Grade 3 Mathematics Curriculum Guide

Grade Level/Course Title: Grade 3	**Trimester 1**	**Academic Year:** 2014-2015

Grade Level Mathematics Focus:
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.

Essential Questions for this Unit:
1. How can students use place value understanding, properties of operations, and the relationship between addition and subtraction to fluently add and subtract within 1000?

Unit (Time)	Standard	Standard Description	Content	Resources
(Aug.-Sept.) **Unit 1:** **Place Value, Addition and Subtraction** **(Approx. 27 days)**	3.NBT.1	Use place value understanding to round whole numbers to the nearest 10 or 100.	• Decomposition by place value • Decomposition of whole numbers by addition • Using decomposition to add and subtract whole numbers • Using open number lines to represent multi-digit addition and subtraction • Using bar models to add and subtract multi-digit numbers • Inverse relationship between addition and subtraction • Commutative and associative properties of addition	**Number Sense and Place Value (10 days)** Lesson 1.1: Numbers and Number Sequences Plotting Numbers on a Number Line [L] Comparing Numbers on a Number Line [L] Lesson 1.2: Number Grids Lesson 1.3, 1.4: Introducing the *Student Reference* Book and Tools Lesson 1.5: Analyzing & Displaying Data Lesson 1.6: Equivalent Names Searching for Tens [L] **Review of Addition and Subtraction (5 days)** Lesson 1.8: Finding Differences Number Line Subtraction [L] Whole Number Operations [CP] Click on Adding and Subtracting Whole Numbers – Multiple Representations Lesson 1.10: Money Lesson 1.11: Solving Problems with Dollars and Sense Lesson 1.12: Patterns Lesson 2.1: Fact Families Fact Families [L]
	3.NBT.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.		

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Unit (Time)	Standard	Standard Description	Content	Resources
(Aug.-Sept.) **Unit 1:** **(Continued)** **Place Value, Addition and Subtraction** **(Approx. 27 days)**	3.NBT.1	Use place value understanding to round whole numbers to the nearest 10 or 100.	• Decomposition by place value • Decomposition of whole numbers by addition • Using decomposition to add and subtract whole numbers • Using open number lines to represent multi-digit addition and subtraction • Using bar models to add and subtract multi-digit numbers • Inverse relationship between addition and subtraction • Commutative and associative properties of addition	**Extension of Addition and Subtraction (10 days)** Lesson 2.2: Extensions of Addition and Subtraction Facts Lesson 2.3: What's My Rule? Lesson 2.4: Parts-and-Total Number Stories Lesson 2.5: Change Number Stories Lesson 2.6: Comparison Number Stories Multi-Step Word Problems [L] Lesson 2.7: The Partial-Sums Algorithm Adding Whole Numbers — Multiple Algorithms [L] Adding By Finding Tens [L] Sums to 10, 100, and 1,000 [L] Lesson 2.8: Subtraction Algorithm Subtracting Whole Numbers — Multiple Methods [L] Subtraction — Comparison Model [L] Lesson 2.9: Addition with Three or More Addends Parent Guide (English): Adding Whole Numbers — Multiple Methods Parent Guide (Spanish): Sumando Números Parent Guide (English): Subtracting Numbers — Multiple Methods Parent Guide (Spanish): Restando Números **Review, Assessment, Reteach (2 days)**
	3.NBT.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.		

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Essential Questions for this Unit:
1. How can 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; learning that multiplication is finding an unknown product, and division is finding an unknown factor in these situations?
2. How can students learn that for equal-sized group situations, division can require finding the unknown number of groups or the unknown group size?
3. How can 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?
4. How can students, by comparing a variety of solution strategies, learn the relationship between multiplication and division?

Unit (Time)	Standard	Standard Description	Content	Resources
(Sept.-Nov.) **Unit 2:** **Multiplication and Division** **(Approx. 32 days)**	3.OA.1	Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as* 5 × 7.	• Equal-sized groups • Repeated addition • Arrays • Area Models • Commutative Property • Associative Property • Importance of place value when multiplying • Partial Products • Distributive Property • Using open number lines to represent multiplication • Using bar models to represent multiplication • Using decomposition to multiply (any decomposition and by place value)	**Multiplication Concepts and Skills (15 days)** Area Model Through The Grades [CP] Lesson 4.1: Multiples of Equal Groups Lesson 4.2: Multiplication Arrays Lesson 4.3: Equal Shares and Equal Groups Lesson 4.4: Division Ties to Multiplication Lesson 4.5: Multiplication Fact Power and Shortcuts Multiplication Fact Mastery Through Multiple Methods [L] Lesson 4.6: Multiplication and Division Fact Families Properties of multiplication [L] Lesson 4.7: *Baseball Multiplication* Lesson 4.8: Exploring Arrays and Facts Optional review: Lesson 5.1: Place Value Lesson 5.2: Ordering Numbers
	3.OA.2	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56÷8.*		
	3.OA.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.		
	3.OA.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = __ ÷ 3, 6 × 6 = ?.		

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Essential Questions for this Unit:
1. How can 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; learning that multiplication is finding an unknown product, and division is finding an unknown factor in these situations?
2. How can students learn that for equal-sized group situations, division can require finding the unknown number of groups or the unknown group size?
3. How can 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?
4. How can students, by comparing a variety of solution strategies, learn the relationship between multiplication and division?

Unit (Time)	Standard	Standard Description	Content	Resources
(Sept.-Nov.) **Unit 2:** **(Continued)** **Multiplication and Division** **(Approx. 32 days)**	3.OA.5	Apply properties of operations as strategies to multiply and divide. *known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*	• Equal-sized groups • Repeated addition • Arrays • Area Models • Commutative Property • Associative Property • Importance of place value when multiplying • Partial Products • Distributive Property • Using open number lines to represent multiplication • Using bar models to represent multiplication • Using decomposition to multiply (any decomposition and by place value)	**Multiplication Extensions (7 days)** Lesson 7.1: Patterns in Products Lesson 7.2: Multiplication Facts Survey Lesson 7.3: Fact Power Multiplication Fact Mastery Through Multiple Methods [L] Lesson 7.4: Number Models with Parentheses Lesson 7.5: Scoring I Basketball: An application Lesson 7.6: Extended Facts: Multiplication and division Lesson 7.7: Estimating Costs Lesson 7.8: Extended Facts: Products of Tens Multiplying by Multiples of Ten [L] Lesson 7.9: Exploring Ratios and Geometric Figures Lesson 7.10: Progress Check
	3.OA.6	Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*		
	3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.		

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Essential Questions for this Unit:
1. How can 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; learning that multiplication is finding an unknown product, and division is finding an unknown factor in these situations?
2. How can students learn that for equal-sized group situations, division can require finding the unknown number of groups or the unknown group size?
3. How can 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?
4. How can students, by comparing a variety of solution strategies, learn the relationship between multiplication and division?

Unit (Time)	Standard	Standard Description	Content	Resources
(Sept.-Nov.) **Unit 2:** **(Continued)** **Multiplication and Division** **(Approx. 32 days)**	3.OA.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.	• Equal-sized groups • Repeated addition • Arrays • Area Models • Commutative Property • Associative Property • Importance of place value when multiplying • Partial Products • Distributive Property • Using open number lines to represent multiplication • Using bar models to represent multiplication • Using decomposition to multiply (any decomposition and by place value)	**More Multiplication, and Connections to Division (8 days)** Mastering the Multiplication Chart Through Student Talk [L] Lesson 9.1: Multiply & Divide with Multiples of 10, 100, and 1,000 Lesson 9.2: Using Mental Math to Multiply Lesson 9.3: Exploring Arrays, Areas, and Fractions Lesson 9.4: A Multiplication Algorithm Lesson 9.5: Buying at the Stock-Up Sale Multiplication Using the Distributive Property [L] Multiplication – One-Digit by Multi-Digit [L] Multiplication Selected Response Practice [L] Multiplying Whole Numbers – Generic Rectangle [L] Base-10 Multiplication and Division Part I [L] Base-10 Multiplication and Division Part II [L] **Review, Assessment, Reteach (2 days)** **BENCHMARK 1 (Units 1 through 2)**
	3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*		
	3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.		

Grade Level/Course Title: Grade 3	**Trimester 2**	**Academic Year:** 2014-2015

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

Unit (Time)	Standard	Standard Description	Content	Resources
(Dec.-Feb.) **Unit 3:** **Fractions** **(Approx. 37 days)**	3.NF.1	Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*.	• Meaning of numerator and denominator • Equivalent fractions • Equivalent forms of 1	**<u>Fraction Concepts (10 days)</u>** Lesson 8.1: Naming Parts with Fractions Fractions and Partitioning Shapes [L] Lesson 8.3: Exploring Fractions, Re-Forming Squares, and Combinations Lesson 8.4: Number-Line Posters for Fractions
	3.NF.2	Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.		

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

Unit (Time)	Standard	Standard Description	Content	Resources
(Dec.-Feb.) **Unit 3:** **(Continued)** **Fractions** **(Approx. 37 days)**	3.NF.3	3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram. d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	• Meaning of numerator and denominator • Equivalent fractions • Equivalent forms of 1	**Equivalent Fractions (25 days)** Lesson 8.5: Equivalent Fractions Recognizing and Generating Equivalent Fractions [L] Lesson 8.6: Comparing Fractions Comparing Fractions [L] Whole Numbers as Fractions [L] Fractions — Ordering and Introduction to Adding/ Subtracting [L] Lesson 8.7: Fractions Greater than ONE Lesson 8.8: Fractions in Number Stories Lesson 8.9: Progress Check **Review, Assessment, Reteach (2 days)**

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Essential Questions for this Unit:
1. How can students describe, analyze, and compare properties of two-dimensional shapes?
2. How can students compare and classify shapes by their sides and angles, and connect these with definitions of shapes?
3. How can students relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole?

Unit (Time)	Standard	Standard Description	Content	Resources
(Feb.) **Unit 4:** **Shapes and Attributes** **(Approx. 18 days)**	3.G.1	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	• Geometric attributes • Relationships among quadrilaterals • Concept of area	**Shapes and Attributes (15 days)** Lesson 6.4: Triangles Lesson 6.5: Quadrangles Lesson 6.6: Polygons Lesson 6.9: Symmetry Lesson 6.10: Congruence ~~and Decimals~~ Lesson 6.11: Polyhedrons – Part I Lesson 6.12: Polyhedrons – Part II Quadrilaterals [CP] Fractions and Partitioning Shapes [L] **Review, Assessment, Reteach (3 days)** **BENCHMARK 2 (Units 3 through 4)**
	3.G.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*		

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Essential Questions for this Unit:
1. How can students learn to recognize area as an attribute of two-dimensional regions?
2. How can students 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, with a square with sides of unit length being the standard unit for measuring area?
3. How can students understand that rectangular arrays can be decomposed into identical rows or into identical columns?
4. How can students connect area to multiplication by decomposing rectangles into rectangular arrays of squares, and justify using multiplication to determine the area of a rectangle?

Unit (Time)	Standard	Standard Description	Content	Resources
(March-April) **Unit 5:** **Length, Perimeter, Area** **(Approx. 25 days)**	3.MD.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.	• Concept of unit measurement • Relationship between area and multiplication	**Length (5 days)** Lesson 3.1: Class Shoe Unit of Length Lesson 3.2: Measuring with a Ruler (if possible, pre-cut rulers) Lesson 3.3: Standard Linear Measures **Perimeter and Area (10 days)** Lesson 3.4: Perimeter Lesson 3.6: Exploring Perimeter and Area Area and Perimeter — Decomposition [L] Discovering Area and Perimeter [L] Same Perimeter – Different Area [L] Same Area – Different Perimeter [L]
	3.MD.5	Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.		
	3.MD.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).		
	3.MD.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.		

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Unit (Time)	Standard	Standard Description	Content	Resources
(March-April) **Unit 5:** **(Continued)** **Length, Perimeter, Area** **(Approx.** **25 days)**	3.MD.7	Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths *a* and *b* + *c* is the sum of *a* × *b* and *a* × *c*. Use area models to represent the distributive property in mathematical reasoning. d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	Relationship between area and multiplication	**Relating Area to Multiplication (5 days)** Area Model Through The Grades [CP] Lesson 3.7: Area Lesson 3.8: Models for Area **Review, Assessment, Reteach (5 days)**

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Essential Questions for this Unit:
1. How can students develop concepts of measurements in time and volume?
2. How can students develop understanding and skill in representing and analyzing data in bar graphs?

Unit (Time)	Standard	Standard Description	Content	Resources
(May-June) **Unit 6:** **Measurement and Data** **(Approx. 25 days)**	3.MD.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.	• Time measurement • Volume measurement • Representing information in bar graphs • Analyzing data in bar graphs	**Time and Other Measurement (10 days)** Time on a Number Line [L] Lesson 10.2: Volume Lesson 10.3: Weight Lesson 10.4: Exploring Weight and Volume Lesson 10.5: Capacity Measurement [L] **Line Plots with Length (10 days)** Lesson 10.1: Review: Length Line Plots [L] **Review, Assessment, Reteach (5 days)** **BENCHMARK 3 (Units 5 through 6)** Optional: Lesson 10.8: Calculator memory Lesson 10.9: Frequency Distributions Lesson 11.1: The Length-of-Day Project Revisited Lesson 11.2: National High/Low Temperatures Summaries Lesson 11.3: Spinner Experiments Lesson 11.4: Designing Spinners Lesson 11.5: Using Data to Predict Outcomes
	3.MD.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). multiply, or divide to solve one-step word problems		
	3.MD.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*		
	3.MD.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.		