Next Generation Math Standards----Grade 3

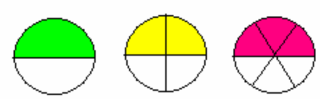
Cognitive Complexity/Depth of Knowledge Rating: Low, Moderate, High

BIG IDEAS (3)

BIG IDEA 1: Develop understandings of multiplication and division and strategies for basic multiplication facts and related division facts.

Benchmark	Description	Clarification	Content Limits
MA.3.A.1.1 Moderate	Model multiplication and division including problems presented in context: repeated addition, multiplicative comparison, array, how many combinations, measurement, and partitioning.	Students will identify models of and/or solve problems involving multiplication and/or division situations. **Repeated addition:** 4 bags of cookies with 8 in each bag. How many cookies are there? **Multiplicative comparison**: Sam has 8 baseball cards. Elise has 8 times as many. How many does Elise have? **Array:** A marching band has 8 rows with 7 students in each row. How many band members are marching? **Combination:** Patrick is getting dressed for school. He has 4 different colored shirts; blue, red, yellow and green. He has blue, tan and black shorts. How many combinations of a shirt and a pair of shorts can he make? Measurement: There are 35 bugs. You will put 5 bugs in each jar. How many jars will you need? **Partitive:** You have 72 coins and 9 jars. If you want to place an equal number of coins in each jar, how many coins will you put in each jar? **Other examples might include:** Finding number of squares (**area**) of wrapping paper; **using rate models**, e.g., traveling 6 miles each day for 3 days; **showing how** 4 x 6 can be represented by 6 + 6 + 6 + 6 or 6 x 4 can be represented by 4 + 4 + 4 + 4 + 4 + 4.	**Items may include:** • Whole-number multiplication facts from 0 x 0 through 9 x 9 and the related division facts. • Division problems with remainders expressed only as whole numbers. Items will not require interpretation of the remainder.
MA.3.A.1.2 High	Solve multiplication and division fact problems by using strategies that result from applying number properties.	Students will recognize equivalent representations of equations or expressions by using number properties, including the commutative, associative, distributive, and identity properties for multiplication and division and the zero property of multiplication. **Example:** 8 x 6 can be solved by finding 4 x 6 then doubling the product. This strategy uses the Associative Property in that 8 x 6 = 2 x (4 x 6). The Distributive Property is applied to 7 x 8 when we find 5 x 8 and add it to 2 x 8. 7 x 8 = (5 + 2) x 8 = (5 x 8)+(2 x 8). **Example:** 14 x 5 can be solved as follows. (10+4) x 5= (10 x 5) + (4 x 5) = 50 + 20 = 70. **Example:** 19 x 5 = (20 -1) x 5 = (20 x 5) - (5 x 1) = 100 - 5 = 95.	**Items may include:** • Only factors or divisors of 0 through 9. **Items will not:** • Include identifying the properties by name. • Require the use of more than two properties to convert one expression or equation to its equivalent.
MA.3.A.1.3 Moderate	Identify, describe, and apply division and multiplication as inverse operations.	Students will identify the inverse of a multiplication or division equation. Students will apply the inverse property to solve real-world problems and to check the solution of a problem involving multiplication or division. **Example:** Twenty-four children are going to the circus in 6 cars. How many children can ride in each car, with the same number of children in each car? Which of the following number sentences can be used to solve this problem? a) 24 - 6 = __ b) 24 + 6 = __ c) __ ÷ 6 = 24 d) 6 x __ = 24	**Items may include:** • Whole-number multiplication facts from 0 x 0 through 9 x 9 and the related division facts. **Items will not:** • Include identifying the inverse property by name.

BIG IDEA 2: Develop an understanding of fractions and fraction equivalence.

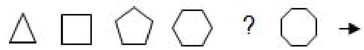
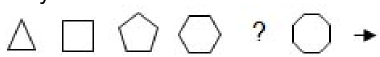
Benchmark	Description	Clarification	Content Limits
MA.3.A.2.1 Moderate	Represent fractions, including fractions greater than one, using area, set, and linear models.	Students will represent a fraction or a mixed number by a graphic representation or identify a fraction or mixed number from its graphic representation. **Example:** Arvin ate ½ of a pizza. April ate ½ of a pizza. Arvin claimed that he ate more pizza than April did. Show that Arvin's claim can be correct.	**Area models** may include shapes such as circles and rectangles. **Set models** may include groups of objects such as counters or other objects familiar to Grade 3 students. **Linear models** may include number lines and fraction strips. **Items may include:** • Fractions and mixed numbers up to and including the whole number 5. • Fractions with denominators from 1 through 10, 12, or 16.
MA.3.A.2.2 Moderate	Describe how the size of the fractional part is related to the number of equal sized pieces in the whole.	**Remark:** For instance, "As the number of equal parts increases, the size of each fractional part decreases." Fractions can also be compared by looking at numerators, such as when comparing 1/5 and 1/6. Since both fractions represent one part of a whole, the size of the parts can be compared. Fifths are larger than sixths so 1/5 is greater than 1/6.	BENCHMARK MISSING FROM THE SPEC MANUAL
MA.3.A.2.3 Moderate	Compare and order fractions, including fractions greater than one, using models and strategies.	Students will compare or order fractions using graphic representations or other strategies, such as benchmark fractions (0, ¼, ⅓, ½, ¾, and 1). **Remark:** Strategies include using benchmark fractions and common numerators and denominators. Typical benchmarks for comparing fractions are 0, 1/2, and 1. Fractions can also be compared by looking at numerators, such as when comparing 2/5 and 2/6. Since both fractions represent two parts of a whole, the size of the parts can be compared. Fifths are larger than sixths so 2/5 is greater than 2/6.	Denominators of fractions must be 1 through 10, 12, or 16. **Items may include:** • Fractions and mixed numbers up to and including the whole number 5. • Only the inequality symbols, < and >.
MA.3.A.2.4 Moderate	Use models to represent equivalent fractions, including fractions greater than 1, and identify representations of equivalence.	**Example:** Use your fraction circle set to come up with different combination of the same sized pieces that represent 1/2 of a circle.  $\frac{1}{2}=\frac{2}{4}=\frac{3}{6}$	Denominators of fractions must be 1 through 10, 12, or 16. **Items may include:** • Fractions and mixed numbers up to and including the whole number 5.

BIG IDEA 3: Describe and analyze properties of two-dimensional shapes.

Benchmark	Description	Clarification	Content Limits
MA.3.G.3.1 Moderate	Describe, analyze, compare, and classify two-dimensional shapes using sides and angles - including acute, obtuse, and right angles - and connect these ideas to the definition of shapes.	**Example:** Polygonal shapes can be classified by the number of sides. For example, quadrilaterals are polygons with four sides. Quadrilaterals can be further classified by other properties, such as the number of parallel pairs of sides (none, one pair or two pair). In the case of two pair of parallel sides, we call it a parallelogram. **Note:** Angles are classified by comparing them to a right angle as a benchmark. Students should be familiar with the geometric term "diagonal."	**Items may include:** • Regular and irregular polygons with 3, 4, 5, 6, 8, or 10 sides. • Polygons used in items may be concave or convex. • Polygons used in items may include types of triangles (right, equilateral, isosceles, and scalene), types of quadrilaterals (parallelogram, trapezoid, rectangle, rhombus, square, and/or kite), pentagons, hexagons, octagons, and decagons. • Polygons may be classified by use of parallel or perpendicular sides as well as number of sides and/or types of angles. • Items may assess the specific names of polygons with 3, 4, 5, 6, 8, or 10 sides and the following terms: *regular* and *irregular polygons*, *lines and line segments (parallel and perpendicular)*, *diagonals*, and *vertices* (vertex). **Items will not:** • Include defining or identifying the following vocabulary terms: *concave* and *convex*. • Types of angles will not be assessed in isolation at this benchmark.
MA.3.G.3.2 High	Compose, decompose, and transform polygons to make other polygons, including concave and convex polygons with three, four, five, six, eight, or ten sides.	Students will identify polygons which have been composed or decomposed from other polygons. Students may use transformations to compose or decompose polygons. **Example:** With pattern blocks, a trapezoid and a triangle can be combined to form a parallelogram or a large triangle. Also, the hexagon can be decomposed to form two trapezoids, and so forth. **Example:** One can cut a triangle off of a parallelogram so that, when translated and attached to the other side, the parallelogram becomes a rectangle.	**Items may include:** • Concave or convex polygons with 3, 4, 5, 6, 8, or 10 sides. • The use of transformations to create new polygons, but the transformation (i.e., rotations, translations, reflections, dilations) will not be assessed. • Geometric terms will be used with common terminology set in parentheses, i.e., *reflection (flip)*. • (May use) The following terms: *overlapping*, *combine*, and *polygon*. **Items will not:** • Assess the following vocabulary terms: *concave*, *convex*, *compose*, or *decompose*.
MA.3.G.3.3 Moderate	Build, draw, and analyze two-dimensional shapes from several orientations in order to examine and apply congruence and symmetry.	Students will identify lines of symmetry and/or reflections. Students will identify congruent polygons. Students will identify two-dimensional shapes composed of congruent polygons. **Example:** Draw a line of symmetry for each of the following:  Symmetry mainly includes reflectional symmetry at grade 3. Students should explore that reflectional symmetry produces congruent shapes.	**Items may include:** • Concave and convex polygons with 3, 4, 5, 6, 8, or 10 sides. • (Should use) the correct geometric term with common terminology set in parentheses, i.e., *reflection (flip)*. • (May assess) The following terms: *symmetry*, *reflection*, and/or *congruent*. **Transformations may be used in graphics; however, the transformations needed to compose or decompose polygons (*rotations, translations, dilations*) will not be assessed.**

SUPPORTING IDEAS (3)

SUPPORTING IDEA 4: Algebra

Benchmark	Description	Clarification	Content Limits
MA.3.A.4.1 High	Create, analyze, and represent patterns and relationships using words, variables, tables, and graphs.	Students may extend numeric or graphic patterns beyond the next step, or find one or more missing elements in a numeric or graphic pattern. Students will identify the rule for a pattern or the relationship between numbers. **Example:** Look at the pattern below. Tell in your own words what shape is missing. Explain.  A possible answer would be a seven sided regular polygon because the number of side is increasing by one from left to right. Another possible answer is some polygon with pointy top because the pattern in the top of the shapes is pointy, flat, pointy, flat,... Example: In the sequence of shapes below, the triangle is shape 1 and the square is shape 2. How many sides would the 10th shape have? How do you know? 	**Items may:** • Use numeric patterns, graphic patterns, function tables, or graphs (bar graphs, pictographs, or line plots only). **Numeric patterns should be shown with three or more elements. Graphic patterns should be shown with at least three examples of the pattern repeated.** **Items will not:** • Include extending the pattern on a bar graph or pictograph. • (Should not) Ask students to extend the pattern more than three steps beyond what is given or to provide more than three missing elements. **Rules for numeric patterns** and relationships shown in function tables must include only one operation limited to addition, subtraction, or multiplication. When the operation of multiplication is used, the rule is limited to the multiplication facts of 0 x 0 through 9 x 9. **Function rules or relationships** may be described using words, tables, graphs, or expressions using variables or geometric shapes (e.g., n, □, Δ); however, the intent of the benchmark is not to assess solving equations.

SUPPORTING IDEA 5: Geometry and Measurement

Benchmark	Description	Clarification	Content Limits
MA.3.G.5.1 High	Select appropriate units, strategies, and tools to solve problems involving perimeter.	Students will solve real-world problems involving perimeter. **Example:** Find the perimeter of a football field.	**Items may:** • Require the student to use properties of polygons to deduce the lengths of a side or sides of a polygon given the perimeter and/or the lengths of the remaining sides of the polygon. (Polygons used in items must be convex with 3, 4, 5, 6, 8, or 10 sides or composed of composite rectangles.) • Require students to measure the sides of a polygon using a ruler. (The lengths of the sides of polygons must be whole numbers.) **Items will not:** • Include conversions between units of measure.
MA.3.G.5.2 Low	Measure objects using fractional parts of linear units such as 1/2, 1/4, and 1/10.	Students will find the measure of objects to the nearest whole, ¼, ½, or ¾ of an inch. Students will find the measure of objects to the nearest whole millimeter and/or centimeter.	**Items will:** • Require students to measure objects using a ruler. Measurements will be less than 6 inches or 15 centimeters. **Items will not include:** • Conversions between units.
MA.3.G.5.3 Moderate	Tell time to the nearest minute and to the nearest quarter hour, and determine the amount of time elapsed.	Students will identify the time displayed on an analog clock to the nearest minute or quarter hour. **Remark:** Elapsed time may include days, weeks, months, years, decades, and centuries.	**Items may include:** • Determining elapsed time of days, weeks, months, or years. • For elapsed time greater than 1 hour and less than or equal to 24 hours, only increments of hours and half hours will be assessed. • For elapsed time less than 1 hour, only increments of quarter hours and 5 minutes will be assessed.

SUPPORTING IDEA 6: Number and Operations

Benchmark	Description	Clarification	Content Limits
MA.3.A.6.1 High	Represent, compute, estimate, and solve problems using numbers through hundred thousands.	Students will represent, identify, compare, and/or order numbers through the hundred thousands place in real-world contexts. Students will compute sums and differences of numbers through the hundred thousands. **Students may use some of the following estimation strategies:** chunking, using a reference, unitizing, benchmarks, clustering, reasonableness, compatible numbers, grouping, rounding, etc., when representing and computing numbers through the hundred thousands. **Remark:** Instructional focus should be placed on estimation through mental computation prior to written calculations.	Numbers may be represented flexibly; for example: 947 can be thought of as 9 hundreds, 4 tens, and 7 ones; 94 tens and 7 ones; or 8 hundreds, 14 tens, and 7 ones. **Items may include:** • The inequality symbols (>, <, =, ≠). • Decimals may be used in the context of money that estimate to a whole dollar. **Students will not** be expected to name the estimation strategies or be restricted to using a specific strategy. **Front-end estimation will not** be an acceptable estimation strategy.
MA.3.A.6.2 High	Solve non-routine problems by making a table, chart, or list and searching for patterns.	**Example:** A frog in a pit tries to go out. He jumps 3 steps up and then slides 1 step down. If the height of the pit is 21 steps, how many jumps does the frog need to make? **Example:** Show 5 different combinations of US coins that total 53¢. **Example:** The 24 chairs in the classroom are arranged in rows with the same number of chairs in each row. List all of the possible ways the chairs can be arranged.	**Items should:** • Require students to solve nonroutine problems and not align with the clarifications of MA.3.A.4.1 (extending a graphic pattern or identifying a simple relationship [rule] for a pattern).

SUPPORTING IDEA 7: Data Analysis

Benchmark	Description	Clarification	Content Limits
MA.3.S.7.1 High	Construct and analyze frequency tables, bar graphs, pictographs, and line plots from data, including data collected through observations, surveys, and experiments.	Students may identify the correct display of a given set of data. Students will analyze and draw conclusions about data displayed in the form of frequency tables, bar graphs, pictographs, and line plots. Students will analyze data to supply missing data in frequency tables, bar graphs, pictographs, and line plots. **Remark:** Use of addition, subtraction, multiplication, and division of whole numbers should be included during this process. At this grade level, students might analyze graphs with words such as most, least, minimum, and maximum to provide a conceptual foundation for the more formal terms such as mode and range that they will learn in later grades. The collected data and the intent of the data collection should help to determine the choice of data display.	**Items may:** • Require the student to choose the most appropriate data display given a set of data from observations, surveys, and/or experiments. • Assess identifying parts of a correct graph and recognizing the appropriate scale. (The increments used on the scale are limited to units of 1, 2, 5, 10, 50, or 100. Pictographs can use keys containing a scale of 1, 2, 5, or 10.) The data presented in graphs should represent no more than five categories. The total sample size for bar graphs should be no more than 1,000. The total sample size should be no more than 200 for frequency tables, pictographs, and line plots. Addition, subtraction, or multiplication of whole numbers may be used within the item.