

# Grade Three

## Mathematics - Grade 3: Critical Areas

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.

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. **(OA.1, OA.2, OA.3, OA.4, OA.5, OA.6, OA.7, OA.9)**

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,  $\frac{1}{2}$  of the paint in a small bucket could be less paint than  $\frac{1}{3}$  of the paint in a larger bucket, but  $\frac{1}{3}$  of a ribbon is longer than  $\frac{1}{5}$  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. **(NF.1, NF.2, NF.3)**

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. **(MD.5, MD.6, MD.7)**

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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. **(NF.1, G.1, G.2)**

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- Additional Clusters | \* Benchmarked Standard

# Third Grade

Operations and Algebraic Thinking	Number and Operations in Base Ten	Number and Operations Fractions	Measurement and Data	Geometry
<p><b>Represent and solve problems involving multiplication and division.</b> operations, multiplication, division, factor, product, quotient, partitioned equally, equal shares, number of groups, number in the groups, array, equation, unknown, expression</p> <p><b>Understand properties of multiplication and the relationship between multiplication and division.</b> operation, multiply, divide, factor, product, quotient, dividend, divisor, strategies, unknown, (properties)-rules about how numbers work</p> <p><b>Multiply and divide within 100.</b> operation, multiply, divide, factor, product, quotient, unknown, strategies, reasonableness, mental computation, property</p> <p><b>Solve problems involving the four operations, and identify and explain patterns in arithmetic.</b> operation, multiply, divide, factor, product, quotient, subtract, add, addend, sum, difference, equation, expression, unknown, strategies, reasonableness, mental computation, estimation, rounding,</p>	<p><b>Use place value understanding and properties of operations to perform multi-digit arithmetic.</b> place value, round, addition, add, addend, sum, subtraction, subtract, difference, strategies, (properties)-rules about how numbers work</p>	<p><b>Develop understanding of fractions as numbers.</b> partition(ed), equal parts, fraction, equal distance (intervals), equivalent, equivalence, reasonable, denominator, numerator, comparison, compare, &lt;, &gt;, =, justify, inequality</p>	<p><b>Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.</b> estimate, time, time intervals, a.m., p.m., digital clock, analog clock, minute, hour, elapsed time, measure, liquid volume, mass, standard units, metric, gram (g), kilogram (kg), liter (L), milliliter (mL)</p> <p><b>Represent and interpret data.</b> scale, scaled picture graph, scaled bar graph, line plot, <b>data</b></p> <p><b>Geometric measurement: understand concepts of area and relate area to multiplication and to addition.</b> attribute, area, square unit, plane figure, gap, overlap, square cm, square m, square in., square ft., nonstandard units, tiling, side length, decomposing</p> <p><b>Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area</b></p>	<p><b>Reason with shapes and their attributes.</b> attributes, properties, quadrilateral, open figure, closed figure, three-sided, 2-dimensional, 3-dimensional, rhombi, rectangles, and squares are subcategories of quadrilaterals, cubes, cones, cylinders, and rectangular prisms are subcategories of 3-dimensional figures shapes: polygon, rhombus/rhombi, rectangle, square, partition, unit fraction, kite, parallelogram example and non-example</p> <p>From previous grades: triangle, quadrilateral,</p>

			<b>measures.</b>	pentagon, hexagon, cube, trapezoid, half/quarter circle, circle, cone, cylinder,
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patterns, (properties)-rules about how numbers work, input and output table			attribute, perimeter, plane figure, linear, area, polygon, side length	sphere, sides, vertices, corners
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The Common Core State Standards for Mathematical Practice are practices expected to be integrated into every mathematics lesson for all students Grades K-12. Below are a few examples of how these Practices may be integrated into tasks that Grade 3 students complete.

### **Practice Explanation and Example**

**MP1) Make Sense and Persevere in Solving Problems.** Mathematically proficient students in Grade 3 examine problems, can make sense of the meaning of the task, and find an entry point or a way to start the task. Grade 3 students also develop a foundation for problem solving strategies and become independently proficient on using those strategies to solve new tasks. They might use concrete objects or pictures to show the actions of a problem. If students are not at first making sense of a problem or seeing a way to begin, they ask questions that will help them get started. They are expected to persevere while solving tasks; that is, if students reach a point in which they are stuck, they can reexamine the task in a different way and continue to solve the task. Students in Grade 3 complete a task by asking themselves the question, “Does my answer make sense?” Example: to solve a problem involving multi-digit numbers, they might first consider similar problems that involve multiples of ten or one hundred. Once they have a solution they look back at the problem to determine if the solution is reasonable and accurate. They often check their answers to problems using a different method or approach.

**2MP) Reason abstractly and quantitatively.** Mathematically proficient students in Grade 3 recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of the quantities. This involved two processes: decontextualizing and contextualizing. In Grade 3, students represent situations by decontextualizing tasks into numbers and symbols. For example, to find the area of the floor of a rectangular room that measures 10 ft. by 12 ft., a student might represent the problem as an equation, solve it mentally, and record the problem and solution as  $10 \times 12 = 120$ . She has decontextualized the problem. When she states at the end that the area of the room is 120 square feet, she has contextualized the answer in order to solve the original problem. Problems like this that begin with a context and are then represented with mathematical objects or symbols are also examples of modeling with mathematics (MP 4).

**MP3) Construct viable arguments and critique the reasoning of others.** Mathematically proficient students in Grade 3 accurately use definitions and previously established solutions to construct viable arguments about mathematics. Grade 3 students might construct arguments using concrete referents such as objects, pictures, and drawings. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like “How did you get that?” and “Why is that true?” They explain their thinking to others and respond to others’ thinking. For example, when comparing the unit fractions  $\frac{1}{3}$  and  $\frac{1}{5}$ , students may generate their own representation of both fractions and then critique each other’s reasoning in class, as they connect their arguments to the representations that they created. Students in Grade 3 present their arguments in the form of representations, actions on those representations, and explanations in words (oral and written).

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**MP4) Model with mathematics.** Mathematically proficient students in Grade 3 experiment with representing problem situations in multiple ways, including numbers, words

(mathematical language), drawing pictures, using objects, acting out, making a chart, list, or graph, creating equations, etc. They model real-life mathematical situations with a number sentence or an equation, and check to make sure that their equation accurately matches the problem context. Students should have ample opportunities to connect the different representations and explain the connections. Grade 3 students should evaluate their results in the context of the situation and reflect on whether the results make sense.

**MP5)** Use appropriate tools strategically. Mathematically proficient students in Grade 3 consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. The tools that students in Grade 3 might use physical objects (place value (base ten) blocks, hundreds charts, number lines, tape diagrams, fraction bars, arrays, tables, graphs, and concrete geometric shapes (e.g. pattern blocks, 3-d solids) paper and pencil, rulers and other measuring tools, grid paper, virtual manipulatives, and concrete geometric shapes (e.g., pattern blocks, 3-d solids), etc. Students should also have experiences with educational technologies, such as calculators and virtual manipulatives that support conceptual understanding and higher-order thinking skills. During classroom instruction, students should have access to various mathematical tools as well as paper, and determine which tools are the most appropriate to use. For example, when comparing  $\frac{4}{6}$  and  $\frac{1}{2}$ , students can use benchmark fractions and the number line and explain that  $\frac{4}{6}$  would be placed to the right of  $\frac{1}{2}$  because it is a “little bit more than  $\frac{1}{2}$ .” When students model situations with mathematics, they are choosing tools appropriately (MP 5). As they decontextualize the situation and represent it mathematically, they are also reasoning abstractly (MP2)

**MP6)** Attend to precision. Mathematically proficient students in Grade 3 are precise in their communication, calculations, and measurements. In all mathematical tasks, they communicate clearly, using grade-level appropriate vocabulary accurately as well as giving precise explanations and reasoning regarding their process of finding solutions. For example, while measuring objects iteratively (repetitively), students check to make sure that there are no gaps or overlaps. In using representations, such as pictures, tables, graphs, or diagrams, they use appropriate labels to communicate the meaning of their representation. During tasks involving number sense, students check their work to ensure the accuracy and reasonableness of solutions.

**MP7)** Look for and make use of structure. Mathematically proficient students in Grade 3 carefully look for patterns and structures in the number system and other areas of mathematics. Grade 3 students use structures such as place value, the properties of operations, other generalizations about the behavior of the operations (for example, the less you subtract, the greater the difference), and attributes of shapes to solve problems. In many cases, they have identified and described these structures through repeated reasoning (SMP 8). For example, when Grade 3 students calculate  $16 \times 9$ , they might apply the structure of place value and the distributive property to find the product:  $16 \times 9 = (10 + 6) \times 9 = (10 \times 9) + (6 \times 9)$ .

**MP8)** Look for and express regularity in repeated reasoning. Mathematically proficient students in Grade 3 notice repetitive actions in computation and look for more shortcut methods. For example, students may use the distributive property as a strategy for using products they know to solve products that they don't know. For example, if students are

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asked to find the product of  $7 \times 8$ , they might decompose 7 into 5 and 2 and then multiply  $5 \times 8$  and  $2 \times 8$  to arrive at  $40 + 16$  or 56. Mathematically proficient 3rd graders formulate conjectures about what they notice. In addition, third graders continually evaluate their work by asking themselves, “Does this make sense?”

Pacing Guide - Year-at-a-Glance - Timing based upon 4 Marking Periods at 9 weeks each

Pacing Guide	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
<p><b>Unit 1 - 9 weeks</b></p> <p><b>Multiplication, Division and Concepts of Area</b></p>	<ul style="list-style-type: none"> <li>● 3.OA.A.1</li> <li>● 3.OA.A.2</li> <li>● 3.OA.A.3*</li> <li>● 3.OA.A.4</li> <li>● 3.OA.B.6</li> <li>● 3.MD.C.5</li> <li>● 3.MD.C.6</li> <li>● 3.MD.C.7a-b</li> <li>● 3.NBT.A.1</li> <li>● 3.NBT.A.3</li> </ul>	<ul style="list-style-type: none"> <li>● Represent and solve problems involving multiplication and division</li> <li>● Understand properties of multiplication and the relationship between multiplication and division</li> <li>● Understand concepts of area and relate area to multiplication and addition (Geometric measurement)</li> <li>● Use place value understanding and properties of operations to perform multi-digit arithmetic</li> </ul>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.3 Construct viable arguments and critique the reasoning of others.</p>
<p><i>Unit 1: Suggested Open Educational Resources</i></p>	<p><a href="#">3.OA.A.2 Fish Tanks</a>  <a href="#">3.OA.A.3 Analyzing Word Problems Involving Multiplication</a>  <a href="#">3.OA.A.4 Finding the unknown in a division equation</a>  <a href="#">3.MD.C.6 Finding the Area of Polygons</a>  <a href="#">3.MD.C.7a India's Bathroom Tiles</a>  <a href="#">3.NBT.A.1 Rounding to 50 or 500</a>  <a href="#">3.NBT.A.1 Rounding to the Nearest Ten and Hundred</a>  <a href="#">3.NBT.A.3 How Many Colored Pencils?</a></p>	<p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p>	

<p><b><u>Unit 2</u> - 9 weeks</b></p> <p><b>Modeling Multiplication, Division and Fractions</b></p>	<ul style="list-style-type: none"> <li>● 3.OA.A.3*</li> <li>● 3.OA.B.5</li> <li>● 3.MD.C.7c</li> <li>● 3.MD.C.7d*</li> <li>● 3.OA.C.7*</li> <li>● 3.OA.D.8*</li> <li>● 3.OA.D.9</li> <li>● 3.NBT.A.2*</li> <li>● 3.NF.A.1</li> <li>● 3.G.A.2</li> </ul>	<ul style="list-style-type: none"> <li>● Represent and solve problems involving multiplication and division</li> <li>● Understand properties of multiplication and the relationship between multiplication and division</li> <li>● Geometric measurement: understand concepts of area and relate area to multiplication and to addition</li> <li>● Multiply and divide within 100</li> <li>● Solve problems involving the four operations, and identify and explain patterns in arithmetic</li> <li>● Use place value understanding and properties of operations to perform multi-digit arithmetic</li> <li>● Develop understanding of fractions as numbers.</li> <li>● Reason with shapes and their attributes</li> </ul>	<p>MP.8 Look for and express regularity in repeated reasoning.</p>
<p><i>Unit 2:</i> <i>Suggested Open Educational Resources</i></p>	<p><a href="#">3.OA.A.3 Two Interpretations of Division</a>  <a href="#">3.OA.B.5 Valid Equalities? (Part 2)</a>  <a href="#">3.MD.C.7c Introducing the Distributive Property</a>  <a href="#">3.OA.C.7 Kiri's Multiplication Matching Game</a>  <a href="#">3.OA.D.8 The Class Trip</a>  <a href="#">3.OA.D.9 Addition Patterns</a>  <a href="#">3.NF.A.1 Naming the Whole for a Fraction</a>  <a href="#">3.G.A.2 Representing Half of a Circle</a></p>		
<p><b><u>Unit 3</u> - 9 weeks</b></p> <p><b>Fractions as Numbers and Measurement</b></p>	<ul style="list-style-type: none"> <li>● 3.NF.A.2</li> <li>● 3.NF.A.3</li> <li>● 3.MD.A.1</li> <li>● 3.MD.A.2</li> <li>● 3.G.A.1</li> <li>● 3.MD.D.8</li> <li>● 3.OA.C.7*</li> </ul>	<ul style="list-style-type: none"> <li>● Develop understanding of fractions as numbers</li> <li>● Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects ●</li> <li>Reason with shapes and their attributes</li> <li>● Recognize perimeter as an attribute of plane figures and distinguish between linear and area measure</li> <li>● Multiply and divide within 100</li> </ul>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p>



<p><i>Unit 3:</i> <i>Suggested Open Educational Resources</i></p>	<p><a href="#">3.NF.A.2 Closest to 1/2</a>  <a href="#">3.NF.A.2 Find 1 Starting from 5/3</a>  <a href="#">3.NF.A.2 Locating Fractions Greater than One on the Number Line</a>  <a href="#">3.NF.A.3b, 3.G.A.2, 3.MD.C.6 Halves, thirds, and sixths</a>  <a href="#">3.MD.A.1 Dajuana's Homework</a>  <a href="#">3.MD.A.2 How Heavy?</a>  <a href="#">3.MD.D Shapes and their Insides</a></p>	<p>MP.3 Construct viable arguments and critique the reasoning of others.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p>
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<p><a href="#">Unit 4 - 9 weeks</a> <b>Representing Data</b></p>	<ul style="list-style-type: none"> <li>● 3.MD.B.3</li> <li>● 3.MD.B.4</li> <li>● 3.OA.C.7*</li> <li>● 3.OA.D.8*</li> <li>● 3.NBT.A.2*</li> <li>● 3.MD.C.7d*</li> </ul>	<ul style="list-style-type: none"> <li>● Represent and interpret data</li> <li>● Multiply and divide within 100</li> <li>● Use place value understanding and properties of operations to perform multi-digit arithmetic</li> <li>● Understand concepts of area and relate area to multiplication and to addition</li> </ul>	<p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p> <p>MP.8 Look for and express regularity in repeated reasoning.</p>
<p><i>Unit 4:</i> <i>Suggested Open Educational Resources</i></p>	<p><a href="#">3.MD.C.7d Three Hidden Rectangles</a>  <a href="#">3.OA.D.8 The Stamp Collection</a>  <a href="#">3.NBT.A.2, 3.MD.B.3, 3.OA.A.3 Classroom Supplies</a></p>		

**Grade 3: Interdisciplinary Connections**

\_\_\_ Language Arts \_\_\_ Science \_\_\_ Social Studies \_\_\_ World Languages \_\_\_ Arts

## 21<sup>st</sup> Century Themes

\_\_\_ Global Awareness \_\_\_ Financial, Economic, Business and Entrepreneurial Literacy \_\_\_ Civic Literacy \_\_\_ Health Literacy \_\_\_ Environmental Literacy

### 21<sup>st</sup> Century Life and Careers Standards

#### Career Ready Practices:

- 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a)
- 9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6)
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2)
- 9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1)
- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3)
- 9.4.5.DC.1: Explain the need for and use of copyrights
- 9.4.5.DC.3: Distinguish between digital images that can be reused freely and those that have copyright restrictions.
- 9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2)
- 9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors.
- 9.1.5.EG.3: Explain the impact of the economic system on one's personal financial goals.
- 9.1.5. EG.5: Identify sources of consumer protection and assistance..

**Unit 1 Grade 3 - Multiplication, Division and Concepts of Area**

Content & Practice Standards	Suggested Standards from Mathematical Practice and P21 Skills	Critical Knowledge & Skills
<ul style="list-style-type: none"> <li>● 3.OA.A.1. Interpret products of whole numbers, e.g., interpret <math>5 \times 7</math> as the total number of objects in 5 groups of 7 objects each. For example, describe <b>and/or represent</b> a context in which a total number of objects can be expressed as <math>5 \times 7</math>.</li> </ul>	<p>MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Multiplication is a means to determine the total number of objects when there are a specific number of groups with the same number of objects in each group.</li> <li>● Multiplication gives the same result as repeated addition.</li> <li>● Product of two whole numbers is the total number of objects in a number of equal groups.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● interpret products of whole numbers as a total number of objects.</li> <li>● use repeated addition to find the total number of objects arranged in an array and in equal groups and compare to the result of multiplication.</li> <li>● describe a context in which a total number of objects is represented by a product.</li> <li>● interpret the product in the context of a real-world problem.</li> </ul> <p>Learning Goal 1: Interpret products of whole numbers as repeated addition and as the total number of objects (up to 100) in equal groups or arrays.</p>
<ul style="list-style-type: none"> <li>● 3.OA.A.2. Interpret whole-number quotients of whole numbers, e.g.,</li> </ul>	<p>MP 2 Reason abstractly and quantitatively.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Division is a means to finding equal groups of objects.</li> </ul>

<p>interpret <math>56 \div 8</math> 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 <b>and/or represent</b> a context in which a number of shares or a number of groups can be expressed as <math>56 \div 8</math>.</p>	<p>MP.4 Model with mathematics.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration</p>	<ul style="list-style-type: none"> <li>• Division gives the same result as repeated subtraction.</li> <li>• Quotient of two whole numbers is the number of objects in each share when objects are grouped equally into shares.</li> <li>• Quotient of two whole numbers is the number of shares when objects are grouped into equal shares of objects.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>• interpret division of whole numbers as a number of equal shares or the number of groups when objects are divided equally.</li> <li>• use repeated subtraction to find the number of shares or the number of groups and compare to the result of division.</li> <li>• describe a context in which the number of shares or number of groups is represented with division.</li> <li>• interpret the quotient in the context of a real-world problem.</li> </ul> <p>Learning Goal 2: Interpret the quotient as a set of objects (up to 100) partitioned equally into a number of shares and as the number of equal shares.</p>
<ul style="list-style-type: none"> <li>• 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. *(benchmarked)</li> </ul>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.4 Model with mathematics.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration</p>	<p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>• multiply to solve word problems involving equal groups and arrays.</li> <li>• divide to solve word problems involving equal groups and arrays.</li> <li>• represent a word problem with a drawing showing equal groups, arrays, equal shares, and/or total objects.</li> <li>• represent a word problem with an equation.</li> </ul> <p>Learning Goal 3: Use multiplication and division within 100 to solve word problems by modeling equal groups or arrays and by writing equations to represent equal groups or arrays</p>

<ul style="list-style-type: none"> <li>● 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 <math>8 \times ? = 48</math>, <math>5 = ? \div 3</math>, <math>6 \times 6 = ?</math>.</li> </ul>	<p>MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Equal sign indicates that the value of the numerical expressions on each side are the same.</li> <li>● Unknown in an equation (<math>4 \times \underline{\quad} = 20</math> and <math>20 = ? \times 4</math>) represents a number.</li> <li>● Unknown can be in different positions.</li> <li>● Letters can represent numbers in equations.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● determine which operation is needed to find the unknown.</li> <li>● multiply or divide, within 100, to find the unknown whole number in a multiplication or division equation.</li> </ul>
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		<p>Learning Goal 4: Determine the unknown in a division or multiplication equation relating 3 whole numbers (within 100).</p>
<ul style="list-style-type: none"> <li>● 3.OA.B.6. Understand division as an unknown-factor problem. For example, find <math>32 \div 8</math> by finding the number that makes 32 when multiplied by 8.</li> </ul>	<p>MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision. MP.7 Look for and make use of structure.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Division can be represented as a multiplication problem having an unknown factor.</li> <li>● Relationships between factors, products, quotients, divisors and dividends.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● write division number sentences as unknown factor problems.</li> <li>● solve division of whole numbers by finding the unknown factor.</li> </ul> <p>Learning Goal 5: Solve division of whole numbers by representing the problem as an unknown factor problem.</p>

<ul style="list-style-type: none"> <li>● 3.MD.C.5. Recognize area as an attribute of plane figures and understand concepts of area measurement.</li> </ul> <p>3.MD.C.5a. 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.</p> <p>3.MD.C.5b. A plane figure which can be covered without gaps or overlaps by <math>n</math> unit squares is said to have an area of <math>n</math> square units.</p> <ul style="list-style-type: none"> <li>● 3.MD.C.6. Measure areas by counting unit squares (square cm, square m, square in, square ft., and <b>non-standard</b> units).</li> </ul>	<p>MP.2 Reason abstractly and quantitatively.  MP.4 Model with mathematics.  MP.5 Use appropriate tools strategically.  MP.7 Look for and make use of structure.</p> <p>Critical Thinking and Problem Solving  Creativity and Innovation  Communication and Collaboration  ICT Literacy</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Area is the amount of space inside the boundary of a (closed) figure.</li> <li>● 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.</li> <li>● Plane figure which can be covered without gaps or overlaps by <math>n</math> unit squares is said to have an area of <math>n</math> square units area can be found by covering a figure with unit squares.</li> <li>● Area of a figure can be determined using unit squares of other dimensions.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● count unit squares in order to measure the area of a figure.</li> <li>● use unit squares of centimeters, meters, inches, feet, and other units to measure area.</li> </ul> <p>Learning Goal 6: Measure areas by counting unit squares (cm<sup>2</sup>, m<sup>2</sup>, in<sup>2</sup>, ft<sup>2</sup>, and improvised units).</p>
<ul style="list-style-type: none"> <li>● 3.MD.C.7. Relate area to the operations of multiplication and addition.</li> </ul> <p>3.MD.C.7a. 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.</p>	<p>MP.4 Model with mathematics.  MP.5 Use appropriate tools strategically.</p> <p>Critical Thinking and Problem Solving  Creativity and Innovation  Communication and Collaboration  ICT Literacy</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Area of a rectangle is found by multiplying the side lengths.</li> <li>● Area of a rectangle may be found by tiling.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● tile a rectangle with unit squares.</li> <li>● multiply side lengths of a rectangle to find its area and compare the result to that found by tiling the rectangle with unit squares.</li> <li>● solve real world and mathematical problems involving measurement.</li> <li>● represent a rectangular area as the product of whole-numbers.</li> </ul>

<p>3.MD.C.7b. 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.</p>		<p>Learning Goal 7: Tile a rectangle to find its area and explain the relationship between tiling and multiplying side lengths to find the area of rectangles; solve real world problems by multiplying side lengths to find areas of rectangles.</p>
<ul style="list-style-type: none"> <li>● 3.NBT. A.1. Round whole numbers to the nearest 10 or 100.</li> </ul>	<p>MP 2 Reason abstractly and quantitatively. Critical Thinking and Problem Solving</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Rounding leads to an approximation or estimate.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● use number lines and a hundreds charts to explain rounding numbers to the nearest 10 and 100.</li> <li>● round a whole number to the nearest 10.</li> <li>● round a whole number to the nearest 100.</li> </ul> <p>Learning Goal 8: Round whole numbers to the nearest 10 or 100.</p>
<ul style="list-style-type: none"> <li>● 3.NBT. A.3. Multiply one-digit whole numbers by multiples of 10 in the range 10 to 90 (e.g., <math>9 \times 80</math>, <math>5 \times 60</math>) using strategies based on place value and properties of operations.</li> </ul>	<p>MP 2 Reason abstractly and quantitatively. Critical Thinking and Problem Solving</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Multiples of 10 can be represented as a specific number of groups of ten.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● multiply to determine the total number of groups of ten.</li> <li>● multiply one-digit whole numbers by multiples of 10.</li> </ul> <p>Learning Goal 9: Multiply one digit whole numbers by multiples of 10 (10-90).</p>

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**Unit 1 Grade 3 Multiplication, Division and Concepts of Area**

**District/School Formative Assessment Plan District/School Summative Assessment Plan**

Released item sets

<https://sites.google.com/site/releaseditemsets/>

formative assessment material- Engageny.org under their New York State Mathematics Curriculum Materials:

<https://www.engageny.org/sites/default/files/resource/attachments/g3-m1-full->

[module.pdf](#)

NC 3-5 Instructional and Assessment Tasks for the CCSS in Mathematics

<http://3-5cctask.ncdpi.wikispaces.net/Third+Grade+Tasks>

Illuminations <https://illuminations.nctm.org/>

TenMarks <https://www.tenmarks.com/>

<http://kidsnumbers.com/>

LearnZillion <https://learnzillion.com/p/>

Math Playground <http://www.mathplayground.com/>

Waggle <https://gogetwaggle.com/> (school subscription required)

IXL <https://www.ixl.com/>

Eureka Math <https://greatminds.org/math/curriculum>

Fun Brain <https://www.funbrain.com/math-zone>  
Benchmarks

Teaching Ideas <http://www.teachingideas.co.uk/subjects/math>

Chapter tests

Watch Know Learn videos

Performance tasks Extended projects PARCC

<http://www.watchknowlearn.org/Category.aspx?CategoryID=81> Kids Numbers

Basic facts drill tests



Classwork

Exit tickets

White boards

Individual and group work

Math journals

Benchmark Assessment Alternative Assessment

Renaissance/STAR

MAP Testing

DRA Assessment

Benchmark Assessment within Envision/Go Math/Eureka/iReady

State Testing Results

**Focus Mathematical Concepts - Multiplication, Division and Concepts of Area**

Prerequisite skills:

2.OA.A.1\*

2.OA.A.2

2.OA.A.3\*

2.OA.B.2\*

2.NBT.A.2\*

2.NBT.B.5\*

2.NBT.A.4

2.NBT.B.8

2.MD.C.7

Teacher Created Assessments Performance Based Assessments Extension Projects

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**Common Misconceptions:**

Students think a symbol ( ? or  $\square$  ) is always the place for the answer. This is especially true when the problem is written as  $15 \div 3 = ?$  or  $15 = \square \times 3$ . Students also think that  $3 \div 15 = 5$  and  $15 \div 3 = 5$  are the same equations. The use of models is essential in helping students eliminate this understanding. The use of a symbol to represent a number once cannot be used to represent another number in a different problem/situation. Presenting students with multiple situations in which they select the symbol and explain what it represents will counter this misconception.

The use of terms like “round up” and “round down” confuses many students. For example, the number 37 would round to 40 or they say it “rounds up”. The digit in the tens place is changed from 3 to 4 (rounds up). This misconception is what causes the problem when applied to rounding down. The number 32 should be rounded (down) to 30, but using the logic mentioned for rounding up, some students may look at the digit in the tens place and take it to the previous number, resulting in the incorrect value of 20. To remedy this misconception, students need to use a number line to visualize the placement of the number and/or ask questions such as: “What tens are 32 between and which one is it closer to?” Developing the understanding of the WHY behind rounding, what the answer choices are, using place value understanding to round numbers, rather than relying on rounding rhymes e.g. Find your number, look next door, fiver or greater add on one more, and so on, can alleviate much of the misconception and confusion related to rounding.

**Number Fluency:**

3.OA. -Multiply/Divide within 100. By the end of the year, know from memory all products of two one digit numbers.

3.NBT.A.2- Add/Subtract within 1000

**District/School Tasks District/School Primary and Supplementary Resources**

PARCC released items

<https://prc.parcconline.org/assessments/parcc-released-items>

PARCC practice tests

<https://parcc.pearson.com/practice-tests/math/>

Math release set folder- contains two Word docs

<https://sites.google.com/site/releaseditemsets/home/math-release-1> <http://3-5cctask.ncdpi.wikispaces.net/Third+Grade+Tasks>

NC 3-5 Instructional and Assessment Tasks for the CCSS in Mathematics

<http://3-5cctask.ncdpi.wikispaces.net/Third+Grade+Tasks>

Framework for 21<sup>st</sup> Century Learning

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<http://www.p21.org/our-work/p21-framework>

NJDOE-21<sup>st</sup> Century Life and Careers

<http://www.state.nj.us/education/aps/cccs/career/>

Arizona flip book

<http://www.katm.org/flipbooks/3%20FlipBook%20Final%20CCSS%202014.pdf>

North Carolina wikispaces

<http://maccss.ncdpi.wikispaces.net/Elementary>

Georgia Department of Education Grade 3

<https://www.georgiastandards.org/Georgia-Standards/Pages/Math-K-5.aspx>

[http://commoncoretools.files.wordpress.com/2011/05/ccss\\_progression\\_cc\\_0a\\_k5\\_2011\\_05\\_302.pdf](http://commoncoretools.files.wordpress.com/2011/05/ccss_progression_cc_0a_k5_2011_05_302.pdf)

See Engage NY Modules: <https://www.engageny.org/resource/grade-3-mathematics>

A Mathematical Story by Cindy Neuschwander or a similar book about multiplication.

<http://gadoe.georgiastandards.org/mathframework.aspx?PageReq=MathBarn#gps26>

“Twenty-Four Kids All in a Row”, Georgia Department of Education.

<http://gadoe.georgiastandards.org/mathframework.aspx?PageReq=MathRows>

“Exploring Equal Sets”, NCTM, Mathematics, Illuminations. This four-part lesson encourages students to explore models for multiplication, the inverse of multiplication, and representing multiplication facts in equation form.

<http://illuminations.nctm.org/WebResourceReview.aspx?ID=489>

“All About Multiplication”, In this four-lesson unit, students explore several meanings and representation of multiplications and learn about properties of operations for

multiplication. <http://illuminations.nctm.org/LessonDetail.aspx?id=U109>

**TECHNOLOGY CONNECTION:**

<http://www.shodor.org/interactivate/activities/EstimatorFour/>

A “Four in a Row” game where players get checkers when they quickly and efficiently estimate a sum to two numbers.

<http://www.oswego.org/ocsd-web/games/Estimate/estimate.html>

Students estimate the number indicated on a number line.

**Essential Questions**

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How are multiplication and division related?

How can you write a mathematical sentence to represent a multiplication or division model we have made?

How do estimation, multiplication, and division help us solve problems in everyday life?

How does understanding the properties of operations help us multiply large numbers?

How can area be determined without counting each square?

How can the knowledge of area be used to solve real world problems?

**Special Education Students English Language Learners Students at Risk of School Failure Gifted and Talented Students**

- |  |   |  |   |
|--|---|--|---|
| <ul style="list-style-type: none"><li>● Provide a checklist for long, detailed tasks</li><li>● Use concrete examples of concepts before teaching the abstract</li><li>● Highlight important concepts to be learned in text of material</li><li>● Provide concrete examples for homework/class work assignments</li><li>● Give additional presentations by varying the methods using repetition, simpler explanations</li></ul> | <p>and modeling</p> <ul style="list-style-type: none"><li>● Give written directions to supplement verbal directions</li><li>● Familiarize student with new vocabulary before beginning lesson</li><li>● Utilize visual aids and graphic organizers</li><li>● Use enVision Spanish Resources</li><li>● Provide text to speech for math problems</li><li>● Use of translation dictionary or software</li><li>● Confer frequently</li><li>● Adapt a Strategy-Adjusting</li></ul> | <p>strategies for ESL students:</p> <p><a href="http://www.teachersfirst.com/content/esl/adaptstrat.cfm">http://www.teachersfirst.com/content/esl/adaptstrat.cfm</a></p> <ul style="list-style-type: none"><li>● Familiarize student with new vocabulary before beginning lesson</li><li>● Utilize visual aids and graphic organizers</li><li>● Utilize manipulative, hands-on activities</li><li>● Additional Support Materials/ Online resources</li><li>● Guided Notes or copy of teacher notes</li></ul> | <ul style="list-style-type: none"><li>● Tiered interventions following RTI framework</li><li>● RTI Intervention Bank</li><li>● NJDOE resources<ul style="list-style-type: none"><li>● Utilize online resources such as <a href="http://www.tenmarks.com">www.tenmarks.com</a></li></ul></li><li>● EnVision K-5 intervention supports</li><li>● Modify activities/assignments/projects/assessments</li><li>● Provide an option for alternative activities/assignments/projects/assessments</li></ul> |
|--|---|--|---|

- Provide higher-order questioning and discussion opportunities
- Utilize exploratory connections to higher grade concepts

- Modify Content
- Adjust Pacing of Content
- Small Group Enrichment
- Individual Enrichment

- Higher-Level Text
- Provide whole group enrichment explorations
- Teach cognitive and

- methodological skills
- Use center, stations, or contracts

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- Utilize manipulative, hands-on activities
- Provide graph paper for computation
- Additional time to complete activities/assignments/projects/assessments
- Modify or provide an option for alternative activities/assignments/projects/assessments
- Small Group Instruction/Intervention/Remediation
- Individual Intervention/Remediation
  - Additional Support Materials/ Online resources
- Guided Notes or copy of teacher notes

- Review prerequisite skills
- After School Tutoring
- Chunk activities/assignments/projects/assessments into manageable units
  - Allow student to receive reading text in various forms (written, verbal, audio) on a lower reading level
- Allow student to make test corrections or retake assessment
- Adjust Pacing of Content

- Review prerequisite skills
- <http://www.wida.us/standards/elp.aspx>

- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Propose independent projects based on individual interests
- Additional Support Materials/ Online resources
  - After school clubs
  - Tiered centers
  - Tiered assignments

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- See IEPs of students for specific modifications

Students with 504 Plans ● Provide a checklist for long, detailed tasks

- Use concrete examples of concepts before teaching the abstract
- Highlight important concepts to be learned in text of material
- Provide concrete examples for homework/class work assignments
- Give additional presentations by varying the methods using repetition, simpler explanations and modeling
- Give written directions to supplement verbal directions
- Familiarize student with new vocabulary before beginning lesson
- Utilize visual aids and graphic organizers
- Utilize manipulative, hands-on activities
- Provide graph paper for computation
- Additional time to complete activities/assignments/projects/assessments
- Modify or provide an option for alternative activities/assignments/projects/assessments
- Small Group Instruction/Intervention/Remediation
- Individual Intervention/Remediation
- Additional Support Materials/ Online resources

- Guided Notes or copy of teacher notes
- Review prerequisite skills
- After School Tutoring
- Chunk activities/assignments/projects/assessments into manageable units
- Allow student to receive reading text in various forms (written, verbal, audio) r on a lower reading level
- Allow student to make test corrections or retake assessment
- Adjust Pacing of Content
- See 504 plan for specific accommodations

### Vocabulary Ongoing Modifications

Building the language of mathematics Georgia Department of Education Grade 3 Intervention Table

<https://achievethecore.org/aligned/ccss-aligned-materials-for-ell-students/>

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<http://maccss.ncdpi.wikispaces.net/file/view/2014+Building+Vocabulary.pdf>  
<https://www.georgiastandards.org/Georgia->

[Standards/Pages/Math-K-5.aspx](https://www.georgiastandards.org/Georgia-Standards/Pages/Math-K-5.aspx) Differentiated centers

Extra time on task

Limited # of items

ELL:

<http://www.wida.us/standards/elp.aspx>

NJ Model Curriculum:

<https://www.state.nj.us/education/bilingual/curriculum/>

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Achieve the Core:

### Instructional Best Practices and Exemplars

In Grade 2, students found the total number of objects using rectangular arrays, such as a  $5 \times 5$ , and wrote equations to represent the sum. This strategy is a foundation for multiplication because students should make a connection between repeated addition and multiplication. Students need to experience problem-solving involving equal groups (whole unknown or size of group is unknown) and multiplicative comparison (unknown product, group size unknown or number of groups unknown) as shown in Table 2 of Appendix. Student should be encouraged to solve these problems in different ways to show the same idea and be able to explain their thinking verbally and in written expression.

Allowing students to present several different strategies provides the opportunity for them to compare strategies. Sets of counters, number lines to skip count and relate to multiplication and arrays/area models will aid students in solving problems involving multiplication and division. Allow students to model problems using these tools. Students should represent the model used as a drawing or equation to find the solution. Show a variety of models of multiplication. (i.e. 3 groups of 5 counters can be written as  $3 \times 5$ . Provide a variety of contexts and tasks so that students will have ample opportunity to develop and use thinking strategies to support and reinforce learning of basic multiplication and division facts.

Ask students to create multiplication problem situations in which they interpret the product of whole numbers as the total number of objects in a group. Ask them to write as an expression. Also, have students create division-problem situations in which they interpret the quotient of whole numbers as the number of shares. Students can use known multiplication facts to determine the unknown fact in a multiplication or division problem.

Have them write a multiplication or division equation and the related multiplication or division equation. For example, to determine the unknown whole number in  $27 \div = 3$ , students should use knowledge of the related multiplication fact of  $3 \times 9 = 27$ . They should ask themselves questions such as, “How many 3s are in 27?” or “3 times what number is 27?” Have them justify their thinking with models or drawings.

Students may experience difficulty in determining which factor represents rows or the number of objects in a group, and which factor represents the number of groups or columns. In division, there are two different situations that can cause confusion depending on which factor is the unknown—the number in the group or the number of groups.

### Interdisciplinary Connections Technology Integration

- Language Arts - Interactive Student Notebook
- Language Arts- reading comprehension (decoding words, vocabulary study), problem solving (“problem of the day”, word problems, identifying important information), writing (“writing to explain” mathematical thinking)
- Language Arts- Students will use reading comprehension skills

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- **8.1.5.A.1** Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems
- **8.1.5.A.3** Use a graphic organizer to organize information about problem or issue.
- **8.2.5.C.4** Collaborate and brainstorm with peers to solve a

to problem solve and effectively explain their mathematical thinking in written form using mathematical terms

- Language Arts: Students will connect everyday vocabulary to strengthen their understanding of mathematical terms
- Science- representing data, discovering patterns, reading temperature to analyze climates

- Science- utilizing measuring tools to create model, utilizing measurement tools to measure results of an experiment, analyzing data to form new theories, choosing the “best” way to represent data, using data to prove a theory
- Science: Students will collect and analyze data and make



calculations involving measurements and other data across all modules (Life Science, Physical Science, Earth Science • Social Studies- understand how to read dates properly  
problem evaluating all solutions to provide the best results with

supporting sketches or models.  
• **8.2.5.D.3** Follow step by step directions to assemble a product or solve a problem

**Grade 3: Interdisciplinary Connections**

\_\_\_ Language Arts \_\_\_ Science \_\_\_ Social Studies \_\_\_ World Languages \_\_\_ Arts

**21<sup>st</sup> Century Themes**

\_\_\_ Global Awareness \_\_\_ Financial, Economic, Business and Entrepreneurial Literacy \_\_\_ Civic Literacy \_\_\_ Health Literacy \_\_\_ Environmental Literacy

**21<sup>st</sup> Century Life and Careers Standards**

**Career Ready Practices:**

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a)

9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6)

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2)

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1)

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3)

9.4.5.DC.1: Explain the need for and use of copyrights

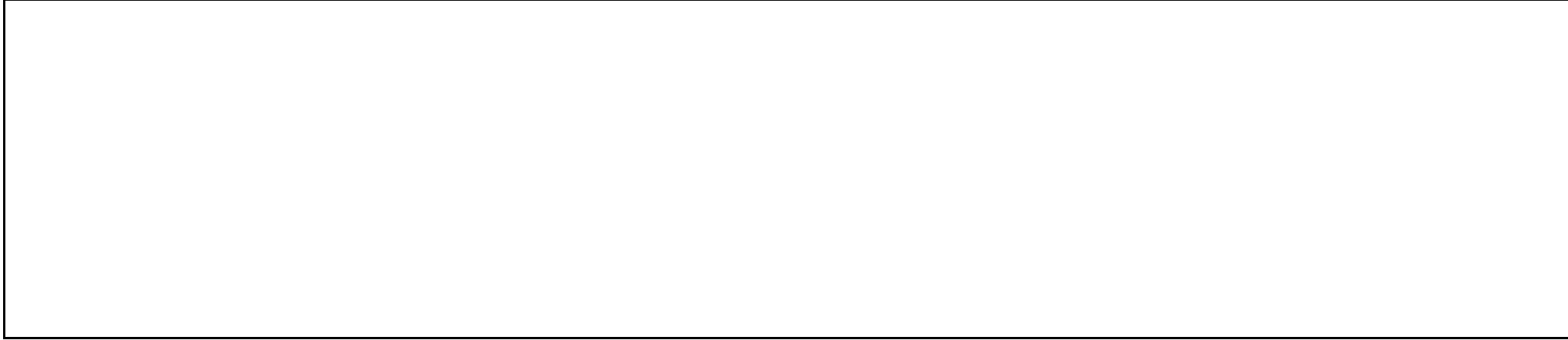
9.4.5.DC.3: Distinguish between digital images that can be reused freely and those that have copyright restrictions.

9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2)

9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors.

9.1.5.EG.3: Explain the impact of the economic system on one's personal financial goals.

9.1.5. EG.5: Identify sources of consumer protection and assistance..



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**Unit 2 Grade 3-Modeling, Multiplication, Division and Fractions**

<b>Unit 2 Grade 3-Modeling, Multiplication, Division and Fractions</b>		
<b>Content Standards</b>	<b>Suggested Standards for Mathematical Practice and P21 Skills</b>	<b>Critical Knowledge &amp; Skills</b>
<ul style="list-style-type: none"> <li>• 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. *(benchmarked)</li> </ul>	<p>MP.1 Make sense of problems and persevere in solving them. MP.4 Model with mathematics.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration</p>	<p>Concept(s): No new concept(s) introduced Students are able to:</p> <ul style="list-style-type: none"> <li>• multiply to solve word problems involving arrays and measurement quantities (area).</li> <li>• divide to solve word problems involving arrays and measurement quantities (area).</li> <li>• represent a word problem with a drawing or array.</li> <li>• represent a word problem with an equation.</li> </ul> <p>Learning Goal 1: Use multiplication and division within 100 to solve word problems involving measurement quantities (area) using drawings.</p>

<ul style="list-style-type: none"> <li>• 3.OA.B.5. Apply properties of operations as strategies to multiply and divide.</li> </ul> <p><i>Examples: If <math>6 \times 4 = 24</math> is known, then <math>4 \times 6 = 24</math> is also known. (Commutative property of multiplication.) <math>3 \times 5 \times 2</math> can be found by <math>3 \times 5 = 15</math>, then <math>15 \times 2 = 30</math>, or by <math>5 \times 2 = 10</math>, then <math>3 \times 10 = 30</math>. (Associative property of multiplication.) Knowing that <math>8 \times 5 = 40</math> and <math>8 \times 2 = 16</math>, one can find <math>8 \times 7</math> as <math>8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56</math>. (Distributive property.)</i></p> <p>*[Students need not use the formal terms for these properties.]</p> <p>*[Limit to single digit factors and multipliers. <math>7 \times 4 \times 5</math> would exceed grade 3 expectations because it would result in a two-digit multiplier (<math>28 \times 5</math>)]</p>	<p>MP.3 Construct viable arguments and critique the reasoning of others.  MP.5 Use appropriate tools strategically. MP.6 Attend to precision.  MP.7 Look for and make use of structure.</p> <p>Critical Thinking and Problem Solving  Creativity and Innovation  Communication and Collaboration</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>• Properties are rules about relationships between numbers.</li> <li>• Changing the order of factors does not change the result of multiplication.</li> <li>• Changing the order of numbers does change the result of division.</li> <li>• Area of a rectangle with whole-number side lengths <math>a</math> and <math>b + c</math> is the sum of <math>a \times b</math> and <math>a \times c</math>.</li> <li>• Area models can be used to represent the distributive property.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>• multiply whole numbers using the commutative property as a strategy.</li> <li>• multiply whole numbers using the associative property as a strategy.</li> <li>• use tiling to show that the area of a rectangle with whole-number side lengths <math>a</math> and <math>b + c</math> is the sum of <math>a \times b</math> and <math>a \times c</math>.</li> <li>• multiply whole numbers using the distributive property as a strategy.</li> </ul> <p>Learning Goal 2: Multiply one-digit whole numbers by applying the properties of operations (commutative, associative, and distributive properties).</p> <p>Learning Goal 3: Use tiling and an area model to represent the distributive property.</p>
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<ul style="list-style-type: none"> <li>● 3.MD.C.7. Relate area to the operations of multiplication and addition.</li> </ul> <p>3.MD.C.7c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths <math>a</math> and <math>b + c</math> is the sum of <math>a \times b</math> and <math>a \times c</math>. Use area models to represent the distributive property in mathematical reasoning.</p>		
<ul style="list-style-type: none"> <li>● 3.MD.C.7. Relate area to the operations of multiplication and addition.</li> </ul> <p>3.MD.C.7d. 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.</p>	<p>MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration ICT Literacy</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Areas of rectilinear figures can be determined by decomposing them into non-overlapping rectangles and adding the areas of the parts.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● decompose rectilinear figures into non-overlapping rectangles.</li> <li>● find areas of non-overlapping rectangles and add to find the area of the rectilinear figure.</li> <li>● solve real world problems involving area of rectilinear figures.</li> </ul> <p>Learning Goal 4: Solve real-world problems involving finding areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts.</p>
<ul style="list-style-type: none"> <li>● 3.OA.C.7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that <math>8 \times 5 = 40</math>, one knows <math>40 \div 5 = 8</math>) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. *(benchmarked)</li> </ul>	<p>MP 2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation ICT Literacy</p>	<p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● multiply and divide <u>within 40</u> with accuracy and efficiency.</li> </ul> <p>Learning Goal 5: Fluently multiply and divide <u>within 40</u> using strategies such as the relationship between multiplication and division.</p>

<ul style="list-style-type: none"> <li>● 3.OA.D.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</li> </ul>	<p>MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Letters or symbols in an equation represent an unknown quantity.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● represent the solution to two-step word problems with equations.</li> <li>● use a symbol to represent an unknown in an equation.</li> </ul>
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<p>reasonableness of answers using mental computation and estimation strategies including rounding. *(benchmarked)</p>	<p>MP.3 Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics MP.5 Use appropriate tools strategically. MP.6 Attend to precision.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration Information Literacy</p>	<ul style="list-style-type: none"> <li>● use rounding as an estimation strategy.</li> <li>● explain, using an estimation strategy, whether an answer is reasonable.</li> </ul> <p>Learning Goal 6: Write equations when solving two-step word problems, using a symbol for an unknown; find the value of an unknown in an equation involving any of the four operations and use estimation strategies to assess the reasonableness of answers.</p>
<ul style="list-style-type: none"> <li>● 3.OA.D.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. <i>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.</i></li> </ul>	<p>MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration ICT Literacy</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Addition and multiplication tables reveal arithmetic patterns.</li> <li>● Patterns may be related to whether a number is even or odd.</li> <li>● Patterns exist in rows, columns and diagonals of addition tables and multiplication tables.</li> <li>● Decomposing numbers into equal addends may reveal patterns.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● explain arithmetic patterns using properties of operations.</li> </ul> <p>Learning Goal 7: Recognize arithmetic patterns, including patterns in addition or multiplication tables, and explain the patterns using properties of operations.</p>

<ul style="list-style-type: none"> <li>● 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. *(benchmarked)</li> </ul>	<p>MP 2 Reason abstractly and quantitatively.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation</p>	<p>Concept(s): No new concept(s) introduced Students are able to:</p> <ul style="list-style-type: none"> <li>● add and subtract two 2-digit whole numbers <u>within 100</u> with accuracy and efficiency.</li> </ul> <p>Learning Goal 8: Fluently add and subtract (with regrouping) two 2-digit whole numbers within 100.</p>
<ul style="list-style-type: none"> <li>● 3.NF.A.1. Understand a fraction <math>1/b</math> as the quantity formed by 1 part when a whole is partitioned into <math>b</math> equal parts; understand a fraction <math>a/b</math> as the quantity formed by <math>a</math> parts of size <math>1/b</math>.</li> </ul>	<p>MP 2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Wholes, when partitioned into equal parts, contain parts representing a unit fraction and each part is the same size.</li> <li>● Each part has the same name and represents a unit fraction (one-half, one-third, one-fourth, one-sixth, one-eighth).</li> <li>● The denominator is the total number of parts in the whole.</li> <li>● The numerator is the number of parts in a given fraction.</li> </ul>

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<p>*[Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.]</p> <ul style="list-style-type: none"> <li>● 3.G.A.2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. <i>For example, partition a shape into 4 parts having equal area and describe the area of each part as <math>1/4</math> of the area of the shape.</i></li> </ul>		<ul style="list-style-type: none"> <li>● Fraction <math>1/b</math> is the quantity formed by 1 part when a whole is partitioned into <math>b</math> equal parts.</li> <li>● Fraction <math>a/b</math> as the quantity formed by <math>a</math> parts of size <math>1/b</math> (e.g. <math>10/2</math> is 10 parts and each part is of size <math>1/2</math>).</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● partition rectangles, and other shapes, into halves, thirds, fourths, sixths and eighths.</li> <li>● identify the fractional name of each part.</li> <li>● model and explain that a fraction <math>a/b</math> is the quantity formed by <math>a</math> parts of size <math>1/b</math> (For example, <math>10/2</math> is 10 parts and each part is of size <math>1/2</math>).</li> </ul> <p>Learning Goal 9: Partition shapes into parts with equal areas and express the area of each part as a unit fraction; interpret the unit fraction <math>1/b</math> as the quantity formed by 1 of <math>b</math> equal parts of a whole and the fraction <math>a/b</math> as the quantity formed by <math>a</math> parts of size <math>1/b</math>.</p>
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## Unit 2 Grade 3- Modeling Multiplication, Division and Fractions

### District/School Formative Assessment Plan District/School Summative Assessment Plan

Released item sets

<https://sites.google.com/site/releaseditemsets/>

IXL <https://www.ixl.com/>

Benchmarks

formative assessment material- Engageny.org under their  
New York State Mathematics Curriculum Materials:

Chapter tests

<https://www.engageny.org/sites/default/files/resource/attachments/g3-m1-full-module.pdf>

Performance tasks Extended projects PARCC

Basic facts drill tests

NC 3-5 Instructional and Assessment Tasks for the CCSS  
in Mathematics <http://3-5cctask.ncdpi.wikispaces.net/Third+Grade+Tasks>

Illuminations <https://illuminations.nctm.org/>

TenMarks <https://www.tenmarks.com/>

LearnZillion <https://learnzillion.com/p/>

Waggle <https://gogetwaggle.com/> (school subscription  
required)

Eureka Math <https://greatminds.org/math/curriculum>

Teaching Ideas  
<http://www.teachingideas.co.uk/subjects/maths>

Watch Know Learn videos  
<http://www.watchknowlearn.org/Category.aspx?CategoryID=81>

Kids Numbers <http://kidsnumbers.com/>

Math Playground <http://www.mathplayground.com/>

Fun Brain <https://www.funbrain.com/math-zone>

<http://www.multiplication.com/>

Classwork

Exit tickets

White boards

Individual and group work

Math journals

**Benchmark Assessment Alternative Assessment**

Renaissance/STAR

Benchmark Assessment within Envision/Go Math/Eureka/iReady

MAP Testing

State Testing Results

DRA Assessment

Teacher Created Assessments Performance Based Assessments

Extension Projects

**Focus Mathematical Concepts- Modeling Multiplication, Division and Fractions**

Prerequisite skills:

2.NBT.A.2\*

2.OA.A.1\*

2.OA.B.2\*

2.OA.C.3

2.OA.C.4

2.MD.A



- 2.MD.C.4
- 2.G.A.2
- 2.NBT.B.5\*

Third-grade students will have prior knowledge/experience related to the concepts and skills identified in this unit.

- In first grade, students are expected to partition circles and rectangles into two or four equal shares, and use the words, halves, half of, a fourth of, and quarter of.
- In second grade, students are expected to partition circles and rectangles into two, three, or four equal shares, and use the words, halves, thirds, half of, a third of, fourth of, quarter of.
- Students should also understand that decomposing into more equal shares equals smaller shares, and that equal shares of identical wholes need not have the same shape.

Common Misconceptions:

Students may experience difficulty in determining which factor represents rows or the number of objects in a group, and which factor represents the number of groups or columns. In division, there are two different situations that can cause confusion depending on which factor is the unknown—the number in the group or the number of groups.

Number Fluency:

- 3.OA. -Multiply/Divide within 100. By the end of the year, know from memory all products of two one digit numbers.
- 3.NBT.A.2- Add/Subtract within 1000

#### **District/School Tasks District/School Primary and Supplementary Resources**

PARCC released items

<https://prc.parcconline.org/assessments/parcc-released-items>

<http://www.state.nj.us/education/aps/cccs/career/>

PARCC practice tests

<https://parcc.pearson.com/practice-tests/math/>

Arizona flip book

<http://www.katm.org/flipbooks/3%20FlipBook%20Final%20CCSS>

Math release set folder- contains two Word docs

<https://sites.google.com/site/releaseditemsets/home/math-release-1>

[%202014.pdf](#) North Carolina wikispaces

<http://maccss.ncdpi.wikispaces.net/Elementary>

NC tasks/assessments

<http://3-5cctask.ncdpi.wikispaces.net/>

Georgia Department of Education Grade 3

Framework for 21<sup>st</sup> Century Learning

<http://www.p21.org/our-work/p21-framework>

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NJDOE-21<sup>st</sup> Century Life and Careers

<https://www.georgiastandards.org/Georgia-Standards/Pages/Math-K-5.aspx>

“Multiplication--It’s In the Cards”, Illuminations, NCTM. Students skip-count and examine multiplication patterns. They also explore the commutative property of multiplication. <http://illuminations.nctm.org/LessonDetail.aspx?ID=L329>

“Multiplication--It’s In the Cards: Looking for Calculator Patterns”, Illuminations, NCTM. Students use a web-based calculator to create and compare counting patterns using the constant function feature of the calculator. Making connections between multiple representations of counting patterns reinforces students understanding of this important idea and helps them recall these patterns as multiplication facts. From a chart, students notice that multiplication is commutative. <http://illuminations.nctm.org/LessonDetail.aspx?ID=L325>

Illustrative Mathematics Tasks: 3.NF Naming the Whole for a Fraction 3.MD, 3.G, 3.NF Halves, thirds, and sixths

“Fraction Reactions,” NCSM, Great Tasks for Mathematics K-5, (2013).

“Exploring Equal Sets”, NCTM, Mathematics, Illuminations. This four-part lesson encourages students to explore models for multiplication, the inverse of multiplication, and representing multiplication facts in equation form. <http://illuminations.nctm.org/WebResourceReview.aspx?ID=489>

### Essential Questions

How can area be determined without counting each square?

How can the knowledge of area be used to solve real world problems?

How can the same area measure produce rectangles with different dimensions? (Ex. 24 square units can produce a rectangle that is a 3 x 8, 4 x 6, 1 x 24, 2 x 12) How

does understanding the distributive property help us multiply large numbers?

How are multiplication and division related?

How can you write a mathematical sentence to represent a multiplication or division model we have made?

How do estimation, multiplication, and division help us solve problems in everyday life?

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How does understanding the properties of operations help us multiply large numbers?

#### Special Education Students English Language Learners Students at Risk of School Failure Gifted and Talented Students

- Provide a checklist for long, detailed tasks
- Use concrete examples of concepts before teaching the abstract
- Highlight important concepts to be learned in text of material

- Provide concrete examples for homework/class work assignments
- Give additional presentations by varying the methods using repetition, simpler explanations and modeling
- Give written directions to supplement verbal directions
- Familiarize student with new vocabulary before beginning lesson
- Utilize visual aids and graphic organizers
- Utilize manipulative, hands-on activities
- Provide graph paper for computation
- Additional time to complete activities/assignments/projects/assessments

- Modify or provide an option for alternative
  - Use enVision Spanish Resources
- Provide text to speech for math problems
  - Use of translation dictionary or software
  - Confer frequently
  - Adapt a Strategy-Adjusting strategies for ESL students: <http://www.teachersfirst.com/content/esl/adaptstrat.cfm>
- Familiarize student with new vocabulary before beginning lesson
- Utilize visual aids and graphic organizers
- Utilize manipulative, hands-on activities
  - Additional Support Materials/ Online resources

- Guided Notes or copy of teacher notes
- Review prerequisite skills
  - <http://www.wida.us/standards/elp.aspx>
  - Tiered interventions following RTI framework
  - RTI Intervention Bank
- NJDOE resources
  - Utilize online resources such as [www.tenmarks.com](http://www.tenmarks.com)
- EnVision K-5 intervention supports
  - Modify activities/assignments/projects/assessments
  - Provide an option for alternative activities/assignments/projects/assessments
  - Provide higher-order questioning and discussion opportunities
  - Utilize exploratory connections to

- higher grade concepts
- Modify Content
- Adjust Pacing of Content
- Small Group Enrichment
- Individual Enrichment
- Higher-Level Text
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)

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- activities/assignments/projects/assessments
- Small Group Instruction/Intervention/Remediation
- Individual Intervention/Remediation
  - Additional Support Materials/ Online resources
- Guided Notes or copy of teacher notes
- Review prerequisite skills
- After School Tutoring
- Chunk activities/assignments/projects/assessments

- essments into manageable units
- Allow student to receive reading text in various forms (written, verbal, audio) on a lower reading level
- Allow student to make test corrections or retake assessment
- Adjust Pacing of Content
- See IEPs of students for specific modifications

Students with 504 Plans

- Provide a checklist for long, detailed tasks

- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Propose independent projects

- based on individual interests
- Additional Support Materials/  
Online resources
  - Afterschool clubs
  - Tiered centers
  - Tiered assignments

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- Use concrete examples of concepts before teaching the abstract
- Highlight important concepts to be learned in text of material
- Provide concrete examples for

homework/class work  
assignments

- Give additional presentations by varying the methods using repetition, simpler explanations and modeling
- Give written directions to supplement verbal directions
- Familiarize student with new vocabulary before beginning lesson
- Utilize visual aids and graphic organizers
- Utilize manipulative, hands-on activities
- Provide graph paper for computation
- Additional time to complete activities/assignments/projects/assessments
- Modify or provide an option for alternative activities/assignments/projects/assessments
- Small Group Instruction/Intervention/Remediation

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- Individual Intervention/Remediation
- Additional Support Materials/ Online resources
- Guided Notes or copy of teacher notes
- Review prerequisite skills
- After School Tutoring

- Chunk activities/assignments/projects/assessments into manageable units
- Allow student to receive reading text in various forms (written, verbal, audio) or on a lower reading level
- Allow student to make test corrections or retake assessment
- Adjust Pacing of Content
- See 504 plan for specific accommodations

### Vocabulary Ongoing Modifications

Building the language of mathematics

<http://maccess.ncdpi.wikispaces.net/file/view/2014+Building+Vocabulary.pdf>  
<https://www.georgiastandards.org/Georgia-Standards/Pages/Math-K-5.aspx>

Differentiated centers

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Georgia Department of Education Grade 3 Intervention Table  
 Extra time on task

Limited # of items

ELL:

<http://www.wida.us/standards/elp.aspx>

NJ Model Curriculum:

<https://www.state.nj.us/education/bilingual/curriculum/>

Achieve the Core:

<https://achievethecore.org/aligned/ccss-aligned-materials-for-ell-students/>

### Instructional Best Practices and Exemplars

Students need to apply properties of operations (commutative, associative and distributive) as strategies to multiply and divide. Applying the concept involved is more important than students knowing the name of the property. Understanding the commutative property of multiplication is developed through the use of models as basic multiplication facts are learned. For example, the result of multiplying  $3 \times 5$  (15) is the same as the result of multiplying  $5 \times 3$  (15). Splitting arrays can help students understand the distributive property. They can use a known fact to learn other facts that may cause difficulty. (See example above where students split an array into smaller arrays and add the sums of the groups. Students' understanding of the part/whole relationships is critical in understanding the connection between multiplication and division.

This is the initial experience students will have with fractions and instruction is best implemented over time. Students need many opportunities to discuss fractional parts using concrete models to develop familiarity and understanding of fractions. Expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8. Understanding that a fraction is a quantity formed by part of a whole is essential to number sense with fractions. Fractional parts are the building blocks for all fraction concepts. Students need to relate dividing a shape into equal parts and representing this relationship on a number line, where the equal parts are between two whole numbers.

Students need many opportunities to discuss fractional parts using concrete models to develop familiarity and understanding of fractions. Expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8. Understanding that a fraction is a quantity formed by part of a whole is essential to number sense with fractions. Fractional parts are the building blocks for all fraction concepts.

### Interdisciplinary Connections Technology Integration

- Language Arts - Interactive Student Notebook
- Language Arts- reading comprehension (decoding words,

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problems, identifying important information), writing ("writing to explain" mathematical thinking)

- Language Arts- Students will use reading comprehension skills to problem solve and effectively explain their mathematical thinking in written form using mathematical terms
- Language Arts: Students will connect everyday vocabulary to strengthen their understanding of mathematical terms ● Science- representing data, discovering patterns, reading temperature to analyze climates
- Science- utilizing measuring tools to create model, utilizing measurement tools to measure results of an experiment, analyzing data to form new theories, choosing the "best" way to

vocabulary study), problem solving ("problem of the day", word

- **8.1.5.A.1** Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems

represent data, using data to prove a theory

- Science: Students will collect and analyze data and make calculations involving measurements and other data across all modules (Life Science, Physical Science, Earth Science ● Social Studies- understand how to read dates properly
  - **8.1.5.A.3** Use a graphic organizer to organize information about problem or issue.
  - **8.2.5.C.4** Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
  - **8.2.5.D.3** Follow step by step directions to assemble a product or solve a problem

**Grade 3: Interdisciplinary Connections**

\_\_\_ Language Arts \_\_\_ Science \_\_\_ Social Studies \_\_\_ World Languages \_\_\_ Arts

**21<sup>st</sup> Century Themes**

\_\_\_ Global Awareness \_\_\_ Financial, Economic, Business and Entrepreneurial Literacy \_\_\_ Civic Literacy \_\_\_ Health Literacy \_\_\_ Environmental Literacy

**21<sup>st</sup> Century Life and Careers Standards**

**Career Ready Practices:**

CRP1: Act as a responsible and contributing citizen and employee.

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CRP2: Apply appropriate academic and technical skills.

CRP3: Attend to personal health and financial well-being.  CRP4:

Communicate clearly and effectively and with reason.  CRP5: Consider the environmental, social and economic impacts of decisions.  CRP6: Demonstrate creativity and innovation.

CRP7: Employ valid and reliable research strategies.

CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9: Model integrity, ethical leadership and effective management.

CRP10: Plan education and career paths aligned to personal goals.

CRP11: Use technology to enhance productivity.

CRP12: Work productively in teams while using cultural global competence.

**9.1 Personal Financial Literacy - Income And Careers 9.2 Career Awareness, Exploration, And Preparation - Career Awareness**

9.1.4.A.1 Explain the difference between a career and a job and identify various jobs in the community and related earnings.

9.1.4.B.4 Identify common household expense categories and sources of income.

9.1.4.C.2 Identify common sources of credit (e.g. banks, credit card companies) and types of credit (e.g. loans, credit cards, mortgages).

9.1.4.D.3 Distinguish between saving and investing.

9.1.4.E.2 Apply comparison shopping skills to purchase items.

9.1.4.F.1 Demonstrate an understanding of individual financial obligations and community financial obligations.

9.2.4.A.3 Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.



**Unit 3 Grade 3- Fractions as Numbers and Measurement**

Content Standards	Suggested Standards for Mathematical Practice and P21 Skills	Critical Knowledge & Skills
<ul style="list-style-type: none"> <li>● 3.NF.A.2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.</li> <li>3.NF.A.2a. Represent a fraction <math>1/b</math> on a number line diagram by</li> </ul>	<p>MP.5 Use appropriate tools strategically.</p> <p>ICT Literacy</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Fraction is a number and has its place on the number line.</li> <li>● When placing unit fractions on a number line, the space between 0 and 1 is the whole and must be partitioned into equal parts.</li> <li>● Each part of a whole has the same size (one-half, one-third, one-fourth, one-sixth or one-eighth).</li> </ul>

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<p>defining the interval from 0 to 1 as the whole and partitioning it into <math>b</math> equal parts. Recognize that each part has size <math>1/b</math> and that the endpoint of the part based at 0 locates the number <math>1/b</math> on the number line.</p> <p>3.NF.A.2b. Represent a fraction <math>a/b</math> on a number line diagram by marking off <math>a</math> lengths <math>1/b</math> from 0. Recognize that the resulting interval has size <math>a/b</math> and that its endpoint locates the number <math>a/b</math> on the number line.</p> <p><i>*[Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.]</i></p>		<ul style="list-style-type: none"> <li>● Parts of the whole that begin at 0 and ends at <math>1/b</math> on the number line is the location of fraction <math>1/b</math> (one-half, one-third, one-fourth, one-sixth, or one-eighth).</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● partition a number line into parts of equal sizes between 0 and 1 (halves, thirds, fourths sixths and eighths).</li> <li>● plot unit fractions on the number line.</li> <li>● identify multiple parts (of length <math>1/b</math>) on the number line.</li> <li>● plot a fraction on the number line by marking off multiple parts of size <math>1/b</math>.</li> <li>● plot fractions equivalent to whole numbers including 0 and up to 5.</li> </ul> <p>Learning Goal 1: Draw a number line depicting the position of <math>1/b</math> (with <math>b = 2, 3, 4, 6,</math> or <math>8</math>); represent the unit fraction <math>1/4</math> on the number line by partitioning the number line between 0 and 1 into 4 equal lengths and name the point at the end of the first length as the position of the unit fraction <math>1/4</math>; apply the same method for placing points <math>1/2, 1/3, 1/6,</math> and <math>1/8</math> on the number line.</p> <p>Learning Goal 2: Draw a number line depicting the position of fraction <math>a/b</math> (with <math>b = 2, 4, 3, 6,</math> or <math>8,</math> and including whole numbers up to 5).</p>
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<ul style="list-style-type: none"> <li>● 3.NF.A.3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size</li> </ul> <p>3.NF.A.3a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.</p> <p>3.NF.A.3b. Recognize and generate simple equivalent fractions, e.g., <math>1/2 = 2/4</math>, <math>4/6 = 2/3</math>. Explain why the fractions are equivalent, e.g., by using a visual fraction model.</p> <p>3.NF.A.3c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. <i>Examples: Express 3 in the form <math>3 = 3/1</math>;</i></p>	<p>MP.2 Reason abstractly and quantitatively.  MP.3 Construct viable arguments and critique the reasoning of others.  MP.4 Model with mathematics.  MP.5 Use appropriate tools strategically.  MP.7 Look for and make use of structure.</p> <p>Critical Thinking and Problem Solving  Creativity and Innovation  Communication and Collaboration  ICT Literacy</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Comparing fractions, each referencing the same <i>whole</i>.</li> <li>● Fractions are equivalent if they are the same size.</li> <li>● Fractions are equivalent if they are at the same point on a number line.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● find equivalent fractions (limited to fractions with denominators 2, 3, 4, 6, and 8).</li> <li>● explain why two fractions are equivalent; use a visual fraction model to support explanation.</li> <li>● write whole numbers as fractions.</li> <li>● identify fractions that are equivalent to whole numbers.</li> <li>● compare two fractions having the same numerator by reasoning about their size.</li> <li>● compare two fractions having the same denominator by reasoning about their size.</li> <li>● explain why comparing fractions that do not have the same whole is not valid (reason about their size and support reasoning with a model).</li> <li>● use <math>&lt;</math>, <math>=</math>, and <math>&gt;</math> symbols to write comparisons of fractions and justify conclusions with a visual fraction model.</li> </ul>
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<p><i>recognize that <math>6/1 = 6</math>; locate <math>4/4</math> and 1 at the same point of a number line diagram.</i></p> <p>3.NF.A.3d. 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 <math>&gt;</math>, <math>=</math>, or <math>&lt;</math>, and justify the conclusions, e.g., by using a visual fraction model.</p> <p><i>*[Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.]</i></p>		<p>Learning Goal 3: Generate simple equivalent fractions, explain why they are equivalent, and support the explanation with visual fraction models; locate them on the number line.</p> <p>Learning Goal 4: Express whole numbers as fractions, identify fractions equivalent to whole numbers and locate them on the number line.</p> <p>Learning Goal 5: Compare two fractions having the same numerator; compare two fractions having the same denominator; reason about their size and use the symbols <math>&gt;</math>, <math>=</math>, or <math>&lt;</math> to record the comparison.</p>
<ul style="list-style-type: none"> <li>• 3.MD.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)</li> </ul>	<p>MP.1 Make sense of problems and persevere in solving them.  MP.2 Reason abstractly and quantitatively.  MP.4 Model with mathematics.  MP.5 Use appropriate tools strategically.</p> <p>Critical Thinking and Problem Solving  Creativity and Innovation  Communication and Collaboration  ICT Literacy</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>• Analog clocks represent hours as numbers and minutes are represented as tick marks.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>• tell time to the nearest minute using digital and analog clocks.</li> <li>• write time to the nearest minute using analog clocks.</li> <li>• choose appropriate strategies to solve real world problems involving time. • use the number line as a visual model to determine intervals of time as <i>jumps</i> on a number line.</li> <li>• measure time intervals.</li> </ul> <p>Learning Goal 6: Tell and write time to the nearest minute, and solve word problems with addition and subtraction involving time intervals in minutes.</p>

<ul style="list-style-type: none"> <li>● 3.MD.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</li> </ul>	<p>MP.1 Make sense of problems and persevere in solving them.  MP.2 Reason abstractly and quantitatively.  MP.4 Model with mathematics.  MP.5 Use appropriate tools strategically.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Mass may be measured in grams and kilograms.</li> <li>● Mass is measured by weighing.</li> <li>● Volume may be measured in liters.</li> <li>● Volume may be measured with instruments such as beakers.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● measure and read a scale to estimate volume.</li> </ul>
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<p>volumes that are given in the same units.</p>	<p>MP.6 Attend to precision.   Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration ICT Literacy</p>	<ul style="list-style-type: none"> <li>● measure and read a scale to estimate mass.</li> <li>● add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes.</li> </ul> <p>Learning Goal 7: Solve one step word problems by estimating and measuring volume and mass using appropriate tools and standard units of grams, kilograms, and liters.</p>
<ul style="list-style-type: none"> <li>● 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.</li> </ul>	<p>MP.5 Use appropriate tools strategically.  MP.6 Attend to precision.  MP.7 Look for and make use of structure.   Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration ICT Literacy</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Shapes in different categories share attributes.</li> <li>● Quadrilaterals are closed figures with four sides.</li> <li>● Rhombuses, rectangles, etc., and other quadrilaterals share attributes.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● classify and sort shapes by attributes.</li> <li>● explain why rhombuses, rectangles, and squares are examples of quadrilaterals.</li> <li>● draw examples of quadrilaterals.</li> </ul> <p>Learning Goal 9: Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.</p>

<ul style="list-style-type: none"> <li>● 3.MD.D.8. 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.</li> </ul>	<p>MP.1 Make sense of problems and persevere in solving them.  MP.2 Reason abstractly and quantitatively.  MP.4 Model with mathematics.  MP.5 Use appropriate tools strategically.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration ICT Literact</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Perimeter of a figure is equivalent to the sum of the length of all of the sides.</li> <li>● Rectangles that have same perimeter can have different areas.</li> <li>● Rectangles that have same area can have different perimeters.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● determine the perimeter of various plane shapes and irregular shapes given the side lengths.</li> <li>● determine the unknown side length give the perimeter and other sides.</li> <li>● show rectangles having the same perimeter and different areas.</li> <li>● show rectangles having different perimeters and the same area.</li> </ul> <p>Learning Goal 10: 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.</p>
<ul style="list-style-type: none"> <li>● 3.OA.C.7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that <math>8 \times 5 = 40</math>, one</li> </ul>	<p>MP.2 Reason abstractly and quantitatively.  MP.7 Look for and make use of structure.</p>	<p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● multiply and divide <u>within 100</u> with accuracy and efficiency.</li> </ul>

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<p>knows <math>40 \div 5 = 8</math>) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.  *(benchmarked)</p>	<p>MP.8 Look for and express regularity in repeated reasoning.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Information Literacy</p>	<p>Learning Goal 8: Fluently multiply and divide <u>within 100</u> using strategies such as the relationship between multiplication and division.</p>
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**Unit 3 Grade 3- Fractions as Numbers and Measurement**

Released item sets  
<https://sites.google.com/site/releaseditemsets/>

IXL <https://www.ixl.com/>  
Benchmarks

formative assessment material- Engageny.org under their  
New York State Mathematics Curriculum Materials:  
<https://www.engageny.org/sites/default/files/resource/attachments/g3-m1-full-module.pdf>

Chapter tests  
Performance tasks Extended projects PARCC

NC 3-5 Instructional and Assessment Tasks for the CCSS  
in Mathematics <http://3-5cctask.ncdpi.wikispaces.net/Third+Grade+Tasks>

Illuminations <https://illuminations.nctm.org/>

TenMarks <https://www.tenmarks.com/>

LearnZillion <https://learnzillion.com/p/>

Waggle <https://gogetwaggle.com/> (school subscription  
required)

Eureka Math <https://greatminds.org/math/curriculum>

Teaching Ideas  
<http://www.teachingideas.co.uk/subjects/maths>

Watch Know Learn videos  
<http://www.watchknowlearn.org/Category.aspx?CategoryId=81>

Kids Numbers <http://kidsnumbers.com/>

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Math Playground <http://www.mathplayground.com/>

Fun Brain <https://www.funbrain.com/math-zone>

<http://www.multiplication.com/>

Classwork

Exit tickets

White boards

Individual and group work

Math journals

**Benchmark Assessment Alternative Assessment**

Renaissance/STAR

Benchmark Assessment within Envision/Go Math/Eureka/iReady

MAP Testing

State Testing Results

DRA Assessment

Teacher Created Assessments Performance Based Assessments

Extension Projects

**Focus Mathematical Concepts- Fractions as Numbers and Measurement**

Prerequisite skills: 2

2.MD.A.1

2.MD.A.2

2.MD.A.3

2.MD.A.4

2.MD.B.5

2.MD.B.6

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2.MD.C.7

2.G.A.1

2.NBT.A.2\*

## 2.NBT.B.5\*

Students in second grade measured length in whole units using both metric and U.S. customary systems. It's important to review with students how to read and use a standard ruler including details about halves and quarter marks on the ruler. Students should connect their understanding of fractions to measuring to one-half and one-quarter inch. Third graders need many opportunities measuring the length of various objects in their environment.

In second grade, students identified and drew triangles, quadrilaterals, pentagons, and hexagons. Third graders build on this experience and further investigate quadrilaterals (technology may be used during this exploration).

### Common Misconceptions:

The idea that the smaller the denominator, the smaller the piece or part of the set, or the larger the denominator, the larger the piece or part of the set, is based on the comparison that in whole numbers, the smaller a number, the less it is, or the larger a number, the more it is. The use of different models, such as fraction bars and number lines, allows students to compare unit fractions to reason about their sizes.

Students may confuse perimeter and area when they measure the sides of a rectangle and then multiply. They think the attribute they find is length, which is perimeter. Pose problems situations that require students to explain whether they are to find the perimeter or area.

Students may identify a square as a “non-rectangle” or a “non-rhombus” based on limited images they see. They do not recognize that a square is a rectangle because it has all of the properties of a rectangle. They may list properties of each shape separately, but not see the interrelationships between the shapes.

Students may read the mark on a scale that is below a designated number on the scale as if it was the next number. For example, a mark that is one mark below 80 grams may be read as 81 grams. Students realize it is one away from 80, but do not think of it as 79 grams. Avoid the use of paper plate clocks. Students need to see the actual relationship between the hour and the minute hand. This is not adequately represented on student made clocks. Students forget to label the measurement or choose the incorrect unit.

Students often focus on size to determine estimates of mass. They can be confused by a big fluffy object and a tiny dense object. Because students cannot tell actual mass until they have handled an object, it is important that teachers do not ask students to estimate the mass of objects until they have had the opportunity to lift the objects and then make an estimate of the mass.

### Number Fluency:

3.OA. -Multiply/Divide within 100. By the end of the year, know from memory all products of two one digit numbers.

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3.NBT.A.2- Add/Subtract within 1000

### District/School Tasks District/School Primary and Supplementary Resources

PARCC released items

<https://prc.parcconline.org/assessments/parcc-released-items>

PARCC practice tests



<https://parcc.pearson.com/practice-tests/math/>

Math release set folder- contains two Word docs

<https://sites.google.com/site/releaseditemsets/home/math-release-1>

NC tasks/assessments

<http://3-5cctask.ncdpi.wikispaces.net/>

### **Essential Questions**

How are fractions used in problem-solving situations?

How can I compare fractions?

What are the important features of a unit fraction?

What relationships can I discover about fractions?

How do the attributes help us identify the different quadrilaterals/shapes?

Framework for 21<sup>st</sup> Century Learning

<http://www.p21.org/our-work/p21-framework>

NJDOE-21<sup>st</sup> Century Life and Careers

<http://www.state.nj.us/education/aps/cccs/career/>

Arizona flip book

<http://www.katm.org/flipbooks/3%20FlipBook%20Final%20CCSS%202014.pdf>

North Carolina wikispaces

<http://maccss.ncdpi.wikispaces.net/Elementary>

Georgia Department of Education Grade 3

<https://www.georgiastandards.org/Georgia-Standards/Pages/Math-K-5.aspx>

What does it mean to partition a shape into parts?

What is the relationship between perimeter and area?

When measuring Liquid volume and Mass what happens when your units of measure change?

Why is it important to know the mass of an object?

In what ways, can we determine the mass of an object?

What units are appropriate to measure mass?

How are units in the same system of measurement related?

What strategies could you use to figure out the mass of multiple objects?

What are some ways I can measure the liquid volume?

What strategies can I use to help me tell and write time to the nearest minute and measure time intervals in minutes?

How can I use what I know about number lines to help me figure out how much time has passed between two events?

**Special Education Students English Language Learners Students at Risk of School Failure Gifted and Talented Students Students with 504 Plans**

- Provide a checklist for long, detailed tasks
- Use concrete examples of concepts before teaching the abstract
- Highlight important concepts to be learned in text of material

- Provide concrete examples for homework/class work assignments
  - Use enVision Spanish Resources
  - Provide text to speech for math problems
  - Use of translation dictionary or software

- Confer frequently
- Tiered interventions following RTI framework
- RTI Intervention Bank ● NJDOE resources
  - Utilize online resources such as [www.tenmarks.com](http://www.tenmarks.com)
  - EnVision K-5 intervention

- Modify supports activities/assignments/projects/assessments
- Provide an option for alternative activities/assignments/projects/assessments
- Provide higher-order questioning and

- Provide a checklist for long, detailed tasks
- Use concrete examples of concepts before teaching the abstract
- Highlight important concepts to be learned in text of material

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- Give additional presentations by varying the methods using repetition, simpler explanations and modeling
- Give written directions to

- supplement verbal directions
- Familiarize student with new vocabulary before beginning lesson
- Utilize visual aids and graphic organizers

- Utilize manipulative, hands-on activities
- Provide graph paper for computation
- Additional time to complete

- activities/assignments/projects/assessments
- Modify or provide an option for alternative

- activities/assignments/projects/assessments
- Small Group Instruction/Intervention/Remediation
- Individual Intervention/Remediation
- Additional Support Materials/ Online resources
- Guided Notes or copy of teacher notes
- Review prerequisite skills
- After School Tutoring
- Chunk activities/assignments/projects/assessments into manageable units

- Familiarize student with new vocabulary before beginning lesson
- Utilize visual aids and graphic organizers
- Utilize manipulative, hands-on activities

● Adaptive Strategy- Adjusting strategies for ESL students:  
<http://www.teachersfirst.com/content/esl/adaptstrat.cfm>

● Additional Support Materials / Online resources  
 ● Guided Notes or copy of teacher notes  
 ● Review prerequisite skills  
 ● <http://www.wida.us/sandar>

[ds/elp.aspx](#)

- Utilize exploratory connections to higher grade concepts
  - Modify Content
- Adjust Pacing of Content
- Small Group Enrichment
- Individual Enrichment
  - Higher-Level Text
- Provide whole group enrichment explorations
  - Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Propose independent projects based on individual interests
- Additional Support Materials / Online resources
- After school clubs

- Tiered centers
- Tiered assignments
- Provide concrete examples for homework/classwork assignments
- Give additional presentations by varying the methods using repetition, simpler explanations and modeling
- Give written direction to supplement verbal directions
- Familiarize student with new vocabulary before beginning lesson
- Utilize visual aids and graphic organizers
- Utilize manipulative, hands-on activities
  - Provide graph paper for computation
- Additional time to complete activities/assignments/projects/assessments
- Modify or provide an option for alternative activities/assignments/projects/assessments
- Small Group Instruction/Intervention/Remediation
- Individual Intervention/Remediation
  - Additional Support Materials/ Online resources

- Allow student to receive reading text in various forms (written, verbal,

audio) or on a lower reading level

- Allow student to make test corrections or retake assessment
- Adjust Pacing of Content
- See IEPs of students for specific modifications

#### Vocabulary Ongoing Modifications

- Guided Notes or copy of teacher notes
- Review prerequisite skills • After School Tutoring
- Chunk activities/assignments/projects/assessments into manageable units
- Allow student to receive reading text in various forms (written, verbal, audio) or on a lower reading level
- Allow student to make test corrections or retake assessment
- Adjust Pacing of Content
- See 504 plan for specific accommodations

[aspx](#)

Differentiated centers

Extra time on task

Limited # of items

ELL:

<http://www.wida.us/standards/elp.aspx>

Building the language of mathematics

<http://maccss.ncdpi.wikispaces.net/file/view/2014+Building+Vocabulary.pdf>

Georgia Department of Education Grade 3 Intervention Table

<https://www.georgiastandards.org/Georgia-Standards/Pages/Math-K-5>

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NJ Model Curriculum:

<https://www.state.nj.us/education/bilingual/curriculum/>

Achieve the Core:

<https://achievethecore.org/aligned/ccss-aligned-materials-for-ell-students/>

#### Instructional Best Practices and Exemplars

This is the initial experience students will have with fractions and instruction is best implemented over time. Students need many opportunities to discuss fractional parts using concrete models to develop familiarity and understanding of fractions. Expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8. Understanding that a fraction is a quantity formed by part of a whole is essential to number sense with fractions. Fractional parts are the building blocks for all fraction concepts. Students need to relate dividing a shape into equal parts and representing this relationship on a number line, where the equal parts are between two whole numbers.

Help students plot fractions on a number line, by using the meaning of the fraction. For example, to plot  $\frac{4}{5}$  on a number line, there are 5 equal parts with 4 copies of one of the 5 equal parts.

Students have experience in telling and writing time from analog and digital clocks to the hour and half hour in Grade 1 and to the nearest five minutes, using a.m. and p.m. in Grade 2. Now students will tell and write time to the nearest minute and measure time intervals in minutes.

Provide geared analog clocks that allow students to move the minute hand. Students need experience representing time from a digital clock to an analog clock and vice versa. Provide word problems involving addition and subtraction of time intervals in minutes. Have students represent the problem on a number line. Student should relate using the number line with subtraction from Grade 2.

Provide opportunities for students to use appropriate tools to measure and estimate liquid volumes in liters only and masses of objects in grams and kilograms. Students need practice in reading the scales on measuring tools since the markings may not always be in intervals of one. The scales may be marked in intervals of two, five or ten. Allow students to hold gram and kilogram weights in their hand to use as a benchmark. Use water colored with food coloring so that the water can be seen in a beaker.

Students should estimate volumes and masses before actually finding the measuring. Show students a group containing the same kind of objects. Then, show them one of the objects and tell them its weight. Fill a container with more objects and ask students to estimate the weight of the objects. Use similar strategies with liquid measures. Be sure that students have opportunities to pour liquids into different size containers to see how much liquid will be in certain whole liters. Show students containers and ask, “How many liters

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do you think will fill the container?” If making several estimates, students should make an estimate, then the measurement and continue the process of estimating measure rather than all estimates and then all measures. It is important to provide feedback to students on their estimates by using measurement as a way of gaining feedback on estimates.

The focus now is on identifying and describing properties of two-dimensional shapes in more precise ways using properties that are shared rather than the appearances of individual shapes. These properties allow for generalizations of all shapes that fit a particular classification. Development in focusing on the identification and description of shapes’ properties should include examples and non-examples, as well as examples and non-examples drawn by students of shapes in a particular category.

### **Interdisciplinary Connections Technology Integration**

- Language Arts - Interactive Student Notebook
- Language Arts- reading comprehension (decoding words, vocabulary study), problem solving (“problem of the day”, word problems, identifying important information), writing (“writing to explain” mathematical thinking)
- Language Arts- Students will use reading comprehension skills to problem

solve and effectively explain their mathematical thinking in written form using mathematical terms

- Language Arts: Students will connect everyday vocabulary to strengthen their understanding of mathematical terms
- Science- representing data, discovering patterns, reading temperature to analyze climates
- Science- utilizing measuring tools to create model, utilizing measurement tools to measure results of an experiment, analyzing

data to form new theories, choosing the “best” way to represent data, using data to prove a theory

- Science: Students will collect and analyze data and make calculations involving measurements and other data across all modules (Life Science, Physical Science, Earth Science ● Social Studies- understand how to read dates properly
  - **8.1.5.A.1** Select and use the appropriate digital tools and resources to

accomplish a variety of tasks including solving problems ● **8.1.5.A.3** Use a graphic organizer to organize information about problem or issue.

- **8.2.5.C.4** Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- **8.2.5.D.3** Follow step by step directions to assemble a product or solve a problem

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**Grade 3: Interdisciplinary Connections**

\_\_\_ Language Arts \_\_\_ Science \_\_\_ Social Studies \_\_\_ World Languages \_\_\_ Arts

**21<sup>st</sup> Century Themes**

\_\_\_ Global Awareness \_\_\_ Financial, Economic, Business and Entrepreneurial Literacy \_\_\_ Civic Literacy \_\_\_ Health Literacy \_\_\_ Environmental Literacy

**21<sup>st</sup> Century Life and Careers Standards**

**Career Ready Practices:**

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse

9.4.5.DC.1: Explain the need for and use of copyrights

perspectives to expand one’s thinking about a topic of curiosity  
(e.g., 8.2.5.ED.2, 1.5.5.CR1a)

9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6)

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2)

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1)

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3)

9.4.5.DC.3: Distinguish between digital images that can be reused freely and those that have copyright restrictions.

9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2)

9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors.

9.1.5.EG.3: Explain the impact of the economic system on one’s personal financial goals.

9.1.5. EG.5: Identify sources of consumer protection and assistance..

**Unit 4 Grade 3- Representing Data**

Unit 4 Grade 3- Representing Data		
<b>Content Standards</b>	<b>Suggested Standards for Mathematical Practice and P21 Skills</b>	<b>Critical Knowledge &amp; Skills</b>

<ul style="list-style-type: none"> <li>● 3.MD.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. <i>For example, draw a bar graph in which each square in the bar graph might represent 5 pets.</i></li> </ul>	<p>MP.1 Make sense of problems and persevere in solving them.  MP.2 Reason abstractly and quantitatively.  MP.4 Model with mathematics.</p> <p>Critical Thinking and Problem Solving  Creativity and Innovation  Communication and Collaboration</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Graphs organize information and contain labels.</li> <li>● Pictures and bars can represent numbers in graphs.</li> <li>● Different graphs may display different scales.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● draw scaled picture graphs.</li> <li>● draw scaled bar graphs.</li> <li>● analyze, interpret and create bar graphs and pictographs in real world situations.</li> <li>● solve “how many more” and “how many less” problems using scaled bar graphs.</li> </ul> <p>Learning Goal 1: Draw scaled picture and scaled bar graphs to represent data with several categories. Solve one and two-step word problems using scaled bar graphs.</p>
<ul style="list-style-type: none"> <li>● 3.MD.B.4. Generate measurement data by measuring lengths using rulers marked with halves and</li> </ul>	<p>MP.2 Reason abstractly and quantitatively.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Show measurements on a line plot displays the information in an organized way</li> </ul> <p>Students are able to:</p>

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<p>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.</p>	<p>MP.5 Use appropriate tools strategically.</p> <p>Critical Thinking and Problem Solving  Creativity and Innovation  ICT Literacy</p>	<ul style="list-style-type: none"> <li>● measure length using rulers marked with inch, quarter inch and half inch</li> <li>● generate measurement data by measuring length and create a line plot of the data</li> <li>● accurately measure several small objects using a standard ruler and display findings on a line plot</li> <li>● display data on line plots with horizontal scales in whole numbers, halves, and quarters</li> </ul> <p>Learning Goal 2: Depict data measured in fourths and halves of an inch with a line plot with scales marked with appropriate units</p>
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<ul style="list-style-type: none"> <li>● 3.OA.C.7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that <math>8 \times 5 = 40</math>, one knows <math>40 \div 5 = 8</math>) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. *(benchmarked)</li> </ul>	<p>MP 2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration</p>	<p>Concept(s): No new concept(s) introduced Students are able to:</p> <ul style="list-style-type: none"> <li>● multiply and divide <u>within 100</u> with accuracy and efficiency.</li> </ul> <p>Learning Goal 3: Fluently multiply and divide <u>within 100</u> using strategies such as the relationship between multiplication and division.</p>
<ul style="list-style-type: none"> <li>● 3.OA.D.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. *(benchmarked)</li> </ul>	<p>MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning of others. MP 4. Model with mathematics MP.5 Use appropriate tools strategically. MP.6 Attend to precision.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation Communication and Collaboration ICT Literacy</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● A letter or variable in an equation represents an unknown quantity.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● represent two-step word problems with equation(s) containing unknowns.</li> <li>● perform operations in the conventional order (no parentheses).</li> <li>● use rounding as an estimation strategy.</li> <li>● explain, using an estimation strategy, whether an answer is reasonable.</li> </ul> <p>Learning Goal 4: Write equation(s) containing an unknown and find the value of an unknown in an equation that is a representation of a two-step word problem (with any four operations); use estimation strategies to assess the reasonableness of answers.</p>

<ul style="list-style-type: none"> <li>● 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. *(benchmarked)</li> </ul>	<p>MP 2 Reason abstractly and quantitatively.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation</p>	<p>Concept(s): No new concept(s) introduced Students are able to:</p> <ul style="list-style-type: none"> <li>● add and subtract <u>within 1000</u> with accuracy and efficiency.</li> </ul> <p>Learning Goal 5: Fluently add and subtract <u>within 1000</u> using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.</p>
<ul style="list-style-type: none"> <li>● 3.MD.C.7. Relate area to the operations of multiplication and addition.</li> </ul> <p>3.MD.C.7d. 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. *(benchmarked)</p>	<p>MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.</p> <p>Critical Thinking and Problem Solving Creativity and Innovation</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> <li>● Areas of rectilinear figures can be determined decomposing the them into non-overlapping rectangles and adding the areas of the parts.</li> </ul> <p>Students are able to:</p> <ul style="list-style-type: none"> <li>● decompose rectilinear figures into non-overlapping rectangles.</li> <li>● find areas of non-overlapping rectangles and add to find the area of the rectilinear figure.</li> <li>● solve real world problems involving area of rectilinear figures.</li> </ul> <p>Learning Goal 6: Solve real world problems involving finding areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts.</p>

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#### Unit 4 Grade 3 Representing Data

##### District/School Formative Assessment Plan District/School Summative Assessment Plan

Released item sets

<https://sites.google.com/site/releaseditemsets/>

Illuminations <https://illuminations.nctm.org/>

formative assessment material- Engageny.org under their New York State Mathematics Curriculum Materials:

TenMarks <https://www.tenmarks.com/>

<https://www.engageny.org/sites/default/files/resource/attachments/g3-m1-full-module.pdf>

LearnZillion <https://learnzillion.com/p/>

Waggle <https://gogetwaggle.com/> (school subscription required)

NC 3-5 Instructional and Assessment Tasks for the CCSS in Mathematics <http://3-5ctask.ncdpi.wikispaces.net/Third+Grade+Tasks>

Eureka Math <https://greatminds.org/math/curriculum>

Teaching Ideas  
<http://www.teachingideas.co.uk/subjects/maths>

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Watch Know Learn videos  
<http://www.watchknowlearn.org/Category.aspx?CategoryID=81>

Kids Numbers <http://kidsnumbers.com/>

Math Playground <http://www.mathplayground.com/>

IXL <https://www.ixl.com/>  
Benchmarks

Chapter tests

Performance tasks Extended projects PARCC

Basic facts drill tests  
Fun Brain <https://www.funbrain.com/math-zone>

<http://www.multiplication.com/>

Classwork

Exit tickets

White boards

Individual and group work

Math journals

**Benchmark Assessment Alternative Assessment**

Renaissance/STAR

Benchmark Assessment within Envision/Go Math/Eurek/iReady

MAP Testing

State Testing Results

DRA Assessment

Teacher Created Assessments Performance Based Assessments

Extension Projects

### Focus Mathematical Concepts- Representing Data

Prerequisite skills:

2.G.A.1  
2.G.A.3  
2.MD.C.8  
2.MD.D.9  
2.MD.D.10  
2.OA.B.2\*

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2.NBT.B.5\*

Common Misconceptions:

Although intervals on a bar graph are not in single units, students count each square as one. To avoid this error, have students include tick marks between each interval. Students should begin each scale with 0. They should think of skip- counting when determining the value of a bar since the scale is not in single units.

Students think that when they are presented with a drawing of a rectangle with only two of the side lengths shown or a problem situation with only two of the side lengths provided, these are the only dimensions they should add to find the perimeter. Encourage students to include the appropriate dimensions on the other sides of the rectangle. With problem situations, encourage students to make a drawing to represent the situation in order to find the perimeter.

Number Fluency:

3.OA. -Multiply/Divide within 100. By the end of the year, know from memory all products of two one digit numbers.  
3.NBT.A.2- Add/Subtract within 1000

### District/School Tasks District/School Primary and Supplementary Resources

PARCC released items

<https://prc.parcconline.org/assessments/parcc-released-items>

PARCC practice tests

<https://parcc.pearson.com/practice-tests/math/>

Math release set folder- contains two Word docs

<https://sites.google.com/site/releaseditemsets/home/math-release-1>

NC tasks/assessments

<http://3-5cctask.ncdpi.wikispaces.net/>

Framework for 21<sup>st</sup> Century Learning

<http://www.p21.org/our-work/p21-framework>

NJDOE-21<sup>st</sup> Century Life and Careers

<http://www.state.nj.us/education/aps/cccs/career/>

Arizona flip book

<http://www.katm.org/flipbooks/3%20FlipBook%20Final%20CCSS%202014.pdf>

North Carolina wikispaces

<http://maccss.ncdpi.wikispaces.net/Elementary>

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Georgia Department of Education Grade 3

<https://www.georgiastandards.org/Georgia-Standards/Pages/Math-K-5.aspx>

“What’s in a Name? – Creating Pictographs”, NCTM, Illuminations. This is a series of lesson in which student use data tools, one of which is pictographs answer questions about the data set. <http://illuminations.nctm.org/LessonDetail.aspx?id=U151>

TECHNOLOGY CONNECTION:

<http://catalog.mathlearningcenter.org/apps/geoboard>

Geoboard

<http://www.mathcats.com/explore/polygons.html>

Explore Polygons

<http://www.math-play.com/Polygon-Game.html>

Name the Shape

### Essential questions

How are tables, bar graphs, and line plot graphs useful ways to display data?

How can you use graphs to answer a question?

How can surveys be used to collect data?

How can surveys be used to gather information?

How can graphs be used to display data gathered from a survey?

### Special Education Students English Language Learners Students at Risk of School Failure Gifted and Talented Students Students with 504 Plans

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- Provide a checklist for long, detailed tasks
- Use concrete examples of concepts before teaching the abstract
- Highlight important concepts to be learned in text of material ● Provide concrete examples for homework/class work assignments
- Give additional presentations by varying the methods using repetition, simpler explanations and modeling
- Give written directions to supplement verbal directions ● Familiarize student with new vocabulary before beginning lesson
- Utilize visual aids and graphic organizers
- Utilize manipulative, hands-on activities
  - Provide graph paper for computation
- Additional time to complete activities/assignments/projects/assessments
- Modify or provide an option for alternative activities/assignments/projects/assessments
- Use enVision Spanish Resources ● Provide text to speech for math problems
- Use of translation dictionary or software
- Confer frequently
- Adapt a Strategy-Adjusting strategies for ESL students: <http://www.teachersfirst.com/content/esl/adaptstrat.cfm>
- Familiarize student with new vocabulary before beginning lesson
- Utilize visual aids and graphic organizers
- Utilize manipulative, hands-on activities
  - Additional Support Materials/ Online resources
- Guided Notes or copy of teacher notes
- Review prerequisite skills ● <http://www.wida.us/standards/elp.aspx>
- Tiered interventions following RTI framework
- RTI Intervention Bank ● NJDOE resources
  - Utilize online resources such as [www.tenmarks.com](http://www.tenmarks.com)
- EnVision K-5 intervention supports
- Modify activities/assignments/projects/assessments
- Provide an option for alternative activities/assignments/projects/assessments
- Provide higher-order questioning and discussion opportunities ● Utilize exploratory connections to higher grade concepts
  - Modify Content
  - Adjust Pacing of Content ● Small Group Enrichment ● Individual Enrichment
  - Higher-Level Text
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts ● Organize integrated problem-solving simulations ● Propose interest-based extension activities
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Propose independent projects based on individual interests
- Provide a checklist for long, detailed tasks
- Use concrete examples of concepts before teaching the abstract
- Highlight important concepts to be learned in text of material ● Provide concrete examples for homework/class work assignments
- Give additional presentations by varying the methods using repetition, simpler explanations and modeling
- Give written directions to supplement verbal directions ● Familiarize student with new vocabulary before beginning lesson
- Utilize visual aids and graphic organizers
- Utilize manipulative, hands-on activities
  - Provide graph paper for computation
- Additional time to complete activities/assignments/projects/assessments
- Modify or provide an option for alternative activities/assignments/projects/assessments

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- Small Group Instruction/Intervention/Remediation
- Individual Intervention/Remediation
- Additional Support Materials/ Online resources
- Guided Notes or copy of teacher notes
- Review prerequisite skills
- After School Tutoring
- Chunk activities/assignments/projects/assessments into manageable units
- Allow student to receive reading

text in various forms (written, verbal, audio) on a lower reading level

- Allow student to make test corrections or retake assessment
- Adjust Pacing of Content
- See IEPs of students for specific modifications

**Vocabulary Ongoing Modifications**

- Additional Support Materials/ Online resources
- After school clubs
- Tiered centers

<http://maccss.ncdpi.wikispaces.net/file/view/2014+Building+Vocabulary.pdf>

Georgia Department of Education Grade 3 Intervention Table

<https://www.georgiastandards.org/Georgia-Standards/Pages/Math-K-5.aspx>

- Tiered assignments
- Small Group Instruction/Intervention/Remediation
- Individual Intervention/Remediation
- Additional Support Materials/ Online resources
- Guided Notes or copy of teacher notes
- Review prerequisite skills • After School Tutoring
- Chunk activities/assignments/projects/assessments into manageable units
- Allow student to receive reading text in various forms (written, verbal, audio) on a lower reading level
- Allow student to make test corrections or retake assessment • Adjust Pacing of Content • See 504 plan for specific accommodations

Building the language of mathematics

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Differentiated centers

Extra time on task

Limited # of items

ELL:

<http://www.wida.us/standards/elp.aspx>

NJ Model Curriculum:

<https://www.state.nj.us/education/bilingual/curriculum/>

Achieve the Core:

<https://achievethecore.org/aligned/ccss-aligned-materials-for-ell-students/>

### **Instructional Best Practices and Exemplars**

Representation of a data set is extended from picture graphs and bar graphs with single-unit scales to scaled picture graphs and scaled bar graphs. Intervals for the graphs should relate to multiplication and division with 100 (product is 100 or less and numbers used in division are 100 or less).

In picture graphs, use values for the icons in which students are having difficulty with multiplication facts. For example, represents 7 people. If there are three, students should use known facts to determine that the three icons represent 21 people. The intervals on the vertical scale in bar graphs should not exceed 100. Students are to draw picture graphs in which a symbol or picture represents more than one object). Bar graphs are drawn with intervals greater than one.

Ask questions that require students to compare quantities and use mathematical concepts and skills. Use symbols on picture graphs that student can easily represent half of, or know how many half of the symbol represents.

Students are to measure lengths using rulers marked with halves and fourths of an inch and record the data on a line plot. The horizontal scale of the line plot is marked off in whole numbers, halves or fourths. Students can create rulers with appropriate markings and use the ruler to create the line plot.

Students can cover rectangular shapes with tiles and count the number of units (tiles) to begin developing the idea that area is a measure of covering. Area describes the size of an object that is two-dimensional. The formulas should not be introduced before students discover the meaning of area. The area of a rectangle can be determined by having students lay out unit squares and count how many square units it takes to completely cover the rectangle completely without overlaps or gaps. Students need to develop the meaning for

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computing the area of a rectangle. A connection needs to be made between the number of squares it takes to cover the rectangle and the dimensions of the rectangle. Ask questions such as:

- What does the length of a rectangle describe about the squares covering it?
- What does the width of a rectangle describe about the squares covering it?

### **Interdisciplinary Connections Technology Integration**

- Language Arts - Interactive Student Notebook
- Language Arts- reading comprehension (decoding words, vocabulary study), problem solving (“problem of the day”, word problems, identifying important information), writing (“writing to explain” mathematical thinking)
- Language Arts- Students will use reading comprehension skills to problem solve and effectively explain their mathematical thinking in written form using mathematical terms
- Language Arts: Students will connect everyday vocabulary to



strengthen their understanding of mathematical terms • Science- representing data, discovering patterns, reading temperature to analyze climates

- Science- utilizing measuring tools to create model, utilizing measurement tools to measure results of an experiment, analyzing data to form new theories, choosing the “best” way to represent data, using data to prove a theory
- Science: Students will collect and analyze data and make calculations involving measurements and other data across all modules (Life Science, Physical Science, Earth Science • Social Studies- understand how to read dates properly

- **8.1.5.A.1** Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems
- **8.1.5.A.3** Use a graphic organizer to organize information about problem or issue.
- **8.2.5.C.4** Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- **8.2.5.D.3** Follow step by step directions to assemble a product or solve a problem