuitive to think of the divisor as the number of groups. In a later activity, students will be reminded that

the divisor can also be interpreted as the size of each group. Working with base-ten blocks encourages students to divide out the tens and then the ones, and to see that sometimes it is necessary to decompose one or more tens to finish putting the dividend into equal groups. When students represent a quotient using base-ten blocks they reason abstractly and quantitatively (MP2).

- **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: Some students may benefit from the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking
- **Access for Students with Disabilities:** *Representation: Internalize Comprehension.* Synthesis: Invite students to identify which details were most important when deciding how to divide up the blocks. Display the sentence frame: "The next time I use base-ten blocks to divide, I will look for/pay attention to . . . ." Supports accessibility for: Visual-Spatial Processing, Attention

Activity 2: Different Ways to Show Division (15 minutes)

- The purpose of this activity is to show that the two meanings of division still apply when dividing larger numbers and that, in some cases, one interpretation may be more helpful than the other. Students first analyze two ways of using base-ten blocks to represent 65÷5 and see that the divisor, 5, can be interpreted to mean the number of groups or the size of one group. They then consider how they might interpret and represent the divisor in other quotients. The reasoning here prepares students to reason more strategically as they divide larger numbers.

Supplemental Resources

- Suggested Centers
  - Compare (1–5) Stage 4: Divide within 100 (Directions) (Cards)
  - How Close? (1–5) Stage 5: Multiply to 100 (pdf)
  - Can You Draw It? (1–5) Stage 2: Grade 2 Shapes (Dot Paper) (Cards)

Assessment Resources

- 3.4.19 Cool Down.pdf

LESSON 20: STRATEGIES FOR DIVIDING (Teacher Guide)

Teacher-Facing Learning Intention

- Students are analyzing strategies for representing and reasoning about division.
- Students are dividing within 100 using strategies based on place value and properties of operations.

Student-Facing Learning Intention

- Let's use different strategies to divide.

Success Criteria

- I can analyze strategies for representing and reasoning about division within 100 using place value and properties of operations.

Lesson Purpose

- The purpose of this lesson is for students to analyze representations and strategies for finding quotients with larger numbers and to divide within 100.

Lesson Narrative

- Previously, students use base-ten blocks, diagrams, and other representations or strategies to reason about division within 100. In this lesson, they extend and formalize this work to include writing a series of equations to find the value of a quotient. In analyzing various strategies to represent division, students reinforce their understanding of place value, properties of operations, and the relationship of multiplication and division.

Vocabulary

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Materials

- Activity 2: Base-ten blocks
- Activity 2: Centimeter Grid Paper (groups of 2)
- Activity 3: Compare Stage 4 Division Cards (groups of 2)
  - Create a set of cards from the blackline master for each group of 2.

	● Remove the cards with two-digit divisors.

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.B.5** Apply properties of operations as strategies to multiply and divide. Examples: If is known, then is also known. (Commutative property of multiplication.) can be found by , then , or by , then. (Associative property of multiplication.) Knowing that 8 × 5= 40 and 8 × 2= 16, one can find 8 × 7 as. (Distributive property.) {Clarification: Students need not use formal terms for these properties). ● **NJSLS.MATH.CONTENT.3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that , one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. ● **NCTM.MATH.CONTENT.3-5.NUM.B.2** Understand the effects of multiplying and dividing whole numbers. ● **NCTM.MATH.CONTENT.3-5.NUM.B.4** Understand and use properties of operations, such as the distributivity of multiplication over addition. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Number Talk: Multiplication and Division (10 minutes)
- The purpose of this Number Talk is to elicit strategies and understandings students have for using multiplication to help them divide. These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to find the value of quotients.

Activity 1: Ways to Divide (15 minutes)
- The purpose of this activity is for students to transition from reasoning about division concretely or visually (using base-ten diagrams) to doing so more abstractly (by writing equations). It also reinforces the connections between multiplication and division. Students make sense of three different strategies of dividing 78 by 3 and attend to the connections between the visual and numerical representations of the same quotient. As they do so, they practice reasoning quantitatively and abstractly (MP2).
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: Display Lin, Priya, and Tyler's strategies. As students share their observations, annotate the display to illustrate connections. For example, annotate where students see the divisor, dividend, and quotient on each diagram. Advances: Listening, Representing

Activity 2: How Would You Divide? (15 minutes)
- The purpose of this activity is for students to practice finding the value of division expressions using any strategy that makes sense to them. They may divide the dividend into equal groups or use the divisor to multiply up to the given dividend. They may choose to represent the division or multiplication with base-ten blocks or by drawing diagrams. During the synthesis, highlight strategies that rely on place value, properties of operations, and the relationship between multiplication and division (MP7).
  - **Access for Students with Disabilities:** *Representation: Develop Language and Symbols.* Synthesis: Make connections between representations visible. Elicit from students the connections between the different strategies and representations shared by students. Supports accessibility for: Visual-Spatial Processing, Conceptual Processing

Activity 3: Compare, Divide within 100 [OPTIONAL] (10 minutes) ● The purpose of this optional activity is for students to practice evaluating division expressions in order to make comparisons. Compare is a center that focuses on the procedural skills needed to solve single- and multi-step word problems. In this stage, students will use division to evaluate and compare quotients within 100. This stage of the Compare center is used in grades 3, 4, and 5. When used in grade 3, remove the cards with two-digit divisors.	
Supplemental Resources ● Centimeter Grid Paper - Standard (pdf) ● Suggested Centers ○ Compare (1–5) Stage 4: Divide within 100 (Directions) (Cards) ■ Compare Stage 4 Division Cards (pdf) ○ How Close? (1–5) Stage 5: Multiply to 100 (pdf) ○ Can You Draw It? (1–5) Stage 2: Grade 2 Shapes (Dot Paper) (Cards)	**Assessment Resources** ● 3.4.20 Cool Down.pdf
LESSON 21: SOLVE PROBLEMS USING THE FOUR OPERATIONS (Teacher Guide)	
Teacher-Facing Learning Intention ● Students are representing two-step word problems using equations with a letter standing for the unknown quantity. ● Students are solving two-step word problems using the four operations. **Student-Facing Learning Intention** ● Let's represent and solve problems using all four operations. **Success Criteria** ● I can use the four operations to represent two-step word problems using equations with a letter standing for the unknown quantity.	**Lesson Purpose** ● The purpose of this lesson is for students to represent and solve two-step word problems using the four operations. **Lesson Narrative** ● Previously, students have represented and solved two-step word problems using addition, subtraction, multiplication, and division with smaller numbers. In this lesson, students continue to deepen their understanding of two-step word problems as they consider what they need to know to solve problems and think about the relationship between numbers in a problem. Students write equations with a letter standing for the unknown quantity to represent these problems. **Vocabulary** ● **Materials** ●
New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.D.8** Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order)	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.B.1** Understand various meanings of multiplication and division. ● **NCTM.MATH.CONTENT.3-5.NUM.B.2** Understand the effects of multiplying and dividing whole numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

(Order of Operations) **Mathematical Practice Standards** ● **MP1.** Make sense of problems and persevere in solving them.	

Warm-up: Notice and Wonder: Apples Again (10 minutes)

- The purpose of this warm-up is to elicit the idea that many different questions could be asked about this situation, which will be useful when students solve problems in a later activity. While students may notice and wonder many things about this situation, the various questions that could be asked about the situation are the important discussion points.

Activity 1: Apple Adventure (20 minutes)

- The purpose of this activity is for students to think about what they need to know to solve two-step word problems. Students choose numbers that make sense together to complete the problem from the warm-up. They articulate relationships between the quantities in the problem to justify their number choices. If students quickly find a combination of numbers that work, encourage them to see if there are other possibilities or to write a completed situation with the numbers they have chosen. Students who do not choose a matching set of numbers quickly make sense of and persevere in solving the problem as they consider the relationship between the different quantities and the restrictions that puts on which numbers can describe the situation (MP1).
  - **Access for Students with Disabilities:** *Action and Expression: Internalize Executive Functions.* Invite students to plan a strategy, including the tools they will use, for completing the chart. If time allows, invite students to share their plan with their partner before they begin. Supports accessibility for: Conceptual Processing, Organization

Activity 2: Apple Days (15 minutes)

- The purpose of this activity is for students to represent a problem with an equation using a letter for the unknown quantity and solve the problem. Students should be encouraged to use whatever strategy or representation makes sense to them. The synthesis focuses on student thinking for the first problem. Students might represent the situation with:
    - a tape diagram or an area diagram
    - an equation that uses multiplication
    - an equation that uses division
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Prior to solving the problems, invite students to make sense of the situations. Monitor and clarify any questions about the context. Advances: Reading, Representing

Supplemental Resources ● Centimeter Grid Paper - Standard (pdf)	**Assessment Resources** ● 3.4.21 Cool Down.pdf

LESSON 22: SCHOOL COMMUNITY GARDEN (Teacher Guide)

Teacher-Facing Learning Intention ● Students are representing and solve "How many groups?" and "How many in each group?" problems in a real world context. Solve two-step problems in a real world context. **Student-Facing Learning Intention**	**Lesson Purpose** ● The purpose of this lesson is to use multiplication and division to model a real-world design problem. **Lesson Narrative** ● This lesson is optional because it does not address any new mathematical content standards. This lesson does provide students with an opportunity to apply precursor skills of mathematical modeling. In previous lessons, students multiplied and divided numbers within 100. They related division to

- Let's plan a school garden.

Success Criteria

- I can represent and solve "How many groups?" and "How many in each group?" problems in a real world context. Solve two-step problems in a real world context.

multiplication by understanding division as an unknown factor problem. They used properties of operations and place value understanding to develop strategies to multiply and divide within 100. In this lesson, they use their understanding of multiplication and division to plan a school garden. In the first activity, students solve problems that involve the spacing between plants in a row and between the rows. In the second activity, they plan a garden. They choose the types of vegetables and fruit to grow, how many plants to grow, and the arrangement of the plants. They also consider the yield of the garden. Students represent their plans with diagrams and expressions or equations. Students model with mathematics (MP4) as they consider constraints, make assumptions and decisions about quantities, think about how to represent the relationships among quantities, and check their solutions in terms of the situation.

Vocabulary

-

Materials

- Activity 2: Centimeter Grid Paper - Standard (groups of 2)

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.A.2**
  Interpret whole-number quotients of whole numbers, e.g., interpret as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as.
- **NJSLS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- **NJSLS.MATH.CONTENT.3.OA.A.4**
  Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8x?=48, 5=? ÷ 3, 6x6=?.
- **NJSLS.MATH.CONTENT.3.OA.D.8**
  Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.B.3**
  Identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

order when there are no parentheses to specify a particular order) (Order of Operations) ● **NJSLS.MATH.CONTENT.3.M.B.5** Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths and is the sum of and . Use area models to represent the distributive property in mathematical reasoning. d. Recognize the area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. **Mathematical Practice Standards** ● **MP4.** Model with mathematics.	

Warm-up: Notice and Wonder: Garden (10 minutes)

- The purpose of this warm-up is to introduce the context of gardening, which will be useful when students plan a garden in a later activity. While students may notice and wonder many things about this image, the spacing of the plants is the important discussion point.

Activity 1: Activity 1: Produce (15 minutes)

- The purpose of this activity is for students to use multiplication and division to solve problems about growing strawberries. They draw diagrams and write expressions or equations to represent each situation, and solve the problem. The given context encourages students to think of equal groups, arrays, or rectangular areas. In previous lessons, students have been asked to write either an equation or expression. This activity gives them an opportunity to make a choice. Alternatively, teachers may opt to instruct students to write either an equation or expression.

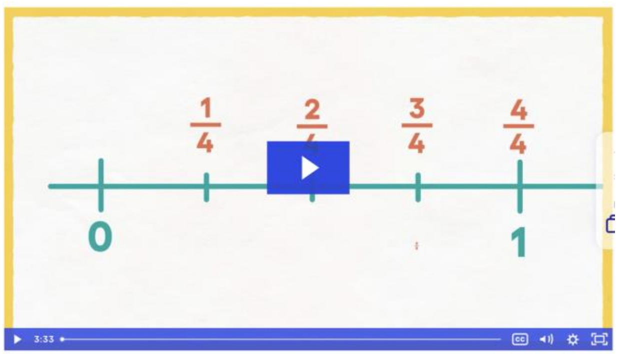
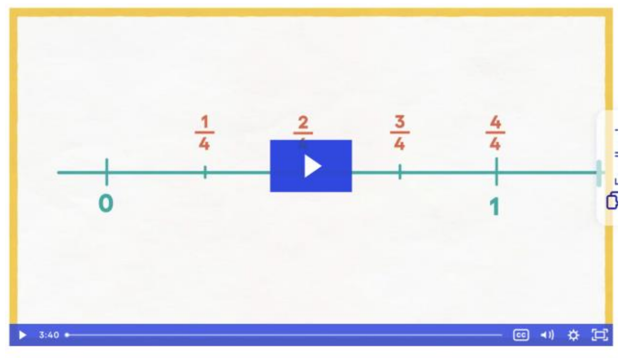
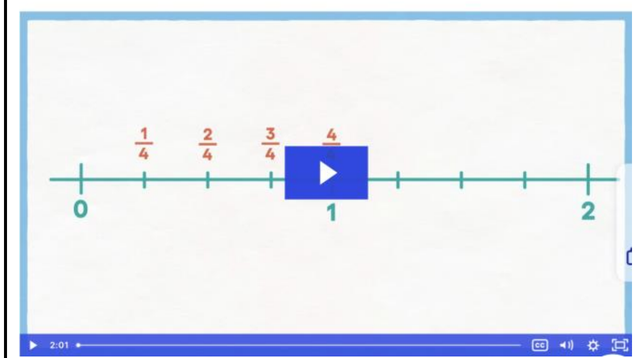
Activity 2: Plan the Garden (25 minutes)

- The purpose of this activity is to use students' experience with multiplication and division within 100 to plan a school garden. In this activity, students make choices about which produce to grow. The choices are guided by some constraints, such as a desired yield. Students draw diagrams to represent how the plants are arranged in the garden and how they bear fruit. If needed, students can be provided with images to see how the different plants grow.
  - **Access for Multilingual Learners:** *MLR7 Compare and Connect:* Invite groups to prepare a visual display that shows the strategies they used to plan part of the community garden. Encourage students to include details that will help others interpret their thinking.
  - **Access for Students with Disabilities:** *Action and Expression: Internalize Executive Functions.* Invite students to plan a strategy, including the tools they will use for designing their garden. If time allows, invite students to share their plan with another group.

Supplemental Resources	Assessment Resources
●	

	• Unit 4 Student Task Lesson 22.pdf

Unit 5 : Fractions as Numbers

PEDAGOGICAL CONTENT KNOWLEDGE RESOURCES FOR TEACHERS		
Learning Narrative Video The Unit Launch: Learning Narrative video for Grade 3, Unit 5 gives insight into the unit objectives, models and representations, possible student errors and misconceptions, and tips that might be used to help support student understanding. The Learning Narrative video is ideal for teachers to study prior to teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 	**Learning Progressions Video** The Unit Launch: Learning Progressions video for Grade 3, Unit 5 details how the content of a unit builds upon prior knowledge, and how the understanding of the content provides students with readiness for future learning. The Learning Progressions video is ideal for teachers to study before teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 	**Learning Supports Video** The Unit Launch: Learning Supports video for Grade 3, Unit 5 gives an in-depth look into the models and representations used in this unit to help support student understanding. The Learning Supports video is ideal for teachers to study prior to teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 

STAGE 1 - DESIRED RESULTS	
Assessed Focus Standards **NJSLS.MATH.CONTENT. 3.OA.B.5** Apply properties of operations as strategies to	**UNIT DESCRIPTION** In this unit, students make sense of fractions as numbers, using various diagrams to represent and reason about fractions, compare their size, and relate them to whole numbers. The denominators of the fractions explored here are limited to 2, 3, 4, 6, and 8. In grade 2, students partitioned circles and rectangles into equal

multiply and divide. Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.) **NJSLS.MATH.CONTENT. 3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **NJSLS.MATH.CONTENT. 3.NF.A.1** Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3 . **NJSLS.MATH.CONTENT.3.NF.A.2** Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. b. Represent a fraction a/b on a number line diagram by marking off a length 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. **NJSLS.MATH.CONTENT. 3.NF.A.3**	parts and used the language “halves,” “thirds,” and “fourths.” Students begin this unit in a similar way, by reasoning about the size of shaded parts in shapes. Next, they create fraction strips by folding strips of paper into equal parts and later represent the strips as tape diagrams.Using fraction strips and tape diagrams to represent fractions prepare students to think about fractions more abstractly: as lengths and locations on the number line. This work builds on students’ prior experience with representing whole numbers on the number line. In each representation, students take care to identify 1 whole. This helps them reason about the size of the parts and whether a fraction is less or greater than 1. (Fractions greater than 1 are not treated as special cases.) Students then use these representations to learn about equivalent fractions and to compare fractions. They see that fractions are equivalent if they are the same size or at the same location on the number line, and that some fractions are the same size as whole numbers. Later in the unit, students compare fractions with the same denominator and those with the same numerator. They recognize that as the numerator gets larger, more parts are being counted, and as the denominator gets larger, the size of each part in a whole gets smaller. **Throughout the unit** The progression of warm-ups in the unit mirrors the development of fraction concepts in the unit. Students work with unit fractions, then learn that non-unit fractions are made of unit fractions. Students learn how to locate fractions on a number line. They identify and generate equivalent fractions before comparing fractions with the same numerator or denominator. Later warm-ups of the unit prepare students for work with fractional lengths in the next unit.
	EXPLICIT ASPECTS OF RIGOR
	Conceptual Understanding ● <u>Apply properties of operations as strategies</u> to multiply and divide. Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.) ● <u>Understand</u> a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3 . ● <u>Understand</u> a fraction as a number on the number line; represent fractions on a number line diagram. ● <u>Represent</u> a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. <u>Recognize</u> that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. ● <u>Represent</u> a fraction a/b on a number line diagram by marking off a length 1/b from 0. <u>Recognize</u> that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. ● <u>Explain</u> equivalence of fractions in special cases,and compare fractions by reasoning about their size. ● <u>Understand</u> two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.
c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.
d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <.

Content Connections

3-LS3-1
Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS3-2
Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4-1
Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

3-LS4-2
Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving,

- Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.
- Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.
- Compare two fractions with the same numerator or the same denominator by reasoning about their size.
- Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <.

Procedural Fluency

- With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

MEANING

Enduring Understandings

U1. A region can be divided into equal-sized parts in different ways. Equal-sized parts may have the same area, but may not have the same shape.

U2. A region can be divided into equal-sized parts in different ways. Equal-sized parts may have the same area, but may not have the same shape.

U3. A region can be divided into equal-sized parts in different ways. Equal-sized parts may have the same area, but may not have the same shape.

U4. The set of real numbers is infinite and ordered. Whole number, integers, and fractions are real numbers. Each real number can be associated with a unique point on a number line.

U5. Some points between whole numbers on a number line can be labeled with fractions or mixed numbers. The denominator of the fraction can be determined by counting the number of equal parts between two consecutive whole numbers.

Essential Questions

Q1. What is a fraction?

Q2. What are different interpretations of a fraction?

Q3. What is fraction equivalence and how can it be recognized?

Q4. What visual models are most useful when working with fractions?

Q5. What are different ways to compare fractions?

Q6. How can whole numbers be expressed as fractions?

<table>
<tr>
<td rowspan="3">finding mates, and reproducing.

3-LS4-3
Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-ESS2-1
Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

INTEGRATION OF 21st CENTURY SKILLS
9.1.4.A.1
Recognize a problem and brainstorm ways to solve the problem individually or collaboratively.

9.1.4.A.5
Apply critical thinking and problem-solving skills in classroom and family settings.

9.1.4.B.1
Participate in brainstorming sessions to seek information, ideas, and strategies that foster creative thinking.

9.1.4.C.1
Practice collaborative skills in groups, and explain how these skills assist in completing tasks in different settings (at home, in school, and during play).

9.4.2.TL.7
Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts

CAREER EDUCATION
9.2.4.A.4
Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

9.3.ST-SM.2</td>
<td>**U6.** Some points between whole numbers on a number line can be labeled with fractions or mixed numbers. The denominator of the fraction can be determined by counting the number of equal parts between two consecutive whole numbers.

U7. Some points between whole numbers on a number line can be labeled with fractions or mixed numbers. The denominator of the fraction can be determined by counting the number of equal parts between two consecutive whole numbers.

U8. Equivalent fractions name the same point on a number line but have different denominators.
If a fraction aligns with a whole number on a number line or to a whole number fraction strip, the whole number is equivalent to that fraction (i.e. 2/2 = 1).

U9. Whole numbers can be expressed as fractions with 1 as the denominator (i.e. 5 = 5/1).</td>
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<tr>
<td colspan="2">**WHAT STUDENTS WILL KNOW AND BE ABLE TO DO**</td>
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<tr>
<td>**Knowledge**

K1. Fractions are built from unit fractions such that a fraction $\frac{a}{b}$ is the quantity formed by a parts of size $\frac{1}{b}$.

K2. Unit fractions are formed by partitioning shapes into equal parts.

K3. Unit fractions are formed by partitioning shapes into equal parts.

K4. Explain equivalence of fractions in special cases and express whole numbers as fractions and fractions as whole numbers.

K5. Compare two fractions with the same numerator</td>
<td>**Skills**

S1. Partition shapes into 2, 3, 4, 6, or 8 parts with equal area and name those parts as halves, thirds, fourths, sixths, and eighths. Recognize that equal-size parts in a shape can be named with numbers called fractions. [Lesson1]

S2. Express the area of each part as a unit fraction of the whole. Partition shapes into halves, thirds, fourths, sixths, and eighths. [Lesson2]

S3. Build non-unit fractions and whole numbers from unit fractions. [Lesson4]

S4. Extend understanding of whole numbers on the number line to see fractions on a number line.</td>
</tr>
</table>

Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems. **9.3.ST-SM.4** Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.	or denominator, record the results with the symbols >, =, or <, and justify the conclusions.	[Lesson 5] **S5.** Partition the interval from 0 to 1 and locate unit fractions within that interval. [Lesson 6] **S6.** Locate non-unit fractions on the number line (including fractions greater than 1). [Lesson 7] **S7.** Locate whole numbers on the number line given the location of a unit fraction and express them as fractions. Recognize that whole numbers can be written as fractions. [Lesson 8] **S8.** Locate 1 on the number line given the location of a non-unit fraction. [Lesson 9] **S9.** Identify equivalent fractions. Understand two fractions as equivalent if they are the same size and the parts refer to the same whole. [Lesson 10] **S10.** Use diagrams to explain or show fraction equivalence. Use diagrams to generate equivalent fractions. [Lesson 11] **S11.** Identify and generate equivalent fractions. Understand two fractions as equivalent if they are at the same point on a number line. [Lesson 12] **S12.** Express whole numbers as fractions. Recognize fractions that are equivalent to whole numbers. [Lesson 13] **S13.** Represent and compare fractions in a way that makes sense to them. [Lesson14] **S14.** Compare two fractions with the same denominator by reasoning about their size. [Lesson 15, 16, 17] **S15.** Record the results of comparison with the symbols >, =, or <. [Lesson 17] **S16.** Apply fraction understanding to create

		geometric designs. [Lesson 18]

CULTURALLY RESPONSIVE TEACHING in PRACTICE	SOCIAL EMOTIONAL LEARNING in PRACTICE
● Encourage collaborative learning in diverse groups. ● Recognize and value multiple problem-solving approaches. ● Be mindful of language barriers and use simple language and visuals. ● Contextualize abstract concepts in real-life situations. ● Tailor instruction to individual interests and strengths. ● Involve families and the community in math-related activities. ● Include diverse mathematicians and scientists in lessons. ● Use multicultural resources and materials. ● Use math problems and examples that relate to students' cultures and experiences.	● Create a positive classroom environment. ● Encourage communication and collaboration. ● Model emotional regulation. ● Connect math to real-life situations. ● Validate effort and persistence. ● Use cooperative learning. ● Model growth mindset. ● Incorporate reflective practices. ● Integrate SEL activities such as use of affirmations. ● Foster positive teacher-student relationships.

STAGE 2 - EVIDENCE

SUMMATIVE ASSESSMENT

Illustrative Mathematics

- 3.5-Section-A-Checkpoint-Assessment.pdf
- 3.5-Section-B-Checkpoint-Assessment.pdf
- 3.5-Section-C-Checkpoint-Assessment.pdf
- 3.5-Section-D-Checkpoint-Assessment.pdf
- 3.5-End-of-Unit-Assessment.pdf
- 3.5-End-of-Unit-Assessment SP.pdf

PRE-ASSESSMENT

Illustrative Mathematics

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FORMATIVE ASSESSMENT		
Illustrative Mathematics Curriculum ● 3.5.1 Cool Down.pdf ● 3.5.2 Cool Down.pdf ● 3.5.3 Cool Down.pdf ● 3.5.4 Cool Down.pdf ● 3.5.5 Cool Down.pdf ● 3.5.6 Cool Down.pdf ● 3.5.7 Cool Down.pdf ● 3.5.8 Cool Down.pdf ● 3.5.9 Cool Down.pdf ● 3.5.10 Cool Down.pdf ● 3.5.11 Cool Down.pdf ● 3.5.12 Cool Down.pdf ● 3.5.13 Cool Down.pdf ● 3.5.14 Cool Down.pdf ● 3.5.15 Cool Down.pdf ● 3.5.16 Cool Down.pdf ● 3.5.17 Cool Down.pdf	*Illustrative Mathematics* Tasks ● Unit 5 Student Task Lesson 1.pdf ● Unit 5 Student Task Lesson 2.pdf ● Unit 5 Student Task Lesson 3.pdf ● Unit 5 Student Task Lesson 4.pdf ● Unit 5 Student Task Lesson 5.pdf ● Unit 5 Student Task Lesson 6.pdf ● Unit 5 Student Task Lesson 7.pdf ● Unit 5 Student Task Lesson 8.pdf ● Unit 5 Student Task Lesson 9.pdf ● Unit 5 Student Task Lesson 10.pdf ● Unit 5 Student Task Lesson 11.pdf ● Unit 5 Student Task Lesson 12.pdf ● Unit 5 Student Task Lesson 13.pdf ● Unit 5 Student Task Lesson 14.pdf ● Unit 5 Student Task Lesson 15.pdf ● Unit 5 Student Task Lesson 16.pdf ● Unit 5 Student Task Lesson 17.pdf ● Unit 5 Student Task Lesson 18.pdf	NJSLA Released Items 3.NBT.A.1 ● Item UIN - 0456-M00013 3.NBT.A.2 ● Item UIN - VH094716 ● Item UIN - M00912P ● Item UIN - M00912P_SP ● Item UIN - M00001 ● Item UIN - M00887 ● Item UIN - M01214 ● Item UIN - M01400 ● Item UIN - M03973 ● Item UIN - VF556343 ● Item UIN - VF556728 ● Item UIN - VH006903 ● Item UIN - VH055439 ● Item UIN - VH058363 ● Item UIN - VH061484 3.NF.A.1 ● Item UIN - M01628 ● Item UIN - M01628_SP ● Item UIN - M00005P ● Item UIN - M01188 ● Item UIN - M01189 ● Item UIN - M01189_SP ● Item UIN - VF909892 ● Item UIN - VH014757 ● Item UIN - M01394 ● Item UIN - M01395 3.NF.A.2 ● Item UIN - VH009554 ● Item UIN - VH009554_SP ● Item UIN - 0487-M02026 ● Item UIN - M00360 ● Item UIN - VF563153

		• Item UIN - VH004708 • Item UIN - VH154887 • Item UIN - VH117904 • Item UIN - M00358 • Item UIN - M00555 • Item UIN - VH080113 • Item UIN - VH117924 **3.NF.A.2.a** • Item UIN - VH000938 • Item UIN - VH000938_SP **3.NF.A.3.a** • Item UIN - M01190 • Item UIN - VF556026 • Item UIN - VF885478 • Item UIN - VF885879 • Item UIN - VF885879_SP • Item UIN - VF889661 • Item UIN - VF889661_SP • Item UIN - VH073655 • Item UIN - M01201 • Item UIN - M01201_SP **3.NF.A.3.b** • Item UIN - VF556095 • Item UIN - VF556095_SP • Item UIN - VF564965 • Item UIN - VH069427 **3.NF.A.3.c** • Item UIN - M01193 • Item UIN - M02506 • Item UIN - VF524247 • Item UIN - VF646687 • Item UIN - VH080084 **3.NF.A.3.d** • Item UIN - M00043 • Item UIN - M03179 • Item UIN - VH000905 • Item UIN - VF524155

		3.G.A.2 ● Item UIN - M00916P ● Item UIN - M03502 ● Item UIN - VF647226 ● Item UIN - VH009537 ● Item UIN - VH094356 ● Item UIN - VF649349 ● Item UIN - VF649349_SP ● Item UIN - VH057846 ● Item UIN - VH096172 ● Item UIN - VH096217 ● Item UIN - VH117970
STAGE 3 - LEARNING PLAN		
MATH WORKSHOP		
***Illustrative Mathematics* Centers** ● Mystery Number ○ Stage 2: Three-digit Numbers (Supporting) ● Number Line Scoot ○ Stage 1: Twos, Fives, and Tens (Supporting) ● Mystery Number ○ Stage 3: Fractions with Denominators 2, 3, 4, 6 (Addressing) ● Number Line Scoot ○ Stage 2: Halves, Thirds and Fourths (Addressing) ● Secret Fraction ○ Stage 1: Building Non-Unit Fractions (Addressing) ● Number Line Scoot ○ Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (Addressing) ● Rolling for Fractions ○ Stage 1: Equivalent Fractions (Addressing) ● Number Line Scoot ○ Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (Addressing)	***Building Thinking Classrooms* Tasks** ● Lesson 2 Activity 2: Partition, Shade, Trade (20 minutes) ● Lesson 3 Activity 2: Fraction Match (20 minutes) ● Lesson 4 Activity 2: Represent Fraction Situations (15 minutes) ● Lesson 6 Activity 1: Partition Fourths (15 minutes) ● Lesson 7 Activity 2: Fractions on the Number Line (10 minutes) ● Lesson 8 Activity 1: Fractions Located at Whole Numbers (15 minutes) ● Lesson 9 Activity 1: Locate 1 Again (20 minutes) ● Lesson 10 Activity 2: Find Equivalent Fractions (20 minutes) ● Lesson 11 Activity 1: Show Equivalence (20 minutes) ● Lesson 12 Activity 1: Running Part of a Trail (10 minutes) ● Lesson 13 Activity 2: Write Them as Fractions (15 minutes) ● Lesson 14 Activity 1: Equivalent or Not? (25 minutes)	**Open Middle** ● Multiply and Divide Within A Hundred 1 ● Fractions On A Number Line ● Multiplying Multiples Of Ten 2 ● Multiplying Multiples Of Ten 1 ● Subtracting 3-Digit Numbers 2 ● Adding 3-Digit Numbers ● Subtracting 3-Digit Numbers 2 ● Adding 3-Digit Numbers ● Subtracting 3-Digit Numbers 1 ● Rounding 1 ● Rounding 2 ● Closest Difference to 200 – Problem 2 ● Subtraction with Zeros ● Closest Difference to 200

● Five in a Row: Multiplication ○ Stage 2: Factors 1–9 (Supporting)	● Lesson 15 Activity 1: Compare Fractions with the Same Denominator (20 minutes) ● Lesson 16 Activity 1: Five Parts of Something (20 minutes) ● Lesson 17 Activity 1: Comparison Problems (15 minutes) ● Lesson 18 Activity 1: Design With ½ (15 minutes)	
Slow Reveal Graphs ●	**Bootstrap (to be added Summer 2025)**	**Other Resources** ● IM Talking Math
PHYSICAL MANIPULATIVES & RESOURCES	**VIRTUAL MANIPULATIVES & RESOURCES**	**VOCABULARY**
● virtual base-ten blocks ● colored pencils ● crayons ● folders ● markers ● number cubes ● number cubes ● rulers ● scissors	**Didax** ● Virtual Base-ten blocks ● Fractions titles & Number Line ● Number Line ● Place Value Disk **Toy Theater** ● Compare ● Fraction Strips ● Fraction Bars ● Number line **PBS** ● Modeling Fractions with Cuisenaire Rods **Math Learning Center** ● Fractions	● denominator ● equivalent fractions ● fraction ● numerator ● unit fraction
SUMMARY OF KEY LEARNING		
Pacing This unit has been assigned 21 days in the Pacing Guide. The 21 days are allotted as follows: 18 lesson days as outlined below, 2 flexible days, and 1 assessment day. Lesson 18 is optional in this unit. **Teacher Resources** Unit 5 Teacher's Guide (English) (Spanish) Unit 5 Teacher's Resource Pack (English) (Spanish)		

Students Resources:
Unit 5 Student Workbook (English) (Spanish)

Section A: Introduction to Fractions
Lesson 1 Name the Parts
Lesson 2 Name Parts as Fractions
Lesson 3 Non-unit Fractions
Lesson 4 Build Fractions from Unit Fractions

Section B: Fractions on the Number Line
Lesson 5 To the Number Line
Lesson 6 Locate Unit Fractions on the Number Line
Lesson 7 Non-unit Fractions on the Number Line
Lesson 8 Fractions and Whole Numbers
Lesson 9 All Kinds of Numbers on the Number Line

Section C: Equivalent Fractions
Lesson 10 Equivalent Fractions
Lesson 11 Generate Equivalent Fractions
Lesson 12 Equivalent Fractions on a Number Line
Lesson 13 Whole Numbers and Fractions

Section D: Fraction Comparisons
Lesson 14 How Do You Compare Fractions?
Lesson 15 Compare Fractions with the Same Denominator
Lesson 16 Compare Fractions with the Same Numerator
Lesson 17 Compare Fractions
Lesson 18 Design With Fractions (optional)

LESSON 1: NAME THE PARTS (Teacher Guide)

Teacher-Facing Learning Intention	Lesson Purpose
● Students are partitioning shapes into 2, 3, 4, 6, or 8 parts with equal area and name those parts as halves, thirds, fourths, sixths, and eighths. ● Students are recognizing that equal-size parts in a shape can be named with numbers called fractions. **Student-Facing Learning Intention** ● Let's name parts of a whole.	● The purpose of this lesson is for students to be introduced to fractions as numbers we write to describe the parts of a whole that has been partitioned into equal parts. **Lesson Narrative** ● In previous grades, students partitioned circles and rectangles into two, three, or four equal pieces and described the pieces as "halves," "thirds," and "fourths." They used the more concrete term "pieces." In this lesson, students extend this understanding to partition rectangles into six or eight equal parts and describe the parts as sixths or eighths. The term "parts" is used in these materials moving forward, but students recognize that "pieces" and "parts" are interchangeable and can use

Success Criteria

- I can partition shapes into 2, 3, 4, 6, or 8 parts with equal area and name those parts as halves, thirds, fourths, sixths, and eighths and can recognize that equal-size parts in fractions.

either one. In the lesson synthesis, students learn the fractions ½, ⅓, ¼, ⅙ and ⅛ as the numbers used to represent the parts described as one half, one third, one fourth, one sixth, and one eighth.

Vocabulary

- fraction

Materials

- Activity 1: Card Sort Partitions (groups of 2)
- Activity 2: Fold and Name (groups of 4)

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT. 3.G.A.2**
  Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as ¼ of the area of the shape.
- **NJSLS.MATH.CONTENT. 3.NF.A.1**
  Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3 .

Mathematical Practice Standards

- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR5.** Representation

Warm-up: Which One Doesn't Belong: Shapes with Parts (10 minutes)

- This warm-up prompts students to compare four shapes that have been partitioned and examine the features of the shapes and the partitions. The observations here prepare students to explore fractions later in the lesson and enable the teacher to hear how students describe the features that they see. During the synthesis, ask students to explain the meaning of any terminology they use, such as partition, whole, parts, pieces, equal, and halves.

Activity 1: Card Sort: Partitions (15 minutes)

- The purpose of this activity is for students to revisit ideas about how to partition shapes into halves, thirds, and fourths. Students sort a set of shapes into categories based on their shared attributes. Monitor for students who distinguish shapes that have been partitioned into equal-size parts and shapes that have not. This distinction will be used to review what it means for a part of a shape to be a half, a third, or a fourth. Sorting the shapes gives students an opportunity to identify important common characteristics or structures, in this case the number and size of the parts (MP7). When students specify that halves, thirds, and fourths of a shape need to be equal in size, they are attending to precision (MP6).
  - **Access for Multilingual Learners:** MLR2 Collect and Display. Collect the language students use while sorting the shapes. Display words and phrases such as: partition, split, parts, equal parts, equal-sized parts, halves, thirds, fourths, whole, and so on. During the synthesis, invite students to suggest ways to update the display: "What are some other words or phrases we should include?" Invite students to borrow language from the display as needed.

Activity 2: Fold and Name (20 minutes)

- The purpose of this activity is for students to partition rectangles into thirds, sixths, fourths, and eighths before learning the name of sixths and eighths. Students do so by folding rectangular strips of paper into equal-sized parts. While folding, students may notice that thirds can be further partitioned to make sixths and that fourths can be further partitioned to make eighths, which will be explored more in a future lesson. The focus of the synthesis should be on naming sixths and eighths, as these are new terms for students.
  - **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Provide access to pre-formatted papers that will be used to fold into rectangles. For example, papers would have dotted lines showing students where to fold for each rectangle.

Supplemental Resources

- Card Sort Partition Card (pdf)
- Fold and Name (pdf)
- Suggested Centers
  - Mystery Number (1–4) Stage 2: Three-digit Numbers (pdf)
  - Number Line Scoot (2–3) Stage 1: Twos, Fives, and Tens (directions) (gameboard) (spinner)

Assessment Resources

- 3.5.1 Cool Down.pdf

LESSON 2: NAME PARTS AS FRACTIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are expressing the area of each part as a unit fraction of the whole.
- Students are partitioning shapes into halves, thirds, fourths, sixths, and eighths.

Student-Facing Learning Intention

- Let's use fractions to describe parts.

Success Criteria

- I can partition unit fraction shapes into halves, thirds, fourths, sixths, and eighths.

Lesson Purpose

- The purpose of this lesson is for students to partition shapes into equal parts and express each equal-size part as a unit fraction.

Lesson Narrative

- Previously, students partitioned rectangles that each represented 1 into fractional parts by folding. They now draw lines to partition a shape and use the fraction notation they learned to label each part as a unit fraction and describe a shaded part as a unit fraction. This lesson is the first time that students work with fraction strips, which will be used multiple times in the unit.

Vocabulary

- N

Materials

- Activity 1: Partition the Strips (groups of 2)

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT. 3.G.A.2**
  Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as ¼ of the area of the shape.
- **NJSLS.MATH.CONTENT. 3.NF.A.1**
  Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- PR5. Representation

quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3 . **Mathematical Practice Standards** ● **MP6.** Attend to precision. ● **MP8.** Look for and express regularity in repeated reasoning.	

Warm-up: Which One Doesn't Belong: Shaded Parts (10 minutes)

- This warm-up prompts students to compare four rectangles that have been partitioned and partially shaded. It gives students a reason to use language precisely (MP6). It gives the teacher an opportunity to hear how students use terminology and talk about the characteristics of the items and the quantities they represent. During the synthesis, ask students to explain the meaning of any terminology they use, such as partition, equal parts, halves, and thirds.

Activity 1: Partition the Strips (15 minutes)

- The purpose of this activity is for students to practice partitioning and labeling equal-sized parts with unit fractions. This provides students a physical tool they can use throughout the unit to make sense of fractions.Have students keep their fractions strips to use in future lessons. Consider having students glue the fraction strips in their workbook When students make halves, fourths, and eighths they observe regularity in repeated reasoning as each piece is subdivided into 2 equal pieces. They observe the same relationship between thirds and sixths (MP8).
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after each chunk. Check in after students fold and label each fraction strip.

Activity 2: Partition, Shade, Trade (20 minutes)

- Previously, students partitioned rectangular pieces of paper into 2, 3, 4, 6, and 8 equal parts by folding. The purpose of this activity is for students to partition rectangles by drawing and continue to practice naming the parts with the unit fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, and $\frac{1}{8}$. It's important that students try to make the parts as close to equal-sized as they can, but student drawings do not need to be exact. After they practice partitioning, students partition and shade, but don't label a fraction on a rectangle, then trade with a partner to determine the fraction their partner has shaded. The synthesis focuses on how to name a single equal part, such as one sixth, rather than talking about all the equal parts in a shape, such as sixths. This will be helpful as students use non-unit fractions to name multiple equal parts in the next lesson.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. At the appropriate time, give students 2–3 minutes to make sure that everyone in their group can explain their process for partitioning their rectangles and determining how to label each part. Invite groups to rehearse what they will say when they share with the whole class.

Supplemental Resources	**Assessment Resources**

● Partition the Strips (pdf)
● Suggested Centers
  ○ Mystery Number (1–4) Stage 2: Three-digit Numbers (pdf)
  ○ Number Line Scoot (2–3) Stage 1: Twos, Fives, and Tens (directions) (gameboard) (spinner)
	● 3.5.2 Cool Down.pdf

LESSON 3: NON-UNIT FRACTIONS (Teacher Guide)

Teacher-Facing Learning Intention	**Lesson Purpose**

- Students are understanding a fraction a/b as the quantity formed by a parts of size 1/b.

Student-Facing Learning Intention
- Let's learn about non-unit fractions.

Success Criteria
- I can understand a fraction a/b as the quantity formed by *a* parts of size 1/b.

- The purpose of this lesson is for students to understand non-unit fractions.

Lesson Narrative
- Previously, students learned how to write unit fractions, using numbers of the form 1/b . They also partitioned rectangles and used unit fractions to describe one of the parts. In this lesson, students use diagrams with multiple equal parts shaded to make sense of how non-unit fractions are made of unit fractions. Students learn that a unit fraction is a fraction in which the numerator is 1 because it describes one of the equal-sized parts. They work with fractions that are equal to a whole number and fractions greater than a whole number to see that all non-unit fractions are built from unit fractions in the same way. Students also notice that if all the parts are shaded, then the non-unit fraction is equivalent to a whole number. The terms numerator and denominator are not used until the next section.

Vocabulary
- NA

Materials
- Activity 2:
  - Fraction Match Part 1 (groups of 2)
  - Fraction Match Part 2 (groups of 4)

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT. 3.NF.A.1**
  Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3 .

Mathematical Practice Standards
- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Notice and Wonder: More than One Part (10 minutes)
- The purpose of this warm-up is to elicit the idea that we can think about multiple equal parts in a diagram and use fractions to refer to them, which will be useful when students identify fractions in diagrams and shade diagrams to show a specific fraction in a later activity. While students may notice and wonder many things about these images, the fact that more than one of the equal parts of the square is shaded, there is a fraction underneath the third diagram, and how the shaded parts could be described are the important discussion points. When students articulate what they notice and wonder, they have an opportunity to attend to precision in the language they use to describe what they see (MP6). They might first propose less formal or imprecise language, and then restate their observation with more precise language in order to communicate more clearly.

Activity 1: Write and Read Fractions (15 minutes)

- The purpose of this activity is for students to make sense of non-unit fractions and the notation used to describe them. They learn that the denominator tells the number of equal parts the whole was partitioned into and the numerator tells the number of parts that are being described. Students write non-unit fractions that represent the shaded portions of area diagrams. If needed, especially with the fractions greater than one, clarify that each rectangle represents one whole. The activity concludes with students practicing how to read non-unit fractions. The terms “numerator” and “denominator” will be introduced in a later lesson. When students notice that the bottom part of the fraction stays the same and the top part of the fraction changes, representing the number of equal parts that are shaded, they look for and make use of structure (MP7).

Activity 2: Fraction Match (20 minutes)

- The purpose of this activity is for students to match fractions to shaded diagrams. Reiterate that each rectangle represents one whole. After one round of matching, students pause to create 4 new pairs of cards to add to their set. Give students the Fraction Match Part 2 cards when they create their own pairs of cards. Students observe and use structure as they identify that the top number in the fraction represents the number of shaded pieces while the bottom number represents the number of those pieces in one whole rectangle (MP7).
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Students should explain to their partner why the chosen cards match or do not match. Display the following sentence frames for all to see: “I notice ____ , so these two cards match/do not match.” Encourage students to challenge each other when they disagree.
  - **Access for Students with Disabilities:** Representation: Access for Perception. Begin by showing a physical demonstration of how to play one round of the game Fraction Match to support understanding of the context.

Supplemental Resources

- Fraction Match Part 1 (pdf)
- Fraction Match Part 2 (pdf)
- Suggested Centers
  - Mystery Number (1–4) Stage 2: Three-digit Numbers (pdf)
  - Number Line Scoot (2–3) Stage 1: Twos, Fives, and Tens (directions) (gameboard) (spinner)

Assessment Resources

- 3.5.3 Cool Down.pdf

LESSON 4: BUILD FRACTIONS FROM UNIT FRACTIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are building non-unit fractions and whole numbers from unit fractions.

Student-Facing Learning Intention

- Let’s build other fractions from unit fractions.

Success Criteria

- I can build non-unit fractions and whole numbers from unit fractions.

Lesson Purpose

- The purpose of this lesson is for students to build non-unit fractions and whole numbers from unit fractions.

Lesson Narrative

- In the previous lesson, students named non-unit fractions and made sense of the notation used to write them. In this lesson, students play a game in which they build non-unit fractions from unit fractions (for example, they try to collect enough cards showing $\frac{1}{6}$ to make 3/6). They record these fractions on a fraction strip diagram. Then, students partition and shade diagrams to represent situations involving fractional lengths and consider the location of the endpoint of a fractional length. This will be helpful in subsequent lessons, when students represent fractions on a number line.

Vocabulary

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Materials

- Activity 1:
  - Colored pencils
  - Folders
- Activity 2: Materials for creating a visual display

Materials to copy:

- Activity 1: Secret Fractions Stage 1 Gameboard (groups of 2)
- Activity 1: Secret Fractions Stage 1 Cards (groups of 2)

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT. 3.NF.A.1**
  Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3 .
- **NJSLS.MATH.CONTENT. 3.OA.C.7**
  With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Number Talk: 3 and Another Factor (10 minutes)

- This Number Talk encourages students to look for structure in multiplication expressions and rely on properties of operations to mentally solve problems. Reasoning about products of whole numbers helps to develop students' fluency with multiplication within 100.

Activity 1: Introduce Secret Fractions (20 minutes)

- The purpose of this activity is for students to learn the Secret Fractions center and build non-unit fractions from unit fractions. Students use unit fractions to build “secret fractions,” which are non-unit fractions. For example, to complete a secret fraction card with 3/4 , students need three cards with ¼ . After completing each secret fraction, they reveal the fraction they’ve made and shade the game board to represent it. The synthesis highlights strategies students used to build their non-unit fractions.
  - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Check in and provide each group with feedback that encourages collaboration and community. For example, check in with partners after the second round of Secret Fractions.

Activity 2: Represent Fraction Situations (15 minutes)

- The purpose of this activity is for students to use diagrams to represent situations that involve non-unit fractions. The synthesis focuses on how students partition and shade the diagrams and how the end of the shaded portion could represent the location of an object. When students interpret the different situations in terms of the diagrams they reason abstractly and quantitatively (MP2).
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: During group presentations, invite student(s) who is/are not speaking to follow along and point to the corresponding parts of the display.

Supplemental Resources

- Secret Fractions Stage 1 Cards (pdf)
- Secret Fractions Stage 1 Gameboard (pdf)
- Suggested Centers
  - Mystery Number (1–4) Stage 3: Fractions with Denominators 2, 3, 4, 6 (pdf)
  - Number Line Scoot (2–3) Stage 2: Halves, Thirds and Fourths (directions) (gameboard)

Assessment Resources

- 3.5.4 Cool Down.pdf

LESSON 5: TO THE NUMBER LINE (Teacher Guide)

Teacher-Facing Learning Intention

- Students are extending understanding of whole numbers on the number line to see fractions on a number line.

Student-Facing Learning Intention

- Let's learn about fractions on the number line.

Success Criteria

- I can extend understanding of whole numbers on the number line to see fractions on a number line.

Lesson Purpose

- The purpose of this lesson is for students to extend their understanding of whole numbers on the number line as they work with number lines partitioned into fractions.

Lesson Narrative

- Previously, students used fraction strips to make sense of unit and non-unit fractions. In grade 2, they represented whole numbers on the number line. In this lesson, students learn that quantities that are not whole numbers can also be represented on the number line, an important step toward the understanding that fractions are numbers. To support this transition, students move from representing fractions by shading diagrams (an area representation) to marking their locations on a number line (a linear representation).

Vocabulary

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Materials

- Activity 2: Scissors

Materials to copy:

- Activity 1: Card Sort: Number Lines (groups of 2)
- Activity 2: Fold and Label Number Lines (groups of 1)

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NF.A.2**
  Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
  a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
  b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.
  c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <.

Mathematical Practice Standards

- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

Warm-up: Notice and Wonder: Two Number Lines (10 minutes)

- The purpose of this warm-up is to elicit the idea that number lines can be partitioned into intervals smaller than 1, which will be useful when students see number lines partitioned into fractions in a later activity. While students may notice and wonder many things, the idea that fractions can be represented on the number line is the important discussion point. Students do not need to identify the tick mark as showing ½ in the warm-up, as that will be the focus later in the lesson. This prompt gives students opportunities to look for and make use of structure (MP7). The specific structure they might notice is that each number line is partitioned in half.

Activity 1: Card Sort: Number Lines (10 minutes)

- The purpose of this activity is for students to further develop the idea that fractional amounts can be represented on a number line. Students sort a given set of cards showing number lines. They first sort in a way of their choice, which might include the number of parts or length of the number line. Monitor for different ways groups choose to categorize the number lines, but especially for categories that distinguish between number lines with whole number partitions and fractional partitions. When students identify common properties of the number lines for their sorts, such as the numbers listed on the tick marks or the total number of tick marks, they look for and make use of structure (MP7).
    - **Access for Multilingual Learners:** MLR2 Collect and Display. Circulate, listen for and collect the language students use as they sort the number lines. On a visible display, record words and phrases such as: parts less than one, smaller than one, whole numbers, partitions, partitioned into fractions, and equal parts. Invite students to borrow language from the display as needed, and update it throughout the lesson.

Activity 2: Fold and Label the Number Line (25 minutes)

- The purpose of this activity is to transition students from thinking about fractional lengths on fraction strips to thinking about fractions as numbers on the number line. Students build on their experience of folding fraction strips to fold number lines into halves, thirds, fourths, sixths, and eighths and then label unit fractions. Students begin by considering how the fraction ½ can be labeled on the number line. They learn that each part of the number line has a length of one half, but the endpoint of the first one-half part is the location of the number ½ on the number line. This distinction is important for understanding fractions as numbers that can be represented as points on the number line and for using the number line precisely (MP6). When folding the number lines, students also need to attend to the fact that it is the interval between 0 and 1 that needs to be partitioned, rather than the length of the entire strip of paper that contains each number line.
    - **Access for Students with Disabilities:** Representation: Develop Language and Symbols. Synthesis: Make connections between representations visible. Highlight the similarities and differences in the strategies students used to fold their number lines.

Supplemental Resources

- Card Sort Number Lines (pdf)
- Fold and Label the Number Line (pdf)
- Suggested Centers

Assessment Resources

- 3.5.5 Cool Down.pdf

- Mystery Number (1–4) Stage 3: Fractions with Denominators 2, 3, 4, 6 (pdf)
- Number Line Scoot (2–3) Stage 2: Halves, Thirds and Fourths (directions) (gameboard)

LESSON 6: LOCATE UNIT FRACTIONS ON THE NUMBER LINE (Teacher Guide)

Teacher-Facing Learning Intention
- Students are partitioning the interval from 0 to 1 and locate unit fractions within that interval.

Student-Facing Learning Intention
- Let's partition the number line to locate unit fractions.

Success Criteria
- I can partition the interval from 0 to 1 and locate unit fractions within that interval.

Lesson Purpose
- The purpose of this lesson is for students to partition the interval from 0 to 1 and locate unit fractions within that interval.

Lesson Narrative
- In previous lessons, students made sense of number lines that were partitioned into fractions. While this lesson focuses on partitioning and locating unit fractions within the interval from 0 to 1, the number lines in this lesson vary in length. This allows students to consider common misconceptions about partitioning the number line into fractional parts, such as partitioning the whole number line rather than each unit interval, such as from 0 to 1, 1 to 2, and so on, and counting tick marks rather than parts of the interval. As students partition number lines in the rest of this unit, the most important thing is that they are accurate in relatively locating fractions on the number line and they understand the partitions should be equally spaced (MP6). It is not necessary that they locate fractions exactly or be overly concerned with making sure partitions are exactly the same size.

Vocabulary
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Materials
-

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.NF.A.2**
  Understand a fraction as a number on the number line; represent fractions on a number line diagram.
  a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.
  b. Represent a fraction a/b on a number line diagram by marking off a length 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.

Mathematical Practice Standards
- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Which One Doesn't Belong: Fraction Details (10 minutes)

- This warm-up prompts students to compare four images. It gives students a reason to use language precisely (MP6). It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the items in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as parts, partitions, mark, label, thirds, or fourths.

Activity 1: Partition Fourths (15 minutes)

- The purpose of this activity is for students to make sense of partitioning number lines that extend beyond one. Clare and Diego's work surfaces 2 common misconceptions that students often make while partitioning number lines into fractions. Clare partitions the entire number line into fourths and Diego places 4 tick marks to show fourths. Students analyze these misconceptions (MP3) before they locate and label unit fractions on number lines of various lengths in the next activity.

Activity 2: Unit Fractions on the Number Line (20 minutes)

- The purpose of this activity is for students to partition the interval from 0 to 1 into equal parts to locate and label unit fractions. Students see number lines that vary in length, from 1 unit to 4 units, which provides an opportunity for them to practice accurately partitioning the unit on the number line, rather than the entire number line (MP6). Some number lines show numbers greater than one which gives students the opportunity to think about fractions greater than one even though they are not explicitly addressed in this lesson.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. During group work, invite students to take turns sharing their responses. Ask students to restate what they heard using precise mathematical language and their own words. Display the sentence frame: "I heard you say . . . ." Original speakers can agree or clarify for their partner.
    - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to select 6 out of 9 number lines to partition and label.

Supplemental Resources

- Suggested Centers
    - Mystery Number (1–4) Stage 3: Fractions with Denominators 2, 3, 4, 6 (pdf)
    - Number Line Scoot (2–3) Stage 2: Halves, Thirds and Fourths (directions) (gameboard)

Assessment Resources

- 3.5.6 Cool Down.pdf

LESSON 7: NON-UNIT FRACTIONS ON THE NUMBER LINE (Teacher Guide)

Teacher-Facing Learning Intention

- Students are locating non-unit fractions on the number line (including fractions greater than 1).

Student-Facing Learning Intention

- Let's locate non-unit fractions on the number line.

Success Criteria

- I can locate non-unit fractions on the number line (including fractions greater than 1).

Lesson Purpose

- The purpose of this lesson is for students to locate non-unit fractions on the number line.

Lesson Narrative

- Previously, students built non-unit fractions from unit fractions with diagrams and fraction strips. Now, students deepen their understanding of fractions on the number line as they locate and label non-unit fractions. Students also discuss how they know when fractions are less than 1 or greater than 1 and are introduced to the terminology numerator and denominator.

Vocabulary

- numerator
- denominator

	Materials Activity 1: ● Base-ten blocks ● Virtual Base-ten blocks included ● Number cubes **Materials to Copy** ● Activity 1: Number Line Scoot Stage 2 Directions (groups of 2) ● Activity 1: Number Line Scoot Stage 2 Gameboard (groups of 2)

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.NF.A.2** Understand a fraction as a number on the number line; represent fractions on a number line diagram. b. Represent a fraction a/b on a number line diagram by marking off a length 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. **Mathematical Practice Standards** ● **MP6.** Attend to precision.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.A.3** Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Choral Count: One-fourths (10 minutes)

- The purpose of this Choral Count is to invite students to practice counting by ¼ and notice patterns in the count. These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to locate fractions on the number line using their knowledge of unit fractions. Save the recorded count to compare to a count in an upcoming lesson.

Activity 1: Number Line Scoot (15 minutes)

- The purpose of this activity is for students to practice identifying fractional intervals along a number line. This is Stage 2 of the center activity, Number Line Scoot. This activity encourages students to count by the number of intervals (the numerator). Students have to land exactly on the last tick mark, which represents 4, to encourage them to move along different number lines. While this activity does not focus on equivalence, it gives students exposure to this idea before they work more formally with it in the next section. In the synthesis, students relate counting on a number line marked off in whole numbers to their number lines marked off in fractional-sized intervals. It may be helpful to play a few rounds with the whole class to be sure students are clear on the rules of the game. Keep the number line game boards for center use.
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Check in and provide each group with feedback that encourages collaboration and community. For example, check in after the first round of Number Line Scoot.

Activity 2: Fractions on the Number Line (10 minutes)

- The purpose of this activity is for students to locate a variety of fractions on the number line. Students are given a fraction less than 1 and greater than 1 with the same denominator to locate on each number line. The activity synthesis focuses on counting the number of unit fractions in a fraction to locate it on a number line and how to determine whether fractions are less than 1 or greater than 1. As they locate the fractions on the number lines, students strengthen their understanding of the meaning of the numerator and denominator of a fraction (MP6).
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Some students may benefit from the opportunity to rehearse what they will say with a partner before they share with the whole class.

Supplemental Resources	Assessment Resources
- Suggested Centers - Number Line Scoot (2–3) Stage 2: Halves, Thirds and Fourths (directions) (gameboard) - Number Line Scoot Stage 2 (Directions) (Gameboard) - Secret Fraction (3) Stage 1: Building Non-Unit Fractions (cards) (gameboard)	3.5.7 Cool Down.pdf

LESSON 8: FRACTIONS AND WHOLE NUMBERS (Teacher Guide)

Teacher-Facing Learning Intention - Students are locating whole numbers on the number line given the location of a unit fraction and express them as fractions. - Students are recognizing that whole numbers can be written as fractions. **Student-Facing Learning Intention** - Let's work with fractions and whole numbers on the number line. **Success Criteria** - I can locate whole numbers on the number line given the location of a unit fraction and express them as fractions.	**Lesson Purpose** - The purpose of this lesson is for students to recognize fractions that are equivalent to whole numbers and, given the location of a unit fraction on the number line, to locate whole numbers. **Lesson Narrative** - In previous lessons, students learned to partition number lines and located and labeled fractions on the number line. Students deepen their understanding of fractions as they consider which fractions are equivalent to whole numbers and relate that understanding to their knowledge of how many halves, thirds, and fourths, are in one whole. They leverage their understanding of how many halves, thirds, and fourths are in one whole to locate whole numbers, such as 1 and 2, on the number line when given the location of a unit fraction. **Vocabulary** **Materials**

New Jersey State Learning Standards	National Council of Teachers of Mathematics Content Standards
NJSLS.MATH.CONTENT.3.NF.A.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.<ol type="a"> - Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. - Represent a fraction a/b on a number line diagram by marking off a length 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. **NJSLS.MATH.CONTENT. 3.NF.A.3**	**NCTM.MATH.CONTENT.3-5.NUM.A.3** Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers. **National Council of Teachers of Mathematics Process Standards** **PR1.** Problem Solving **PR4.** Connections **PR5.** Representation

Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram. **Mathematical Practice Standards** ● **MP7.** Look for and make use of structure. ● **MP8.** Look for and express regularity in repeated reasoning.	
Warm-up: Number Talk: Divide by 4 (10 minutes) ● This Number Talk encourages students to rely on their knowledge of multiplication, place value, and properties of operations to mentally solve division problems. The reasoning elicited here helps to develop students' fluency with multiplication and division within 100. To find the quotients of larger numbers, students need to look for and make use of structure in quotients that are smaller or more familiar, or to rely on the relationship between multiplication and division (MP7).	
Activity 1: Fractions Located at Whole Numbers (15 minutes) ● The purpose of this activity is for students to place fractions greater than 1 on the number line and notice how fractions can be written as whole numbers. For example, students will see that for halves, every second half is located at a whole number because it takes 2 halves to make a whole. Students work in groups. Each member will be assigned a different set of fractions to put on their number line so that the group can look for patterns across halves, thirds, and fourths. Through repeated reasoning, students may notice two types of regularity (MP8): It takes 2 halves, 3 thirds, or 4 fourths to make a whole. Whole numbers appear regularly (every 2 halves, every 3 thirds).	
Activity 2: Locate 1 on the Number Line (20 minutes) ● The purpose of this activity is for students to use the location of a unit fraction to locate 1 and 2 on a number line. It is likely students will reason about repeating the size of the unit fraction to locate 1. To locate 2 on the number lines, they may continue to count unit fraction size parts or use the location of 1 to locate 2. ○ **Access for Multilingual Learners:** MLR1 Stronger and Clearer Each Time. Synthesis: Before the whole-class discussion, give students time to meet with 2–3 partners to share and get feedback on their response to "How did you locate 1 when given the location of a unit fraction?" Invite listeners to ask questions, to press for details and to suggest mathematical language. Give students 2–3 minutes to revise their written explanation or representation based on the feedback they receive. ○ **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were needed or most useful to solve the problem. Display the sentence frame, "The next time I locate 1 on a number line, I will look for/pay attention to . . . "	
Supplemental Resources ● Suggested Centers ○ Number Line Scoot (2–3) Stage 2: Halves, Thirds and Fourths (directions) (gameboard) ○ Secret Fraction (3) Stage 1: Building Non-Unit Fractions (cards) (gameboard)	**Assessment Resources** ● 3.5.8 Cool Down.pdf

LESSON 9: ALL KINDS OF NUMBERS ON THE NUMBER LINE (Teacher Guide)

Teacher-Facing Learning Intention

- Students are locating 1 on the number line given the location of a non-unit fraction.

Student-Facing Learning Intention

- Let's locate numbers on the number line when we are given the location of one fraction.

Success Criteria

- I can locate 1 on the number line given the location of a non-unit fraction.

Lesson Purpose

- The purpose of this lesson is for students to use their knowledge of fractions on the number line to locate 1 when given a non-unit fraction.

Lesson Narrative

- Previously, students have located fractions on the number line, including locating 1 when given a unit fraction. In the first activity, students reinforce their understanding of the numerator and denominator of a fraction as they find 1 given a fraction greater than 1. They use the numerator of the given fraction to identify the size of a unit fraction and then to locate 1. Later, they locate a non-unit fraction given the location of a unit fraction with a different denominator. There, students use their knowledge of locating 1 first and then locating the non-unit fraction from 1. The second activity in this lesson is optional because it goes beyond the depth of understanding required to address grade 3 standards.

Vocabulary

- NA

Materials

- NA

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NF.A.2**
  Understand a fraction as a number on the number line; represent fractions on a number line diagram.
  a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.
  b. Represent a fraction a/b on a number line diagram by marking off a length 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.

Mathematical Practice Standards

- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Which One Doesn't Belong: Many Number Lines (10 minutes)

- This warm-up prompts students to compare four number lines. It gives students a reason to use language precisely (MP6). It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the number lines in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as parts, partitions, mark, label, halves, fourths, or whole.

Activity 1: Locate 1 Again (20 minutes)

- The purpose of this activity is for students to locate 1 on a number line given the location of a non-unit fraction less than 1 or greater than 1. In either case, it is likely students will reason about unit fractions to locate 1. In the first problem, students may use the size of thirds to locate 1. In the second problem, they reinforce their knowledge that the denominator of a fraction tells us the number of equal parts in a whole and the size of a unit fraction, and that the numerator gives the number of those parts (MP6). Students typically use the denominator to partition a number line, but here they need to use the numerator.
    - **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Synthesis. Identify connections between strategies that result in the same outcomes but use differing approaches.

Activity 2: Locate [OPTIONAL] (15 minutes)

- The purpose of this activity is for students to use the location of a unit fraction to locate another fraction with a different denominator on the number line. Students can use their knowledge from the previous activity to place 1 on the number line and then use that to partition the interval from 0 to 1 to find other numbers. Because students have only located fractions with the same denominator on a single number line, they may want to use more than one number line in this activity. They may or may not label the points they find along the way to . Encourage them to use whatever strategy makes sense to them. Monitor for students who use a single number line to show both thirds and fourths and those who use separate number lines. Select them to share during activity synthesis. This activity is optional because it goes beyond the depth of understanding required to address grade 3 standards.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: As students share the similarities and differences between the strategies, use gestures to emphasize what is being described. For example, point to each fraction and show with your fingers the partitions such as thirds and fourths, that are being discussed.

Supplemental Resources	Assessment Resources

• Suggested Centers
  ○ Number Line Scoot (2–3) Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (directions) (gameboard)
  ○ Secret Fraction (3) Stage 1: Building Non-Unit Fractions (cards) (gameboard)
	• 3.5.9 Cool Down.pdf

LESSON 10: EQUIVALENT FRACTIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are identifying equivalent fractions.
- Students are understanding two fractions as equivalent if they are the same size and the parts refer to the same whole.

Student-Facing Learning Intention

- Let's identify equivalent fractions.

Success Criteria

- I can understand two fractions as equivalent if they are the same size and the parts refer to the same whole.

Lesson Purpose

- The purpose of this lesson is for students to see that different fractions can be equivalent if they are the same size of the same whole.

Lesson Narrative

- Previously, students were introduced to unit fractions and non-unit fractions using area diagrams, fraction strips, and number lines. They began to work with the idea of equivalence by noticing fractions that are also whole numbers. Here, students revisit area diagrams and fraction strips to learn about fraction equivalence. Students learn that fractions that are the same size are equivalent fractions. Later, they will identify equivalent fractions as having the same location on a number line.

Vocabulary

- equivalent fractions

	Materials ● Activity 2: Materials from a previous lesson

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT. 3.NF.A.3** Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram. d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <. **Mathematical Practice Standards** ● **MP6.** Attend to precision.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.A.3** Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Choral Count: One-halves (10 minutes)

- The purpose of this Choral Count is to invite students to practice counting by ½ and notice patterns in the count. These understandings help students develop fluency and will be helpful later in this lesson when students recognize and generate equivalent fractions. In the synthesis, students have the opportunity to notice that 2/2 and 4/4 are both equal to 1 whole.

Activity 1: Equivalent to ½ (15 minutes)

- The purpose of this activity is for students to consider equivalent fractions using diagrams. One half has been chosen to introduce equivalent fractions because there are many ways to see and represent fractions that are equivalent to ½ . Many students may be familiar with the concept of halves and justify equivalence by saying 2 is half of 4. This reasoning is helpful with 1 half and 2 fourths but may not be generalizable to other cases of equivalence. For this reason, the activity synthesis focuses on justifications about whether or not the shaded parts are the same size. The idea that ½ and 2/4 are the same size is used to define equivalent fractions as fractions that are the same size. Students need to use language carefully as they explain why the shaded parts of a shape show ½ (MP6). For example, they may say that 2 of 4 equal parts in shape D are shaded, but if they combine those parts, the total shaded amount is the same as in the shape where 1 of 2 equal parts is shaded.
    - **Access for Multilingual Learners:** MLR7 Compare and Connect. Synthesis: Lead a discussion comparing, contrasting, and connecting shapes C and D. Ask, "How are shapes C and D the same?", "How are they different?", and "How do these two different representations show ½ ?"
    - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Synthesis: Invite students to share connections between finding one-half in fractions with more than two equal parts in this activity and when they might, in their own lives, see one half when there are more than 2 equal parts. Supports accessibility for: Visual-Spatial Processing

Activity 2: Find Equivalent Fractions (20 minutes)

- The purpose of this activity is for students to use fraction strips to identify equivalent fractions and explain why they are equivalent. Highlight explanations that make clear that the parts that represent the fractions are the same size and the parts of the fractions refer to the same whole.

Supplemental Resources

- Suggested Centers
  - Number Line Scoot (2–3) Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (directions) (gameboard)
  - Secret Fraction (3) Stage 1: Building Non-Unit Fractions (cards) (gameboard)

Assessment Resources

- 3.5.10 Cool Down.pdf

LESSON 11: GENERATE EQUIVALENT FRACTIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are using diagrams to explain or show fraction equivalence.

Student-Facing Learning Intention

- Let's generate equivalent fractions.

Success Criteria

- I can use diagrams to generate equivalent fractions.

Lesson Purpose

- The purpose of this lesson is for students to generate equivalent fractions.

Lesson Narrative

- In previous lessons, students learned what it means for two fractions to be equivalent. In this lesson, students continue to reason about and show equivalence visually, building on their work with fraction strips. They use shaded diagrams to help them generate equivalent fractions, including fractions greater than 1. The work here prepares students to use number lines to explain fraction equivalence later in the section.

Vocabulary

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Materials

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT. 3.OA.B. 5**
  Apply properties of operations as strategies to multiply and divide. Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)
- **NJSLS.MATH.CONTENT. 3.NF.A.3**
  Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
  a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.

Mathematical Practice Standards

- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP7.** Look for and make use of structure.

Warm-up: Number Talk: Something Times 8 (10 minutes)

- This Number Talk encourages students to look for structure in multiplication expressions and rely on properties of operations to mentally solve problems. Reasoning about products of whole numbers helps to develop students' fluency.

Activity 1: Show Equivalence (20 minutes)

- The purpose of this activity is for students to use diagrams to reason about equivalence and reinforce their awareness of the relationship between fractions that are equivalent. Students show that a shaded diagram can represent two fractions, such as ½ and 4/8 , by further partitioning given parts or composing larger parts
  from the given parts. Unlike with the fraction strips, where different fractional parts are shown in rows and students could point out where and how they see equivalence, here students need to make additional marks or annotations to show equivalence. In upcoming lessons, students will extend similar strategies to reason about equivalence on a number line—by partitioning the given intervals on a number lines into smaller intervals or by composing larger intervals from the given intervals. In the first problem, students construct a viable argument in order to convince Tyler that 4/8 of the rectangle is shaded (MP3).
  - **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches.

Activity 2: More Than One Name (15 minutes)

- The purpose of this activity is for students to generate equivalent fractions, including for fractions greater than 1, given partially shaded diagrams. Student may use strategies from an earlier activity—partitioning a diagram into smaller equal parts, or making larger equal parts out of existing parts—or patterns they observed in the numerators and denominators of equivalent fractions (MP7).
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Students should take turns naming the equivalent fractions they came up with and explaining their reasoning to their partner. Display the following sentence frames for all to see: "I noticed _____ , so I thought . . . ." Encourage students to challenge each other when they disagree.

Supplemental Resources

- Suggested Centers
  - Number Line Scoot (2–3) Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (directions) (gameboard)
  - Secret Fraction (3) Stage 1: Building Non-Unit Fractions (cards) (gameboard)

Assessment Resources

- 3.5.11 Cool Down.pdf

LESSON 12: EQUIVALENT FRACTIONS ON A NUMBER LINE (Teacher Guide)

Teacher-Facing Learning Intention	**Lesson Purpose**

- Students are identifying and generating equivalent fractions.

Student-Facing Learning Intention

- Let's find fractions at the same location.

Success Criteria

- I can understand two fractions as equivalent if they are at the same point on a number line.

- The purpose of this lesson is for students to use the number line to determine whether fractions are equivalent.

Lesson Narrative

- In previous lessons, students learned that two fractions are equivalent if they are the same size. In this lesson, students work with situations that involve lengths to build their understanding that fractions at the same location on a number line are equivalent. Number lines are provided to ensure that if students choose to use two number lines to demonstrate equivalence, they work with the same length interval for 1 unit.

Vocabulary

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Materials

- Activity 3: Number cubes

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT. 3.NF.A.3**
  Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
  a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
  b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Notice and Wonder: Running on a Trail (10 minutes)

- The purpose of this warm-up is to elicit the idea that fractions can be used to describe lengths. While students may notice and wonder many things about this statement, the idea that Han and Tyler could have run the same distance or different distances are the important discussion points.

Activity 1: Running Part of a Trail (10 minutes)

- The purpose of this activity is for students to explain equivalence using a number line. Students are given situations in a measurement context and have to determine whether the distance is the same. Students are encouraged to use a number line to provide an opportunity to explain fraction equivalence as fractions that are at the same location. They may choose to use two number lines for each question (one for each fraction). Choosing to use one number line or two will be discussed in the synthesis of the next activity. When they identify whether or not two fractions of the same trail represent the same distance, students reason abstractly and quantitatively (MP2).
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Display sentence frames to support whole group discussion. "First, I ____ because . . .", "I noticed ____ so I . . . ."

Activity 2: Locate and Pair (10 minutes)

- The purpose of this activity is for students to locate fractions on the number line, and find pairs of fractions that are equivalent. Students can use a separate number line for each denominator, but they can also place fractions with different denominators on the same number line to show equivalence. Focus explanations about why fractions are equivalent on the fact that they share the same location. In the synthesis, discuss how one number line or two can be used to compare fractions.
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after each chunk.

Activity 3: Rolling for Equivalent Fractions (15 minutes)

- The purpose of this activity is for students to practice generating equivalent fractions. The goal of each round is to use the numbers on the number cubes to complete a statement that shows that two fractions are equivalent. Students roll 6 number cubes and try to use 4 of the numbers to create a statement that shows two equivalent fractions. If students roll a 5 (or a blank), they may choose any number to use. Students may choose to re-roll any of their number cubes up to 2 times. Students get a point for every true statement they make. Students may choose to use fraction strips, diagrams, or number lines to prove that their fractions are equivalent. If students choose to use diagrams, monitor to make sure they are drawing equal-sized wholes.

Supplemental Resources

- Suggested Centers
    - Number Line Scoot (2–3) Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (directions) (gameboard)
    - Secret Fraction (3) Stage 1: Building Non-Unit Fractions (cards) (gameboard)

Assessment Resources

- 3.5.12 Cool Down.pdf

LESSON 13: WHOLE NUMBERS AND FRACTIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are expressing whole numbers as fractions.
- Students are recognizing fractions that are equivalent to whole numbers.

Student-Facing Learning Intention

- Let's find fractions and whole numbers that are equivalent.

Success Criteria

- I can express whole numbers as fractions.

Lesson Purpose

- The purpose of this lesson is for students to recognize fractions that are equivalent to whole numbers and write whole numbers as fractions.

Lesson Narrative

- In previous lessons, students noticed fractions at the same location as whole numbers on the number line. In this lesson, students develop more fully the idea that whole numbers can be written as fractions and learn to recognize fractions that are equivalent to whole numbers. Students encounter and make sense of fractions with 1 for the denominator. Students use their knowledge of parts and wholes and the patterns they observed on number lines to express the numbers 1, 2, and 3 as fractions, then extend the patterns they observed to express larger whole numbers as fractions.

Vocabulary

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Materials

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New Jersey State Learning Standards

- NJSLS.MATH.CONTENT. 3.NF.A.3

National Council of Teachers of Mathematics Content Standards

- NCTM.MATH.CONTENT.3-5.NUM.A.3

Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

   c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.

Mathematical Practice Standards
- **MP7.** Look for and make use of structure.
- **MP8.** Look for and express regularity in repeated reasoning.

Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Notice and Wonder: Four Number Lines (10 minutes)
- This warm-up elicits observations about the different ways whole numbers can be expressed as fractions. Students have previously seen number lines where 1, 2, and 3 were labeled with fractions in halves, thirds, fourths, sixths, and eighths. They understand that a denominator of 2 corresponds to 2 equal parts in the length representing 1 whole. The number line marked with ½ , 2/1 , 3/1 and is shown together with those marked with halves, thirds, and fourths to highlight that a denominator of 1 means each whole has 1 part. In the synthesis, students learn that fractions with 1 as a denominator can be used to represent whole numbers (2/1 = 2).

Activity 1: Hidden Whole Numbers (20 minutes)
- In an earlier lesson, students saw that whole numbers could be written as fractions. The purpose of this activity is for students to recognize fractions that are equivalent to whole numbers, using patterns in number lines to support their reasoning. To identify fractions that are equivalent to whole numbers on number lines, students may: Use what they know about 2 halves, 3 thirds, and 4 fourths to identify 1, and then circle fractions at the same intervals down each number line. Use what they know about 2 halves, 4 halves, and 6 halves to identify 1, 2, and 3 on the first number line, and then circle fractions in the same locations on other number lines. Use the relationship between parts and wholes (for instance, 3 thirds make 1, 6 thirds make 2, and 9 thirds make 3). Students then record equations that show fractions that are equivalent to whole numbers. Finally, given a list of fractions, students determine which ones are equivalent to whole numbers.When students use patterns to identify fractions that are equivalent to whole numbers, they look for and express regularity in repeated reasoning (MP8).
  - **Access for students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to select at least 3 of the 5 problems in each question to complete.

Activity 2: Write Them as Fractions (15 minutes)
- The purpose of this activity is for students to write whole numbers as fractions. Students may reason in any way that makes sense to them, including using patterns they noticed previously. When students observe patterns as they write whole numbers as fractions, they look for and make use of structure (MP7). This activity uses a “carousel” structure in which students complete a rotation of tasks. Consider demonstrating the steps before students begin.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: During group presentations, invite the student(s) who are not speaking to follow along and point to the corresponding parts of the display.

Supplemental Resources
- Suggested Center
  - Rolling for Fractions (3–5) Stage 1: Equivalent Fractions (pdf)

Assessment Resources
- 3.5.13 Cool Down.pdf

LESSON 14: HOW DO YOU COMPARE FRACTIONS? (Teacher Guide)

Teacher-Facing Learning Intention
- Students are representing and comparing fractions in a way that makes sense to them.

Student-Facing Learning Intention
- Let's represent and compare fractions.

Success Criteria
- I can represent and compare fractions in a way that makes sense to them.

Lesson Purpose
- The purpose of this lesson is for students to represent and compare fractions in a way that makes sense to them.

Lesson Narrative
- Previously, students used various representations to make sense of fractions and their size. In this lesson, students consider representations that will be helpful for comparisons, such as diagrams, fraction strips, and number lines. They also learn that comparisons are valid only when the fractions being compared refer to the same size whole. This lesson does not discuss specific strategies for comparing different types of fractions as the intent is to elicit different ways to reason about comparison.

Vocabulary
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Materials
- Activity 1: Materials for creating a visual display

New Jersey State Learning Standards
NJSLS.MATH.CONTENT. 3.NF.A.3
Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
b. Recognize and generate simple equivalent fractions, e.g., $1/2 = 2/4$, $4/6 = 2/3$). Explain why the fractions are equivalent, e.g., by using a visual fraction model.
c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form $3 = 3/1$; recognize that $6/1 = 6$; locate $4/4$ and 1 at the same point of a number line diagram.
d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <.

Mathematical Practice Standards
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Number Talk: Which Whole Numbers? (10 minutes)

- This Number Talk encourages students to use what they know about the meaning of fractions and about properties of operations to mentally relate fractions that are equivalent to whole numbers.

Activity 1: Equivalent or Not? (25 minutes)

- The purpose of this activity is for students to analyze pairs of fractions to determine if they are equivalent. Students may use any representation that makes sense to them. Students will create a visual display and have a gallery walk to consider the different ways of looking for equivalence. Highlight representations such as diagrams and number lines, which will support students as they learn to compare fractions with the same numerator or denominator in this section.
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Invite students to generate a list of shared expectations for group work. Record responses on a display and keep visible during the activity.

Activity 2: Same Fractions, Different Result? (10 minutes)

- The purpose of this activity is for students to recognize that fraction comparisons are only valid when they refer to the same whole. Previously, students analyzed pairs of fractions to determine if they were equivalent. In doing so, they were likely to have used comparison language, such as "larger or smaller than" or "greater or less than." In this activity, students encounter a pair of fractions they saw earlier (4/6 and ⅚) and compare them more explicitly. The student work in this activity uses the number line, but this might also come up with student-drawn diagrams. In order to interpret Lin's argument that 4/6 is greater than ⅚ students will need to articulate the meaning of fractions and highlight the fact that the two wholes Lin is comparing are not equal (MP6).
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Revoice student ideas to demonstrate and amplify mathematical language use. For example, revise the student statement "the number lines are different" as "the size of the whole from 0 to 1 is different."

Supplemental Resources	Assessment Resources

• Suggested Centers
  ○ Number Line Scoot (2–3) Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (directions) (gameboard)
  ○ Rolling for Fractions (3–5) Stage 1: Equivalent Fractions (pdf)
  ○ Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)
	• 3.5.14 Cool Down.pdf

LESSON 15: COMPARE FRACTIONS WITH THE SAME DENOMINATOR (Teacher Guide)

Teacher-Facing Learning Intention

- Students are comparing two fractions with the same denominator by reasoning about their size.

Student-Facing Learning Intention

- Let's compare two fractions with the same denominator.

Success Criteria

- I can compare two fractions with the same denominator by reasoning about their size.

Lesson Purpose

- The purpose of this lesson is for students to compare two fractions with the same denominator.

Lesson Narrative

- In previous lessons, students learned that fractions are built from unit fractions. Here, they reason that fractions with the same denominator are composed of parts that are the same size or length, so the numerator, which describes the number of parts, determines which fraction is greater. It is important that students have the opportunity to develop this understanding rather than learning a rule about comparing fractions with the same denominator. Students are reminded that they can use the symbols >, =, or < to record the results of comparison of fractions, just as they did with whole numbers in earlier grades (MP6). This lesson (including the cool-down) enables the teacher to gauge students' familiarity with the symbols, but students are not yet expected to rely on the symbols to express comparison.

Vocabulary

	● **Materials** Activity 2 ● Colored pencils ● Paper clips **Materials to copy:** Activity 2: ● Spin to Win Recording Sheet (groups of 2) ● Spin to Win Spinner (groups of 2)

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT. 3.NF.A.3** Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram. d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP6.** Attend to precision. ● **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.A.3** Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: Two More Strips (10 minutes)

- The purpose of this warm-up is to elicit the idea that the size and the number of unit fractions can help us compare fractions. Students can see that the two diagrams have same-size parts but not how much of one diagram is shaded, prompting them to think about the number of shaded parts. While students may notice and wonder many things about these images, what fractions could be represented by the partially hidden strip is the important discussion point.

Activity 1: Compare Fractions with the Same Denominator (20 minutes)

- The purpose of this activity is for students to compare two fractions with the same denominator. Students may use any representation to reason about how the size or length of the parts in the two fractions are the same because the denominator is the same, but that there are different numbers of those parts because the numerator is different (MP2). Students are also reminded about the meaning of the symbols > and <.
    - **Access for Multilingual Learners:** MLR7 Compare and Connect. Synthesis: Invite groups to prepare a visual display that shows the strategy they used to compare the fractions. Encourage students to include details that will help others interpret their thinking. For example, specific language, using different colors, shading, arrows, labels, notes, diagrams, or drawings. Give students time to investigate each other's work. During the whole-class discussion, ask students, "What do these representations have in common?" "How are they different?" and "What kinds of additional details or language helped you understand the displays?"

Activity 2: Spin to Win: Same Denominator (15 minutes)

- The purpose of this activity is for students to practice comparing fractions with the same denominator while playing a game. Students spin a spinner for the numerator of their fractions and then locate and label the fractions on a number line to determine which fraction is greater.
    - **Access for Students with Disabilities:** Representation: Access for Perception. To support understanding, begin by demonstrating how to play one round of "Spin to Win."

Supplemental Resources

- Spin To Win (recording sheet) (spinner)
- Suggested Centers
    - Number Line Scoot (2–3) Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (directions) (gameboard)
    - Rolling for Fractions (3–5) Stage 1: Equivalent Fractions (pdf)
    - Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)

Assessment Resources

- 3.5.15 Cool Down.pdf

LESSON 16: COMPARE FRACTIONS WITH THE SAME NUMERATOR (Teacher Guide)

Teacher-Facing Learning Intention

- Students are comparing two fractions with the same numerator by reasoning about their size.

Student-Facing Learning Intention

- Let's compare two fractions with the same numerator.

Success Criteria

- I can compare two fractions with the same numerator by reasoning about their size.

Lesson Purpose

- The purpose of this lesson is for students to compare two fractions with the same numerator.

Lesson Narrative

- In this lesson, students reason that fractions with the same numerator have the same number of parts, and that the denominator shows the size or length of those parts. Students recognize that as the denominator increases, each part gets smaller. It is important that students develop this understanding rather than learning a rule about comparing fractions with the same numerator.

Vocabulary

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Materials

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New Jersey State Learning Standards

- NJSLS.MATH.CONTENT. 3.NF.A.3

National Council of Teachers of Mathematics Content Standards

- NCTM.MATH.CONTENT.3-5.NUM.A.3

Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <.

Mathematical Practice Standards

- **MP7.** Look for and make use of structure.

Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: True or False: Unit Fractions (10 minutes)

- The purpose of this True or False is to elicit insights students have about comparing unit fractions. The reasoning students do helps to deepen their understanding of what the denominator of a fraction means. It will also be helpful later when students compare fractions with the same numerator. In this activity, students have an opportunity to look for and make use of structure (MP7) because they notice that a larger denominator indicates that a whole is split into more parts. The more parts the whole is split into, the smaller those parts will be.

Activity 1: Five Parts of Something (20 minutes)

- The purpose of this activity is for students to represent their thinking visually as they compare pairs of fractions with the same numerator. They also locate fractions with the same numerator on number lines and observe the relative locations of the points. Students see that fractions with larger denominator are smaller in size (or are closer to 0 on the number line). Their reasoning here reinforces the idea that the denominator of a fraction determines how many equal parts are in a whole, and that the more parts there are, the smaller each part is (MP7). To compare $\frac{5}{6}$ and $\frac{5}{8}$, students are likely to draw one diagram or number line for sixths and a separate one for eighths. They may use a single diagram or number line, but find it more difficult to partition and represent both denominators.

Activity 2: Fractions with the Same Numerator (15 minutes)

- The purpose of this activity is for students to compare two fractions with the same numerator. Students use any representation to reason about the number and size of the parts of each fraction. In the last problem, students may notice that more than one denominator can sometimes work, but do not need to generalize about all the denominators that make each statement true. There is an opportunity for that kind of generalization in a future lesson.
    - Access for Multilingual Learners: MLR1 Stronger and Clearer Each Time. Synthesis: Before the whole-class discussion, give students time to meet with 2–3 partners to share and get feedback on their response to "Which denominators did you choose and why do they make the statements true?" Invite listeners to ask questions, to press for details, and to suggest mathematical language. Give students 2–3 minutes to revise their written explanation based on the feedback they receive.
    - Access for Students with Disabilities: Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after each chunk.

Supplemental Resources

- Suggested Centers
    - Number Line Scoot (2–3) Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (directions) (gameboard)
    - Rolling for Fractions (3–5) Stage 1: Equivalent Fractions (pdf)
    - Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)

Assessment Resources

- 3.5.16 Cool Down.pdf

LESSON 17: COMPARE FRACTIONS (Teacher Guide)

Teacher-Facing Learning Intention
- Students are comparing two fractions with the same numerator or the same denominator.
- Students are recording the results of comparison with the symbols >, =, or <.

Student-Facing Learning Intention
- Let's compare more fractions in different situations.

Success Criteria
- I can compare two fractions with the same numerator or the same denominator using the symbols >, =, or <.

Lesson Purpose
- The purpose of this lesson is for students to compare two fractions with the same numerator or the same denominator in and out of context and to justify their conclusions.

Lesson Narrative
- In previous lessons, students learned what it means for fractions to be equivalent, and compared two fractions with the same denominator or the same numerator. In this lesson, students apply their knowledge to compare fractions in and out of context and have an opportunity to generalize about what they have learned about fraction comparison.

Vocabulary
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Materials
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New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.NF.A.2**
  Understand a fraction as a number on the number line; represent fractions on a number line diagram.
  a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.
  b. Represent a fraction a/b on a number line diagram by marking off a length 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.
- **NJSLS.MATH.CONTENT. 3.NF.A.3**
  Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
  a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
  b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.
  c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.

Warm-up: Estimation Exploration: Ladybug Length (10 minutes)

- The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. In this warm-up, students apply what they know about fractions to estimate the length of an insect that is less than 1 inch.

Activity 1: Comparison Problems (15 minutes)

- The purpose of this activity is for students to compare two numbers in context, to explain or show their reasoning, and record the results of the comparisons with the symbols >, =, or < (MP2). The numbers may be fractions with the same numerator or the same denominator, or a fraction and a whole number.Students are likely to generate different comparison statements for the same situation. For example, they may write $\frac{5}{8} > \frac{3}{8}$ or $\frac{3}{8} < \frac{5}{8}$ to represent $\frac{5}{8}$ being the greater fraction. During synthesis, discuss how both statements capture the comparison and are valid.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: As students share the similarities and differences between the representations and comparison statements, use gestures to emphasize what is being described. For example, show with your fingers the partitions such as fourths or eighths that are the same in the representations that are being compared.
  - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Synthesis: Optimize meaning and value. Invite students to share a connection between activity content and their own lives. Ask “How can I use this in my own life?”

Activity 2: What Fraction Makes Sense? (15 minutes)

- The purpose of this activity is for students to generalize what they have learned about comparing fractions to complete comparison statements and to generate new ones, using the symbols <, >, or =. Students first consider all numbers that could make an incomplete comparison statement true. Then, they find a fraction less than, greater than, and equivalent to a given fraction and write statements to record the comparisons. As in the previous activity, students see that there are different ways to record the same comparison of two numbers.

Supplemental Resources

- Suggested Centers
  - Number Line Scoot (2–3) Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (directions) (gameboard)
  - Rolling for Fractions (3–5) Stage 1: Equivalent Fractions (pdf)
  - Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)

Assessment Resources

- 3.5.17 Cool Down.pdf

LESSON 18: DESIGN WITH FRACTIONS (OPTIONAL) (Teacher Guide)

Teacher-Facing Learning Intention

- Students are applying fraction understanding to create geometric designs.

Lesson Purpose

- The purpose of this lesson is for students to apply their understanding of fractions to create geometric designs.

Student-Facing Learning Intention

- Let's use fractions to create a design.

Success Criteria

- I can apply fraction understanding to create geometric designs.

Lesson Narrative

- This lesson is optional because it does not address any new mathematical content standards. It does provide students with an opportunity to apply precursor skills of mathematical modeling.In this lesson, students apply their understanding of fractions to create geometric designs, starting with a given square. They are tasked with marking a fractional length (½ or ¼) of each side of the square with a point. They then connect the points, which creates a new shape within the square. Students iterate this process of marking a fractional length and connecting points to generate their designs. To mark a given length, students apply their experience with partitioning a segment into equal parts. To mark a fractional length, they decide which endpoint of each side to use as a starting point, whether to always mark the points in the same direction (clockwise or counterclockwise), how many iterations are practical, and so on (MP4).

Vocabulary

- NA

Materials

Activity 1:

- Paper
- Rulers or straightedges

Activity 2:

- Paper
- Rulers or straightedges

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NF.A.2**
  Understand a fraction as a number on the number line; represent fractions on a number line diagram.
    a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.

Mathematical Practice Standards

- **MP4.** Model with mathematics.
- **MP8.** Look for and express regularity in repeated reasoning.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Notice and Wonder: Between 0 and 1 (10 minutes)

- The purpose of this warm-up is to elicit observations about partitions in number lines of different scales. In subsequent design activities, students will partition the sides of squares and other shapes into unit fractions. That process will be iterative, with the length being partitioned changing each time. The work here familiarizes students with the reasoning they will encounter later in the lesson.

Activity 1: Design With ½ (15 minutes)

- The purpose of this activity is for students to create a design using the fraction ½ as a constraint for length. Students partition each side of a given square into halves and mark a length of ½ on each side. They connect those midpoints to form another shape, partition the sides into halves again, and repeat the process to make increasingly smaller shapes. Students notice that the resulting shapes are also squares, and the squares in the pattern alternate between having vertical and horizontal sides and diagonal sides.
    - **Access for Multilingual Learners:** MLR2 Collect and Display. Circulate, listen for and collect the language students use as they work in groups. On a visible display, record words and phrases such as: middle, midpoint, point, endpoint, connect, mark, cut, partition, side length. Invite students to borrow language from the display as needed, and update it throughout the lesson.
    - **Access for Students with Disabilities:** Representation: Access for Perception. Provide appropriate reading accommodations and supports to ensure student access to written directions, word problems, and other text-based content.

Activity 2: Design With ¼ (25 minutes)

- The purpose of this activity is for students to create a design using the fraction ¼ as a constraint for length. The fraction 1 / 4 expands the number of possible designs that could be generated.When the fractional length to be marked on the sides of a square was ½ , students could use either end of a side as a starting point and would mark the same point. The shape that resulted from connecting the midpoints was always a square. When the fractional length to be marked is 1/4 , the location of the point changes depending on the starting point. Consequently, the shapes that result from connecting the points may be a square, another type of quadrilateral, or may vary each time. The shapes in turn determine how many iterations can be done. (For example, if the resulting shapes are narrow parallelograms, students may only be able to do 2 or 3 rounds before further partitioning becomes unfeasible.) If time permits, encourage students to color or decorate their drawings. Some students may also enjoy the challenge of creating another design using new constraints, such as:
    - starting with a square of a different size or with another shape
    - using another unit fraction or a non-unit fraction to mark the length of each side
    - using a different unit fraction for each iteration.

      Students can observe regularity in repeated reasoning (MP8) in many different ways as the new shapes they make are often smaller versions of the previous shape, but this depends heavily on how they decide to mark off ¼ of each side.

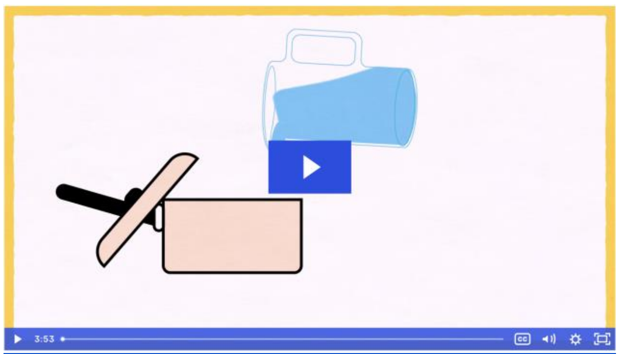
Supplemental Resources	Assessment Resources
• Suggested Centers ○ Number Line Scoot (2–3) Stage 3: Halves, Thirds, Fourths, Sixths and Eighths (directions) (gameboard) ○ Rolling for Fractions (3–5) Stage 1: Equivalent Fractions (pdf) ○ Five in a Row: Multiplication (3–5) Stage 2: Factors 1–9 (pdf)	•

Unit 6: Measuring Length, Time, Liquid Volume, and Weight

PEDAGOGICAL CONTENT KNOWLEDGE RESOURCES FOR TEACHERS

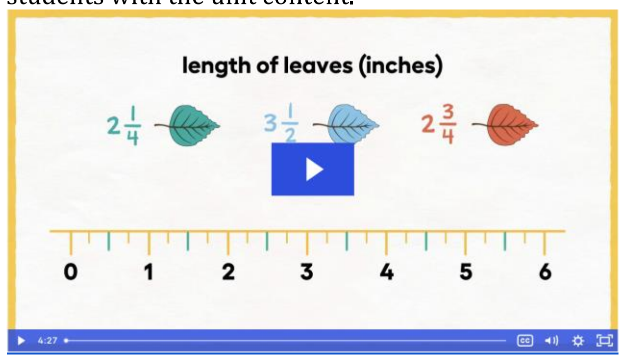
Learning Narrative Video

The Unit Launch: Learning Narrative video for Grade 3, Unit 6 gives insight into the unit objectives, models and representations, possible student errors and misconceptions, and tips that might be used to help support student understanding. The Learning Narrative video is ideal for teachers to study prior to teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content.



Learning Progressions Video

The Unit Launch: Learning Progressions video for Grade 3, Unit 6 details how the content of a unit builds upon prior knowledge, and how the understanding of the content provides students with readiness for future learning. The Learning Progressions video is ideal for teachers to study before teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content.



Learning Supports Video

The Unit Launch: Learning Supports video for Grade 3, Unit 6 gives an in-depth look into the models and representations used in this unit to help support student understanding. The Learning Supports video is ideal for teachers to study prior to teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content.

STAGE 1 - DESIRED RESULTS

Assessed Focus Standards	UNIT DESCRIPTION
NJSLS.MATH.CONTENT.3.M.A.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	In this unit, students measure length, weight, liquid volume, and time. They begin with a study of length measurement, building on their recent work with fractions. In grade 2, students measured lengths using informal and formal units to the nearest whole number. They plotted length data on line plots. Here, students explore length measurements in halves and fourths of an inch. They use a ruler to collect measurements and then display the data on line plots, learning about mixed numbers and revisiting equivalent fractions along the way. Next, students learn about standard units for measuring weight (kilograms and grams) and liquid volume (liters). To build a sense of weights such as 1 gram or 1 kilogram, students hold common objects such

NJSLS.MATH.CONTENT.3.M.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Clarification: "Measure and estimate liquid volumes and masses" excludes compound units such as cm3 and finding the geometric volume of a container. "Multiplying to solve one-step word problems" excludes multiplicative comparison problems (problems involving "times as much"; See Glossary, Tables 2a–2d)) **NJSLS.MATH.CONTENT.3.M.B.4** Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units). **NJSLS.MATH.CONTENT.3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **NJSLS.MATH.CONTENT.3.NF.A** Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3. **NJSLS.MATH.CONTENT.3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **NJSLS.MATH.CONTENT.3.OA.C.7**	as paper clips and bottles of water. To gain familiarity with liters, they fill a container with water by the liter and estimate the volume of everyday containers such as pots, tubs, and buckets. They then use the scale on measurement tools to measure and represent liquid volume. From there, students move on to measure time. In grade 2, they told and wrote time to the nearest 5 minutes. Now, they tell time to the minute, using the relationship between the hour hand and the minute hand to make sense of times such as 3:57 p.m. In the final section of the unit, students make sense of and solve problems related to all three measurements. The work here allows students to continue to develop their fluency with addition and subtraction within 1,000 and understanding of properties of operations. It also prompts them to use the relationship between multiplication and division to solve problems. **Throughout the unit** The progression of warm-ups in the first three sections of the unit reflect the progression of ideas in those sections of the unit. In these sections students begin with opportunities to build conceptual understanding of an attribute and notice structures in the tools used to measure the attribute. The notice and wonder routine is used for these purposes. Warm-ups in the last section of the unit are directly connected to supporting students to apply what they've learned about a variety of measurement contexts to the last section themed around exploring the fair. Throughout the unit, students participate in Number Talks to continue the development of multiplication and division strategies as they work toward fluent division within 100. **EXPLICIT ASPECTS OF RIGOR** **Conceptual Understanding** ● Understand time to the nearest minute. ● Tell and write time to the nearest minute and measure time intervals in minutes, within 60 minutes, on an analog and digital clock. ● Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem ● Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. ● Understand a fraction 1/b, with denominators 2, 3, 4, 6, and 8, as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. ● Understand a fraction with denominators 2, 3, 4, 6, and 8 as a number on a number line diagram. ● Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. ● Represent a fraction a/b on a number line diagram by marking off a length 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. ● Explain equivalence of fractions with denominators 2, 3, 4, 6, and 8 in special cases, and compare fractions by reasoning about their size.

With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Content Connections
3-LS3-1
Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS3-2
Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4-1
Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

3-LS4-2
Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

3-LS4-3
Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-ESS2-1
Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

INTEGRATION OF 21st CENTURY SKILLS
9.1.4.A.1

- Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
- Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.
- Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.
- Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

Procedural Fluency
- Tell and write time to the nearest minute and measure time intervals in minutes, within 60 minutes, on an analog and digital clock.
- Calculate elapsed time greater than 60 minutes to the nearest quarter and half hour on a number line diagram.
- Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.
- Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.
- Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
- Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Application
- Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.
- Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.
- Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

MEANING

<table>
<tr>
<td rowspan="3">Recognize a problem and brainstorm ways to solve the problem individually or collaboratively.

9.1.4.A.5
Apply critical thinking and problem-solving skills in classroom and family settings.

9.1.4.B.1
Participate in brainstorming sessions to seek information, ideas, and strategies that foster creative thinking.

9.1.4.C.1
Practice collaborative skills in groups, and explain how these skills assist in completing tasks in different settings (at home, in school, and during play).

CAREER EDUCATION
9.2.4.A.4
Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

9.3.ST-SM.2
Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.

9.3.ST-SM.4
Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.</td>
<td>Enduring Understandings

U1. Time can be measured using different units that are related to one another.

U2. The minute hand takes 5 minutes to move from one number to the next on an analog clock.

U3. The minute hand takes 1 minute to move from one mark to the next mark on an analog clock.

U4. The duration of an event can be measured if I know the start and end times for the event.

U5. Word problems can include time and elapsed time.

U6. Capacity is a measure of the amount of liquid a container can hold.

U7. Mass is a measure of the quantity of matter in an object.

U8. Weight and mass are different.

U9. The weight of an object is a measure of how heavy an object is.</td>
<td>Essential Questions

Q1. How can length of time be measured and found?

Q2. What are the customary units for measuring capacity and weight?

Q3. What are the metric units for measuring capacity and weight?

Q4. What is mass and how does it relate to weight?</td>
</tr>
<tr>
<td colspan="2">WHAT STUDENTS WILL KNOW AND BE ABLE TO DO</td>
</tr>
<tr>
<td>Knowledge

K1. Measure lengths using rulers marked with halves and fourths of an inch to generate data for making a line plot.

K2. Measure and estimate weights and liquid volumes of objects.

K3. Solve problems involving addition and subtraction of time intervals in minutes.

K4. Tell time to the minute.</td>
<td>Skills

S1. Measure lengths using a ruler marked with halves of an inch. [Lesson 1]

S2. Measure lengths using rulers marked with fourths of an inch. [Lessons 2, 3]

S3. Interpret line plots that display measurement data in fractions of an inch. [Lesson 4]

S4. Create a line plot where the horizontal scale is marked off in appropriate units— whole numbers,</td>
</tr>
</table>

	K5. Solve problems involving the four operations and measurement contexts.	halves, or quarters—to represent measurement data. Generate measurement data by measuring lengths using a ruler marked with halves and fourths of an inch. [Lesson 5] **S5.** Measure and estimate weights of objects using standard units of grams (g) and kilograms (kg). [Lesson 6] **S6.** Estimate and compare liquid volumes of containers using informal units and liters. Understand liquid volume as the amount of space that a liquid takes up. [Lesson 7] **S7.** Measure and estimate liquid volumes of objects using standard units of liters (L). [Lesson 8] C: Problems Involving Time **S8.** Tell and write time to the nearest minute. [Lesson 9] **S9**. Solve problems involving addition and subtraction of time intervals in minutes in a way that makes sense to them. [Lesson 10] **S10.** Solve problems involving addition and subtraction of time intervals in minutes. [Lesson 11] **S11.** Ask and answer questions about situations involving measurements. Interpret representations of situations involving measurements. [Lesson 12] **S12.** Determine information that is needed to solve measurement problems. Solve one-step word problems involving weight. [Lesson 13] **S13.** Reason about quantities, questions, and solutions that make sense in measurement problems. Solve one-step word problems involving time and liquid volume. [Lesson 14] **S14.** Analyze strategies for solving problems and for

		presenting solutions. Use the four operations to solve one-step word problems involving measurements. [Lesson 15] **S15.** Apply knowledge of measurement and operations to design a game. [Lesson 16 - Optional]

CULTURALLY RESPONSIVE TEACHING in PRACTICE	SOCIAL EMOTIONAL LEARNING in PRACTICE
• Encourage collaborative learning in diverse groups. • Recognize and value multiple problem-solving approaches. • Be mindful of language barriers and use simple language and visuals. • Contextualize abstract concepts in real-life situations. • Tailor instruction to individual interests and strengths. • Involve families and the community in math-related activities. • Include diverse mathematicians and scientists in lessons. • Use multicultural resources and materials. • Use math problems and examples that relate to students' cultures and experiences.	• Create a positive classroom environment. • Encourage communication and collaboration. • Model emotional regulation. • Connect math to real-life situations. • Validate effort and persistence. • Use cooperative learning. • Teach growth mindset. • Incorporate reflective practices. • Integrate SEL activities such as use of affirmations. • Foster positive teacher-student relationships.

STAGE 2 - EVIDENCE

SUMMATIVE ASSESSMENT

Illustrative Mathematics
- 3.6-Section-A-Checkpoint-Assessment.pdf
- 3.6-Section-B-Checkpoint-Assessment.pdf
- 3.6-Section-C-Checkpoint-Assessment.pdf
- 3.6-Section-D-Checkpoint-Assessment.pdf
- 3.6-End-of-Unit-Assessment.pdf
- 3.6-End-of-Unit-Assessment SP.pdf

PRE-ASSESSMENT

Illustrative Mathematics
-

FORMATIVE ASSESSMENT		
Illustrative Mathematics Curriculum ● 3.6.1 Cool Down.pdf ● 3.6.2 Cool Down.pdf ● 3.6.3 Cool Down.pdf ● 3.6.4 Cool Down.pdf ● 3.6.5 Cool Down.pdf ● 3.6.6 Cool Down.pdf ● 3.6.7 Cool Down.pdf ● 3.6.8 Cool Down.pdf ● 3.6.9 Cool Down.pdf ● 3.6.10 Cool Down.pdf ● 3.6.11 Cool Down. pdf ● 3.6.12 Cool Down.pdf ● 3.6.13 Cool Down.pdf ● 3.6.14 Cool Down.pdf ● 3.6.15 Cool Down.pdf	*Illustrative Mathematics* Tasks ● Unit 6 Student Task Lesson 1.pdf ● Unit 6 Student Task Lesson 2.pdf ● Unit 6 Student Task Lesson 3.pdf ● Unit 6 Student Task Lesson 4.pdf ● Unit 6 Student Task Lesson 5.pdf ● Unit 6 Student Task Lesson 6.pdf ● Unit 6 Student Task Lesson 7.pdf ● Unit 6 Student Task Lesson 8.pdf ● Unit 6 Student Task Lesson 9.pdf ● Unit 6 Student Task Lesson 10.pdf ● Unit 6 Student Task Lesson 11.pdf ● Unit 6 Student Task Lesson 12.pdf ● Unit 6 Student Task Lesson 13.pdf ● Unit 6 Student Task Lesson 14.pdf ● Unit 6 Student Task Lesson 15.pdf ● Unit 6 Student Task Lesson 16.pdf	NJSLA Released Items 3.M.A.1 ● Item UIN - M00821 ● Item UIN - 0115-M00611 ● Item UIN - 0115-M00611 SP ● Item UIN - M00033 ● Item UIN - M00033 SP ● Item UIN - M01194 ● Item UIN - M01754 ● Item UIN - M03286 ● Item UIN - M03419 ● Item UIN - VF442827 ● Item UIN - VH080124 ● Item UIN - VF524248 ● Item UIN - VF524248 SP ● Item UIN - VH046497 3.M.A.2 ● Item UIN - 0062-M00384 ● Item UIN - 0062-M00384Y SP ● Item UIN - 0374-M01644 ● Item UIN - M01197 ● Item UIN - M01399 ● Item UIN - M01877 ● Item UIN - M03158 ● Item UIN - VF647323 ● Item UIN - M03336P ● Item UIN - VH057282 3.DL.B.4 ● Item UIN - M300196 ● Item UIN - VF819700 ● Item UIN - VF819700 SP ● Item UIN - VH000998 ● Item UIN - M00361P ● Item UIN - M00361P SP ● Item UIN - VH039421 ● Item UIN - VH096301

<table>
<tr><th colspan="3">STAGE 3 - LEARNING PLAN</th></tr>
<tr><td colspan="3">MATH WORKSHOP</td></tr>
<tr>
<td>Illustrative Mathematics Centers

Estimate and Measure (1–4)
Stage 2: Centimeters and Inches (supporting)
Stage 3: Quarter Inches (addressing)
Target Measurements (2–5)
Stage 1: Inches and Centimeters (supporting)
Stage 2: Quarter Inches (addressing)
Creating Line Plots (2–5)
Stage 1: Inches and Centimeters (supporting)
Target Measurements (2–5)
Stage 2: Quarter Inches (addressing)
Creating Line Plots (2–5)
Stage 2: Quarter Inches (addressing)
Target Measurements (2–5)
Stage 2: Quarter Inches (addressing)
Creating Line Plots (2–5)
Stage 2: Quarter Inches (addressing)
Number Puzzles: Addition and Subtraction (1–4)
Stage 5: Within 1,000 (supporting)
Target Numbers (1–5)
Stage 7: Subtract Hundreds, Tens, or Ones (supporting)
Compare (1–5)
Stage 3: Multiply within 100 (supporting)
How Close? (1–5)
Stage 5: Multiply to 100 (supporting)
</td>
<td>Building Thinking Classrooms Tasks

Lesson 1: Activity 1: Measure Around the Room
Lesson 2: Activity 1: Partition Inches into Fourths
Lesson 3: Activity 2: Measure and Describe
Lesson 4: Activity 2: All About Twigs
Lesson 5: Activity 2: Let’s Make a Line Plot
Lesson 6: Activity 1: Estimate Weight
Lesson 7: Activity 1: Liquid Volume Estimation Exploration
Lesson 8: Activity 1: Estimate Liquid Volume
Lesson 9: Activity 1: Just a Clock on the Wall
Lesson 10: Activity 1: Time at the Bus Stop
Lesson 11: Activity 1: On the Bus Again
Lesson 12: Activity 1: Giant Pumpkin Event
Lesson 14: Activity 1: Carnival Time Number Choice
Lesson 15: Activity 1: A Day at the Fair
Lesson 16: Activity 1: Create Your Own Carnival Game
</td>
<td>Open Middle

Make The Time
Operations with Time
Operations with Time
Building Shelves 1
Building Shelves 2
It’s About Time 1
Interpreting Graphs
</td>
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<tr>
<td>Slow Reveal Graphs
</td>
<td>Bootstrap (to be added Summer 2025)</td>
<td>Other Resources
IM Talking Math</td>
</tr>
</table>

PHYSICAL MANIPULATIVES & RESOURCES	VIRTUAL MANIPULATIVES & RESOURCES	VOCABULARY
• rulers (inches) • glue or tape • scissors • tools for creating a visual display • chart paper • markers • markers (dry-erase) • paper clips • pipe cleaners • tape (painter's or masking) • yardsticks	**Didax** • Pattern Blocks (at Didax.com) **Toy Theater** • Area Perimeter Explorer | Geometry for Kids • Coordinate Graph » Toy Theater | Learn • Create • Play • Graph Drawing Tool | Teaching Tools • Graph Square | Teaching Tools **Phet Colorado** • Area Model Introduction **Mathigon** • Polypad – Virtual Manipulatives **PBS Learning Media** • Thinkport | Displaying Data With Line Plots | PBS LearningMedia **Maths Frame** • Bar Charts - Mathsframe	• gram • kilogram • liquid volume • liter • mixed number • weight

SUMMARY OF KEY LEARNING
Pacing This unit has been assigned 18 days in the Pacing Guide. The 18 days are allotted as follows: 16 lesson days as outlined below, 1 flexible day, and 1 assessment day. Lesson 16 is optional in this unit. **Teacher Resources:** Unit 6 Teacher's Guide (English) (Spanish) Unit 6 Teacher's Resource Pack (English) (Spanish) **Student Resources:** Unit 6 Student Workbook (English) (Spanish) **Section A: Measurement Data on Line Plots** Lesson 1: Measure in Halves of an Inch Lesson 2: Measure in Fourths of an Inch Lesson 3: Measure in Halves and Fourths of an Inch

LESSON 1: MEASURE IN HALVES OF AN INCH (Teacher Guide)

Teacher-Facing Learning Intention
- Students are measuring lengths using a ruler marked with halves of an inch.

Student-Facing Learning Intention
- Let's measure the length of objects around the room.

Success Criteria
- I can measure lengths using a ruler marked with halves of an inch.

Lesson Purpose
- The purpose of this lesson is for students to measure lengths that are fractions of an inch and relate these measurements to fractions on a number line.

Lesson Narrative
- In grade 2, students learned how to measure lengths to the nearest inch. They also learned how to represent fractions on the number line in the previous unit. In this lesson, students start by measuring the length of objects using an inch ruler. As students find objects whose length is not a whole number of inches, they consider how to partition the inches to get a more precise measurement. Students then partition a ruler to show halves of an inch and use the ruler to measure lengths to the nearest half of an inch. The lesson synthesis introduces students to mixed numbers as numbers that combine whole numbers and fractions less than 1.

Vocabulary
- mixed number

Materials
- Activity 1: Make copies and cut out the rulers from the blackline master (5 rulers per page).
- Activity 2: Each student needs a ruler from the previous activity.

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.M.B.4** Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units). **Mathematical Practice Standards** ● **MP6.** Attend to precision.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.ME.B.2** Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles. ● **NCTM.MATH.CONTENT.3-5.ALG.B.3** Express mathematical relationships using equations. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: What Do You Know About Inches? (10 minutes)

- The purpose of this warm-up is to invite students to share what they know about inches. Later in the lesson, students will explore lengths that are not a whole-number of inches.

Activity 1: Measure Around the Room (15 minutes)

- In grade 2, students only measured the length of objects that were whole units and sometimes described lengths as "about 4 inches." The purpose of this activity is for students to learn that fractions of an inch can be useful for measuring the length of an object that is not exactly a whole number of inches. Given a ruler marked with inches, students measure objects around the room. They may record measurements in whole inches even for objects whose length is not exactly a whole number in inches. In the synthesis, discuss the need for fractions of an inch to describe lengths more precisely (MP6).
  - **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence.* Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after each chunk. Supports accessibility for: Attention, Organization

Activity 2: Partition Inches into Halves (20 minutes)

- The purpose of this activity is for students to partition the inches on a ruler to show half inches and then use their ruler to measure lengths to the nearest half of an inch.
  - **Access for Multilingual Learners:** MLR2 Collect and Display. Circulate, listen for and collect the language and numbers students use as they measure objects. On a visible display, record numbers, words and phrases such as: seven half inches, seven halves of an inch, 7/2, between 2 and 3 inches, six and a half inches, 6 1/2, and less than 5 inches. Invite students to borrow language from the display as needed, and update it throughout the lesson. Advances: Conversing, Reading

Supplemental Resources ● Suggested Centers ○ Estimate and Measure (1–4) Stage 2: Centimeters and Inches (pdf) ○ Target Measurements (2–5) Stage 1: Inches and Centimeters (pdf) ○ MeasureAround the Room (pdf)	**Assessment Resources** ● 3.6.1 Cool Down.pdf

LESSON 2: MEASURE IN FOURTHS OF AN INCH (Teacher Guide)

Teacher-Facing Learning Intention
- Students are measuring lengths using rulers marked with fourths of an inch.

Student-Facing Learning Intention
- Let's measure lengths in quarters of an inch.

Success Criteria
- I can measure lengths using rulers marked with fourths of an inch.

Lesson Purpose
- The purpose of this lesson is for students to measure length using a ruler marked with fourths of an inch.

Lesson Narrative
- In the previous lesson, students applied what they knew about fractions to partition inches into halves and measure lengths to the nearest half inch. In this lesson, students partition inches into fourths and measure lengths to both the nearest fourth and half of an inch. Students are likely to see that they can use the ruler partitioned into fourths to measure lengths in whole numbers of inches, halves of an inch, and fourths of an inch, rather than to use separate rulers for different fractions. Some students may use fraction equivalence to describe the same length in half of an inch and fourth of an inch, which is helpful but not essential at this point. Focus the conversation on choosing the nearest quarter inch to describe the length of the object being measured.

Vocabulary
-

Materials
- Activity 2:
  - Materials from a previous activity
  - Materials from a previous lesson

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.M.B.4**
  Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).

Mathematical Practice Standards
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.ME.B.2**
  Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Estimation Exploration: Measure in Inches (10 minutes)
- The purpose of this Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. The warm-up also draws students' attention to a length between a full inch and one-half of an inch, preparing students to work with such lengths later.

Activity 1: Partition Inches into Fourths (20 minutes)

- The purpose of this activity is for students to partition the inches on a ruler into fourth or quarter inches, using what they know about fractions on a number line. Students then use the ruler to measure objects in the classroom to the nearest quarter inch. In the synthesis, students practice reading the measurements as fractions greater than 1 and mixed numbers. They also discuss how measuring in fourths of an inch is different than measuring in half inches.
    - **Access for Multilingual Learners:** *MLR2 Collect and Display.* Direct attention to words collected and displayed from the previous lesson. Invite students to borrow language from the display as needed, and update it throughout the lesson with numbers, words, and phrases such as: eight fourths, , five-and-one-fourth inches, less than five-and-one-half inch. Advances: Conversing, Reading

Activity 2: Find Some Lengths (20 minutes)

- The purpose of this activity is for students to practice measuring objects in the classroom using their partitioned rulers and find objects of certain fractional lengths. Because the specified lengths are in halves and fourths of an inch, students may use both rulers. As they realize that all lengths could be measured with the rulers showing fourths of an inch, they may opt to use only one ruler. When students decide to measure in halves or fourths of an inch based on the length of an object, they attend to precision (MP6).
    - **Access for Students with Disabilities:** *Representation: Internalize Comprehension*. Synthesis: Invite students to identify which details were most useful to measure accurately. Display the sentence frame, "The next time I measure objects with a ruler, I will look for . . . ." Supports accessibility for: Memory, Conceptual Processing

Supplemental Resources	Assessment Resources
• Suggested Centers ◦ Estimate and Measure (1–4) Stage 2: Centimeters and Inches (pdf) ◦ Target Measurements (2–5) Stage 1: Inches and Centimeters (pdf)	• 3.6.2 Cool Down.pdf

LESSON 3: MEASURE IN HALVES AND FOURTHS OF AN INCH (Teacher Guide)

Teacher-Facing Learning Intention	Lesson Purpose
• Students are: ◦ Measuring lengths using a ruler marked with both halves and fourths of an inch. ◦ Using equivalent fractions to describe length measurements. **Student-Facing Learning Intention** • Let's measure lengths in halves of an inch and quarters of an inch. **Success Criteria** • I can measure halves and fourths of an inch with a ruler and use equivalent fractions to describe the measurements.	• The purpose of this lesson is for students to use what they know about fraction equivalence to measure with a ruler that is marked with halves and fourths of an inch. **Lesson Narrative** • Previously, students learned to measure lengths using separate rulers that were marked with halves or fourths of an inch. Here, they use what they know about fraction equivalence to read measurements from a ruler marked with both halves and fourths of an inch. Then, students consider lengths that could be named in more than one way. **Vocabulary** • **Materials** • Rulers (inches) • Warm-up: Notice and Wonder Rulers (groups of 4) • Cut out a ruler from the blackline master for each student.

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.M.B.4** Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units). ● **NJSLS.MATH.CONTENT.3.NF.A** Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3 . **Mathematical Practice Standards** ● **MP6.** Attend to precision.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.ME.B.2** Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles. ● **NCTM.MATH.CONTENT.3-5.ALG.B.3** Express mathematical relationships using equations. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: Rulers (10 minutes)

- The purpose of this warm-up is to elicit the idea that a ruler can be marked with halves and fourths of an inch, which will be useful when students use a ruler like this in a later activity. While students may notice and wonder many things about these rulers, focus the conversation on how the quarter-inch marks are distinguished from the half-inch and whole-inch marks.

Activity 1: Halves and Quarters (15 minutes)

- The purpose of this activity is for students to measure lengths using a ruler that is marked with half inches and quarter inches. Building on their understanding of equivalent fractions, students recognize that lengths that line up with a half-inch mark can be read as one-half of an inch or two-fourths of an inch. They also recognize that lengths that are whole numbers of inches can be expressed as fractions.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Provide students with the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking

Activity 2: Measure and Describe (25 minutes)

- The purpose of this activity is for students to practice measuring with a ruler that is marked with halves and fourths of an inch, as well as to identify lengths that can be described in different ways because they are equivalent. This activity gives students an opportunity to attend to the details of each measurement and to use language precisely (MP6). Students are prompted to find objects with whole-number lengths and those with fractional lengths. The work here allows students to reinforce earlier work on expressing whole numbers as fractions and naming equivalent fractions.
  - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Invite students to generate a list of shared expectations for group work. Record responses on a display and keep visible during the activity. Supports accessibility for: Social-Emotional Functioning

Supplemental Resources ● Notice and Wonder Rulers (pdf) ● Suggested Centers ○ Estimate and Measure (1–4) Stage 3: Quarter Inches (pdf) ○ Target Measurements (2–5) Stage 2: Quarter Inches (pdf) ○ Creating Line Plots (2–5) Stage 1: Inches and Centimeters (pdf)	**Assessment Resources** ● 3.6.3 Cool Down.pdf

LESSON 4: INTERPRET MEASUREMENT DATA ON LINE PLOTS (Teacher Guide)

Teacher-Facing Learning Intention:
- Students are interpreting line plots that display measurement data in fractions of an inch.

Student-Facing Learning Intention
- Let's make sense of line plots with lengths in half inches and quarter inches.

Success Criteria
- I can interpret line plots that display measurement data in fractions of an inch.

Lesson Purpose
- The purpose of this lesson is for students to make sense of line plots that represent measurements to the nearest half or fourth of an inch.

Lesson Narrative
- In grade 2, students made line plots to show measurements to the nearest whole unit. In previous lessons, they measured objects with rulers marked with halves and fourths of an inch. In this lesson, students interpret line plots that show lengths in half inches and quarter inches and ask and answer questions about the data.

Vocabulary
-

Materials
-

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.M.B.4**
  Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).

Mathematical Practice Standards
- **MP5.** Use appropriate tools strategically.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.ME.B.2**
  Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
- **NCTM.MATH.CONTENT.3-5.ALG.B.3**
  Express mathematical relationships using equations.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Notice and Wonder: A List and a Line Plot (10 minutes)
- The purpose of this warm-up is to remind students that measurement data can be shown on a line plot, preparing them to interpret a line plot that includes fractional measurements in a later activity. While students may notice and wonder many things about the given data, the general structure of the line plot and how it shows the measurement data in the table are the important discussion points.

Activity 1: A Set of Seedlings (20 minutes)
- The purpose of this activity is for students to analyze a line plot that represents lengths that are measured to the nearest half inch. They make observations and write statements about the data represented in the line plot, and then generate questions that could be answered with the line plot. When students recognize how organizing data helps to read the information and to answer questions, they learn that line plots are a powerful tool to present data (MP5).

Activity 2: All About Twigs (15 minutes)
- The purpose of this activity is for students to use a line plot to answer questions about a set of length data. The data show measurements to the nearest quarter inch. Students may apply their understanding of fraction equivalence to interpret the data and answer the questions.

- **Access for Multilingual Learners:** *Reading: MLR6 Three Reads*. Keep books or devices closed. Display only the graph, without revealing the questions. "We are going to read this graph 3 times." 1st Read: Give students 2–3 minutes to interpret and read the information displayed by the graph. Ask, "What is this situation about?" Listen for and clarify any questions about the context. 2nd Read: "Read and interpret the graph a second time. What quantities are represented? What can be counted or measured in this situation?" 3rd Read: Reveal and read the questions aloud. Invite students to take turns explaining their observations about the graph related to each question as they work together. Advances: Reading, Representing
- **Access for Students with Disabilities:** *Engagement: Provide Access by Recruiting Interest*. Leverage choice around perceived challenge. Invite students to select complete 6 out of the 8 line plot questions. Supports accessibility for: Organization, Attention, Social-emotional skills

Supplemental Resources

- Suggested Centers
  - Estimate and Measure (1–4) Stage 3: Quarter Inches (pdf)
  - Target Measurements (2–5) Stage 2: Quarter Inches (pdf)
  - Creating Line Plots (2–5) Stage 1: Inches and Centimeters (pdf)

Assessment Resources

- 3.6.4 Cool Down.pdf

LESSON 5: REPRESENT MEASUREMENT DATA ON LINE PLOTS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are creating a line plot where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters—to represent measurement data.
- Students are generating measurement data by measuring lengths using a ruler marked with halves and fourths of an inch.

Student-Facing Learning Intention

- Let's collect measurement data and show them on a line plot.

Success Criteria

- I can create a line plot and generate measurement data by measuring lengths using a ruler marked with halves and fourths of an inch.

Lesson Purpose

- The purpose of this lesson is for students to generate measurement data and represent them on a line plot.

Lesson Narrative

- In a previous lesson, students analyzed line plots that included measurements in halves and fourths of an inch. In this lesson, students collect measurement data, represent them on a line plot, and analyze line plots that represent different data sets (MP2). This lesson may take more than one day if students need more time to collect data around the school and to create their line plots. If time permits and preferable, consider carrying out the activities across two days.

Vocabulary

-

Materials

- Glue or tape
- Scissors
- Tools for creating a visual display
- Activity 2: Let's Make a Line Plot (groups of 2)
- a ruler marked with half inches and quarter inches

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.M.B.4**
  Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).
- **NJSLS.MATH.CONTENT.3.OA.C.7**
  With accuracy and efficiency, multiply and divide within 100, using

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.B.2**
  Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**

strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Mathematical Practice Standards

- **MP2.** Reason abstractly and quantitatively.
- **MP7.** Look for and make use of structure.

Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.

- **NCTM.MATH.CONTENT.3-5.ME.A.2**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.
- **NCTM.MATH.CONTENT.3-5.ME.A.3**
  Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Number Talk: Multiply Teen Numbers (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for multiplying within 100 and to help students develop fluency. When students use known multiplication facts to multiply larger numbers, they look for and make use of structure (MP7).

Activity 1: Go for a Measurement Walk (20 minutes)

- The purpose of this activity is for students to generate measurement data using rulers marked with half inches and quarter inches. Students go on a walk in nature, around the school, or on the playground to measure the length of items they chose. If time is limited, this activity could also be done in the classroom. Students may record and organize their data in the provided tables or on lined paper.
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: Revoice student ideas to demonstrate and amplify mathematical language use. For example, revise the student statement “It lined up with one of the half thingies” as “It lined up with one of the half inch marks,” or “We recorded it in halves” as “We recorded it in half inches.” Advances: Speaking

Activity 2: Let’s Make a Line Plot (20 minutes)

- In this activity, students create a line plot using the measurement data that they generated earlier and display their group’s line plot for all to see. Encourage students to plan their line plot using the blank line in the activity statement before creating a poster version for display in a gallery walk. A template for a larger line plot is provided in the blackline master. Students can join the number lines on two copies of the blackline master to create a longer number line. As students visit others’ data displays, they consider how the line plots are alike and how they are different, as well as why different scales might have been chosen for different objects measured.
  - **Access for Students with Disabilities:** Representation: Access for Perception. Synthesis: Use gestures during the explanation of the line plot to emphasize important aspects of the line plot. Supports accessibility for: Conceptual Processing, Attention

Supplemental Resources

- Let’s Make a Line Plot (pdf)
- Suggested Centers
  - Estimate and Measure (1–4) Stage 3: Quarter Inches (pdf)
  - Target Measurements (2–5) Stage 2: Quarter Inches (pdf)
  - Creating Line Plots (2–5) Stage 1: Inches and Centimeters (pdf)

Assessment Resources

- 3.6.5 Cool Down.pdf

LESSON 6: ESTIMATE AND MEASURE WEIGHT (Teacher Guide)

Teacher-Facing Learning Intention
- Students are measuring and estimating weights of objects using standard units of grams (g) and kilograms (kg).

Student-Facing Learning Intention
- Let's measure and estimate weight.

Success Criteria
- I can measure and estimate weights of objects using standard units of grams (g) and kilograms (kg).

Lesson Purpose
- The purpose of this lesson is for students to learn to measure and estimate the weight of objects in grams or kilograms.

Lesson Narrative
- In previous grades, students learned that weight is a measurable attribute and directly compared the weights of two objects. In this lesson, students learn that weight is a measure of how heavy something is. They are introduced to grams and kilograms as metric units for measuring weight. Students hold objects of different numbers of grams and kilograms to familiarize themselves with the units before estimating
  the weight of objects in those units. Since the distinction between mass and weight is beyond what students need to learn, the term "weight" is used throughout the unit. To build a sense of weight measurements and an intuition for comparison, it is extremely helpful for students to have firsthand experience of holding different weights. To make that possible, some new materials and preparation are required for this lesson.

Vocabulary
- gram
- kilogram
- weight

Materials
- Activity 1:
  - Create a set of metric weights (1 kilogram, 2 kilograms, 1 gram, 10 grams, 100 grams). Weights can be made by filling bags with the following quantities of objects:
  - for 1 kilogram: 1,000 jumbo paper clips or a 1 liter bottle filled with water
  - for 1 gram: 1 large paper clip
  - Create a poster with the labels "less than 1 gram," "between 1 gram and 100 grams," "between 100 grams and 1 kilogram," and "over 1 kilogram" for the synthesis.
  - If possible, gather scales (analog and digital), primary balances, and any other available weight measurement tools for the synthesis of Estimate Weight activity. Prepare enough tools for each group of students to have one, or prepare one for a whole-class weighing demonstration.
  - Chart paper
  - Markers

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.M.A.2**
  Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.ME.B.2**
  Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**

volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Clarification: “Measure and estimate liquid volumes and masses” excludes compound units such as cm3 and finding the geometric volume of a container. “Multiplying to solve one-step word problems” excludes multiplicative comparison problems (problems involving “times as much”; See Glossary, Tables 2a–2d)) **Mathematical Practice Standards** ●	Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. ● **NCTM.MATH.CONTENT.3-5.ME.A.2** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. ● **NCTM.MATH.CONTENT.3-5.ME.A.3** Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: Produce Stand (10 minutes)

- The purpose of this warm-up is to elicit the idea that weight can be measured. While students may notice and wonder many things about this image, how weight can be measured is the important discussion point.

Activity 1: Estimate Weight (30 minutes)

- The purpose of this activity is for students to learn that grams and kilograms are standard units for measuring weight. Students are introduced to the units using common objects as benchmarks. For each benchmark, students hold an object of some number of grams or kilograms and think of an example of an object that has about the same weight. Then, students look for items in the room that are in specific weight ranges. If time permits and if a scale or a balance is available, give students an opportunity during the synthesis to confirm the weights of the objects they estimated. Depending on the number of weight measurement tools available, arrange for a whole-class weighing demonstration with the objects students chose, or arrange for students to weigh their chosen objects in groups, taking turns with each type of available tool.

Activity 2: The Weight of Pets (10 minutes)

- The purpose of this activity is for students to use what they’ve learned about grams and kilograms to estimate the weights of some common pets. Students should rely on the experiences they have had in previous activities to explain why the estimates they choose are reasonable. In the synthesis, students consider when it might be helpful to estimate a weight rather than measure the exact weight.
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis: Before students share, remind students to use words such as weight, grams, and kilograms. Advances: Speaking
  - **Access for Students with Disabilities:** *Action and Expression: Develop Expression and Communication.* Provide access to the weights used in the previous activity to determine a reasonable weight for each pet. Supports accessibility for: Conceptual Processing

Supplemental Resources ● Suggested Centers ○ Target Measurements (2–5) Stage 2: Quarter Inches (pdf) ○ Creating Line Plots (2–5) Stage 2: Quarter Inches (pdf)	**Assessment Resources** ● 3.6.6 Cool Down.pdf

LESSON 7: INTRODUCTION TO LIQUID VOLUME (Teacher Guide)

Teacher-Facing Learning Intention

- Students are estimating and comparing liquid volumes of containers using informal units and liters.
- Students are learning liquid volume as the amount of space that a liquid takes up.

Student-Facing Learning Intention

- Let's learn about liquid volume.

Success Criteria

- I can estimate and compare liquid volumes of containers using informal units and liters.

Lesson Purpose

- The purpose of this lesson is to introduce students to the measurement of liquid volume.

Lesson Narrative

- In previous lessons, students measured and estimated the weight of objects in grams and kilograms. In this lesson, students learn that liquid volume is the amount of space that a liquid takes up and consider the challenges of directly comparing liquid volumes by just looking at them. Students use informal units (such as plastic cups, spoons, and so on) to compare the liquid volume that two containers will hold. Finally, students are introduced to the liter as a metric unit of liquid volume. They create a tool for measuring liquid volume in liters by filling a container and making a mark for each liter as it's added to the container. A clear container is used so students can see the level of the liquid and a dry erase marker is used so the marks can be erased after the lesson. To build a conceptual understanding of liquid
volume, it is extremely helpful for students to have firsthand experience of comparing liquids in different containers. To make that possible, some new materials and preparation are required for this lesson.

Vocabulary

- liquid volume
- liter

Materials

- Activity 1: Each group of 4 needs:
    - a supply of water (1 liter bottles would work and could be reused for the next activity)
    - two containers that are different in shape, but close in size, each labeled with "A" and "B"
    - a small container labeled with "unit," such as a large spoon, film canister, or a small measuring cup
    - a tray or towel to work on (optional)
- Activity 2: Gather the following materials:
    - a large clear container that can be written on, such as a gallon water jug with top removed or clear storage bin
    - 1-liter container (1-liter water bottle, measuring cup, etc.)
    - a supply of water (enough to fill the larger container) or the Liquid Volume in Liters video: https://vimeo.com/451620298

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.M.A.2**
  Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.B.2**
  Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**

a beaker with a measurement scale) to represent the problem. (Clarification: "Measure and estimate liquid volumes and masses" excludes compound units such as cm3 and finding the geometric volume of a container. "Multiplying to solve one-step word problems" excludes multiplicative comparison problems (problems involving "times as much"; See Glossary, Tables 2a–2d)) **Mathematical Practice Standards** ● **MP1.** Make sense of problems and persevere in solving them. ● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP4.** Model with mathematics.	Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. ● **NCTM.MATH.CONTENT.3-5.ME.A.2** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. ● **NCTM.MATH.CONTENT.3-5.ME.A.3** Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: The Bowl and the Jar (10 minutes)

- The purpose of this warm-up is to elicit the idea that liquid volume is a measurable attribute, which will be useful when students use informal units and liters to measure liquid volume in later activities. While students may notice and wonder many things about these containers, ideas around how much each container holds and which container holds more are the important discussion points.

Activity 1: Liquid Volume Estimation Exploration (20 minutes)

- In this activity, students explore liquid volumes by estimating and comparing them. They use a unit container to fill two containers, A and B, to determine which container holds a greater liquid volume. To make the comparison interesting, containers A and B should be different in size and shape but could hold similar liquid volumes. Consider, for example, a bowl and a cup. The unit container should be small enough so that multiple iterations are needed to fill and compare containers A and B. Consider a large spoon or a small measuring cup. To involve every student in the measuring process, consider assigning roles of "filler" and "recorder" for container A, then switch roles for container B. The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. It gives students a low-stakes opportunity to share a mathematical claim and the thinking behind it (MP3). Asking oneself "Does this make sense?" is a component of making sense of problems (MP1). Making an estimate or a range of reasonable answers with incomplete information is a part of modeling with mathematics (MP4).

Activity 2: Liquid Volume in Liters (15 minutes)

- The purpose of this activity is to introduce students to liters as a formal unit to measure liquid volume. Students learn how much liquid is contained in a liter, then the whole class fills a large clear container with water one liter at a time. As the container is filled students mark the container with a dry erase marker to show the amount of liters in the container. While it is highly recommended that the class has the experience of filling and marking the container, a video has been provided to show the process and could be used for a class demonstration. Having more than one 1-liter container or some prefilled 1-liter containers will make the process of filling and marking the container go faster.
    - **Access for Multilingual Learners:** *MLR5 Co-Craft Questions.* Keep books or devices closed. Display only the large clear container and 1 liter of water, or the image if using the video for this activity, without revealing the questions. Ask students to write down possible mathematical questions that could be asked about the situation. Invite students to compare their questions before revealing the task. Ask, "What do these questions have in common? How are they different?" Reveal the intended questions for this task and invite additional connections. Advances: Reading, Writing
    - **Access for Students with Disabilities:** *Engagement: Provide Access by Recruiting Interest.* Synthesis: Invite students to generate a list of additional examples of items that would be measured in liters that connect to their personal backgrounds and interests. Supports accessibility for: Visual-Spatial Processing, Memory

Supplemental Resources

- Suggested Centers
  - Target Measurements (2–5) Stage 2: Quarter Inches (pdf)
  - Creating Line Plots (2–5) Stage 2: Quarter Inches (pdf)

Assessment Resources

- 3.6.7 Cool Down.pdf

LESSON 8: ESTIMATE AND MEASURE LIQUID VOLUME (Teacher Guide)

Teacher-Facing Learning Intention

- Students are measuring and estimating liquid volumes of objects using standard units of liters (L).

Student-Facing Learning Intention

- Let's measure and estimate liquid volume.

Success Criteria

- I can measure and estimate liquid volumes of objects using standard units of liters (L).

Lesson Purpose

- The purpose of this lesson is for students to use liters to measure and estimate liquid volumes.

Lesson Narrative

- In previous lessons, students learned that liquid volume is a measurable attribute and that liters can be used to measure liquid volume. Students use this experience to match containers with estimated liquid volumes they can hold. They compare the marks on a ruler to the marks on a container and learn to use a container with liter marks to measure liquid volume.

Vocabulary

-

Materials

-

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.M.A.2**
  Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Clarification: "Measure and estimate liquid volumes and masses" excludes compound units such as cm3 and finding the geometric volume of a container. "Multiplying to solve one-step word problems" excludes multiplicative comparison problems (problems involving "times as much"; See Glossary, Tables 2a–2d))
- **NJSLS.MATH.CONTENT.3.NF.A**
  Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3.
- **NJSLS.MATH.CONTENT.3.OA.C.7**
  With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.B.2**
  Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.2**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.
- **NCTM.MATH.CONTENT.3-5.ME.A.3**
  Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

(e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Mathematical Practice Standards** ● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP4.** Model with mathematics. ● **MP7.** Look for and make use of structure.	

Warm-up: Number Talk: Divide by 3 (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for dividing within 100 and to help students develop fluency. When students use known multiplication and division facts to divide larger numbers, they look for and make use of structure (MP7).

Activity 1: Estimate Liquid Volume (15 minutes)

- The purpose of this activity is for students to estimate liquid volumes in liters. First, students consider the number of liters it could take to fill a bathtub. Then, students match a variety of containers to the number of liters they could hold, using their experience from the previous lesson to support their reasoning. In order to solve these problems, students rely on their experience as well as information provided by the photos of different objects. They also rely on their ability to make reasoned estimates (MP4). The activity provides students an opportunity to share their thinking and critique the reasoning of others (MP3).
    - **Access for Multilingual Learners:** *MLR8 Discussion Supports*. Synthesis: Provide students with the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking

Activity 2: Measure Liquid Volume (20 minutes)

- The purpose of this activity is for students to measure liquid volume using liters. Students compare the liter marks on a container for measuring liquid volume to the marks on a ruler before they use images of containers marked in liters to determine or show the volume of liquid in each container.
    - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to select 6 out of the 8 parts of problem 1 and 3 out of the 5 parts of problem 2 to complete. Supports accessibility for: Organization, Attention, Social-emotional skills

Supplemental Resources ● Suggested Centers ○ Target Measurements (2–5) Stage 2: Quarter Inches (pdf) ○ Creating Line Plots (2–5) Stage 2: Quarter Inches (pdf)	**Assessment Resources** ● 3.6.8 Cool Down.pdf

LESSON 9: TIME TO THE NEAREST MINUTE (Teacher Guide)

Teacher-Facing Learning Intention ● Students are telling and writing time to the nearest minute. **Student-Facing Learning Intention** ● Let's tell and write time to the nearest minute. **Success Criteria**	**Lesson Purpose** ● The purpose of this lesson is for students to tell and write time to the nearest minute. **Lesson Narrative** ● In previous grades, students learned to tell and write time from analog and digital clocks to the nearest five minutes, and to use a.m. and p.m. In this lesson, students build on this work to understand that they can tell time to the nearest minute, using the marks between the numbers that show the 5-minute increments. They also draw hands on a clock to show a given time. As students

● I can tell and write time to the nearest minute.	represent time on the clock and tell time to the minute, they may be off by 1 or 2 minutes. This level of precision is sufficient for the work of this lesson. **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.M.A.1** Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. **Mathematical Practice Standards** ● **MP6.** Attend to precision.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.ME.B.2** Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles. ● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. ● **NCTM.MATH.CONTENT.3-5.ME.A.2** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. ● **NCTM.MATH.CONTENT.3-5.ME.A.3** Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Estimation Exploration: On the One Hand . . . . (10 minutes)

- The purpose of this Estimation Exploration is for students to make sense of times that would be reasonable with only the hour hand as a reference on a clock.

Activity 1: Just a Clock on the Wall (20 minutes)

- The purpose of this activity is for students to tell and write time to the nearest minute. They learn that there are 60 small tick marks around the clock to show each of the 60 minutes in 1 hour. The work here gives students a reason to attend to the features of the clock and use them to tell time more precisely (MP6). The synthesis provides an opportunity to discuss how the clock does not indicate whether the time is a.m. or p.m.
    - **Access for Multilingual Learners:** *MLR8 Discussion Supports. Synthesis:* Create a visual display of a clock. As students share their strategies, annotate the display to illustrate connections. For example, next to each number or tick mark, write the minutes the student indicates. Advances: Speaking, Representing
    - **Access for Students with Disabilities:** *Engagement: Provide Access by Recruiting Interest.* Provide choice and autonomy. Provide access to colored pencils for students to color the minute hand one color and the hour hand a different color so they can determine the time on each clock. Supports accessibility for: Attention

Activity 2: Show Time (15 minutes)
- The purpose of this activity is for students to tell and write time to the nearest minute as they draw times on blank clocks.

Supplemental Resources
- Suggested Centers
  - Target Measurements (2–5) Stage 2: Quarter Inches (pdf)
  - Creating Line Plots (2–5) Stage 2: Quarter Inches (pdf)

Assessment Resources
- 3.6.9 Cool Down.pdf

LESSON 10: SOLVE PROBLEMS INVOLVING TIME (PART 1) (Teacher Guide)

Teacher-Facing Learning Intention
- Students are solving problems involving addition and subtraction of time intervals in minutes in a way that makes sense to them.

Student-Facing Learning Intention
- Let's solve problems involving time.

Success Criteria
- I can solve problems involving addition and subtraction of time intervals in minutes in a way that makes sense to them.

Lesson Purpose
- The purpose of this lesson is for students to solve problems involving addition and subtraction of time intervals in minutes in a way that makes sense to them.

Lesson Narrative
- In a previous lesson, students learned to tell and write time to the nearest minute. In this lesson, students reason about elapsed time using any representation that makes sense to them, such as the number line,
tables, equations, and words. Students consider a variety of representations so that they can make connections and possibly use them in the next lesson (MP2).

Vocabulary
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Materials
-

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.M.A.1**
Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

Mathematical Practice Standards
- **MP2.** Reason abstractly and quantitatively.
- **MP8.** Look for and express regularity in repeated reasoning.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.ME.B.2**
Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.2**
Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.
- **NCTM.MATH.CONTENT.3-5.ME.A.3**
Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement.

National Council of Teachers of Mathematics Process Standards

	● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Choral Count: Fifteens (10 minutes)

- The purpose of this Choral Count is to invite students to practice counting times by 15 minutes and notice patterns in the count. This will be helpful later in this section when students will solve problems involving addition and subtraction of time intervals. Students have an opportunity to notice regularity through repeated reasoning (MP8) as they count by 15 minutes over a span of 3 hours.

Activity 1: Time at the Bus Stop (25 minutes)

- In this activity, students solve problems involving elapsed time in a way that makes sense to them. Although the problem type may be new, students can reason about them using their understanding of time and of addition and subtraction. They can also support their reasoning by drawing on a clock. In each problem, students are given a start time and an elapsed time of 24 minutes. To find each end time, students may:
    - use words to describe their thinking
    - write a series of numbers and symbols to show how 24 minutes is added to the start time
    - create a table to track changes in time from the start time to 24 minutes later
    - show incremental "jumps" that add up to 24 minutes on the clock
    - use a linear representation to show incremental changes from the start time to 24 minutes later

  To elicit and discuss as many possible strategies and representations for reasoning about the problems, significant time is allocated for this activity. Students may choose to use any of the strategies or representations they see here to solve elapsed time problems in future lessons. When they determine what time different events occurred based on the initial time and the 24 minutes of elapsed time students reason abstractly and quantitatively(MP2).
    - **Access for Multilingual Learners:** *MLR7 Compare and Connect.* Synthesis: Lead a discussion comparing, contrasting, and connecting the different representations. Ask, "How are the representations alike?", "How are they different?", "How do 24 minutes show up in each representation?" Advances: Representing, Conversing
    - **Access for Students with Disabilities:** *Action and Expression:* Internalize Executive Functions. Invite students to plan a strategy, including the tools they will use, for solving the elapsed time story problem. If time allows, invite students to share their plan with a partner before they begin. Supports accessibility for: Organization

Activity 2: Time on the Bus (10 minutes)

- In this activity, students encounter another type of elapsed-time problem in which the start and end times are given but the elapsed time is not. Students consider possible strategies they saw earlier that could be used to find elapsed time. Although they are not required to solve the problem, students may choose to do so as they think about ways to reason abstractly and quantitatively about the solution (MP2).

Supplemental Resources ● Suggested Centers ○ Number Puzzles: Addition and Subtraction (1–4) Stage 5: Within 1,000 (pdf) ○ Target Numbers (1–5) Stage 7: Subtract Hundreds, Tens, or Ones (pdf)	**Assessment Resources** ● 3.6.10 Cool Down.pdf

LESSON 11: SOLVE PROBLEMS INVOLVING TIME (PART 2) (Teacher Guide)

Teacher-Facing Learning Intention
- Students are solving problems involving addition and subtraction of time intervals in minutes.

Student-Facing Learning Intention
- Let's solve more problems involving time.

Success Criteria
- I can solve problems involving addition and subtraction of time intervals in minutes.

Lesson Purpose
- The purpose of this lesson is for students to solve problems involving addition and subtraction of time intervals in minutes.

Lesson Narrative
- In this lesson, students use any strategy and representation to solve problems involving elapsed time. The problems involve unknowns in all positions: start time, end time, and duration. When students recognize the mathematical features of familiar real-world objects and use those features to solve problems, they model with mathematics (MP4).

Vocabulary
-

Materials
- Activity 1: Materials from a previous activity
  - Virtual clock included
- Activity 1: Display students' ideas from the lesson synthesis in the previous lesson.

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.M.A.1**
  Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

Mathematical Practice Standards
- **MP2.** Reason abstractly and quantitatively.
- **MP4.** Model with mathematics.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.ME.B.2**
  Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.2**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.
- **NCTM.MATH.CONTENT.3-5.ME.A.3**
  Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Notice and Wonder: Band Practice (10 minutes)
- The purpose of this warm-up is to elicit the idea that many different questions could be asked about this situation involving time, which will be useful when students solve problems in a later activity.

Activity 1: On the Bus Again (15 minutes)

- The purpose of this activity is for students to solve problems involving addition and subtraction of time intervals when given times on a clock. Students may choose to show or explain their reasoning in any way, but the clocks are given to encourage use of that representation. Monitor for different ways that students represent their thinking, particularly differences in strategies when the problem involves time crossing the hour mark and when it doesn't.
    - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Synthesis. Display sentence frames to support whole-class discussion: "Can you say more about . . . ?" "Why did you . . . ?" Advances: Speaking, Representing
    - **Access for Students with Disabilities:** Representation: Develop Language and Symbols. Synthesis: Make connections between representations visible. Supports accessibility for: Conceptual Processing, Memory

Activity 2: Math Libs Time (20 minutes)

- The purpose of this activity is for students to solve problems involving addition and subtraction of time intervals in minutes. Students fill a name and activity into each problem before they solve it using any representation that makes sense to them. The synthesis draws attention to the different types of problems that have been solved. Students need to read and think carefully about the given information and the unknown, which differ in most of the situations, in order to decide which calculations to perform (MP2).

Supplemental Resources

- Suggested Centers
    - Number Puzzles: Addition and Subtraction (1–4) Stage 5: Within 1,000 (pdf)
    - Target Numbers (1–5) Stage 7: Subtract Hundreds, Tens, or Ones (pdf)

Assessment Resources

- 3.6.11 Cool Down. pdf

LESSON 12: WAYS TO REPRESENT MEASUREMENT SITUATIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are asking and answering questions about situations involving measurements.
- Students are interpreting representations of situations involving measurements.

Student-Facing Learning Intention

- Let's make sense of and represent measurement situations at the fair.

Success Criteria

- I can interpret, ask and answer questions about situations involving measurements.

Lesson Purpose

- The purpose of this lesson is for students to make sense of situations involving measurements, interpret representations of the situations, and ask and answer questions about them.

Lesson Narrative

- In previous lessons, students estimated and measured weights and liquid volumes. They learned a variety of methods and representations to solve problems involving all four operations, and used representations that made sense to them. In this lesson, students make sense of tape diagrams (MP2), which better represent the continuous nature of measurement contexts. The context of a fair is used in this lesson and subsequent ones.

Vocabulary

-

Materials

- Activity 1: Tools for creating a visual display
- Activity 2: Card Sort: Giant Pumpkins (groups of 2)
- Activity 2: Create a set of cards from the blackline master for each group of 2.

New Jersey State Learning Standards	National Council of Teachers of Mathematics Content Standards
NJSLS.MATH.CONTENT.3.M.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Clarification: "Measure and estimate liquid volumes and masses" excludes compound units such as cm3 and finding the geometric volume of a container. "Multiplying to solve one-step word problems" excludes multiplicative comparison problems (problems involving "times as much"; See Glossary, Tables 2a–2d)) **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP7.** Look for and make use of structure.	● **NCTM.MATH.CONTENT.3-5.ME.B.2** Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles. ● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. ● **NCTM.MATH.CONTENT.3-5.ME.A.2** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. ● **NCTM.MATH.CONTENT.3-5.ME.A.3** Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: The Fair (10 minutes)

- The purpose of this warm-up is to elicit the idea that there are many mathematical contexts at a state or county fair, and to familiarize students with some possible situations before they solve problems in upcoming activities.

Activity 1: Giant Pumpkin Event (20 minutes)

- The purpose of this activity is for students to solve problems involving weights that are given in the same units. Students begin by generating mathematical questions about an image of two giant pumpkins. Then, weights are given for each pumpkin and students narrow down the questions that could be answered with this information. Students then solve one of the problems generated by the class. Students can all solve the same problem or each group could solve a different problem. As students are generating questions that can be answered, decide which option makes the most sense for your class.

Activity 2: Card Sort: Giant Pumpkins (15 minutes)

- The purpose of this activity is for students to make sense of representations of situations involving weights and liquid volumes. Students are reminded that tape diagrams can be used to represent relationships between quantities in different types of problems. As students analyze descriptions of situations and make connections across representations, they practice looking for and making use of structure (MP7). As they relate the numbers and relationships in situations to those in diagrams, they reason quantitatively and abstractly (MP2).
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Activity: Students should take turns finding a match and explaining their reasoning to their partner. Display the following sentence frames for all to see: "I noticed _____, so I matched . . . ." Encourage students to challenge each other when they disagree. Advances: Speaking, Representing
  - **Access for Students with Disabilities:** *Engagement: Develop Effort and Persistence.* Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce the remaining cards once students have completed their initial set of matches. Supports accessibility for: Organization, Social-Emotional Functioning

Supplemental Resources	Assessment Resources
● Card Sort: Giant Pumpkins (pdf)	

● Suggested Centers ○ Number Puzzles: Addition and Subtraction (1–4) Stage 5: Within 1,000 (pdf) ○ Target Numbers (1–5) Stage 7: Subtract Hundreds, Tens, or Ones (pdf)	● 3.6.12 Cool Down.pdf

LESSON 13: PROBLEMS WITH MISSING INFORMATION (Teacher Guide)

Teacher-Facing Learning Intention
● Students are determining information that is needed to solve measurement problems.
● Students are solving one-step word problems involving weight.
 	
Student-Facing Learning Intention
● Let's find out what information is needed to solve problems about measurements at the fair.
 	
Success Criteria
● I can determine information that is needed to solve measurement problems involving weight.
	Lesson Purpose
	● The purpose of this lesson is for students to determine the information needed to solve problems involving weight.
	
	Lesson Narrative
	● In this lesson, students solve problems involving weight in two Information Gap activities. They interpret descriptions of situations involving all four operations and in which one or more quantities are missing. Students determine the information that they need to answer the questions and then reason about the solutions.
	
	Vocabulary
	●
	
	Materials
	● Pre-printed cards cut from copies of the blackline master
	● Activity 1:
	  ● Create a set of cards from the blackline master for each group of 2.
	  ● Keep set 1 separate from set 2.
	● Activity 2:
	  ● Create a set of cards from the blackline master for each group of 2.
	  ● Keep set 1 separate from set 2.

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.M.A.2** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Clarification: "Measure and estimate liquid volumes and masses" excludes compound units such as cm3 and finding the geometric volume of a container. "Multiplying to solve one-step word problems" excludes multiplicative comparison problems (problems involving "times as much"; See Glossary, Tables 2a–2d))	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.ME.B.2** Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles. ● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. ● **NCTM.MATH.CONTENT.3-5.ME.A.2** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. ● **NCTM.MATH.CONTENT.3-5.ME.A.3**

Mathematical Practice Standards ● **MP1.** Make sense of problems and persevere in solving them. ● **MP6.** Attend to precision.	Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Estimation Exploration: Giant Cantaloupe (10 minutes)

- The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information.

Activity 1: Info Gap: Pumpkin Weigh-Off (20 minutes)

- This activity uses MLR4 Information Gap. The Info Gap structure requires students to make sense of problems by determining what information is necessary, and then to ask for information they need to solve it. This may take several rounds of discussion if their first requests do not yield the information they need (MP1). It also allows them to refine the language they use and ask increasingly more precise questions until they get the information they need (MP6). This Info Gap activity provides students an opportunity to solve multiplication and division problems involving weight.
  - **Access for Students with Disabilities:** *Representation: Access for Perception.* Begin by demonstrating one round of the info gap routine, to support understanding of the context. Supports accessibility for: Conceptual Processing

Activity 2: Info Gap: Pig Weigh-Off (20 minutes)

- This activity uses MLR4 Information Gap. In this activity, students solve addition and subtraction problems involving weight.

Supplemental Resources ● Info Gap Pumpkin Weigh Off (pdf) ● Info Gap: Pig Weigh-Off (pdf) ● Suggested Centers ○ Number Puzzles: Addition and Subtraction (1–4) Stage 5: Within 1,000 (pdf) ○ Target Numbers (1–5) Stage 7: Subtract Hundreds, Tens, or Ones (pdf)	**Assessment Resources** ● 3.6.13 Cool Down.pdf

LESSON 14: WHAT MAKES SENSE IN THE PROBLEM? (Teacher Guide)

Teacher-Facing Learning Intention ● Students are reasoning about quantities, questions, and solutions that make sense in measurement problems. ● Students are solving one-step word problems involving time and liquid volume. **Student-Facing Learning Intention** ● Let's think about what numbers and questions make sense in problems.	**Lesson Purpose** ● The purpose of this lesson is for students to consider quantities and questions that make sense in situations and solve problems accordingly. **Lesson Narrative** ● In earlier lessons, students encountered and solved problems about time and liquid volume. In this lesson, students model with mathematics (MP4) as they determine quantities, questions, and solutions that make sense in given situations and adhere to mathematical and real-world constraints when solving problems.

Success Criteria • I can reason about quantities, questions, and solutions that make sense in measurement problems involving time and liquid volume.	**Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.M.A.1** Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. ● **NJSLS.MATH.CONTENT.3.M.A.2** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Clarification: "Measure and estimate liquid volumes and masses" excludes compound units such as cm3 and finding the geometric volume of a container. "Multiplying to solve one-step word problems" excludes multiplicative comparison problems (problems involving "times as much"; See Glossary, Tables 2a–2d)) ● **NJSLS.MATH.CONTENT.3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Mathematical Practice Standards** ● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP4.** Model with mathematics. ● **MP7.** Look for and make use of structure.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.ME.B.2** Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles. ● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. ● **NCTM.MATH.CONTENT.3-5.ME.A.2** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. ● **NCTM.MATH.CONTENT.3-5.ME.A.3** Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Number Talk: Give and Take (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for adding within 1,000 and help students develop fluency. When students consider the addends carefully and adjust them to facilitate addition (such as by subtracting from one and adding to the other), they practice looking for and making use of structure (MP7).

Activity 1: Carnival Time Number Choice (20 minutes)

- The purpose of this activity is for students to consider numbers that make sense in situations involving elapsed time. Then students solve the problems. While a variety of times and answers make sense for each situation, students focus on justifying why their choices make sense to them (MP3). Consider preparing and displaying images of roller coasters and Ferris wheels for students who may be unfamiliar with carnival attractions.

- **Access for Students with Disabilities:** *Representation: Internalize Comprehension.* Synthesis: Invite students to identify which details were most useful to solve the problem. Display the sentence frame, "The next time I solve problems involving time, I will look for . . . ." Supports accessibility for: Memory, Conceptual Processing

Activity 2: Lemonade Break (15 minutes)

- The purpose of this activity is for students to write a question that could be answered by given mathematical work and that would make sense in the given situation. When students interpret given student work in terms of the supplied information and decide what question the work might answer, they identify important quantities and their relationships in context (MP4).
  - **Access for Multilingual Learners:** *MLR8 Discussion Supports*. Prior to solving the problem, invite students to make sense of the situation and take turns sharing their understanding with their partner. Listen for and clarify any questions about the context. Advances: Reading, Representing

Supplemental Resources

- Suggested Centers
  - Compare (1–5) Stage 3: Multiply within 100 (Directions) (Cards)
  - How Close? (1–5) Stage 5: Multiply to 100 (pdf)

Assessment Resources

- 3.6.14 Cool Down.pdf

LESSON 15: WAYS TO SOLVE PROBLEMS AND SHOW SOLUTIONS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are analyzing strategies for solving problems and for presenting solutions.
- Students are using the four operations to solve one-step word problems involving measurements.

Student-Facing Learning Intention

- Let's solve problems about spending a day at the fair and think about how to best show our solutions.

Success Criteria

- I can use the four operations to analyze strategies for solving problems and presenting solutions.

Lesson Purpose

- The purpose of this lesson is for students to solve problems using the four operations as they imagine spending a day at the fair.

Lesson Narrative

- In previous lessons, students became familiar with and solved problems involving equal groups, time, weight, and liquid volume. In this lesson, students put together the ideas they have learned to consider a
  variety of mathematical situations that might arise during a day at the fair. Students solve problems as they imagine the course of a day at the fair and create a poster to highlight their mathematical reasoning.

Vocabulary

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Materials

- Activity 1: Tools for creating a visual display
- Activity 2:
  - Materials from a previous activity
  - Display posters from the previous activity.

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.M.A.1**
  Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.B.2**
  Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.

intervals in minutes, e.g., by representing the problem on a number line diagram. ● **NJSLS.MATH.CONTENT.3.M.A.2** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Clarification: "Measure and estimate liquid volumes and masses" excludes compound units such as cm3 and finding the geometric volume of a container. "Multiplying to solve one-step word problems" excludes multiplicative comparison problems (problems involving "times as much"; See Glossary, Tables 2a–2d)) ● **NJSLS.MATH.CONTENT.3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. ● **NJSLS.MATH.CONTENT.3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP7.** Look for and make use of structure.	● **NCTM.MATH.CONTENT.3-5.ME.A.1** Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. ● **NCTM.MATH.CONTENT.3-5.ME.A.2** Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems. ● **NCTM.MATH.CONTENT.3-5.ME.A.3** Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Number Talk: Divide by 8 (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for dividing by 8. These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to divide when solving problems. When students use multiplication facts they know to divide and then add or remove groups of 8 for facts they are less familiar with, they look for and make use of structure (MP7).

Activity 1: A Day at the Fair (25 minutes)

- The purpose of this activity is for students to put together their knowledge of problem solving, measurement topics (time, weight, and liquid volume), and equal groups to solve a variety of problems about a day at the fair. After solving problems, students create a poster about the day. Students should feel free to display their work in creative ways while making sure that the mathematical thinking on each problem is made clear. If they want, students could create individual posters rather than working with a partner. Throughout the activity, students reason abstractly and quantitatively as they interpret the different problems and situations, represent them, and find solutions (MP2).

Activity 2: A Day at the Fair Gallery Walk (10 minutes)

- The purpose of this activity is for students to consider strategies different from their own (MP3) and aspects of student work that make mathematical ideas clear as they visit the posters created in the previous activity.
    - **Access for Multilingual Learners:** *MLR7 Compare and Connect.* Synthesis: After the Gallery Walk, lead a discussion comparing, contrasting, and connecting the different approaches. Ask, “What did the approaches have in common?”, “How were they different?”, “Why did the different approaches lead to the same outcome?” To amplify student language and illustrate connections, follow along and point to the relevant parts of the displays as students speak. Advances: Representing, Conversing
    - **Access for Students with Disabilities:** *Action and Expression:* Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches. Supports accessibility for: Conceptual Processing

Supplemental Resources	**Assessment Resources**
• Suggested Centers ◦ Compare (1–5) Stage 3: Multiply within 100 (Directions) (Cards) ◦ How Close? (1–5) Stage 5: Multiply to 100 (pdf)	• 3.6.15 Cool Down.pdf

LESSON 16: DESIGN A CARNIVAL GAME (Teacher Guide)

Teacher-Facing Learning Intention
- Students are applying knowledge of measurement and operations to design a game.

Student-Facing Learning Intention
- Let’s design a carnival game.

Success Criteria
- I can apply knowledge of measurement and operations to design a game.

Lesson Purpose
- The purpose of this lesson is for students to apply their understanding of length measurement, time measurement, and fluency with four operations to design a carnival game.

Lesson Narrative
- This lesson is optional because it does not address any new mathematical content standards. This lesson does provide students with an opportunity to apply precursor skills of mathematical modeling. In this lesson, students continue to work with the context of a fair. Students analyze games they might see at a carnival such as a penny toss or marble run and consider what makes a good game. They then create their own games with given materials and integrate mathematical ideas from this unit. Students play the game and consider ways to improve it. When students make choices about quantities and rules, analyze constraints in situations, and adjust their work to meet constraints, they model with mathematics (MP4).
This lesson may take more than 60 minutes, as students may need additional time to design, set up, and play their games. Consider modifying the activities or expanding the lesson across 2 days to meet students’ needs or to give more time for revision.

Vocabulary
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Materials
- Activity 1:
    - Paper clips
    - Pipe cleaners
    - Rulers
    - Tape (painter's or masking)
    - Yardsticks

	- Gather tape measures, toilet paper tubes, marbles, pennies, paper cups, and a collection of balls that bounce for students to use as they create their games. - Other material not included in this list can be made available to students to use to create their games.

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.M.A.1**
  Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.
- **NJSLS.MATH.CONTENT.3.M.A.2**
  Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Clarification: "Measure and estimate liquid volumes and masses" excludes compound units such as cm3 and finding the geometric volume of a container. "Multiplying to solve one-step word problems" excludes multiplicative comparison problems (problems involving "times as much"; See Glossary, Tables 2a–2d))
- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
- **NJSLS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- **NJSLS.MATH.CONTENT.3.OA.C.7**
  With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Mathematical Practice Standards

- **MP4.** Model with mathematics.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.ME.B.2**
  Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
- **NCTM.MATH.CONTENT.3-5.ME.A.1**
  Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.
- **NCTM.MATH.CONTENT.3-5.ME.A.2**
  Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.
- **NCTM.MATH.CONTENT.3-5.ME.A.3**
  Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Notice and Wonder: Carnival Games (10 minutes)

- The purpose of this warm-up is to introduce the context of carnival games and have students consider the elements that make a good game. While students may notice and wonder many things about these images, constraints that make a game challenging, rules that make the game fair, and the way someone can win the game are the important discussion points.

Activity 1: Create Your Own Carnival Game (45 minutes)

- The purpose of this activity is for students to use the provided materials to design their own game. If available, students can be provided with additional materials not included in the materials list. Students decide the rules and objectives of the game. After playing the game at least once, students revise their design to include 2 of the following elements: measuring elapsed time, measuring distance, multiplication or division within 100, addition or subtraction within 1,000. If there is time, a pair of students from each group can swap with another group at different points of this activity so they have an opportunity to play a different game.
    - **Access for Multilingual Learners:** *MLR8 Discussion Supports.* Before they begin, give students 2–3 minutes to make sense of the task and take turns sharing their understanding with their group. Listen for and clarify any questions about the directions. Advances: Reading, Representing
    - **Access for Students with Disabilities:** *Engagement: Provide Access by Recruiting Interest.* Use visible timers or audible alerts to help learners anticipate and prepare to transition between activities. Supports accessibility for: Social-Emotional Functioning, Organization

Supplemental Resources	**Assessment Resources**

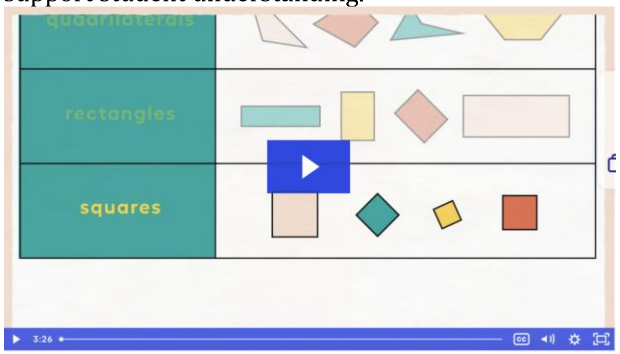
• Suggested Centers
  ◦ Compare (1–5) Stage 3: Multiply within 100 (Directions) (Cards)
  ◦ How Close? (1–5) Stage 5: Multiply to 100 (pdf)
	•

Unit 7 : Two-dimensional Shapes and Perimeter

PEDAGOGICAL CONTENT KNOWLEDGE RESOURCES FOR TEACHERS

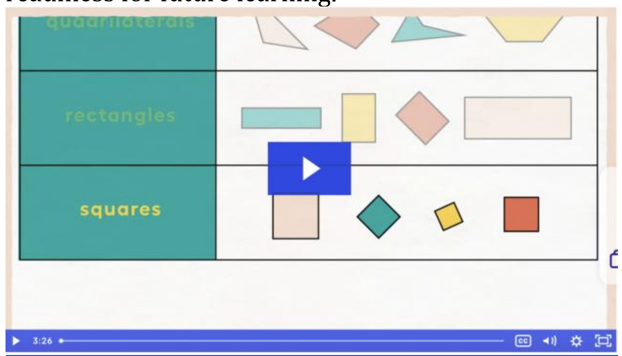
Learning Narrative Video

The Unit Launch: Learning Narrative video for Grade 3, Unit 7 gives insight into the unit objectives, models and representations, possible student errors and misconceptions, and tips that might be used to help support student understanding.



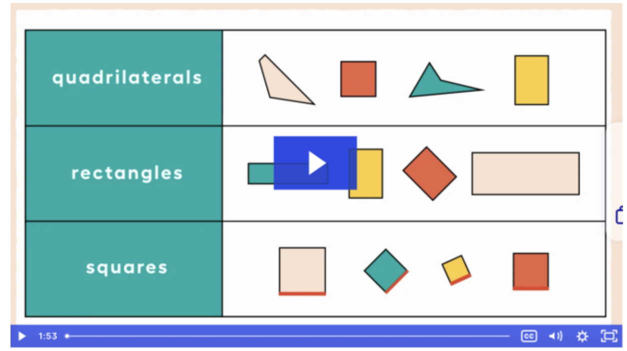
Learning Progressions Video

The Unit Launch: Learning Progressions video for Grade 3, Unit 7 details how the content of a unit builds upon prior knowledge, and how the understanding of the content provides students with readiness for future learning.



Learning Supports Video

The Unit Launch: Learning Supports video for Grade 3, Unit 7 gives an in-depth look into the models and representations used in this unit to help support student understanding.



STAGE 1 - DESIRED RESULTS

Assessed Focus Standards

NJSLS.MATH.CONTENT. 3.G.A.1

Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw

UNIT DESCRIPTION

In this unit, students reason about attributes of two-dimensional shapes and learn about perimeter. Students began to describe, compare, and sort two-dimensional shapes in earlier grades. Here, they continue to do so and to develop language that is increasingly more precise to describe and categorize shapes. Students learn to classify broader categories of shapes (quadrilaterals and triangles) into more specific subcategories based on their attributes. For instance, they study examples and non-examples of rhombuses, rectangles, and squares, and come to recognize their specific attributes. In this unit, students reason about attributes of two-dimensional shapes and learn about perimeter. Students began to describe, compare, and sort two-dimensional shapes in earlier grades. Here, they continue to do so and to develop language that is increasingly

examples of quadrilaterals that do not belong to any of these subcategories **NJSLS.MATH.CONTENT. 3.M.C.6** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. **NJSLS.MATH.CONTENT. 3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **NJSLS.MATH.CONTENT. 3.NBT.A.3** Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. **NJSLS.MATH.CONTENT. 3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **NJSLS.MATH.CONTENT. 3.OA.D.8** Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are	more precise to describe and categorize shapes. Students learn to classify broader categories of shapes (quadrilaterals and triangles) into more specific subcategories based on their attributes. For instance, they study examples and non-examples of rhombuses, rectangles, and squares, and come to recognize their specific attributes. As the lessons progress, they consider situations that involve perimeter, and then those that involve both perimeter and area. These lessons aim to distinguish the two attributes (which are commonly confused) and reinforce that perimeter measures length or distance (in length units) and area measures the amount of space covered by a shape (in square units). At the end of the unit, students solve problems in a variety of contexts. They apply what they learn about geometric attributes of shapes, perimeter, and area, to design a park, a West African wax print pattern, and a robot. They then solve problems within the context of their design. **Throughout the unit** The warm-ups throughout the unit are used to address topics within each section and continue to support the fluencies of grade 3. Warm-ups that are not focused on the grade-level fluencies address the learning in the specific sections. In section A, warm-ups focus on using attributes of triangles and quadrilaterals to describe and analyze shapes. In sections B and C, warm-ups focus on perimeter. In the last section, students consider how geometric attributes, perimeter, and area can be used in design.
	EXPLICIT ASPECTS OF RIGOR
	Conceptual Understanding ● Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories ● Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. ● Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations) **Procedural Fluency** ● Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories ● Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. ● Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

no parentheses to specify a particular order) (Order of Operations)

Content Connections

INTEGRATION OF 21st CENTURY SKILLS
9.1.4.A.1
Recognize a problem and brainstorm ways to solve the problem individually or collaboratively.

9.1.4.A.5
Apply critical thinking and problem-solving skills in classroom and family settings.

9.1.4.B.1
Participate in brainstorming sessions to seek information, ideas, and strategies that foster creative thinking.

9.1.4.C.1
Practice collaborative skills in groups, and explain how these skills assist in completing tasks in different settings (at home, in school, and during play).

CAREER EDUCATION
9.2.4.A.4
Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

9.3.ST-SM.2
Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.

- With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Application
- Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

MEANING

Enduring Understandings	Essential Questions
U1. Two and three-dimensional objects with or without curved surfaces can be described, classified, and analyzed by their attributes.	**Q1.** How can two-dimensional shapes be described, analyzed and classified?
U2 Plane shapes have many properties that make them different from one another.	**Q2.** How can equal areas of parts of a shape be expressed?

WHAT STUDENTS WILL KNOW AND BE ABLE TO DO

Knowledge

K1. Reason about shapes and their attributes.

K2. Find the perimeter of two-dimensional shapes, including when all or some side lengths are given.

K3. Find the perimeter of two-dimensional shapes, including when all or some side lengths are given.

K4. Find the perimeter of two-dimensional shapes, including when all or some side lengths are given.

Skills

S1. Describe attributes of shapes. Sort shapes based on attributes in a way that makes sense to them. [Lesson 1]

S2. Sort triangles and quadrilaterals into subcategories. Understand that shared attributes of shapes can define a larger category, such as triangle or quadrilateral. [Lesson 2]

S3. Describe and identify shapes using their distinguishing attributes. [Lesson 3]

S4. Identify attributes of rhombuses, rectangles, and squares. [Lesson 4]

S5. Draw examples of quadrilaterals that are not rhombuses, rectangles, or squares. Draw examples of quadrilaterals that are not rhombuses, rectangles, or

		squares. [Lesson 5] **S6.** Describe perimeter as the length of the boundary of a flat shape. [Lesson 6] **S7.** Find the perimeter of two-dimensional shapes. [Lessons 6, 7] **S8.** Find the perimeter of two-dimensional shapes given all or some of the side lengths. [Lesson 8] **S9.** Find unknown side lengths given the perimeter of a shape. Solve problems that involve perimeters of shapes. [Lesson 9] **S10.** Solve problems that involve perimeter and area of rectangles. [Lesson 10] **S11.** Draw rectangles with the same perimeter and different areas. [Lessons 11, 12] **S12.** Apply geometric understanding to solve problems about parks. [Lessons 13, 14, 15]

CULTURALLY RESPONSIVE TEACHING in PRACTICE	SOCIAL EMOTIONAL LEARNING in PRACTICE
● Encourage collaborative learning in diverse groups. ● Recognize and value multiple problem-solving approaches. ● Be mindful of language barriers and use simple language and visuals. ● Contextualize abstract concepts in real-life situations. ● Tailor instruction to individual interests and strengths. ● Involve families and the community in math-related activities. ● Include diverse mathematicians and scientists in lessons. ● Use multicultural resources and materials. ● Use math problems and examples that relate to students' cultures and experiences.	● Create a positive classroom environment. ● Encourage communication and collaboration. ● Model emotional regulation. ● Connect math to real-life situations. ● Validate effort and persistence. ● Use cooperative learning. ● Model growth mindset. ● Incorporate reflective practices. ● Integrate SEL activities such as use of affirmations. ● Foster positive teacher-student relationships.

STAGE 2 - EVIDENCE		
SUMMATIVE ASSESSMENT		
Illustrative Mathematics ● 3.7-Section-A-Checkpoint-Assessment.pdf ● 3.7-Section-B-Checkpoint-Assessment.pdf ● 3.7-Section-C-Checkpoint-Assessment.pdf ● 3.7-Section-D-Checkpoint-Assessment.pdf ● 3.7-End-of-Unit-Assessment.pdf ● 3.7-End-of-Unit-Assessment SP.pdf		
PRE-ASSESSMENT		
Illustrative Mathematics ●		
FORMATIVE ASSESSMENT		
Illustrative Mathematics Curriculum ● 3.7.1 Cool Down.pdf ● 3.7.2 Cool Down.pdf ● 3.7.3 Cool Down.pdf ● 3.7.4 Cool Down.pdf ● 3.7.5 Cool Down.pdf ● 3.7.6 Cool Down.pdf ● 3.7.7 Cool Down.pdf ● 3.7.8 Cool Down.pdf ● 3.7.9 Cool Down.pdf ● 3.7.10 Cool Down.pdf ● 3.7.11 Cool Down.pdf ● 3.7.12 Cool Down.pdf ● 3.7.13 Cool Down.pdf ● 3.7.14 Cool Down.pdf ● 3.7.15 Cool Down.pdf	*Illustrative Mathematics* Tasks ● Unit 7 Student Task Lesson 1.pdf ● Unit 7 Student Task Lesson 2.pdf ● Unit 7 Student Task Lesson 3.pdf ● Unit 7 Student Task Lesson 4.pdf ● Unit 7 Student Task Lesson 5.pdf ● Unit 7 Student Task Lesson 6.pdf ● Unit 7 Student Task Lesson 7.pdf ● Unit 7 Student Task Lesson 8.pdf ● Unit 7 Student Task Lesson 9.pdf ● Unit 7 Student Task Lesson 10.pdf ● Unit 7 Student Task Lesson 11.pdf ● Unit 7 Student Task Lesson 12.pdf ● Unit 7 Student Task Lesson 13.pdf ● Unit 7 Student Task Lesson 14.pdf ● Unit 7 Student Task Lesson 15.pdf	NJSLA Released Items 3.G.A.1 ● Item UIN - M00039P ● Item UIN - M00368 ● Item UIN - M00368_SP ● Item UIN - VF442839 ● Item UIN - VF906751 ● Item UIN - VH011929 ● Item UIN - M00917 ● Item UIN - M00917_SP ● Item UIN - VF819714 ● Item UIN - VH096345 ● Item UIN - VH080663 3.MD.C.6 ● Item UIN - M00007P ● Item UIN - M02022 ● Item UIN - M03591 ● Item UIN - M05032 ● Item UIN - VF657436

- Item UIN - VH003077
- Item UIN - VH003077_SP
- Item UIN - VH003125
- Item UIN - M00885P
- Item UIN - M00885P_SP
- Item UIN - VH057881
- Item UIN - VH059737

STAGE 3 - LEARNING PLAN

MATH WORKSHOP

Illustrative Mathematics Centers

- Can You Draw It? (1–5)
    - Stage 2: Grade 2 Shapes (supporting)
- How Are They the Same? (1–5)
    - Stage 2: Grade 2 Shapes (supporting)
- Which One? (K–5)
    - Stage 3: Grade 2 Shapes (supporting)
    - Stage 4: Grade 3 Shapes (addressing)
- Picture Books (K–5)
    - Stage 3: Find Shapes (addressing)
- Can You Draw It? (1–5)
    - Stage 3: Grade 3 Shapes (addressing)
- How Are They the Same? (1–5)
    - Stage 3: Grade 3 Shapes (addressing)
- Which One? (K–5)
    - Stage 4: Grade 3 Shapes (addressing)
- Picture Books (K–5)
    - Stage 3: Find Shapes (addressing)
- Can You Draw It? (1–5)
    - Stage 3: Grade 3 Shapes (addressing)
    - Stage 4: Area and Perimeter (addressing)

Building Thinking Classrooms Tasks

- Lesson 3 Activity 2: Play Mystery Quadrilateral (25 minutes)
- Lesson 4 Activity 1: What Makes These Shapes So? (35 minutes)
- Lesson 5 Activity 1: All the Ways (20 minutes)
- Lesson 6 Activity 2: Distance Around (20 minutes)
- Lesson 7 Activity 2: Draw Your Own (20 minutes)
- Lesson 8 Activity 2: Something is Missing (15 minutes)
- Lesson 9 Activity 2: Can I Use a Perimeter? (20 minutes)
- Lesson 10 Activity 1: Rope Off the Garden (15 minutes)
- Lesson 11 Activity 2: Same Perimeter, Different Area (20 minutes)
- Lesson 12 Activity 1: Area of 24 (15 minutes)
- Lesson 13 Activity 2: Park Problems (15 minutes)
- Lesson 14 Activity 1: Create a Wax Print Pattern (20 minutes)
- Lesson 15 Activity 1: Create Your Own Robot (35 minutes)

Open Middle

- Biggest Rectangle
- Perimeter
- Rectangles: Maximizing Area
- Rectangles: Maximizing Perimeter
- Squares: Perimeter v. Area
- Rectangles: Perimeter v. Area
- Rectangles: Perimeter v. Area

● How Are They the Same? (1–5)
  ○ Stage 3: Grade 3 Shapes (addressing)
● Which One? (K–5)
  ○ Stage 4: Grade 3 Shapes (addressing)
● Compare (1–5)
  ○ Stage 4: Divide within 100 (supporting)
● How Close? (1–5)
  ○ Stage 5: Multiply to 100 (supporting)
● Can You Draw It? (1–5)
  ○ Stage 4: Area and Perimeter (addressing)
● Compare (1–5)
  ○ Stage 4: Divide within 100 (supporting)
● How Close? (1–5)
  ○ Stage 5: Multiply to 100 (supporting)		

Slow Reveal Graphs ●	**Bootstrap (to be added Summer 2025)**	**Other Resources** ● IM Talking Math
PHYSICAL MANIPULATIVES & RESOURCES	**VIRTUAL MANIPULATIVES & RESOURCES**	**VOCABULARY**
● Bags ● Colored Pencils ● Folders ● Paper clips ● Scissors ● Tape ● Two-color counters	**Didax** ● Pattern Blocks ● Color Tiles **Toy Theater** ● Area ● Area Perimeter ● Pattern Blocks ● Tangram **PBS Learning** ● Finding Patterns to Make Predictions **Math Learning Center** ● Geoboard	● angle in a shape ● perimeter ● right angle in a shape

SUMMARY OF KEY LEARNING		
Pacing This unit has been assigned 21 days in the Pacing Guide. The 21 days are allotted as follows: 15 lesson days as outlined below, 5 flexible days, and 1 assessment day. There are no optional lessons in this unit. **Teacher Resources:** Unit 7 Teacher's Guide (English) (Spanish) Unit 7 Teacher's Resource Pack (English) (Spanish) **Student Resources:** Unit 7 Student Workbook (English) (Spanish) **Section A: Reason with Shapes** Lesson 1 What Attributes Do You See? Lesson 2 Attributes of Triangles and Quadrilaterals Lesson 3 Attributes that Define Shapes Lesson 4 Attributes of Rectangles, Rhombuses, and Squares Lesson 5 Attributes of Other Quadrilaterals **Section B: What is Perimeter?** Lesson 6 Distance Around Shapes Lesson 7 Same Perimeter, Different Shapes Lesson 8 Find the Perimeter Lesson 9 Perimeter Problems **Section C: Expanding on Perimeter** Lesson 10 Problem Solving With Perimeter and Area Lesson 11 Rectangles with the Same Perimeter Lesson 12 Rectangles with the Same Area **Section D: Design with Perimeter and Area** Lesson 13 Shapes and Play Lesson 14 Wax Prints Lesson 15 Design Your Own Robot		
LESSON 1 :WHAT ATTRIBUTES DO YOU SEE? (Teacher Guide)		
Teacher-Facing Learning Intention	**Lesson Purpose**	

- Students are describing attributes of shapes.
- Students are sorting shapes based on attributes in a way that makes sense to them.

Student-Facing Learning Intention
- Let's sort shapes into groups.

Success Criteria
- I can describe and sort shapes based on attributes in a way that makes sense to me.

- The purpose of this lesson is for students to sort shapes into categories based on their attributes.

Lesson Narrative
- In previous grades, students sorted shapes into categories based on the attributes of the shape. In this lesson, students revisit this work and learn the terms angle in a shape and right angle in a shape to describe the corners of shapes. This will be helpful in later lessons as students further sort triangles and rectangles by additional attributes. Throughout the lesson, if students have trouble determining if sides have the same length, offer rulers to measure the side lengths.

Vocabulary
- angle in a shape
- right angle in a shape

Materials
- Activity 1: Shape Cards Grade 3 (groups of 2)

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT. 3.G.A.1**
  Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories

Mathematical Practice Standards
- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.GE.A.1**
  Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- **NCTM.MATH.CONTENT.3-5.GE.A.2**
  Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Which One Doesn't Belong: Who's in the Group? (10 minutes)
- This activity prompts students to compare four shapes. It gives students a reason to use language precisely (MP6). It gives the teacher an opportunity to hear how students use terminology and talk about the characteristics of the items in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as sides, corners, quadrilateral, and pentagon.

Activity 1: Card Sort: Shapes (35 minutes)
- The purpose of this activity is to encourage students to observe attributes of shapes and use them to sort shapes into groups. When students sort the cards, they look for common attributes or structures shared by different shapes (MP7). Students notice that there are multiple ways to categorize the shapes and that a shape may belong to more than one category depending on the attributes used to sort. In grade 2, students refer to right angles as square corners. Here, students learn to use the terms angle in a shape and right angle in a shape to describe the corners of shapes. Note that the term "angle" here is understood informally and used only in reference to shapes and their geometric attributes (for instance, to distinguish rhombuses from squares). Students will not learn the formal definition of an angle—a figure formed by two rays that share an endpoint—or that it is a measurable attribute until grade 4. When students consider the language they use and revise it to describe a shape in detail or with more specificity, they attend to precision (MP6).

- **Access for Multilingual Learners:** MLR2 Collect and Display. Collect the language students use to sort the cards into categories. Display words and phrases such as: “equal sides,” “equal lengths,” “corners,” “diagonal,” “straight,” “curved,” “slanted,” and “shaded.” During the synthesis, invite students to suggest ways to update the display: “What are some other words or phrases we should include?” etc. Invite students to borrow language from the display as needed.
- **Access for Students with Disabilities:** Representation: Develop Language and Symbols. Synthesis: Maintain a visible display to record new vocabulary. Invite students to suggest details (words or pictures) that will help them remember the meaning of angle and right angle.

Supplemental Resources
- Shape Cards Grade 3 (pdf)
- Suggested Centers
  - Can You Draw It? (1–5) Stage 2: Grade 2 Shapes (dot paper) (cards)
  - How Are They the Same? (1–5) Stage 2: Grade 2 Shapes (pdf)
  - Which One? (K–5) Stage 3: Grade 2 Shapes (pdf)

Assessment Resources
- 3.7.1 Cool Down.pdf

LESSON 2: ATTRIBUTES OF TRIANGLES AND QUADRILATERALS (Teacher Guide)

Teacher-Facing Learning Intention
- Students are sorting triangles and quadrilaterals into subcategories.
- Students are understanding that shared attributes of shapes can define a larger category, such as triangle or quadrilateral.

Student-Facing Learning Intention
- Let’s sort shapes into more specific categories.

Success Criteria
- I can sort triangles and quadrilaterals into subcategories.
- I can understand that shared attributes of shapes can define a larger category, such as triangle or quadrilateral.

Lesson Purpose
- The purpose of this lesson is for students to use attributes of triangles and quadrilaterals to sort them into more specific categories.

Lesson Narrative
- In the previous lesson, students learned that shapes could be sorted into more than one category depending on the attributes being considered. In this lesson, they learn that shapes with the same number of sides can be further sorted into subgroups based on other attributes. As students sort triangles and quadrilaterals into subgroups, they focus on attributes other than the number of sides, such as the length of the sides or the number of angles. Throughout the lesson, if students have trouble determining if sides have the same length, offer rulers to measure the side lengths.

Vocabulary
-

Materials
- Activity 1: Triangle Cards Grade 3 (groups of 2)
- Activity 2: Bags or envelopes
- Activity 2: Quadrilateral Cards Grade 3 (groups of 2)

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT. 3.G.A.1**
  Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.GE.A.1**
  Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- **NCTM.MATH.CONTENT.3-5.GE.A.2**

examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories

- **NJSLS.MATH.CONTENT. 3.NBT.A.3**
  Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.

Mathematical Practice Standards

- **MP7.** Look for and make use of structure.

Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: True or False: Multiples of Ten (10 minutes)

- The purpose of this True or False is to elicit strategies students have for multiplying a one-digit number by a multiple of ten. The reasoning students do here helps to deepen their understanding of the properties of operations and develop fluency. When students use place value or properties of operations as strategies to divide, they look for and make use of structure (MP7).

Activity 1: Card Sort: Triangles (15 minutes)

- The purpose of this activity is for students to sort triangles into more specific categories. This requires students to attend to an attribute other than the number of sides. As students sort the triangles, monitor for students who sort by the number of equal side lengths or the presence of a right angle (MP7). Although the terms "equilateral," "isosceles," and "scalene" are not introduced in this lesson it is fine if students already know them and use them to describe the groups of triangles.
  - Access for Multilingual Learners: MLR2 Collect and Display. Direct attention to words collected and displayed from the previous lesson. Invite students to borrow language from the display as needed, and update it throughout the lesson.
  - Access for Students with Disabilities: Representation: Access for Perception. Synthesis: Use gestures during explanation of triangle sorting to emphasize side lengths of triangles.

Activity 2: Card Sort: Quadrilaterals (20 minutes)

- The purpose of this activity is to sort quadrilaterals by their attributes. By now students may be inclined to look for sides of equal lengths and for right angles. They may not look for parallel sides (and are not expected to know the term "parallel"), but may notice that some quadrilaterals have pairs of sides that are oriented in the same direction (MP7). Encourage students to describe such observations in their own words. The quadrilateral cards from this activity will be used in the next lesson and in centers.

Supplemental Resources

- Triangle Grade 3 Cards (pdf)
- Quadrilateral Cards Grade 3 (pdf)
- Suggested Centers
  - Can You Draw It? (1–5) Stage 2: Grade 2 Shapes (dot paper) (cards)
  - How Are They the Same? (1–5) Stage 2: Grade 2 Shapes (pdf)
  - Which One? (K–5) Stage 3: Grade 2 Shapes (pdf)

Assessment Resources

- 3.7.2 Cool Down.pdf

LESSON 3: ATTRIBUTES THAT DEFINE SHAPES (Teacher Guide)

Teacher-Facing Learning Intention
- Students are describing and identifying shapes using their distinguishing attributes.

Student-Facing Learning Intention
- Let's play Mystery Quadrilateral.

Success Criteria
- I can describe and identify shapes using their distinguishing attributes.

Lesson Purpose
- The purpose of this lesson is for students to describe geometric attributes of shapes.

Lesson Narrative
- Students ask yes or no questions about geometric attributes to identify a "mystery quadrilateral." Students will need their quadrilateral cards from the previous lesson to hide in the mystery quadrilateral folder and will have access to the quadrilaterals in their workbook to support them in questioning, guessing, and ruling out quadrilaterals in the table. Also, it may be helpful to provide counters that students can use to cover quadrilaterals that they rule out with their questioning.

Vocabulary
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Materials
- Activity 1: Materials from a previous lesson
- Activity 2:
  - Counters
  - Folders

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT. 3.G.A.1**
  Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories
- **NJSLS.MATH.CONTENT. 3.NBT.A.3**
  Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.

Mathematical Practice Standards
- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.GE.A.1**
  Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- **NCTM.MATH.CONTENT.3-5.GE.A.2**
  Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Number Talk: Multiply Multiples of Ten (10 minutes)
- This Number Talk prompts students to use place value and properties of operations to multiply single-digit numbers by multiples of ten. The strategies elicited here help students develop fluency.

Activity 1: Learn How to Play Mystery Quadrilateral (10 minutes)

- The purpose of this activity is to introduce the game Mystery Quadrilateral and strategically consider the questions that could be asked next to determine a mystery quadrilateral. Students play a round of this game against the teacher. In the next activity, students will play this game in groups of 2.

Activity 2: Play Mystery Quadrilateral (25 minutes)

- The purpose of this activity is for students to practice describing geometric attributes of a quadrilateral with increasing precision by playing a game. Students should be encouraged to ask questions like, "Are all the sides the same length?" rather than, "Is it a square?" to keep the focus on attributes of the quadrilateral rather than the name. As students decide which questions to ask they think about important attributes such as side lengths and angles and have an opportunity to use language precisely (MP6, MP7). Students will use the quadrilaterals from the previous lesson to hide in the "mystery quadrilateral" folder, but will have a copy of all the shapes in their workbook to support them in asking questions to narrow down the shape. Students can also cover shapes in their workbook with counters as they rule out shapes.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Think aloud and use gestures to emphasize the attributes that students use to describe the shapes. For example, trace your finger along the angles and sides of the shape as students describe them.
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Check in and provide each group with feedback that encourages collaboration and community.

Supplemental Resources

- Suggested Centers
    - Can You Draw It? (1–5) Stage 2: Grade 2 Shapes (dot paper) (cards)
    - How Are They the Same? (1–5) Stage 2: Grade 2 Shapes (pdf)
    - Which One? (K–5) Stage 3: Grade 2 Shapes (pdf)

Assessment Resources

- 3.7.3 Cool Down.pdf

LESSON 4: ATTRIBUTES OF RECTANGLES, RHOMBUSES, AND SQUARES (Teacher Guide)

Teacher-Facing Learning Intention

- Students are identifying attributes of rhombuses, rectangles, and squares.

Student-Facing Learning Intention

- Let's identify attributes of rhombuses, rectangles, and squares and find a definition for each shape.

Success Criteria

- I can identify attributes of rhombuses, rectangles, and squares.

Lesson Purpose

- The purpose of this lesson is for students to consider the geometric attributes a quadrilateral must have to be a rhombus, rectangle, or square.

Lesson Narrative

- In previous lessons, students learned how to compare and describe shapes using geometric attributes. In this lesson, students analyze examples and non-examples of rectangles, rhombuses, and squares in order to identify their defining attributes. As they discern and describe features that define these quadrilaterals, students practice looking for structure (MP7) and communicating with precision (MP6).

Vocabulary

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Materials

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New Jersey State Learning Standards

- NJSLS.MATH.CONTENT. 3.G.A.1
  Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories

Mathematical Practice Standards

- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.GE.A.1**
  Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- **NCTM.MATH.CONTENT.3-5.GE.A.2**
  Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Which One Doesn't Belong: More Attributes (10 minutes)

- This warm-up prompts students to compare four shapes. It gives students a reason to use language precisely (MP6). It gives the teacher an opportunity to hear how students use terminology and talk about the characteristics of the items in comparison to one another. During the synthesis, emphasize that three of the shapes are quadrilaterals, even though they look very different.

Activity 1: What Makes These Shapes So? (35 minutes)

- The purpose of this activity is for students to identify the attributes that make a quadrilateral a rectangle, a rhombus, or a square. They do so by studying examples and non-examples, looking for features that each set has in common and drawing conclusions accordingly (MP7). The goal is not to craft the most precise definition for each, but to develop an understanding of the defining geometric attributes.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Display sentence frames to support small-group discussion: "I notice ____ so I think . . .", "____ and ____ are the same/alike because . . .", "____ and ____ are different because . . . ." Advances: Conversing, Representing
  - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Optimize meaning and value. Invite students to share, with a partner, the attributes needed in order to be an example of this type of quadrilateral. Supports accessibility for: Social-Emotional Functioning, Attention

Supplemental Resources

- Suggested Centers
  - Which One? (K–5) Stage 4: Grade 3 Shapes (cards 1) (cards 2) (cards 3)
  - Picture Books (K–5) Stage 3: Find Shapes (pdf)

Assessment Resources

- 3.7.4 Cool Down.pdf

LESSON 5: ATTRIBUTES OF OTHER QUADRILATERALS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are drawing examples of quadrilaterals that are not rhombuses, rectangles, or squares.
- Students are understanding that shapes can be in more than one category.

Lesson Purpose

- The purpose of this lesson is for students to use their knowledge of geometric attributes to name quadrilaterals in different ways and to draw quadrilaterals that are not rhombuses, rectangles, or squares.

Lesson Narrative

Student-Facing Learning Intention ● Let's describe and draw shapes in specific groups. **Success Criteria** ● I can draw examples of quadrilaterals that are not rhombuses, rectangles, or squares and understand that they can be in more than one category.	● In previous lessons, students learned the defining attributes of a rhombus, a rectangle, and a square. In this lesson, students apply that knowledge to name quadrilaterals in multiple ways and to draw quadrilaterals that are not rhombuses, rectangles, or squares. **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT. 3.G.A.1** Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories ● **NJSLS.MATH.CONTENT. 3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Mathematical Practice Standards** ● **MP6.** Attend to precision.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.GE.A.1** Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes. ● **NCTM.MATH.CONTENT.3-5.GE.A.2** Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof

Warm-up: Number Talk: Divide by 7 (10 minutes)

- This Number Talk prompts students to rely on properties of operations and the relationship between multiplication and division to divide within 100. The reasoning here helps students develop fluency in division.

Activity 1: All the Ways (20 minutes)

- The purpose of this activity is to deepen students' understanding that a shape can belong to multiple categories because of its attributes. Students analyze shapes and determine all the ways that each one could be named. The names may refer to a broad category such as triangle or quadrilateral, or a narrower subcategory such as rhombus or rectangle. As they name the different categories students need to be precise both about the meaning of the categories and verifying the properties of the different shapes (MP6).
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: For each observation that is shared, invite students to turn to a partner and restate what they heard using precise mathematical language. Advances: Listening, Speaking
    - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to select at least 4 of the 6 problems. Supports accessibility for: Organization, Attention, Social-Emotional Skills

Activity 2: Draw One That's Not . . . (15 minutes)

- The purpose of this activity is for students to apply what they know about the defining attributes of rectangles, rhombuses, and squares to draw shapes that are not those quadrilaterals. They use geometric attributes to explain why their drawings meet the criteria.

Supplemental Resources

- Suggested Centers
  - Which One? (K–5) Stage 4: Grade 3 Shapes (cards 1) (cards 2) (cards 3)
  - Picture Books (K–5) Stage 3: Find Shapes (pdf)

Assessment Resources

- 3.7.5 Cool Down.pdf

LESSON 6: DISTANCE AROUND SHAPES (Teacher Guide)

Teacher-Facing Learning Intention

- Students are describing perimeter as the length of the boundary of a flat shape.
- Students are finding the perimeter of two-dimensional shapes.

Student-Facing Learning Intention

- Let's find the distance around shapes.

Success Criteria

- I can find the perimeter of two-dimensional shapes.

Lesson Purpose

- The purpose of this lesson is for students to understand perimeter and find the perimeter of shapes by counting to determine the side lengths.

Lesson Narrative

- In previous lessons, students reasoned about shapes and their attributes. In this lesson, students determine how many paper clips it takes to build a given shape to introduce perimeter as the boundary of a flat shape. Then, they find the distance around shapes with marked side lengths and consider different strategies for finding the total length of the sides. In the lesson synthesis, students have the opportunity to share familiar situations that could involve perimeter.

Vocabulary

-

Materials

- Activity 1: Paper Clips

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT. 3.M.C.6** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

Mathematical Practice Standards

- **MP8.** Look for and express regularity in repeated reasoning.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.GE.A.1**
  Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- **NCTM.MATH.CONTENT.3-5.GE.A.2**
  Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Notice and Wonder: Paper Clips & Shapes (10 minutes)

- The purpose of this warm-up is for students to visualize the idea of perimeter and elicit observations about distances around a shape. It also familiarizes students with the context and materials they will be working with in the next activity, where they will use paper clips to form the boundary of shapes and compare or quantify their lengths.

Activity 1: What Does It Take to Build the Shapes? (15 minutes) ● The purpose of this activity is to give students a concrete experience of building the boundary of shapes and quantifying that length of the boundary, allowing them to conceptualize perimeter as a measurable geometric attribute. Students use -inch paper clips as the units for measuring the distances around four shapes. The reasoning here prepares them to reason about equal-size intervals that can be marked on the sides of a shape to measure its length (as students will see in the next activity).
Activity 2: Distance Around (20 minutes) ● In this activity, students find the perimeter of shapes—first on dot paper, and then using the tick marks on the sides of the shapes. Students may need a reminder that when we measure length, we count the number of length-units, not the number of endpoints. While students may count the tick marks on all sides and add them, they may also observe that some side lengths are the same, especially on shapes A and B, and use this structure and multiplication by 2 to find the perimeter efficiently (MP8). ○ **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: To support the transfer of new vocabulary to long-term memory, invite students to chorally repeat these phrases in unison 1–2 times: perimeter and distance around a shape. Advances: Speaking ○ **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches. Supports accessibility for: Visual-Spatial Processing

Supplemental Resources ● What does it take to build the shapes? (pdf) ● Suggested Centers ○ Which One? (K–5) Stage 4: Grade 3 Shapes (cards 1) (cards 2) (cards 3) ○ Picture Books (K–5) Stage 3: Find Shapes (pdf)	**Assessment Resources** ● 3.7.6 Cool Down.pdf

LESSON 7: SAME PERIMETER, DIFFERENT SHAPES (Teacher Guide)

Teacher-Facing Learning Intention ● Students are finding the perimeter of two-dimensional shapes. ● Students are understanding that many different shapes can have the same perimeter. **Student-Facing Learning Intention** ● Let's learn about shapes with the same perimeter. **Success Criteria** ● I can find the perimeter of two-dimensional shapes.	**Lesson Purpose** ● The purpose of this lesson is for students to practice finding the perimeter of shapes and to understand that many different shapes can have the same perimeter. **Lesson Narrative** ● The purpose of this lesson is for students to practice finding the perimeter of shapes and to understand that many different shapes can have the same perimeter. **Vocabulary** ● **Materials** ●

New Jersey State Learning Standards ● NJSLS.MATH.CONTENT. 3.M.C.6	**National Council of Teachers of Mathematics Content Standards** ● NCTM.MATH.CONTENT.3-5.GE.A.1

Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. ● **NJSLS.MATH.CONTENT. 3.NBT.A.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Mathematical Practice Standards** ● **MP7.** Look for and make use of structure.	Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes. ● **NCTM.MATH.CONTENT.3-5.GE.A.2** Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof

Warm-up: True or False: Sums of Four Numbers (10 minutes)

- The purpose of this True or False is to elicit strategies and understandings students have for adding multi-digit numbers. It prompts students to rely on their understanding of the properties of operations and place value. The strategies used here will be helpful as students find the perimeter of shapes with repeated side lengths later in the lesson.

Activity 1: All Kinds of Shapes (15 minutes)

- The purpose of this activity is for students to understand that many different shapes can have the same perimeter. Students start to focus more specifically on shapes with repeated side lengths, so they can leverage the efficient addition strategies elicited in the warm-up (MP7).
    - **Access for Multilingual Learners:** MLR7 Compare and Connect. Synthesis: After all strategies have been presented, lead a discussion comparing, contrasting, and connecting the different approaches for finding the perimeter of one of the shapes. Ask, “How did the same perimeter show up in each method?” and “Why did the different approaches lead to the same outcome?” Advances: Representing, Conversing
    - **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches. Supports accessibility for: Memory, Visual-Spatial Processing

Activity 2: Draw Your Own (20 minutes)

- The purpose of this activity is for students to draw shapes with specific perimeters. Students may create any shape that uses horizontal and vertical lines. Since diagonal lines that connect the dots are not one length unit, students cannot find the perimeter of shapes that include diagonal sides. Encourage students to be creative in drawing their shapes to reinforce the idea that different shapes can have the same perimeter.

Supplemental Resources ● Suggested Centers ○ Can You Draw It? (1–5) Stage 3: Grade 3 Shapes (directions) (grid paper) (cards 1) (cards 2) ○ How Are They the Same? (1–5) Stage 3: Grade 3 Shapes (cards 1) (cards 2) (cards 3)	**Assessment Resources** ● 3.7.7 Cool Down.pdf

LESSON 8: FIND THE PERIMETER (Teacher Guide)

Teacher-Facing Learning Intention	**Lesson Purpose**

- Students are finding the perimeter of two-dimensional shapes given all or some of the side lengths.

Student-Facing Learning Intention
- Let's find the perimeter of more shapes.

Success Criteria
- I can find the perimeter of two-dimensional shapes given all or some of the side lengths.

- The purpose of this lesson is for students to find perimeters of shapes given all or some of the side lengths.

Lesson Narrative
- In previous lessons, students learned about attributes of two-dimensional shapes. They also learned about perimeter and drew shapes with specific perimeters. In this lesson, students find perimeters of shapes given side lengths and use the attributes of shapes to find the perimeter given only some of the side lengths.

Vocabulary
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Materials
- Activity 2: Tools for creating a visual display

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT. 3.M.C.6**
  Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
- **NJSLS.MATH.CONTENT. 3.OA.C.7**
  With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Mathematical Practice Standards
- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.GE.A.1**
  Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- **NCTM.MATH.CONTENT.3-5.GE.A.2**
  Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Number Talk: Decreasing Dividend (10 minutes)
- The purpose of this Number Talk is to elicit strategies and understandings students have for dividing within 100. These understandings help students develop fluency and are helpful as students use division to solve problems involving perimeter.

Activity 1: Ways to Find Perimeter (20 minutes)
- The purpose of this activity is for students to practice finding the perimeter of shapes that have labeled side lengths. The synthesis focuses on methods students have for efficiently finding the perimeter of shapes with some or all side lengths having equal length. As students discuss and justify their decisions, they share a mathematical claim and the thinking behind it (MP3).
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Provide students with the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking

Activity 2: Something is Missing (15 minutes)

- The purpose of this activity is for students to find the perimeter of shapes when some of the side lengths are not given. Students use their knowledge of shapes to reason about the length of the missing sides before they find the perimeter of the shape (MP7). This activity uses MLR7 Compare and Connect. Advances: representing, conversing
  - **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were most useful to solve the problem. Display the sentence frame: "The next time I find the perimeter of a shape where some side lengths are not given, I will pay attention to .. . ." Supports accessibility for: Memory, Visual-Spatial Processing

Supplemental Resources

- Suggested Centers
  - Can You Draw It? (1–5) Stage 3: Grade 3 Shapes (directions) (grid paper) (cards 1) (cards 2)
  - How Are They the Same? (1–5) Stage 3: Grade 3 Shapes (cards 1) (cards 2) (cards 3)
  - Which One? (K–5) Stage 4: Grade 3 Shapes (cards 1) (cards 2) (cards 3)

Assessment Resources

- 3.7.8 Cool Down.pdf

LESSON 9: PERIMETER PROBLEMS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are finding unknown side lengths given the perimeter of a shape.
- Students are solving problems that involve perimeters of shapes.

Student-Facing Learning Intention

- Let's solve problems about perimeter.

Success Criteria

- I can find unknown side lengths given the perimeter of a shape.

Lesson Purpose

- The purpose of this lesson is for students to find unknown side lengths given the perimeter of a shape and solve problems involving perimeter.

Lesson Narrative

- In previous lessons, students learned how to find the perimeter of shapes given all sides lengths or some side lengths. In this lesson, students use their understanding of perimeter to find missing side lengths when given the perimeter. Then, students solve problems in situations that involve perimeter. This lesson prepares students to think carefully about the difference between perimeter and area, which will be addressed in subsequent lessons.

Vocabulary

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Materials

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT. 3.M.C.6**
  Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.GE.A.1**
  Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- **NCTM.MATH.CONTENT.3-5.GE.A.2**

Mathematical Practice Standards ● **MP2.** Reason abstractly and quantitatively.	Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof

Warm-up: Estimation Exploration: Statue of Liberty (10 minutes)

- The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information.

Activity 1: Missing Measurements (15 minutes)

- The purpose of this activity is for students to find the length of a missing side of a shape when the perimeter is given, using any strategy that makes sense to them. The synthesis highlights the variety of methods students used to solve the problem.

Activity 2: Can I Use a Perimeter? (20 minutes)

- The purpose of this activity is for students to solve problems in situations that involve perimeter (MP2). Students may draw diagrams with length labels or simply reason arithmetically. They also explain how each problem does or does not involve perimeter. The activity synthesis provides an opportunity to begin discussing the difference between area and perimeter, which will be fully explored in upcoming lessons.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Prior to solving the problems, invite students to make sense of the situations and take turns sharing their understanding with their partner. Listen for and clarify any questions about the context. Advances: Reading, Representing
  - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Synthesis: Invite students to generate a list of additional examples of needing to know the perimeter of an object or space that connect to their personal backgrounds and interests. Supports accessibility for: Language, Visual-Spatial Processing

Supplemental Resources ● Suggested Centers ○ Can You Draw It? (1–5) Stage 3: Grade 3 Shapes (directions) (grid paper) (cards 1) (cards 2) ○ How Are They the Same? (1–5) Stage 3: Grade 3 Shapes (cards 1) (cards 2) (cards 3) ○ Which One? (K–5) Stage 4: Grade 3 Shapes (cards 1) (cards 2) (cards 3)	**Assessment Resources** ● 3.7.9 Cool Down.pdf

LESSON 10: PROBLEM SOLVING WITH PERIMETER AND AREA (Teacher Guide)

Teacher-Facing Learning Intention ● Students are solving problems that involve perimeter and area of rectangles. **Student-Facing Learning Intention** ● Let's solve problems involving perimeter and area.	**Lesson Purpose** ● The purpose of this lesson is for students to solve problems that involve both perimeter and area of rectangles in order to reinforce the difference between perimeter and area. **Lesson Narrative** ● In previous lessons, students learned what area is and how to find the area of rectangles and figures made up of rectangles. They also learned how to measure the perimeter of other shapes, solve

Success Criteria

- I can accurately solve problems that involve perimeter and area of rectangles.

problems that involved perimeter, and recognize situations in which perimeter is and is not relevant. By the end of this lesson, students confirm that while perimeter and area are both measurements that can appear together in problems, perimeter is a linear measurement while area is two-dimensional.

Vocabulary

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Materials

- Activity 2: Info Gap: A Garden and a Playground (groups of 2)

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT. 3.M.C.6**
  Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
- **NJSLS.MATH.CONTENT.3.OA.C.7**
  With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.
- **NJSLS.MATH.CONTENT.3.OA.D.8**
  Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations)

Mathematical Practice Standards

- **MP1.** Make sense of problems and persevere in solving them.
- **MP3.** Construct viable arguments and critique the reasoning of others.
- **MP6.** Attend to precision.
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.GE.A.1**
  Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- **NCTM.MATH.CONTENT.3-5.GE.A.2**
  Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: True or False: Divide in Parts (10 minutes)

- The purpose of this True or False is to elicit strategies and understandings students have for dividing within 100. It also prompts them to rely on properties of operations and familiar division facts to facilitate division. When students think about how to decompose larger dividends using facts about 10 to make the division easier, they look for and make use of structure (MP7).

Activity 1: Rope Off the Garden (15 minutes) ● The purpose of this activity is for students to differentiate methods for finding perimeter from those for finding area. While addition and multiplication are both involved in various ways, students need to understand the problem situation and think about whether the operations performed will provide the desired information. As in earlier problems, students can find perimeter in various ways. The emphasis should be on how understanding the problem situation and the information given should inform the solution method. When students analyze claims about how to use addition and multiplication to find the perimeter of a rectangle they construct viable arguments (MP3). ○ **Access for Multilingual Learners:** MLR1 Stronger and Clearer Each Time. Synthesis: Before the whole-class discussion, give students time to meet with 2–3 partners to share and get feedback on their response to “Who do you agree with? Explain or show your reasoning.” Invite listeners to ask questions, to press for details and to suggest mathematical language. Give students 2–3 minutes to revise their written explanation based on the feedback they receive. Advances: Writing, Speaking, Listening
Activity 2: Info Gap: A Garden and a Playground (20 minutes) ● This info gap activity gives students a chance to understand that given the area and one side length of a rectangle, the perimeter can be found, and that given the perimeter and one side length of a rectangle, the area can be found. In both cases, students need to find the missing side length to solve the problem. There are several ways students might find the missing side length and then the perimeter or area once the missing side length is known. This activity uses MLR4 Information Gap. The info gap structure requires students to make sense of problems by determining what information is necessary, and then to ask for information they need to solve it. This may take several rounds of discussion if their first requests do not yield the information they need (MP1). It also allows them to refine the language they use and ask increasingly more precise questions until t**hey get the information they need (MP6).** ○ **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were needed to solve the problem. Display the sentence frame, “The next time I use the area of a rectangle to find the perimeter, I will look for . . . .“ Supports accessibility for: Memory, Visual-Spatial Processing

Supplemental Resources ● Info Gap: A garden and a Playground (pdf) ● Suggested Centers ○ Can You Draw It? (1–5) Stage 3: Grade 3 Shapes (directions) (grid paper) (cards 1) (cards 2) ○ How Are They the Same? (1–5) Stage 3: Grade 3 Shapes (cards 1) (cards 2) (cards 3) ○ Which One? (K–5) Stage 4: Grade 3 Shapes (cards 1) (cards 2) (cards 3)	**Assessment Resources** ● 3.7.10 Cool Down.pdf

LESSON 11: RECTANGLES WITH THE SAME PERIMETER (Teacher Guide)

Teacher-Facing Learning Intention ● Students are drawing rectangles with the same perimeter and different areas. **Student-Facing Learning Intention** ● Let’s explore rectangles with the same perimeter. **Success Criteria**	**Lesson Purpose** ● The purpose of this lesson is for students to understand that rectangles with the same perimeter do not always have the same area. **Lesson Narrative** ● In previous lessons, students learned to find the area and perimeter of rectangles. In this lesson, students draw rectangles with a specified perimeter, find their areas, and notice that rectangles with the same perimeter do not always have the same area. Students then draw rectangles with specific perimeter that have different areas.

- I can draw rectangles with the same perimeter and different areas.

Vocabulary
-

Materials
- Activity 2:
- Scissors
- Tape

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT. 3.M.C.6**
  Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
- **NJSLS.MATH.CONTENT.3.OA.C.7**
  With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Mathematical Practice Standards
- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.GE.A.1**
  Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- **NCTM.MATH.CONTENT.3-5.GE.A.2**
  Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids.

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Number Talk: Multiply to Divide (10 minutes)
- The purpose of this Number Talk is to elicit strategies and understandings students have for dividing within 100. These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to divide fluently within 100.

Activity 1: Perimeter of 16 Units (15 minutes)
- The purpose of this activity is for students to understand that rectangles with the same perimeter do not necessarily have the same area. In the synthesis, students begin to consider how to systematically draw different rectangles with the same perimeter.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Provide students with the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking

Activity 2: Same Perimeter, Different Area (20 minutes)
- The purpose of this activity is for students to draw rectangles with the same perimeter and different areas. Students draw a pair of rectangles for each given perimeter, then display their rectangles and make observations about them in a gallery walk. Students may notice new patterns (MP7) in the rectangles with the same perimeter (for instance, that as two sides each increase by 1 unit, the other two sides each decrease in length by 1 unit). They may also notice that, so far, all the perimeters are even numbers. Students may wonder if it is possible for a perimeter to be an odd number. If these observations arise, consider discussing them in the synthesis.
  - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to select to complete 3 of the 5 perimeter problems in task 1. Supports accessibility for: Organization, Attention, Social-Emotional Skills

Supplemental Resources ● Square Dot Paper Standard (pdf) ● Suggested Centers ○ Can You Draw It? (1–5) ■ Stage 3: Grade 3 Shapes (directions) (grid paper) (cards 1) (cards 2) ■ Stage 4: Area and Perimeter (pdf)	**Assessment Resources** ● 3.7.11 Cool Down.pdf

LESSON 12: RECTANGLES WITH THE SAME AREA (Teacher Guide)

Teacher-Facing Learning Intention ● Students are drawing rectangles with the same area and different perimeters. **Student-Facing Learning Intention** ● Let's explore rectangles with the same area. **Success Criteria** ● I can draw rectangles with the same area and different perimeters.	**Lesson Purpose** ● The purpose of this lesson is for students to understand that rectangles with the same area do not always have the same perimeter. **Lesson Narrative** ● In previous lessons, students learned to find the area and perimeter of rectangles and saw that rectangles with the same perimeter do not always have the same area. In this lesson, students draw rectangles with a specified area, find their perimeters, and notice that rectangles with the same area do not always have the same perimeter. Students then draw rectangles with specific areas that have different perimeters. **Vocabulary** ● **Materials** ● Activity 2: ● Scissors ● Tape

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT. 3.M.C.6** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. ● **NJSLS.MATH.CONTENT.3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that, one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Mathematical Practice Standards**	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.GE.A.1** Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes. ● **NCTM.MATH.CONTENT.3-5.GE.A.2** Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof

● **MP7.** Look for and make use of structure.	

Warm-up: Number Talk: Divide in Parts (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for dividing within 100. These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to divide fluently within 100. When students use properties of operations and quotients with a value of 10 to find other quotients, they look for and make use of structure (MP7).

Activity 1: Area of 24 (15 minutes)

- The purpose of this activity is for students to understand that rectangles with the same area do not necessarily have the same perimeter. The work here reinforces the idea that area and perimeter are two separate measures of shapes. An area of 24 was chosen because it has many factors and is a familiar number to students.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Provide students with the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking
  - **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Provide access to blank pre-formatted graph paper to create rectangles. Supports accessibility for: Fine Motor Skills, Social-Emotional Functioning

Activity 2: Same Area, Different Perimeter (20 minutes)

- The purpose of this activity is for students to draw rectangles with the same area and different perimeters. Students draw a pair of rectangles for each given area, then display their rectangles and make observations about them in a gallery walk.

Supplemental Resources ● Square Dot Paper Standard (pdf) ● Suggested Centers ○ Can You Draw It? (1–5) Stage 4: Area and Perimeter (pdf) ○ Compare (1–5) Stage 4: Divide within 100 (directions) (cards) ○ How Close? (1–5) Stage 5: Multiply to 100 (pdf)	**Assessment Resources** ● 3.7.12 Cool Down.pdf

LESSON 13: SHAPES AND PLAY (Teacher Guide)

Teacher-Facing Learning Intention ● Students are applying geometric understanding to solve problems about parks. **Student-Facing Learning Intention** ● Let's design a park. **Success Criteria** ● I can apply geometric understanding to solve problems about parks.	**Lesson Purpose** ● The purpose of this lesson is for students to consider how geometric attributes, perimeter, and area are used when designing a playground. **Lesson Narrative** ● In previous lessons, students learned how to identify different types of quadrilaterals, find the perimeter of different shapes, and draw shapes with the same area and different perimeters or the same perimeter and different areas. In this lesson, students put all of this together to design a small park with specific features, then describe the area and perimeter of features of the park. Students also solve area and perimeter problems that involve the features of a park. **Vocabulary**

	● **Materials** ● Activity 1: Square Dot Paper Standard (groups of 1)

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT. 3.M.C.6** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP4.** Model with mathematics.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.GE.A.1** Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes. ● **NCTM.MATH.CONTENT.3-5.GE.A.2** Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof

Warm-up: Notice and Wonder: A Park (10 minutes) ● The purpose of this warm-up is to elicit the idea that different shapes are used in the design of park areas, which will be useful when students design a park in a later activity. While students may notice and wonder many things about these images, how different shapes are used in the design of the park is the important discussion point.
Activity 1: Design a Park (20 minutes) ● The purpose of this activity is to provide students an opportunity to apply what they've learned about perimeter and area to design a small park. Since diagonal lines that connect the dots are not one length unit, students should use vertical and horizontal lines to design the park. When students make and describe their own choices for how they represent real-world objects, they model real-world problems with mathematics (MP4). ○ **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: At the appropriate time, give students 2–3 minutes to make sure they can explain parts of their display. Invite students to rehearse with their partner what they will say about their display. Advances: Speaking, Conversing, Representing
Activity 2: Park Problems (15 minutes) ● The purpose of this activity is for students to solve problems that involve perimeter and area (MP2). The problems that students solve involve features that could be present in a park. ○ **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches. Supports accessibility for: Conceptual Processing, Visual-Spatial Processing.

Supplemental Resources ● Square Dot Paper Standard (pdf) ● Suggested Centers ○ Can You Draw It? (1–5) Stage 4: Area and Perimeter (pdf) ○ Compare (1–5) Stage 4: Divide within 100 (directions) (cards) ○ How Close? (1–5) Stage 5: Multiply to 100 (pdf)	**Assessment Resources** ● 3.7.13 Cool Down.pdf

LESSON 14: WAX PRINTS (Teacher Guide)

Teacher-Facing Learning Intention

- Students are applying geometric understanding to solve problems about wax prints.

Student-Facing Learning Intention

- Let's analyze and make wax prints.

Success Criteria

- I can apply geometric understanding to solve problems about wax prints.

Lesson Purpose

- The purpose of this lesson is for students to consider how geometric attributes, perimeter, and area are used to design and use wax print fabric.

Lesson Narrative

- In previous lessons, students learned how to identify different types of quadrilaterals and solve problems involving area and perimeter. In this lesson students put all of their learning together to analyze geometric attributes of wax prints, then design a wax print of their own with specific constraints about the shapes they need to use. Then, students use what they know about area and perimeter to solve problems that involve wax print fabric.

Vocabulary

- NA

Materials

- Activity 1: Colored pencils, crayons, or markers

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT. 3.G.A.1**
  Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories
- **NJSLS.MATH.CONTENT. 3.M.C.6**
  Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

Mathematical Practice Standards

- **MP1.** Make sense of problems and persevere in solving them.
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.GE.A.1**
  Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- **NCTM.MATH.CONTENT.3-5.GE.A.2**
  Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning & Proof

Warm-up: Notice and Wonder: Textiles (10 minutes)

- The purpose of this warm-up is to elicit the idea that there are many shapes that are visible in wax prints, which will be useful when students design a wax print in a later activity.

Activity 1: Create a Wax Print Pattern (20 minutes)

- The purpose of this activity is for students to apply what they've learned about quadrilaterals to design a wax print pattern. First, students analyze wax prints that have quadrilaterals incorporated into the pattern. Then, students design their own wax print that incorporates rhombuses, rectangles, or squares and a quadrilateral that doesn't belong to any of these subcategories.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: During group presentations, invite the student(s) who are not speaking to follow along and point to the corresponding parts of the display. Advances: Speaking, Representing
    - **Access for Students with Disabilities:** Action and Expression: Internalize Executive Functions. To support working memory, provide students with access to sticky notes or mini whiteboards. Supports accessibility for: Memory, Organization

Activity 2: Info Gap: The Bundle (20 minutes)

- This Info Gap activity provides students an opportunity to solve problems involving perimeter and area. The problems involve the context of a bundle of wax print fabric that is shared to make multiple pieces of clothing. The purpose of the launch is to get students thinking about where they've seen bundles of fabric and familiarize them with language that will be used in the problem. This activity uses MLR4 Information Gap. The Info Gap structure requires students to make sense of problems by determining what information is necessary, and then to ask for information they need to solve it. This may take several rounds of discussion if their first requests do not yield the information they need (MP1). It also allows them to refine the language they use and ask increasingly more precise questions until they get the information they need (MP6).

Supplemental Resources

- Square Dot Paper Standard (pdf)
- Info Gap: The Bundle (pdf)
- Suggested Centers
    - Can You Draw It? (1–5) Stage 4: Area and Perimeter (pdf)
    - Compare (1–5) Stage 4: Divide within 100 (directions) (cards)
    - How Close? (1–5) Stage 5: Multiply to 100 (pdf)

Assessment Resources

- 3.7.14 Cool Down.pdf

LESSON 15: DESIGN YOUR OWN ROBOT (Teacher Guide)

Teacher-Facing Learning Intention

- Students are applying geometric understanding to solve problems about robots.

Student-Facing Learning Intention

- Let's use perimeter and area to design robots.

Success Criteria

- I can apply geometric understanding to solve problems about robots. .

Lesson Purpose

- The purpose of this lesson is for students to draw rectangles with specified perimeters to create a robot.

Lesson Narrative

- In previous lessons, students used geometric understanding to solve problems involving the design of wax prints and parks. In this lesson, students create a robot as they draw parts with specified parameters. Students then find the area of the robot's body parts they drew and consider different areas that can be drawn with the same perimeter. If time allows, students can color their robots to highlight their mathematical ideas. When students recognize mathematical features of objects in the real world, they model with mathematics (MP4).

Vocabulary

-

Materials

	● Activity 1: Tape

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT. 3.M.C.6** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. **Mathematical Practice Standards** ● **MP4.** Model with mathematics.	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.GE.A.1** Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes. ● **NCTM.MATH.CONTENT.3-5.GE.A.2** Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids. **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning & Proof

Warm-up: What Do You Know About Area and Perimeter? (10 minutes)

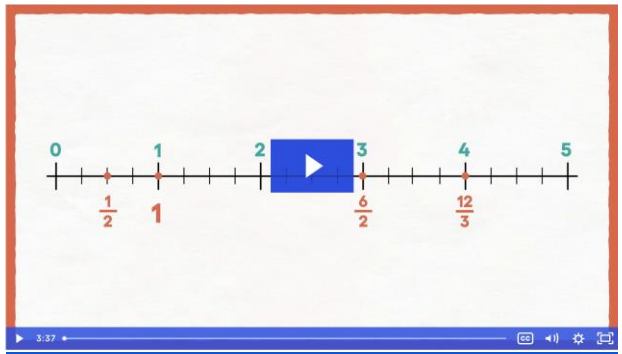
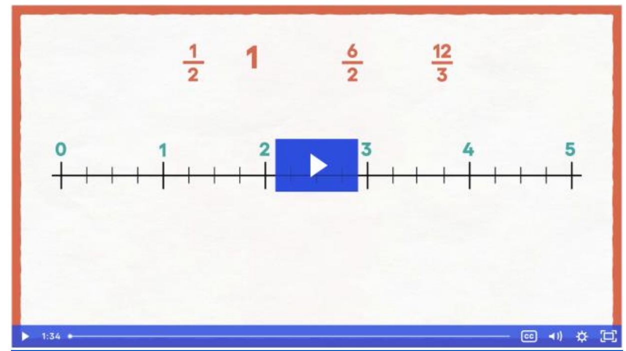
- The purpose of this What Do You Know About is to invite students to share what they know about and how they can represent area and perimeter.

Activity 1: Create Your Own Robot (35 minutes)

- The purpose of this activity is for students to draw rectangles with specified perimeters to create their own robot. Students practice with perimeter and also find the area of their robots' body parts in preparation for discussion during the gallery walk, which centers around the different areas that can be created with rectangles that have the same perimeter. Students can choose to work independently, with a partner, or in a small group.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Before presentations begin, remind students to use words such as area, perimeter, units, and square units. Advances: Speaking, Representing
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after each chunk. Supports accessibility for: Social-Emotional Functioning, Organization

Supplemental Resources ● Square Dot Paper Standard (pdf) ● Suggested Centers ○ Can You Draw It? (1–5) Stage 4: Area and Perimeter (pdf) ○ Compare (1–5) Stage 4: Divide within 100 (directions) (cards) ○ How Close? (1–5) Stage 5: Multiply to 100 (pdf)	**Assessment Resources** ● 3.7.15 Cool Down.pdf

Unit 8: Putting It All Together

PEDAGOGICAL CONTENT KNOWLEDGE RESOURCES FOR TEACHERS		
Learning Narrative Video The Unit Launch: Learning Narrative video for Grade 3, Unit 8 gives insight into the unit objectives, models and representations, possible student errors and misconceptions, and tips that might be used to help support student understanding. The Learning Narrative video is ideal for teachers to study prior to teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 	**Learning Progressions Video** The Unit Launch: Learning Progressions video for Grade 3, Unit 8 details how the content of a unit builds upon prior knowledge, and how the understanding of the content provides students with readiness for future learning. The Learning Progressions video is ideal for teachers to study before teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content.  	**Learning Supports Video** The Unit Launch: Learning Supports video for Grade 3, Unit 8 gives an in-depth look into the models and representations used in this unit to help support student understanding. The Learning Supports video is ideal for teachers to study prior to teaching a unit, for a coach who will be supporting teachers with a specific unit, or for an instructional assistant or parent volunteer to quickly and efficiently understand what is needed to support students with the unit content. 

STAGE 1 - DESIRED RESULTS	
Assessed Focus Standards	UNIT DESCRIPTION

NJSLS.MATH.CONTENT.3.DL.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. **NJSLS.MATH.CONTENT.3.DL.B.4** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. **NJSLS.MATH.CONTENT.3.M.B.3** Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units. **NJSLS.MATH.CONTENT.3.M.D.5.b** Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. **NJSLS.MATH.CONTENT.3.M.B.5.d** Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. **NJSLS.MATH.CONTENT.3.M.D.6**	In this unit, students revisit major work and fluency goals of the grade, applying their learning from the year. In section A, students reinforce what they learned about fractions, their size, and their location on the number line. In section B, students deepen their understanding of perimeter, area, and scaled graphs by solving problems about measurement and data. Two of the lessons invite students to design a tiny house that meet certain conditions and calculate the cost for furnishing it. Section C enables students to work toward multiplication and division fluency goals through games. In the final section, students review major work of the grade as they create activities in the format of the warm-up routines they have encountered throughout the year (Notice and Wonder, Estimation Exploration, Number Talk, and How Many Do You See?). The concepts and skills strengthened in this unit prepare students for major work in grade 4: comparing, adding, and subtracting fractions, multiplying and dividing within 1,000, and using the standard algorithm to add and subtract multi-digit numbers within 1 million. The sections in this unit are standalone sections, not required to be completed in order. Within each section, many lessons can also be completed independently of the ones preceding them. The goal is to offer ample opportunities for students to integrate the knowledge they have gained and to practice skills related to the expected fluencies of the grade. **Throughout the unit** The warm-ups throughout the unit provide an invitation for students to think about the topics addressed within each section.

	EXPLICIT ASPECTS OF RIGOR

Assessed Focus Standards	Conceptual Understanding
NJSLS.MATH.CONTENT.3.DL.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. **NJSLS.MATH.CONTENT.3.DL.B.4** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. **NJSLS.MATH.CONTENT.3.M.B.3** Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units. **NJSLS.MATH.CONTENT.3.M.D.5.b** Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. **NJSLS.MATH.CONTENT.3.M.B.5.d** Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. **NJSLS.MATH.CONTENT.3.M.D.6**	● Recognize area as an attribute of plane figures and understand concepts of area measurement. ● A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. ● A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of *n* square units. ● Understand a fraction 1/b, with denominators 2, 3, 4, 6, and 8, as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by parts of size 1/b. ● Understand a fraction with denominators 2, 3, 4, 6, and 8 as a number on a number line diagram. ● Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. ● Represent a fraction a/b on a number line diagram by marking off lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. ● Explain equivalence of fractions with denominators 2, 3, 4, 6, and 8 in special cases, and compare fractions by reasoning about their size. ● Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. ● Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. ● Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram. ● Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. ● Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **Procedural Fluency** ● Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. ● Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). ● Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. **NJSLS.MATH.CONTENT.3.NBT.A.2** Use place value understanding and properties of operations to perform multi-digit arithmetic. With accuracy and efficiency, add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **NJSLS.MATH.CONTENT.3.NF.A.1** Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3. **NJSLS.MATH.CONTENT.3.NF.A.2** Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. For example, partition the number line from 0 to 1 into 3 equal parts, represent ⅓ on the number line and show that each part has a size 1/3. b. Represent a fraction a/b on a number line diagram by marking off lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. **NJSLS.MATH.CONTENT.3.NF.A.3**	**Application** ● <u>Draw</u> a scaled picture graph and a scaled bar graph to represent a data set with several categories. <u>Solve</u> one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. ● Solve two-step <u>word problems</u> using the four operations. <u>Represent</u> these problems using equations with a letter standing for the unknown quantity. <u>Assess</u> the reasonableness of answers using mental computation and estimation strategies including rounding.

Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size. Understand two fractions as equivalent if they are located at the same point on a number line.
b. Recognize and generate simple equivalent fractions by reasoning about their size, (e.g. $\frac{1}{2}=\frac{2}{4}$, $\frac{4}{6}=\frac{2}{3}$). Explain why the fractions are equivalent with the support of a visual fraction model.
c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3=3/1; recognize that 6/1=6; locate 4/4 and 1 at the same point on a number line diagram.
d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions with the support of a visual fraction model.

NJSLS.MATH.CONTENT.3.OA.A.1
Interpret products of whole numbers, e.g., interpret as the total number of objects in 5 groups of 7 objects each. For example, describe and/or represent a context in which a total number of objects can be expressed as.

NJSLS.MATH.CONTENT.3.OA.A.2
Interpret whole-number quotients of whole numbers, e.g., interpret 56÷8 as the number of objects in each share when 56 objects are partitioned equally into 8

MEANING

Enduring Understandings	Essential Questions
U1. Recognize area as an attribute of plane figures and understand concepts of area measurement.	Q1. What are different ways I can find the area of a shape?
U2. Relate area to multiplication and addition.	Q2. How is area related to the operations of multiplication and addition?
U3. Use area models to represent the distributive property in mathematical reasoning.	Q3. How can visual models be used to help me understand and calculate area and perimeter?
U4. The distance around a figure is its perimeter. To find the perimeter of a polygon, add the lengths of the sides.	Q4. How can the area of some rectangles be used to model the Distributive Property?
U5. Line and line segments are sets of points in space that can be used to describe parts of other geometric lines, shapes and solids.	**Q5.** How can two-dimensional shapes be described, analyzed and classified?
U6. Polygons can be described and classified by their sides and angles.	**Q6.** What visual models are most useful when working with fractions?
U7. A region can be divided into equal-sized parts in different ways. Equal-sized parts may have the same area, but may not have the same shape.	**Q7.** What are different ways to compare fractions?
U8. A fraction describes the division of a whole into equal parts.	**Q8.** What is fraction equivalence and how can it be recognized?
U9. The bottom number of a fraction (denominator) tells how many equal parts the whole is divided into.	**Q9.** How can whole numbers be expressed as fractions?
U10. The top number (numerator) tells how many equal parts are indicated.	

WHAT STUDENTS WILL KNOW AND BE ABLE TO DO

shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as 56÷8 . **NJSLS.MATH.CONTENT.3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **NJSLS.MATH.CONTENT.3.OA.A.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8x?=48, 5=?÷3, 6x6=?. **NJSLS.MATH.CONTENT.3.OA.B.6** Understand division as an unknown-factor problem. For example, find by finding the number that makes 32 when multiplied by 8. **NJSLS.MATH.CONTENT.3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that , one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **NJSLS.MATH.CONTENT.3.OA.D.8** Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform	**Knowledge** **K1.** Understand a fraction as a number and represent fractions on the number line. **K2.** Apply concepts of measurement and data to solve problems. **K3.** Develop fluency with single-digit multiplication facts and their related division facts. **K4.** Review the major work of the grade by creating and designing instructional routines.	**Skills** **S1.** Estimate fractions represented in diagrams and on number lines. [Lesson 1] **S2.** Record the results of comparisons with the symbols >, =, or <. Represent fractions on a number line.[Lesson 2] **S3.** Generalize key ideas about fractions, such as what fractions mean, whole numbers as fractions, and fraction comparisons. [Lesson 3] **S4.** Apply understanding of area and perimeter to solve problems about design. [Lesson 4] **S5.** Solve problems about the cost of finishing a room in a tiny house. [Lesson 5] **S6.** Collect categorical data to create a data set with several categories. [Lesson 6] **S7.** Draw a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. [Lesson 7] **S8.** Practice multiplication within 100. Reflect on multiplication fluency. [Lesson 8] **S9.** Practice finding products within 100 by playing multiplication games. [Lesson 9] **S10.** Interpret representations of the relationship between multiplication and division. Represent the relationship between multiplication and division. [Lesson 10] **S11.** Practice dividing whole numbers within 100. [Lesson 11] **S12.** Apply understanding of equal groups to create a

operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations) **Content Connections** **INTEGRATION OF 21st CENTURY SKILLS** **9.1.4.A.1** Recognize a problem and brainstorm ways to solve the problem individually or collaboratively. **9.1.4.A.5** Apply critical thinking and problem-solving skills in classroom and family settings. **9.1.4.B.1** Participate in brainstorming sessions to seek information, ideas, and strategies that foster creative thinking. **9.1.4.C.1** Practice collaborative skills in groups, and explain how these skills assist in completing tasks in different settings (at home, in school, and during play). **CAREER EDUCATION** **9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success. **9.3.ST-SM.2** Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems. **9.3.ST-SM.4** Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.		Notice and Wonder activity. [Lesson 12, 13] **S13.** Apply understanding of measuring objects to the nearest half and fourth of an inch to create an Estimation Exploration activity. [Lesson 14, 15]

CULTURALLY RESPONSIVE TEACHING in PRACTICE	SOCIAL EMOTIONAL LEARNING in PRACTICE
● Encourage collaborative learning in diverse groups. ● Recognize and value multiple problem-solving approaches. ● Be mindful of language barriers and use simple language and visuals. ● Contextualize abstract concepts in real-life situations. ● Tailor instruction to individual interests and strengths. ● Involve families and the community in math-related activities. ● Include diverse mathematicians and scientists in lessons. ● Use multicultural resources and materials. ● Use math problems and examples that relate to students' cultures and experiences.	● Create a positive classroom environment. ● Encourage communication and collaboration. ● Model emotional regulation. ● Connect math to real-life situations. ● Validate effort and persistence. ● Use cooperative learning. ● Teach growth mindset. ● Incorporate reflective practices. ● Integrate SEL activities such as use of affirmations. ● Foster positive teacher-student relationships.

STAGE 2 - EVIDENCE

SUMMATIVE ASSESSMENT

Illustrative Mathematics
- 3.8 End-of-Unit-Assessment.pdf
- 3.8 End-of-Unit-Assessment SP.pdf

PRE-ASSESSMENT

Illustrative Mathematics
-

FORMATIVE ASSESSMENT

Illustrative Mathematics Curriculum	*Illustrative Mathematics* Tasks	NJSLA Released Items
● 3.8.1 Cool Down.pdf ● 3.8.2 Cool Down.pdf ● 3.8.3 Cool Down.pdf ● 3.8.4 Cool Down.pdf ● 3.8.5 Cool Down.pdf ● 3.8.6 Cool Down.pdf ● 3.8.7 Cool Down.pdf ● 3.8.8 Cool Down.pdf ● 3.8.9 Cool Down.pdf	● Unit 8 Student Task Lesson 1.pdf ● Unit 8 Student Task Lesson 2.pdf ● Unit 8 Student Task Lesson 3.pdf ● Unit 8 Student Task Lesson 4.pdf ● Unit 8 Student Task Lesson 5.pdf ● Unit 8 Student Task Lesson 6.pdf ● Unit 8 Student Task Lesson 7.pdf ● Unit 8 Student Task Lesson 8.pdf ● Unit 8 Student Task Lesson 9.pdf	

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- [3.8.10 Cool Down.pdf]
- [3.8.11 Cool Down.pdf]
- [3.8.12 Cool Down.pdf]
- [3.8.13 Cool Down.pdf]
- [3.8.14 Cool Down.pdf]
- [3.8.15 Cool Down.pdf]

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- Unit 8 Student Task Lesson 10.pdf
- Unit 8 Student Task Lesson 11.pdf
- Unit 8 Student Task Lesson 12.pdf
- Unit 8 Student Task Lesson 13.pdf
- Unit 8 Student Task Lesson 14.pdf
- Unit 8 Student Task Lesson 15.pdf

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<tr><td colspan="3">STAGE 3 - LEARNING PLAN</td></tr>
<tr><td colspan="3">MATH WORKSHOP</td></tr>
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Illustrative Mathematics Centers

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Building Thinking Classrooms Tasks

- Lesson 1 Activity 1: Estimation Exploration: Diagram
- Lesson 2 Activity 1: Create Your Own Number Line
- Lesson 3 Activity 1: Fractions Round Table
- Lesson 4 Activity 1: Design a Tiny House
- Lesson 5 Activity 1: What's the Cost?
- Lesson 6 Activity 1: Create a Survey
- Lesson 7 Activity 1: Draw a Scaled Bar Graph
- Lesson 9 Activity 1: Introduce Rectangle Rumble and How Close?
- Lesson 11 Activity 1: Play Race to 1
- Lesson 12 Activity 1: Design Your Notice and Wonder
- Lesson 13 Activity 1: Design Your How Many Do You See
- Lesson 14 Activity 1: Design Your Estimation Exploration
- Lesson 15 Activity 1: Number Talk Design 1

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Open Middle

- Building Shelves 1
- Building Shelves 2
- Interpreting Graphs
- Biggest Rectangle
- Perimeter
- Rectangles: Maximizing Area
- Rectangles: Maximizing Perimeter
- Squares: Perimeter v. Area
- Rectangles: Perimeter v. Area
- Marble Madness 1
- Marble Madness 2
- Greatest Difference of Two Rounded Numbers
- Fractions On A Number Line
- How Many Numbers Are There?
- Identify a Fraction on a Number Line
- Multiply and Divide Within A Hundred 1
- Multiply and Divide Within A Hundred 2
- Planting Carrots 1

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Slow Reveal Graphs

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</td><td>Bootstrap (to be added Summer 2025)</td><td>

Other Resources

- IM Talking Math

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<tr><td>PHYSICAL MANIPULATIVES & RESOURCES</td><td>VIRTUAL MANIPULATIVES & RESOURCES</td><td>VOCABULARY</td></tr>
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- markers
- tape (painter's or masking)

</td><td>

Desmos

Students find domain and range for continuous and

</td><td>

- NA

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● glue or tape ● tools for creating a visual display ● number cubes ● picture books ● chart paper ● markers ● rulers	discrete functions in real world contexts. ● Desmos Grade 3: Task Building Fractions **Toy Theater** ● Fraction Strips | Free Virtual Manipulatives | Toy Theater Toy Theater **Didax** Students can model fractions and identify fractions on a number line by arranging a collection of fraction tiles on a number line and providing its equivalent. ● Fraction Number - Didax **Math Learning Center** ● Number Line, by The Math Learning Center **PBS Learning** ● Fractions with Cuisenaire Rods	

SUMMARY OF KEY LEARNING

Pacing
This unit has been assigned 22 days in the Pacing Guide. The 22 days are allotted as follows: 15 lesson days as outlined below, 6 flexible days, and 1 assessment day. There are no optional lessons in this unit.

Teacher Resources:
Unit 8 Teacher's Guide (English) (Spanish)
Unit 8 Teacher's Resource Pack (English) (Spanish)

Student Resources:
Unit 8 Student Workbook (English) (Spanish)

Section A: Fraction Fun
Lesson 1: Estimation Explorations with Fractions
Lesson 2: Create Your Own Number Line
Lesson 3: Fractions Round Table

Section B: Measurement and Data
Lesson 4: Tiny House: Design and Solve
Lesson 5: Tiny House: Cost

Lesson 6: Survey the Class, Survey the School
Lesson 7: Graph and Answer

Section C: Multiplication and Division Games
Lesson 8: Multiplication Center Day
Lesson 9: Multiplication Game Day
Lesson 10: Multiplication and Division
Lesson 11: Division Game Day

Section D: Create and Design
Lesson 12: Notice and Wonder
Lesson 13: How Many Do You See?
Lesson 14: Estimation Exploration
Lesson 15: Number Talk

LESSON 1: ESTIMATION EXPLORATIONS WITH FRACTIONS (Teacher Guide)

Teacher-Facing Learning Intention
- Students are estimating fractions represented in diagrams and on number lines.

Student-Facing Learning Intention
- Let's explore estimations with fractions.

Success Criteria
- I can estimate fractions represented in diagrams and on number lines.

Lesson Purpose
- The purpose of this lesson is for students to practice reasoning about fraction representations through estimation.

Lesson Narrative
- In previous lessons, students learned how to represent fractions with area diagrams, fraction strips, and number lines. In this lesson, students revisit each of these representations in an estimation context. Students have an opportunity to think about how to partition each representation to decide what fraction is shown (MP7). Additionally, if time allows and it seems of benefit to student understanding, there is an option after each activity to find the exact value of the fraction in the task statement.

Vocabulary
-

Materials
-

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.NF.A.1**
  Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3.
- **NJSLS.MATH.CONTENT.3.NF.A.2**

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving

Understand a fraction as a number on the number line; represent fractions on a number line diagram. 1. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. For example, partition the number line from 0 to 1 into 3 equal parts, represent ⅓ on the number line and show that each part has a size 1/3. 2. Represent a fraction a/b on a number line diagram by marking off lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. **Mathematical Practice Standards** ● **MP7.** Look for and make use of structure.	● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Which One Doesn't Belong

- This warm-up prompts students to compare four images. It gives students a reason to use language precisely. It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the items in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as parts, pieces, whole, shapes, triangle, quadrilateral, or halves.

Activity 1: Estimation Exploration: Diagram (15 minutes)

- The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. In this activity, students estimate what fraction of a square is shaded to revisit area diagrams.
  - **Access for Multilingual Learners:** MLR2 Collect and Display: Circulate, listen for and collect the language students use as they estimate the fraction of the square that is shaded. On a visible display, record words and phrases such as: area, partition, larger area, between one-half and three-fourths, and more than one-half. Invite students to borrow language from the display as needed, and update it throughout the lesson. Advances: Conversing, Reading

Activity 2: Estimation Exploration: Fraction Strip (10 minutes)

- The purpose of this activity is for students to use their experience with fraction strips and tape diagrams to estimate what fraction of a strip is shaded.
  - **Access for Students with Disabilities:** Engagement: Internalize Self-Regulation. Synthesis: Provide students an opportunity to self-assess and reflect on their own progress. For example, their progress with estimation exploration. Supports accessibility for: Social-Emotional Functioning

Supplemental Resources	**Assessment Resources**
●	● 3.8.1 Cool Down.pdf

LESSON 2: CREATE YOUR OWN NUMBER LINE (Teacher Guide)

Teacher-Facing Learning Intention	**Lesson Purpose**

- Students are recording the results of comparisons with the symbols >, =, or <.
- Students are representing fractions on a number line.

Student-Facing Learning Intention
- Let's create number lines and compare fractions.

Success Criteria
- I can represent fractions on a numberline and record the results of comparisons with the symbols >, =, or <.

- The purpose of this lesson is for students to create their own number line to represent and compare fractions.

Lesson Narrative
- In previous lessons, students learned to represent fractions on number lines and to record the results of comparisons of fractions with the symbols >, =, or <. In this lesson, students create their own number lines to practice writing fraction comparison statements. If students need additional support with the concepts in this lesson, refer back to Unit 5, Section B in the curriculum materials.

Vocabulary
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Materials
- **Activity 1: Each group of 3-4 students needs a roll of tape and a marker.**
- **Activity 1:**
    - **Markers**
    - **Tape (painter's or masking)**

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.NF.A.2**
  Understand a fraction as a number on the number line; represent fractions on a number line diagram.
    1. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. For example, partition the number line from 0 to 1 into 3 equal parts, represent ⅓ on the number line and show that each part has a size 1/3.
    2. Represent a fraction a/b on a number line diagram by marking off lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.
- **NJSLS.MATH.CONTENT.3.NF.A.3**
  Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
    a. Understand two fractions as equivalent (equal) if they are the same size. Understand two fractions as equivalent if they are located at the same point on a number line.
    b. Recognize and generate simple equivalent fractions by reasoning about their size, (e.g. $\frac{1}{2}=\frac{2}{4}$, $\frac{4}{6}=\frac{2}{3}$). Explain why the fractions are equivalent with the support of a visual fraction model.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication
- **PR4.** Connections
- **PR5.** Representation

c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3=3/1; recognize that 6/1=6; locate 4/4 and 1 at the same point on a number line diagram. **Mathematical Practice Standards** ● **MP7.** Look for and make use of structure.	

Warm-up: Which One Doesn't Belong: Fractions on Number Lines (10 minutes)

- This warm-up prompts students to compare four images. It gives students a reason to use language precisely. It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the items in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as tick marks, labels, unit fractions, whole numbers, and length.

Activity 1: Create Your Own Number Line (25 minutes)

- The purpose of this activity is for students to use their fraction reasoning skills to practice locating fractions on a number line. Students should be in groups, but the groups should stay small enough that every member will have a chance to share their ideas. Be sure to space groups so that each has their own area to work in. Students write the fractions on their tape. Students will use the number line they create in the next activity. As they place the different numbers, students think about the meaning of the numerator and denominator in the fractions and how whole numbers can be written as fractions (MP7).
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: At the appropriate time, give groups 2–3 minutes to plan what they will say when they present to the class. "Practice what you will say when you share your number line with the class. Talk about what is important to say, and decide who will share each part." Advances: Speaking, Conversing, Representing
  - **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches. Supports accessibility for: Memory

Activity 2: Make a Statement (10 minutes)

- The purpose of this activity is for students to use the number line they created in the previous activity to make comparison statements about fractions. Students use the symbols >,<,= and to record comparisons between pairs of fractions.

Supplemental Resources	**Assessment Resources**
●	● 3.8.2 Cool Down.pdf

LESSON 3: FRACTIONS ROUND TABLE (Teacher Guide)

Teacher-Facing Learning Intention	**Lesson Purpose**
● Students are generalizing key ideas about fractions, such as what fractions mean, whole numbers as fractions, and fraction comparisons. **Student-Facing Learning Intention** ● Let's discuss fractions.	● The purpose of this lesson is for students to consider statements about fractions that will help them solidify their understanding of fractions as numbers. **Lesson Narrative** ● In previous lessons, students learned what fractions are and how to represent fractions with area diagrams, fraction strips, and on the number line. Students also compared fractions and recognized and generated equivalent fractions. In this lesson, students think about and discuss statements that address their understanding of important ideas about fractions.

Success Criteria

- I can generalize key ideas about fractions, such as what fractions mean, whole numbers as fractions, and fraction comparisons.

Vocabulary

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Materials

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.NF.A.1**
  Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, each part is 1/3 . Two of those parts would be 2/3.
- **NJSLS.MATH.CONTENT.3.NF.A.2**
  Understand a fraction as a number on the number line; represent fractions on a number line diagram.
  1. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. For example, partition the number line from 0 to 1 into 3 equal parts, represent ⅓ on the number line and show that each part has a size 1/3.
  2. Represent a fraction a/b on a number line diagram by marking off lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.
- **NJSLS.MATH.CONTENT.3.NF.A.3**
  Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
  a. Understand two fractions as equivalent (equal) if they are the same size. Understand two fractions as equivalent if they are located at the same point on a number line.
  b. Recognize and generate simple equivalent fractions by reasoning about their size, (e.g. $\frac{1}{2}=\frac{2}{4}$, $\frac{4}{6}=\frac{2}{3}$). Explain why the fractions are equivalent with the support of a visual fraction model.
  c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3=3/1; recognize that 6/1=6; locate 4/4 and 1 at the same point on a number line diagram.

Mathematical Practice Standards

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication
- **PR4.** Connections
- **PR5.** Representation

● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP6.** Attend to precision.	

Warm-up: What Do You Know About 1/8? (10 minutes)
- The purpose of this What Do You Know About ____ is to invite students to share what they know about and how they can represent the number 1/8.

Activity 1: Fractions Round Table (35 minutes)
- The purpose of this activity is for students to think about and discuss statements that address their understanding of important ideas about fractions. Students will consider ideas about how fractions are defined, comparing fractions, and how fractions relate to whole numbers. It is not necessary for each group to discuss all of the statements, but if there are any you'd like to make sure each group discusses, let them know at the start of the activity. Students construct viable arguments to explain their choices (MP3) and in order to do so they need to use key fraction language, such as whole and equal-size piece, precisely (MP6).
    - **Access for Multilingual Learners:** MLR8 Discussion Supports.Synthesis: Provide students with the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence: Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after each round. Supports accessibility for: Organization, Focus

Supplemental Resources	**Assessment Resources**
●	● 3.8.3 Cool Down.pdf

LESSON 4: TINY HOUSE: DESIGN AND SOLVE (Teacher Guide)

Teacher-Facing Learning Intention ● Students are applying understanding of area and perimeter to solve problems about design. **Student-Facing Learning Intention** ● Let's design a tiny house. **Success Criteria** ● I can apply understanding of area and perimeter to solve problems about design.	**Lesson Purpose** ● The purpose of this lesson is for students to design and solve problems about a tiny house. **Lesson Narrative** ● In an earlier unit, students learned about area and perimeter. In this lesson, they apply their understanding of area and perimeter and their creativity to design a tiny house, which is generally a house under 400 square feet. After students design their tiny house (along with the furniture and other details), they write, revise, and answer problems involving area and perimeter that can be answered using their design. **Vocabulary** ● **Materials** ● Activity 2: Materials from a previous activity ● Activity 2: Students use their tiny house designs from the previous activity.

New Jersey State Learning Standards	**National Council of Teachers of Mathematics Content Standards**
● NJSLS.MATH.CONTENT.3.M.D.5.b	● NCTM.MATH.CONTENT.3-5.NUM.A.3

Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. ● **NJSLS.MATH.CONTENT.3.M.B.5.d** Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP3.** Construct viable arguments and critique the reasoning of others. ● **MP4.** Model with mathematics.	Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation
Warm-up: Notice and Wonder: Tiny Houses (10 minutes) ● The purpose of this warm-up is to familiarize students with tiny houses and encourage them to think about the area of a tiny house, which will be useful when students design a tiny house in a later activity. While students may notice and wonder many things about the images, the fact that the tiny houses are very small and cover small areas are the important discussion points.	
Activity 1: Design a Tiny House (25 minutes) ● The purpose of this activity is for students to choose a type of tiny house and design the spaces inside it by partitioning the rectangular floor plan into smaller areas. The synthesis provides time to share and ask questions about each others' designs. As students design the different living needs for their home, thinking about the amount of space needed for each part and the available space, they model with mathematics (MP4). ○ **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: At the appropriate time, provide students 2–3 minutes to plan what they will say when they present their design. "Practice what you will say when you share your design with the class. Practice what is important to say, and if you are part of a group, decide who will share each part." Advances: Speaking, Conversing, Representing ○ **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Invite students to share connections between activity context/content and their own lives. Supports accessibility for: Attention, Visual-Spatial Processing	
Activity 2: Ask, Revise, and Answer (15 minutes) ● The purpose of this activity is for students to generate questions involving area and perimeter that can be answered with their tiny house design (MP2). To confirm that their questions make sense and can be answered with their design, students work with a partner to answer their own questions before posing the questions to others (MP3).	
Supplemental Resources ●	**Assessment Resources** ● 3.8.4 Cool Down.pdf
LESSON 5: TINY HOUSE: COST (Teacher Guide)	
Teacher-Facing Learning Intention	**Lesson Purpose**

- Students are solving problems about the cost of finishing a room in a tiny house.

Student-Facing Learning Intention
- Let's calculate the cost of finishing a room in a tiny house.

Success Criteria
- I can solve problems about the cost of finishing a room in a tiny house.

- The purpose of this lesson is for students to apply what they've learned about operations to calculate the cost to finish a space in a tiny house.

Lesson Narrative
- In a previous lesson, students used what they learned about area and perimeter to design a tiny house. In this lesson, they apply their knowledge of operations to calculate the cost of finishing one of the rooms of their tiny house. Students engage in aspects of mathematical modeling as they make decisions about quantities, relate measurements and costs, and interpret their results in context (MP4).

Vocabulary
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Materials
- Activity 1: Materials from a previous lesson
- Activity 1: Each student needs the tiny house design they created in the previous lesson.

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.NBT.A.2**
  Use place value understanding and properties of operations to perform multi-digit arithmetic. With accuracy and efficiency, add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
- **NJSLS.MATH.CONTENT.3.OA.D.8**
  Solve two-step word problems, including problems involving money, using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Clarification: This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order) (Order of Operations)

Mathematical Practice Standards
- **MP4.** Model with mathematics.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Estimation Exploration: Cost of a Room (10 minutes)
- The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information.

Activity 1: What's the Cost? (35 minutes)

● The purpose of this activity is for students to calculate the cost of finishing a room in the tiny house they designed. Students will have a cost sheet with common items, but, if time permits, students could research the cost of additional items that are not listed. Also, the lesson could be extended by having students finish a second room in their tiny house design. When students decide which room to work on and which items to purchase for the room, with a constraint of $1,000, they model with mathematics (MP4). ○ **Access for Multilingual Learners:** MLR8 Discussion Supports. Prior to solving the problem, invite students to make sense of the items on the cost sheet. Monitor and clarify any questions about the context. Advances: Reading, Representing ○ **Access for Students with Disabilities:** Action and Expression: Internalize Executive Functions. Synthesis: To support working memory, provide students with access to sticky notes or mini whiteboards. Supports accessibility for: Memory, Organization

Supplemental Resources	**Assessment Resources**
●	● 3.8.5 Cool Down.pdf

LESSON 6: SURVEY THE CLASS, SURVEY THE SCHOOL (Teacher Guide)

Teacher-Facing Learning Intention	**Lesson Purpose**
● Students are collecting categorical data to create a data set with several categories. **Student-Facing Learning Intention** ● Let's survey a large group. **Success Criteria** ● I can collect categorical data to create a data set with several categories.	● The purpose of this lesson is for students to use a survey to collect a data set with several categories. **Lesson Narrative** ● Earlier in the course, students used scaled picture graphs and bar graphs to represent data sets with several categories. In this lesson, they collect a large data set by surveying others at the school. In the next lesson, they represent the data on scaled picture graphs and bar graphs. Students should survey at least several classes, as many as time and circumstances permit. The lesson may take 2 or 3 days depending on the survey size. **Vocabulary** ● **Materials** ● Activity 2: Survey a Large Group (groups of 4) ● Activity 2: A blackline master is provided to record students' survey results, but they could also record their results using lined paper.

New Jersey State Learning Standards	**National Council of Teachers of Mathematics Content Standards**
● **NJSLS.MATH.CONTENT.3.DL.B.3** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. **Mathematical Practice Standards** ●	● **NCTM.MATH.CONTENT.3-5.NUM.A.3** Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication

	- **PR4.** Connections - **PR5.** Representation

Warm-up: Notice and Wonder: Survey (10 minutes)
- The purpose of this warm-up is to elicit the idea that each bar on the bar graph represents a category, which will be useful when students use survey data to create a bar graph in a later activity.

Activity 1: Create a Survey (10 minutes)
- The purpose of this activity is for students to decide on a question and answer choices that they will use to survey a group of students.

Activity 2: Survey a Large Group (25 minutes)
- The purpose of this activity is for students to survey a large group of students. This data set will be used in the next lesson to make a scaled picture graph and a scaled bar graph. This process could take 2–3 days depending on how many students in your school are surveyed.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Provide students with the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking
  - **Access for Students with Disabilities: Engagement:** Develop Effort and Persistence. Invite students to generate a list of shared expectations for group work. Record responses on a display and keep visible during the activity. Supports accessibility for: Social-Emotional Functioning

Supplemental Resources - Survey a Large Group (pdf)	**Assessment Resources** - 3.8.6 Cool Down.pdf

LESSON 7: GRAPH AND ANSWER (Teacher Guide)

Teacher-Facing Learning Intention - Students are drawing a scaled bar graph to represent a data set with several categories. - Students are solving one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. **Student-Facing Learning Intention** - Let's represent our data on scaled bar graphs and answer questions about the data. **Success Criteria** - I can draw a scaled bar graph to represent a data set in one- and two-step word problems.	**Lesson Purpose** - The purpose of this lesson is for students to draw a scaled bar graph to represent a data set with several categories. **Lesson Narrative** - In a previous lesson, students used a survey to collect data. In this lesson, they represent their data set with a scaled bar graph. Then, students ask and answer questions about the information presented in their scaled bar graphs. **Vocabulary** - **Materials** - Activity 1: Materials from a previous lesson - Activity 1: Draw Scaled Graphs (groups of 1) - Activity 1: Each group of 4 needs the survey data from the previous lesson. - Activity 2: Each group needs the bar graphs they created in the previous activity. - Activity 2: Materials from a previous activity

New Jersey State Learning Standards	National Council of Teachers of Mathematics Content Standards
NJSLS.MATH.CONTENT.3.DL.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. **Mathematical Practice Standards** ● **MP2.** Reason abstractly and quantitatively. ● **MP6.** Attend to precision.	**NCTM.MATH.CONTENT.3-5.NUM.A.3** Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Notice and Wonder: Graph (10 minutes)

- The purpose of this warm-up is to elicit the idea that bar graphs need a title and a scale in order to be able to communicate information clearly (MP6), which will be useful when students draw a scaled bar graph in a later activity. During the synthesis, focus the discussion on the missing scale.

Activity 1: Draw a Scaled Bar Graph (20 minutes)

- The purpose of this activity is for students to make a scaled bar graph to represent the data from the survey conducted in the previous lesson (MP2). The synthesis focuses on how students chose the scales for their graphs. Students will use their scaled bar graphs in the next activity.
  - **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were most important when accurately creating scaled bar graphs. Display the sentence frame, "The next time I create scaled bar graphs, I will pay attention to . . . ." Supports accessibility for: Memory

Activity 2: Ask and Answer Questions (20 minutes)

- The purpose of this activity is for students to ask and answer questions using their bar graphs from a previous activity. Students work with the group they collected survey data with to create questions that can be answered with their bar graphs. Then students are paired up with a new partner to use these questions to practice solving one- and two-step "how many more" and "how many fewer" problems using information presented in scaled bar graphs (MP2).
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Prior to solving the problems, invite students to make sense of the bar graphs and take turns sharing their understanding with their partner. Listen for and clarify any questions about the context. Advances: Speaking, Representing

Supplemental Resources	Assessment Resources
● Draw Scaled Graphs (pdf)	● 3.8.7 Cool Down.pdf

LESSON 8: MULTIPLICATION CENTER DAY (Teacher Guide)

Teacher-Facing Learning Intention	Lesson Purpose
● Students are practicing multiplication within 100. ● Students are reflecting on multiplication fluency.	● The purpose of this lesson is for students to evaluate their fluency with multiplication within 100. **Lesson Narrative** ● Throughout the course, students have worked to develop fluency with multiplication and division within 100. In this lesson, they reflect on their progress and ways to improve their fluency with

Student-Facing Learning Intention

- Let's sort multiplication facts and play a multiplication game.

Success Criteria

- I can practice multiplication within 100 and practice fluency..

products within 100. Students sort multiplication facts into groups based on whether they know them right away, can find them quickly, or don't know them yet. They then consider strategies for finding the value of unfamiliar products efficiently and practice applying those strategies. At the end of the year, grade 3 students are expected to fluently multiply and divide within 100 and to know from memory all products of two single-digit numbers.

Vocabulary

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Materials

- Activity 1:
    - Card Sort: Multiplication (groups of 2)
    - Materials from a previous lesson
    - Card Sort: Multiplication Recording Sheet (groups of 2)
    - Gather materials from Multiplication Card Sort, an activity from a previous unit.
    - If remaking the cards, create a set of cards from the blackline master for each group of 2.
- Activity 2:
    - Compare Stage 3 Multiplication Cards (groups of 2)
    - Create a set of cards from the blackline master for each group of 2.

New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.OA.C.7**
  With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that , one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Mathematical Practice Standards

- **MP7.** Look for and make use of structure.

National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Number Talk: Products (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for multiplying one- and two-digit numbers, which will be helpful later in this lesson when students multiply within 100.

Activity 1: Card Sort: Multiplication (20 minutes)

- In this activity, students check their progress toward fluent multiplication within 100. They do this by revisiting an activity from a previous unit, in which they sorted multiplication expressions from 1x1 to 10x10 into groups: those that they know right away, those they can find quickly, or those they don't know yet.

Here, students sort the same set of expressions, then practice finding five products of their choice after sharing strategies for finding products they don't know yet.

- **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Create a visual display of multiplication facts students do not yet know. As students share their strategies for finding a product, annotate the display to illustrate connections. For example, next to "9x8", write "10 groups of 8 minus 1 group of 8." Advances: Speaking, Representing

Activity 2: Compare, Multiply Within 100 (15 minutes)

- The purpose of this activity is for students to learn stage 3 of the Compare center to practice multiplying within 100. Students may compare expressions by finding the value of each or by reasoning about the features of the expressions (MP7). (For example, when comparing 12x7 and 12x9 they see that both involve 12 groups but in 12x9 there are 2 more in each group than in 12x7.) When students multiply 2 one-digit numbers, they should know these products from memory. When students multiply a one-digit and a two-digit number, students should have an efficient method for finding the product, but do not need to know the product from memory. If students need more practice with their one-digit multiplication facts, consider having them use the cards from the first activity.
  - **Access for Students with Disabilities:** Action and Expression: Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches. Supports accessibility for: Memory, Conceptual Processing

Supplemental Resources

- Card Sort: Multiplication Recording Sheet (recording sheet) (cards 1) (cards 2)

Assessment Resources

- 3.8.8 Cool Down.pdf

LESSON 9: MULTIPLICATION GAME DAY (Teacher Guide)

Teacher-Facing Learning Intention

- Students are practicing finding products within 100 by playing multiplication games.

Student-Facing Learning Intention

- Let's play multiplication games.

Success Criteria

- I can practice finding products within 100 by playing multiplication games.

Lesson Purpose

- The purpose of this lesson is for students to practice multiplying within 100.

Lesson Narrative

- In the previous lesson, students sorted multiplication expressions to gauge their fluency in finding products. They also played a multiplication game to practice multiplying within 100. In this lesson, students continue to develop their fluency through games. In the first activity, students are introduced to two multiplication centers. In the second activity, students choose between three centers to practice multiplying within 100.

Vocabulary

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Materials

- Activity 1:
  - Rectangle Rumble Stage 3 Spinners (groups of 2)
  - Number Cards (0-10) (groups of 2)
  - Rectangle Rumble Stage 3 Grid (groups of 2)
  - How Close? Stage 5 Recording Sheet (groups of 1)
- Activity 2: Materials from previous centers
- Activity 2: Gather materials from:

	● Compare, Stage 3 ● How Close, Stage 5 ● Rectangle Rumble, Stage 3

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that , one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Mathematical Practice Standards** ●	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.A.3** Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Number Talk: Multiplying Large Factors (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for multiplying a one-digit number and a two-digit number, which will be helpful later in this lesson when students continue to practice multiplying within 100.

Activity 1: Introduce Rectangle Rumble and How Close? (20

- The purpose of this activity is for students to learn stage 3 of the Rectangle Rumble center and stage 5 of the How Close? center to practice multiplying within 100. These are centers that were previously suggested, so if one of them has been used before, only introduce the center that is new to students. If both centers are familiar to students, consider giving them center choice time or choosing one or more centers for students to play.
  - **Access for Multilingual Learners:** MLR7 Compare and Connect. Synthesis: After all strategies have been presented, lead a discussion comparing, contrasting, and connecting the different approaches. Ask, "Did anyone solve the problem the same way, but would explain it differently?", "What did the strategies have in common?", "How were they different?" Advances: Representing, Conversing

Activity 2: Choice Time: Multiplication Games (20 minutes)

- In this activity, students practice multiplying within 100 by playing a game of their choice. The game options are from previously introduced centers:
  - Compare, Stage 3: Multiply within 100
  - How Close, Stage 5: Multiply to 100
  - Rectangle Rumble, Stage 3: Factors 1–10

  If students had center choice time in the last activity, consider having students design their own multiplication game with the materials used in the centers. Students could also use additional materials such as number cubes, grid paper, and index cards if they are available.
  - **Access for Students with Disabilities:** Engagement: Provide Access by Recruiting Interest. Use visible timers or audible alerts to help learners anticipate and prepare to transition between activities. Supports accessibility for: Social-Emotional Functioning, Organization

Supplemental Resources ● How Close? Stage 5 (recording sheet) (cards) (grid) (spinner)	**Assessment Resources** ● 3.8.9 Cool Down.pdf

LESSON 10: MULTIPLICATION AND DIVISION (Teacher Guide)

Teacher-Facing Learning Intention
- Students are interpreting representations of the relationship between multiplication and division.
- Students are representing the relationship between multiplication and division.

Student-Facing Learning Intention
- Let's represent equal groups and write equal groups situations.

Success Criteria
- I can interpret and represent the relationship between multiplication and division.

Lesson Purpose
- The purpose of this lesson is for students to use a variety of representations to illustrate the relationship between multiplication and division to develop fluency with division within 100.

Lesson Narrative
- In previous units, students learned the meaning of multiplication and division and understood division as an unknown-factor problem. They have worked to develop fluency with multiplication within 100. In this lesson, they continue that work by reinforcing their understanding of the relationship between multiplication and division. In the first activity, students are given a card with an equation or a diagram and asked to find another student whose card represents the same situation or quantities. Then, they create an additional diagram and a situation that matches their division equation. Students then view and compare the diagrams and the situations that their classmates created in a gallery walk.

Vocabulary
-

Materials
- Activity 1:
  - Glue or tape
  - Tools for creating a visual display
  - Activity 1: Find the Match (groups of 24)
  - Activity 1: The blackline master has 24 cards. Copy and cut enough cards so that each student can have one card.
- Activity 2:
  - Materials from a previous activity
  - Keep posters from the previous activity displayed.

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.OA.A.3**
  3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- **NJSLS.MATH.CONTENT.3.OA.B.6**
  6. Understand division as an unknown-factor problem. For example, find by finding the number that makes 32 when multiplied by 8.

Mathematical Practice Standards
- **MP2.** Reason abstractly and quantitatively.
- **MP6.** Attend to precision.

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication
- **PR4.** Connections
- **PR5.** Representation

Warm-up: Which One Doesn't Belong: Multiplication and Division (10 minutes)

- This warm-up prompts students to compare four representations. The reasoning here prepares students to connect the previous multiplication work to the division work of this lesson. It gives students an opportunity to use precise terms such as "factors," "product," and "quotient" in making comparisons (MP6). During the synthesis, ask students to explain the meaning of any terminology they use.

Activity 1: Card Sort: Find the Match (25 minutes)

- The purpose of this activity is for students to relate multiplication and division using a variety of representations. Students are given a card with a base ten diagram, tape diagram, area diagram, multiplication equation with a missing factor, or division equation. Students need to find the other student who has the card that matches their card. Each pair of cards includes a division equation. After students find the student with the matching card, they work together to create another diagram and a division situation that their cards could represent (MP2).
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce the remaining cards once students have completed their initial set of matches. Supports accessibility for: Organization, Social-Emotional Functioning

Activity 2: Find the Match Gallery Walk (10 minutes)

- The purpose of this activity is to reinforce students' understanding of the relationship between multiplication and division by examining different representations of that relationship.
    - **Access for Multilingual Learners:** MLR7 Compare and Connect. Synthesis: After the Gallery Walk, lead a discussion comparing, contrasting, and connecting the different representations. "What did the representations have in common?" "How did the relationship between multiplication and division show up in each representation?" To amplify student language, and illustrate connections, follow along and point to the relevant parts of the displays as students speak. Advances: Representing, Conversing

Supplemental Resources	**Assessment Resources**
• Find the Match (pdf)	• 3.8.10 Cool Down.pdf

LESSON 11: DIVISION GAME DAY (Teacher Guide)

Teacher-Facing Learning Intention • Students are practicing dividing whole numbers within 100. **Student-Facing Learning Intention** • Let's play division games. **Success Criteria** • I can practice dividing whole numbers within 100.	**Lesson Purpose** • The purpose of this lesson is for students to develop fluency with dividing within 100. **Lesson Narrative** • In this lesson, students continue to develop fluency with dividing whole numbers within 100 by playing games. Students should have an efficient strategy for finding quotients, but they do not need to know quotients from memory. **Vocabulary** • **Materials** • Activity 1: Number cubes • Activity 2: Materials from previous centers • Activity 2: Gather materials from: • Compare, Stage 4

New Jersey State Learning Standards	National Council of Teachers of Mathematics Content Standards
New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.C.7** With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that , one knows) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. Mathematical Practice Standards ● **MP7.** Look for and make use of structure.	National Council of Teachers of Mathematics Content Standards ● **NCTM.MATH.CONTENT.3-5.NUM.A.3** Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers National Council of Teachers of Mathematics Process Standards ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Number Talk: Divide 48 (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for finding related quotients, which will be helpful later in this lesson when students divide within 100. When students use the relationship between multiplication and division and known division facts to find a division fact they don't know, they look for and make use of structure (MP7).

Activity 1: Play Race to 1 (15 minutes)

- The purpose of this activity is for students to practice division within 100 by playing a game called Race to 1. The goal of the game is to repeatedly divide numbers until they reach one.
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Check in and provide each group with feedback that encourages collaboration and community. Supports accessibility for: Social-Emotional Functioning, Organization

Activity 2: Play Compare, Division (20 minutes)

- The purpose of this activity is for students to practice dividing within 100. They do this by revisiting the Compare center introduced in a previous unit. (As was the case then, exclude cards with two-digit divisors from this activity.) Students may compare expressions by finding the value of each or by reasoning based on the expressions (MP7). (For example, when comparing $94 \div 4$ and $84 \div 4$, they can recognize that $94 \div 4$ is greater because there would be more groups of 4.) When students divide within 100, students should have an efficient method for finding the quotient, but do not need to know the quotient from memory.
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Provide students with the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking

Supplemental Resources	Assessment Resources
●	● 3.8.11 Cool Down.pdf

LESSON 12: NOTICE AND WONDER (Teacher Guide)

Teacher-Facing Learning Intention	Lesson Purpose

- Students are applying understanding of equal groups to create a Notice and Wonder activity.

Student-Facing Learning Intention
- Let's create a Notice and Wonder activity.

Success Criteria
- I can apply understanding of equal groups to create a Notice and Wonder activity.

- The purpose of this lesson is for students to apply their understanding of equal groups to create a Notice and Wonder activity.

Lesson Narrative
- This lesson provides an opportunity to observe the ways in which students notice and describe equal groups. After the warm-up, students create their own Notice and Wonder activity and then facilitate it with other students in the class. Students can find images to use for their Notice and Wonder from books or other sources.

Vocabulary
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Materials
- Activity 1: Picture books
- Activity 1: Each group of 3-4 needs picture books to use as they create their Notice and Wonder activity.
- Activity 2:
    - Chart paper
    - Markers
- Activity 2: Each group of 3-4 from the previous activity needs 1 piece of chart paper and a marker.

New Jersey State Learning Standards
- **NJSLS.MATH.CONTENT.3.OA.A.1**
  Interpret products of whole numbers, e.g., interpret as the total number of objects in 5 groups of 7 objects each. For example, describe and/or represent a context in which a total number of objects can be expressed as.
- **NJSLS.MATH.CONTENT.3.OA.A.2**
  Interpret whole-number quotients of whole numbers, e.g., interpret 56÷8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as 56÷8 .
- **NJSLS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- **NJSLS.MATH.CONTENT.3.OA.A.4**
  Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the

National Council of Teachers of Mathematics Content Standards
- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers

National Council of Teachers of Mathematics Process Standards
- **PR1.** Problem Solving
- **PR2.** Reasoning and Proof
- **PR3.** Communication
- **PR4.** Connections
- **PR5.** Representation

unknown number that makes the equation true in each of the equations 8x?=48, 5=?÷3, 6x6=?. **Mathematical Practice Standards** ●	

Warm-up: Notice and Wonder: Equal Groups (10 minutes)

- The purpose of this warm-up is to elicit the idea that equal groups appear in many contexts, which will be useful when students create their own Notice and Wonder in a later activity. In the synthesis, discuss what students know about Notice and Wonders and what they need to think about to create one like this example.

Activity 1: Design Your Notice and Wonder (20 minutes)

- The purpose of this activity is for students to collaborate and create a Notice and Wonder activity that involves equal groups. Students find an image in a book or from another source and anticipate what other students might notice and wonder about the image.
    - **Access for Students with Disabilities:** Engagement: Develop Effort and Persistence. Invite students to generate a list of shared expectations for group work. Record responses on a display and keep visible during the activity. Supports accessibility for: Social-Emotional Functioning

Activity 2: Facilitate Your Notice and Wonder (15 minutes)

- The purpose of this activity is for students to facilitate the Notice and Wonder they created in the previous activity. Each group takes turns facilitating their Notice and Wonder for another group (or two groups, if time permits).
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. During group work, invite students to take turns sharing their responses. Ask students to restate what they heard using precise mathematical language and their own words. Display the sentence frame: “I heard you say . . .” Original speakers can agree or clarify for their partner. Advances: Listening, Speaking

Supplemental Resources ●	**Assessment Resources** ● 3.8.12 Cool Down.pdf

LESSON 13: HOW MANY DO YOU SEE? (Teacher Guide)

Teacher-Facing Learning Intention ● Students are applying understanding of equal groups and multiplication to create a How Many Do You See activity. **Student-Facing Learning Intention** ● Let’s create a How Many Do You See activity. **Success Criteria** ● I can apply understanding of equal groups and multiplication to create a How Many Do You See activity.	**Lesson Purpose** ● The purpose of this lesson is for students to apply their understanding of equal groups and multiplication to create a How Many Do You See activity. **Lesson Narrative** ● This lesson provides an opportunity to observe the ways in which students find the number of objects in equal groups. After the warm-up, students create their own How Many Do You See activity and then facilitate it with other students in the class. **Vocabulary** ● **Materials**

	● Activity 2:
	  ● Chart paper
	  ● Markers
	● Activity 2: Each group of 3-4 from the previous activity needs 1 piece of chart paper and a marker

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.OA.A.1** Interpret products of whole numbers, e.g., interpret as the total number of objects in 5 groups of 7 objects each. For example, describe and/or represent a context in which a total number of objects can be expressed as. ● **NJSLS.MATH.CONTENT.3.OA.A.2** Interpret whole-number quotients of whole numbers, e.g., interpret 56÷8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as 56÷8 . ● **NJSLS.MATH.CONTENT.3.OA.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. ● **NJSLS.MATH.CONTENT.3.OA.A.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8x?=48, 5=?÷3, 6x6=?. **Mathematical Practice Standards** ●	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.A.3** Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: How Many Do You See: Equal Groups (10 minutes)

- The purpose of this How Many Do You See is to allow students to use subitizing or grouping strategies to describe the images they see. In the synthesis, discuss what students know about the How Many Do You See routine and what they need to think about to create one like this example.

Activity 1: Design Your How Many Do You See (20 minutes)

- The purpose of this activity is for students to collaborate and create a How Many Do You See activity that focuses on equal groups. Students create their own dot image and come up with different ways that other students might see the dots.

Activity 2: Facilitate Your How Many Do You See (15 minutes)

- The purpose of this activity is for students to facilitate the How Many Do You See they created in the previous activity. Each group takes turns facilitating their How Many Do You See for another group (or two groups, if time permits).

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- **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Provide students with the opportunity to rehearse what they will say with a partner before they share with the whole class. Advances: Speaking
- **Access for Students with Disabilities:** Action and Expression: Internalize Executive Functions. Check for understanding by inviting students to rephrase directions in their own words. Keep a display of directions visible throughout the activity. Supports accessibility for: Memory; Organization

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Supplemental Resources

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Assessment Resources

- 3.8.13 Cool Down.pdf

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LESSON 14: ESTIMATION EXPLORATION (Teacher Guide)

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Teacher-Facing Learning Intention

- Students are applying understanding of measuring objects to the nearest half and fourth of an inch to create an Estimation Exploration activity.

Student-Facing Learning Intention

- Let's create an Estimation Exploration activity.

Success Criteria

- I can apply understanding of measuring objects to the nearest half and fourth of an inch to create an Estimation Exploration activity.

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Lesson Purpose

- The purpose of this lesson is for students to apply their understanding of measurement of fractional lengths to create an Estimation Exploration activity.

Lesson Narrative

- This lesson provides an opportunity to observe the ways in which students think about fractional measurements. After the warm-up, students create their own Estimation Exploration activity and then facilitate it with other students in the class. Students can find images to use for their Estimation Exploration from books or other provided sources, or use actual objects from around the classroom.

Vocabulary

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Materials

- Activity 1:
  - Picture books
  - Rulers
  - Each group of 2-3 needs picture books and a ruler to design their Estimation Exploration activity.
- Activity 2:
  - Chart paper
  - Markers
  - Each group of 2–3 from the previous activity needs 1 piece of chart paper and a marker.

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New Jersey State Learning Standards

- **NJSLS.MATH.CONTENT.3.DL.B.4**
  Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.

Mathematical Practice Standards

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National Council of Teachers of Mathematics Content Standards

- **NCTM.MATH.CONTENT.3-5.NUM.A.3**
  Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers

National Council of Teachers of Mathematics Process Standards

- **PR1.** Problem Solving

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	● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Estimation Exploration: Fractional Measurement (10 minutes)

- The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. In the synthesis, discuss what students know about Estimation Explorations and what they need to think about to create one like this example.

Activity 1: Design Your Estimation Exploration (20 minutes)

- The purpose of this activity is for students to collaborate and create an Estimation Exploration activity that focuses on fractional measurement. Students find an object from the classroom or an image in a book or another source. They anticipate and record what other students might estimate the length of the object to be.
    - **Access for Students with Disabilities:** Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were most useful in creating an estimation exploration. Display the sentence frame, "The next time I create an estimation exploration, I will pay attention to . . . " Supports accessibility for: Memory

Activity 2: Facilitate Your Estimation Exploration (15 minutes)

- The purpose of this activity is for students to facilitate the Estimation Exploration they created in the previous activity. Each group takes turns facilitating their Estimation Exploration for another group (or two groups, if time permits).
    - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Display sentence frames to support whole-class discussion: "I learned . . . " "The next time I create an estimation exploration, I will . . . " Advances: Speaking, Representing

Supplemental Resources	**Assessment Resources**
●	● 3.8.14 Cool Down.pdf

LESSON 15: NUMBER TALK (Teacher Guide)

Teacher-Facing Learning Intention ● Students are applying understanding of addition and subtraction within 1,000 to create a Number Talk activity. **Student-Facing Learning Intention** ● Let's create a Number Talk activity. **Success Criteria** ● I can apply understanding of addition and subtraction within 1,000 to create a Number Talk activity.	**Lesson Purpose** ● The purpose of this lesson is for students to apply their understanding of addition and subtraction to create a Number Talk activity. **Lesson Narrative** ● This lesson provides an opportunity to observe the ways in which students make use of structure and repeated reasoning to design a Number Talk. The warm-up is followed by four Number Talk activities. In the first activity, students are given three expressions and asked to write the missing expression. In each of the subsequent activities, one additional expression is missing. In the last activity, students write all four expressions of a Number Talk. It is not essential that students complete all four activities. Decide which activities to do based on how much scaffolding students may need. The lesson may take more than one day, especially if students facilitate their Number Talk with other groups.

	Vocabulary ● **Materials** ●

New Jersey State Learning Standards ● **NJSLS.MATH.CONTENT.3.NBT.A.2** Use place value understanding and properties of operations to perform multi-digit arithmetic. With accuracy and efficiency, add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Mathematical Practice Standards** ●	**National Council of Teachers of Mathematics Content Standards** ● **NCTM.MATH.CONTENT.3-5.NUM.A.3** Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers **National Council of Teachers of Mathematics Process Standards** ● **PR1.** Problem Solving ● **PR2.** Reasoning and Proof ● **PR3.** Communication ● **PR4.** Connections ● **PR5.** Representation

Warm-up: Number Talk: Addition (10 minutes)

- The purpose of this Number Talk is to elicit strategies and understandings students have for adding within 1,000. These understandings help students develop fluency and will be helpful when students create their own Number Talk activities.

Activity 1: Number Talk Design 1 (15 minutes)

- The purpose of this activity is for students to reason about subtraction and write another subtraction expression to complete a partially-completed Number Talk activity. If there is time, students can facilitate their Number Talk with another group. Students are given three expressions and prompted to think of ways that they could be evaluated mentally. They then write a fourth expression in which similar reasoning could be used, or by making use of the first three expressions.
  - **Access for Multilingual Learners:** MLR8 Discussion Supports. Synthesis: Create a visual display of the task. As students share their expression, annotate the display with the expression and its connection to the third expression in the Number Talk. For example, if students share , write “100 less than 399” next to the expression. Advances: Reading, Representing

Activity 2: Number Talk Design 2 (15 minutes)

- The purpose of this activity is for students to reason about addition and apply their reasoning to complete a partially-completed Number Talk activity. This time, students are given addition expressions and are asked to think about how the value of the sums could be found mentally. They then write two new addition expressions to complete the set.
  - **Access for Students with Disabilities:** Action and Expression: Internalize Executive Functions. To support working memory, provide students with access to sticky notes or mini whiteboards. Supports accessibility for: Memory, Organization

Activity 3: Number Talk Design 3 (15 minutes)

- The purpose of this activity is for students to write a sequence of three subtraction expressions to complete a Number Talk with only one given expression. As in earlier activities, students consider strategies that they or others might use to mentally subtract numbers within 1,000.

Activity 4: Number Talk Design 4 (15 minutes) ● The purpose of this activity is for students to design a Number Talk from a blank slate. They can choose to write addition or subtraction expressions, but still consider possible ways that others might find the value of the expressions mentally. If there is time, allow students to facilitate their Number Talk with another group.	
Supplemental Resources ●	**Assessment Resources** ● 3.8.15 Cool Down.pdf