

A Planning Guide of

INVESTIGATIONS
IN NUMBER, DATA, AND SPACE®



and the

**Minnesota
Academic Standards in Mathematics
Grade 4**

**A Planning Guide of Investigations in Number, Data, and Space, 3rd Edition
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Unit 1 Arrays, Factors, And Multiplicative Comparison Multiplication and Division 1	
Investigation 1 Representing Multiplication with Arrays	
Session 1.1 - Things That Come In Arrays	4.1.1.1: Demonstrate fluency with multiplication and division facts.
Session 1.2 - Making Arrays	4.1.1.1: Demonstrate fluency with multiplication and division facts. 4.3.3.3: Apply rotations (turns) of 90° clockwise or counterclockwise. 4.3.3.4: Recognize that translations, reflections and rotations preserve congruency and use them to show that two figures are congruent.
Session 1.3 - Making Arrays, Continued	4.1.1.1: Demonstrate fluency with multiplication and division facts.
Session 1.4 - Factor Pairs	4.1.1.1: Demonstrate fluency with multiplication and division facts.
Session 1.5 - Multiplicative Comparison	4.1.1.1: Demonstrate fluency with multiplication and division facts. 4.2.2.1: Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.
Session 1.6 - Prime Or Composite	4.1.1.1: Demonstrate fluency with multiplication and division facts. 4.2.2.1: Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.
Session 1.7 - Multiple Turn Over	4.1.1.1: Demonstrate fluency with multiplication and division facts.
Session 1.8 - Comparison And Prime Numbers	4.1.1.1: Demonstrate fluency with multiplication and division facts. 4.2.2.1: Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.

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Investigation 2 Finding Factors	
Session 2.1 - Factors of 100	4.1.1.1: Demonstrate fluency with multiplication and division facts.
Session 2.2 - Factors of Multiples Of 100	4.1.1.1: Demonstrate fluency with multiplication and division facts.
Session 2.3 - Factors of Related Numbers	4.1.1.1: Demonstrate fluency with multiplication and division facts. 4.1.1.2: Use an understanding of place value to multiply a number by 10, 100 and 1000.
Session 2.4 - Factors of 36	4.1.1.1: Demonstrate fluency with multiplication and division facts. 4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.
Unit 2 Generating and Representing Measurement Data Modeling with Data	
Investigation 1 Modeling with Data	
Session 1.1 - How Many Raisins In A Box?	4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.
Session 1.2 - How Tall Are Fourth Graders?	4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.
Session 1.3 - How Tall Are First Graders?	4.1.1.1: Demonstrate fluency with multiplication and division facts. 4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.

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Session 1.4 - Representing the Heights of Fourth And First Graders	4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.
Session 1.5 - Representing and Comparing Data	4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.
Investigation 2 Using Data to Compare	
Session 2.1 - What Do We Want to Find Out?	4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.
Session 2.2 - Collecting and Comparing Data	4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.
Session 2.3 - Representing Survey Data	4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.
Session 2.4 - What Can You Learn from Your Data?	4.1.1.1: Demonstrate fluency with multiplication and division facts. 4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.
Session 2.5 - Mystery Data	4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.

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Session 2.6 - Representing and Interpreting Data	4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.
Unit 3 Multiple Towers and Cluster Problems Multiplication and Division 2	
Investigation 1 Breaking Apart Multiplication Problems	
Session 1.1 – Solving Multiplication Problems	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms. 4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.
Session 1.2 – Making Big Arrays	4.1.1.1: Demonstrate fluency with multiplication and division facts. 4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.
Session 1.3 – Small Array/Big Array	4.1.1.1: Demonstrate fluency with multiplication and division facts.
Session 1.4 - Breaking Up Arrays	4.1.1.1: Demonstrate fluency with multiplication and division facts. 4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.
Session 1.5 – Solving 18×7	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.

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Investigation 2 Solving Division Problems	
Session 2.1 – Looking at Division	<p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>
Session 2.2 – Division with Remainders	<p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>
Session 2.3 – Division Stories	<p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>

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Session 2.4 – Strategies for Division	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p>
Session 2.5 - Related Multiplication and Division Problems	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p>
Session 2.6 - Writing and Solving a Division Problem	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p> <p>4.2.2.1: Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.</p>

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Investigation 3 Strategies for Multiplication	
Session 3.1 – Building Multiple Towers	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.
Session 3.2 – Multiplying Groups of Ten	4.1.1.2: Use an understanding of place value to multiply a number by 10, 100 and 1000. 4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.
Session 3.3 – Multiplying By Multiples of Ten	4.1.1.2: Use an understanding of place value to multiply a number by 10, 100 and 1000. 4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.
Session 3.4 – Doubles and Halves	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.
Session 3.5 – Multiplication Cluster Problems	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.
Session 3.6 – Strategies for Multiplication	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.

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Session 3.7 - Solving Multiplication and Division Problems	<p>4.1.1.2: Use an understanding of place value to multiply a number by 10, 100 and 1000.</p> <p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p>
Unit 4 Measuring and Classifying Shapes 2-D Geometry and Measurement	
Investigation 1 Linear Measurement	
Session 1.1 – Measurement Benchmarks	4.1.1.1: Demonstrate fluency with multiplication and division facts.
Session 1.2 – Converting Measurements	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.
Session 1.3 – Solving Measurement Problems	4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.
Session 1.4 – Determining the Perimeter Of Rectangles	The lesson addresses this MN Grade 3 Standard. 3.3.2.2: Find the perimeter of a polygon by adding the lengths of the sides.
Session 1.5 - Measuring Length and Determining Perimeter	The lesson addresses this MN Grade 3 Standard. 3.3.2.2: Find the perimeter of a polygon by adding the lengths of the sides.
Investigation 2 Sorting And Classifying Polygons	
Session 2.1 – Is It A Polygon?	The lesson addresses this MN Grade 3 Standard. 3.3.1.1: Identify parallel and perpendicular lines in various contexts, and use them to describe and create geometric shapes, such as right triangles, rectangles, parallelograms and trapezoids.

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Investigations in Number, Data, and Space Grade 4	Minnesota Academic Standards in Mathematics Grade 4
Session 2.2 – Making Polygons	The lesson addresses this MN Grade 3 Standard. 3.3.1.1: Identify parallel and perpendicular lines in various contexts, and use them to describe and create geometric shapes, such as right triangles, rectangles, parallelograms and trapezoids.
Session 2.3 - Sorting Quadrilaterals	4.3.1.2: Describe, classify and draw quadrilaterals, including squares, rectangles, trapezoids, rhombuses, parallelograms and kites. Recognize quadrilaterals in various contexts.
Session 2.4 - Sorting Quadrilaterals and Triangles	4.3.1.1: Describe, classify and sketch triangles, including equilateral, right, obtuse and acute triangles. Recognize triangles in various contexts. 4.3.1.2: Describe, classify and draw quadrilaterals, including squares, rectangles, trapezoids, rhombuses, parallelograms and kites. Recognize quadrilaterals in various contexts.
Session 2.5 Making Triangles and Quadrilaterals	4.3.2.2: Compare angles according to size. Classify angles as acute, right and obtuse.
Investigation 3 Measuring Angles	
Session 3.1 - Making Right Angles	4.3.2.2: Compare angles according to size. Classify angles as acute, right and obtuse.
Session 3.2 – Measuring and Building Angles	4.3.2.1: Measure angles in geometric figures and real-world objects with a protractor or angle ruler. 4.3.2.2: Compare angles according to size. Classify angles as acute, right and obtuse.
Session 3.3 - Measuring Angles with a Protractor	4.3.2.1: Measure angles in geometric figures and real-world objects with a protractor or angle ruler.
Session 3.4 – More Measuring and Building Angles	4.3.2.1: Measure angles in geometric figures and real-world objects with a protractor or angle ruler.

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Investigation 4 Symmetry and Area	
Session 4.1 Mirror Symmetry	<p>4.3.2.3: Understand that the area of a two-dimensional figure can be found by counting the total number of same size square units that cover a shape without gaps or overlaps. Justify why length and width are multiplied to find the area of a rectangle by breaking the rectangle into one unit by one unit squares and viewing these as grouped into rows and columns.</p> <p>4.3.3.2: Apply reflections (flips) to figures by reflecting over vertical or horizontal lines and relate reflections to lines of symmetry.</p> <p>4.3.3.4: Recognize that translations, reflections and rotations preserve congruency and use them to show that two figures are congruent.</p>
Session 4.2 – Symmetry and Area	<p>4.3.2.3: Understand that the area of a two-dimensional figure can be found by counting the total number of same size square units that cover a shape without gaps or overlaps. Justify why length and width are multiplied to find the area of a rectangle by breaking the rectangle into one unit by one unit squares and viewing these as grouped into rows and columns.</p>
Session 4.3 - Finding Halves of Crazy Cakes	<p>4.3.2.4: Find the areas of geometric figures and real-world objects that can be divided into rectangular shapes. Use square units to label area measurements.</p>
Session 4.4 – Area of Polygons	<p>4.3.2.4: Find the areas of geometric figures and real-world objects that can be divided into rectangular shapes. Use square units to label area measurements.</p>
Session 4.5 - Area of Rectangles	<p>4.3.2.1: Measure angles in geometric figures and real-world objects with a protractor or angle ruler.</p> <p>4.3.2.3: Understand that the area of a two-dimensional figure can be found by counting the total number of same size square units that cover a shape without gaps or overlaps. Justify why length and width are multiplied to find the area of a rectangle by breaking the rectangle into one unit by one unit squares and viewing these as grouped into rows and columns.</p>

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Session 4.6 – Area and Angles	<p>4.3.2.1: Measure angles in geometric figures and real-world objects with a protractor or angle ruler.</p> <p>4.3.2.3: Understand that the area of a two-dimensional figure can be found by counting the total number of same size square units that cover a shape without gaps or overlaps. Justify why length and width are multiplied to find the area of a rectangle by breaking the rectangle into one unit by one unit squares and viewing these as grouped into rows and columns.</p>
Unit 5 Large Numbers and Landmarks Addition, Subtraction, and the Number System	
Investigation 1 Studying Addition	
Session 1.1 - Solving Addition Problems	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p> <p>4.1.2.5: Compare and order decimals and whole numbers using place value, a number line and models such as grids and base 10 blocks.</p>
Session 1.2 – Addition Strategies	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p>
Session 1.3 - Starter Problems	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p>
Session 1.4 - Studying the U.S. Standard Algorithm For Addition	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p>

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Session 1.5 - Close To 1,000	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p> <p>4.1.2.5: Compare and order decimals and whole numbers using place value, a number line and models such as grids and base 10 blocks.</p>
Session 1.6 – Solving an Addition Problem in Two Ways	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p> <p>4.1.2.5: Compare and order decimals and whole numbers using place value, a number line and models such as grids and base 10 blocks.</p>
Investigation 2 Studying Subtraction	
Session 2.1 Representing Subtraction Problems:	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p>
Session 2.2 – Strategies For Subtraction	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p>
Session 2.3 - How Did You Start?	<p>The lesson addresses this MN Grade 3 Standard.</p> <p>3.1.2.1: Add and subtract multi-digit numbers, using efficient and generalizable procedures based on knowledge of place value, including standard algorithms.</p>

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Session 2.4 -Studying the U.S. Standard Algorithm for Subtraction	The lesson addresses this MN Grade 3 Standard. 3.1.2.1: Add and subtract multi-digit numbers, using efficient and generalizable procedures based on knowledge of place value, including standard algorithms.
Session 2.5 - Subtraction Starter Problems	4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.
Session 2.6 – Solving Subtraction Problems	4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.
Session 2.7 - Solving A Subtraction Problem	4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.
Investigation 3 Adding and Subtracting Large Numbers	
Session 3.1 - Making a 10,000 Chart	4.1.1.2: Use an understanding of place value to multiply a number by 10, 100 and 1000. 4.1.2.5: Compare and order decimals and whole numbers using place value, a number line and models such as grids and base 10 blocks. 4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.

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Session 3.2 – How Much Is 10,000?	4.1.1.2: Use an understanding of place value to multiply a number by 10, 100 and 1000.
Session 3.3 - Working with Numbers In The 10,000s	4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.
Session 3.4 - Adding and Subtracting With 4- And 5-Digit Numbers (Part 1)	4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.
Session 3.5 - Adding and Subtracting With 4- And 5-Digit Numbers (Part 2)	4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results. 4.1.2.5: Compare and order decimals and whole numbers using place value, a number line and models such as grids and base 10 blocks.
Session 3.6 Adding and Subtracting With 4- And 5-Digit Numbers (Part 3)	4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.

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Unit 6 Fraction Cards and Decimal Grids Fractions and Decimals	
Investigation 1 Parts of Rectangles	
Session 1.1 - Fractions of an Area: Halves, Fourths, And Eighths	4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.
Session 1.2 - Fractions of an Area: Thirds and Sixths	4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.
Session 1.3 - Same Parts, Different Wholes	4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.
Session 1.4 - Representing Decimals	4.1.2.4: Read and write decimals with words and symbols; use place value to describe decimals in terms of thousands, hundreds, tens, ones, tenths, hundredths and thousandths. 4.1.2.6: Read and write tenths and hundredths in decimal and fraction notations using words and symbols; know the fraction and decimal equivalents for halves and fourths.
Session 1.5 - Equivalent Fractions and Decimals	4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions. 4.1.2.6: Read and write tenths and hundredths in decimal and fraction notations using words and symbols; know the fraction and decimal equivalents for halves and fourths.

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Session 1.6 - Finding Equivalent Fractions and Identifying Decimals	<p>4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.</p> <p>4.1.2.6: Read and write tenths and hundredths in decimal and fraction notations using words and symbols; know the fraction and decimal equivalents for halves and fourths.</p>
Investigation 2 Comparing Fractions and Decimals	
Session 2.1 - Fraction Cards	<p>4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.</p> <p>4.1.2.2: Locate fractions on a number line. Use models to order and compare whole numbers and fractions, including mixed numbers and improper fractions.</p>
Session 2.2 - Fraction Cards, Continued	<p>4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.</p> <p>4.1.2.2: Locate fractions on a number line. Use models to order and compare whole numbers and fractions, including mixed numbers and improper fractions.</p>
Session 2.3 - Capture Fractions	<p>4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.</p> <p>4.1.2.2: Locate fractions on a number line. Use models to order and compare whole numbers and fractions, including mixed numbers and improper fractions.</p>

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Session 2.4 - Comparing Fractions to Landmarks	<p>4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.</p> <p>4.1.2.2: Locate fractions on a number line. Use models to order and compare whole numbers and fractions, including mixed numbers and improper fractions.</p>
Session 2.5 – Fractions on a Number Line	<p>4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.</p> <p>4.1.2.2: Locate fractions on a number line. Use models to order and compare whole numbers and fractions, including mixed numbers and improper fractions.</p>
Session 2.6 - Comparing Fractions	<p>4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.</p> <p>4.1.2.2: Locate fractions on a number line. Use models to order and compare whole numbers and fractions, including mixed numbers and improper fractions.</p>
Session 2.7 -Decimals on the Number Line	<p>4.1.2.5: Compare and order decimals and whole numbers using place value, a number line and models such as grids and base 10 blocks.</p> <p>4.1.2.6: Read and write tenths and hundredths in decimal and fraction notations using words and symbols; know the fraction and decimal equivalents for halves and fourths.</p>

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Session 2.8 - Equivalent Fractions and Comparing Decimals	<p>4.1.2.1: Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.</p> <p>4.1.2.5: Compare and order decimals and whole numbers using place value, a number line and models such as grids and base 10 blocks.</p> <p>4.1.2.6: Read and write tenths and hundredths in decimal and fraction notations using words and symbols; know the fraction and decimal equivalents for halves and fourths.</p>
Investigation 3 Adding and Subtracting Fractions and Decimals	
Session 3.1 - Decomposing and Adding Fractions	<p>4.1.2.3: Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators.</p>
Session 3.2 - Subtracting Fractions	<p>4.1.2.3: Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators.</p>
Session 3.3 - Adding and Subtracting Mixed Numbers	<p>4.1.2.3: Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators.</p> <p>4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.</p>
Session 3.4 - Adding and Subtracting Fractions And Mixed Numbers	<p>4.1.2.3: Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators.</p> <p>4.4.1.1: Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.</p>

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Session 3.5 - Adding Tenths and Hundredths	4.1.2.3: Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators. 4.1.2.6: Read and write tenths and hundredths in decimal and fraction notations using words and symbols; know the fraction and decimal equivalents for halves and fourths.
Session 3.6 - More Adding Tenths and Hundredths	4.1.2.3: Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators.
Investigation 4 Computation with Rational Numbers	
Session 4.1 - Multiplying a Fraction by a Whole Number	4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.
Session 4.2 - Computation with Fractions	4.1.2.3: Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators.
Session 4.3 - Computation with Fractions, Continued	4.1.2.3: Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators. 4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.

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Session 4.4 - Multiplying, Adding and Subtracting Fractions	<p>4.1.2.3: Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>
Unit 7 How Many Packages and Groups? Number and Operations 4	
Investigation 1 Multiplication With 2-Digit Numbers	
Session 1.1 - Measurement Equivalents	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p>
Session 1.2 - Measurement Problems	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p>
Session 1.3 - Making Estimates	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</p>

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Session 1.4 - Breaking Numbers Apart	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</p> <p>4.2.2.1: Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.</p>
Session 1.5 - Multiplication Cluster Problems	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</p> <p>4.2.2.1: Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.</p>
Session 1.6 - Solving Multiplication Problems	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</p>
Session 1.7 - Solving 2-Digit Problems	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p>

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Investigation 2 Strategies for Multiplication	
Session 2.1 - Making An Easier Problem	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.
Session 2.2 - Solutions To Cluster Problems	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms. 4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.
Session 2.3 - Multiplying 4-Digit By 1-Digit Numbers	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms. 4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results. 4.2.2.1: Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.
Session 2.4 Practicing Multiplication	4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms. 4.2.2.1: Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.

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Session 2.5 - Multiplication Problems	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p> <p>4.2.2.1: Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.</p>
Investigation 3 Solving Division Problems	
Session 3.1 - How Many Teams?	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>
Session 3.2 - Solving Division Problems	<p>4.1.1.2: Use an understanding of place value to multiply a number by 10, 100 and 1000.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p>

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Session 3.3 - Dividing 4-Digit Numbers By 1-Digit Numbers	<p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>
Session 3.4 - Multi-Step Problems and Division Strategies	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>
Session 3.5 - Multiplication and Division Problems	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p>

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Session 3.6 - Multiplication, Division and Multi-Step Problems	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p>
Unit 8 Penny Jars and Towers Analyzing Patterns and Rules	
Investigation 1 Representing and Analyzing Patterns	
Session 1.1 - The Penny Jar	<p>4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</p> <p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p> <p>4.2.1.1: Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</p>

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Session 1.2 - Penny Jar Tables	<p>4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</p> <p>4.1.1.6: Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</p> <p>4.2.1.1: Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</p>
Session 1.3 - Arithmetic Patterns	<p>4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</p> <p>4.2.1.1: Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>
Session 1.4 - Round 20	<p>4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</p> <p>4.2.1.1: Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>

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Session 1.5 - Penny Jar Comparisons	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.1.1.4: Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</p> <p>4.2.1.1: Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</p>
Session 1.6 - Windows And Towers	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.2.1.1: Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>
Session 1.7 - Square And Corner Towers	<p>4.2.1.1: Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</p> <p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>

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Session 1.8 - Comparing Two Penny Jar Situations	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p> <p>4.2.1.1: Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>
Session 1.9 - Rules For Windows and Towers	<p>4.1.1.3: Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</p> <p>4.2.1.1: Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>

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Session 1.10 - Arithmetic Patterns, Tables, And Notation	<p>4.1.1.5: Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</p> <p>4.2.1.1: Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</p> <p>4.2.2.2: Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</p>

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