Fifth Grade Standards

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These are the standards for what is taught throughout the year in Fifth Grade. It is the expectation that these skills will be reinforced after they have been taught.

Mathematical Practice Standards Taught Throughout the Year		
1. Make sense of problems and persevere in solving them	**2. Reason abstractly and quantitatively**	**3. Construct viable arguments and critique the reasoning of others**
Students solve problems by applying their understanding of operations with whole numbers, decimals, and fractions including mixed numbers. They solve problems related to volume and measurement conversions. Students seek the meaning of a problem and look for efficient ways to represent and solve it. *For example, Sonia had 2 1/3 candy bars. She promised her brother that she would give him 1/2 of a candy bar. How much will she have left after she gives her brother the amount she promised?* They may check their thinking by asking themselves, "What is the most efficient way to solve the problem?", "Does this make sense?", and "Can I solve the problem in a different way?".	Fifth graders should recognize that a number represents a specific quantity. They connect quantities to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Students write simple expressions that record calculations with numbers and represent or round numbers using place value concepts. For example, students use abstract and quantitative thinking to recognize that $0.5 \times (300 \div 15)$ is 1/2 of $(300 \div 15)$ without calculating the quotient.	In Grade 5, students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain calculations based upon models and properties of operations and rules that generate patterns. They demonstrate and explain the relationship between volume and multiplication. 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. Students use various strategies to solve problems and they defend and justify their work with others. For example, two afterschool clubs are having pizza parties. The teacher will order 3 pizzas for every 5 students in the math club; and 5 pizzas for every 8 students in the student council. If

		a student is in both groups, decide which party he/she should to attend. How much pizza will each student get at each party? If a student wants to have the most pizza, which party should he/she attend?

Mathematical Practice Standards Taught Throughout the Year		
4. Model with mathematics	**5. Use appropriate tools strategically**	**6. Attend to precision**
Students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Fifth graders should evaluate their results in the context of the situation and whether the results make sense. They also evaluate the utility of models to determine which models are most useful and efficient to solve problems.	Fifth graders consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use unit cubes to fill a rectangular prism and then use a ruler to measure the dimensions. They use graph paper to accurately create graphs and solve problems or make predictions from real world data.	Students continue to refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning. Students use appropriate terminology when referring to expressions, fractions, geometric figures, and coordinate grids. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, when figuring out the volume of a rectangular prism they record their answers in cubic units.

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Mathematical Practice Standards Taught Throughout the Year	
7. Look for and make use of structure	**8. Look for and express regularity in repeated reasoning**
In Grade 5, students look closely to discover a pattern or structure. For instance, students use properties of operations as strategies to add, subtract, multiply and divide with whole numbers, fractions, and decimals. They examine numerical patterns and relate them to a rule or a graphical representation.	Fifth graders use repeated reasoning to understand algorithms and make generalizations about patterns. Students connect place value and their prior work with operations to understand algorithms to fluently multiply multi-digit numbers. They also perform all operations with decimals to hundredths. Students explore operations with fractions with visual models and begin to formulate generalizations.

Fifth Grade Standards

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Standards taught during 1st Quarter		
Numbers in Base Ten Perform operations with multi-digit whole numbers and with decimals to hundredths.	**Number and Operations- Fractions** Use equivalent fractions as a strategy to add and subtract fractions. Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (Fractions need not be simplified).	**Measurement and Data** Convert like measurement units within a given measurement system. Represent and interpret data.
5.NBT.5 Fluently ^{G} multiply multi-digit whole numbers using a standard algorithm ^{G}.	**5.NF.1** Add and subtract fractions with unlike denominators (including mixed numbers and fractions greater than 1) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, use visual models and properties of operations to show* $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$. *In general,* $\frac{a}{b} + \frac{c}{d} = (\frac{a}{b} x \frac{d}{d}) + (\frac{c}{d} x \frac{b}{b}) = \frac{(ad+bc)}{bd}$. **5.NF.2** Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models ^{G} or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result* $\frac{2}{5} + \frac{1}{2} = \frac{3}{7}$, *by observing that* $\frac{3}{7} < \frac{1}{2}$.	**5.MD.1** Know relative sizes of these U.S. customary measurement units: pounds, ounces, miles, yards, feet, inches, gallons, quarts, pints, cups, fluid ounces, hours, minutes, and seconds. Convert between pounds and ounces; miles and feet; yards, feet, and inches; gallons, quarts, pints, cups, and fluid ounces; hours, minutes, and seconds in solving multi-step, real-world problems. **5.MD.2** Display and interpret data in graphs (picture graphs, bar graphs, and line plots ^{G}) to solve problems using numbers and operations for this grade, e.g., including U.S. customary units in fractions $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$, or decimals.

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5.NF.3 Interpret a fraction as division of the numerator by the denominator ($\frac{a}{b} = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret $\frac{3}{4}$ as the result of dividing 3 by 4, noting that $\frac{3}{4}$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

   a. Interpret the product $(\frac{a}{b}) \times q$ as a part of a partition of q into b equal parts, equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show $(\frac{2}{3}) \times 4 = \frac{8}{3}$, and create a story context for this equation. Do the same with $(\frac{2}{3}) \times (\frac{4}{5}) = \frac{8}{15}$. (In general, $(\frac{a}{b}) \times (\frac{c}{d}) = \frac{ac}{bd}$.)*

   b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

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5.NF.5 Interpret multiplication as scaling (resizing).
    a. Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
    b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $\frac{a}{b} = \frac{(n \, x \, a)}{(n \, x \, b)}$ to the effect of multiplying $\frac{a}{b}$ by 1.

5.NF.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. In general, students able to multiply fractions can develop strategies to divide fractions, by reasoning about the relationship between multiplication and division, but division of a fraction by a fraction is not a requirement at this grade.
    a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for ($\frac{1}{3}$) ÷4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to*

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explain that $(\frac{1}{3}) \div 4 = (\frac{1}{12})$ because $(\frac{1}{12}) \times 4 = (\frac{1}{3})$.

 b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for* $4 \div (\frac{1}{5})$, *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $4 \div (\frac{1}{5}) = 20$ *because* $20 \times (\frac{1}{5}) = 4$.

 c. Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share* $\frac{1}{2}$ *pound of chocolate equally? How many* $\frac{1}{3}$ *cup servings are in 2 cups of raisins?*

Fifth Grade Standards

These are the standards for what is taught throughout the year in Fifth Grade. It is the expectation that these skills will be reinforced after they have been taught.

Standards taught during 2nd Quarter	
Operations and Algebraic Thinking **Write and interpret numerical expressions.**	**Number and Operations in Base Ten** **Understand the place value system. Perform operations with multi-digit whole numbers and with decimals to hundredths.**

5.OA.1 Use parentheses in numerical expressions, and evaluate expressions with this symbol. Formal use of algebraic order of operations is not necessary.
 	
5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18,932 + 921) is three times as large as 18,932 + 921, without having to calculate the indicated sum or product.*
	5.NBT.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.
	
	5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
	
	5.NBT.3 Read, write, and compare decimals to thousandths.
	  a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form ^{G}, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (\frac{1}{10}) + 9 \times (\frac{1}{100}) + 2 \times (\frac{1}{1,000})$.
	  b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

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	5.NBT.4 Use place value understanding to round decimals to any place, millions through hundredths.
	5.NBT.5 Fluently [G] multiply multi-digit whole numbers using a standard algorithm [G].
	5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
	5.NBT.7 Solve real-world problems by adding, subtracting, multiplying, and dividing decimals using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction, or multiplication and division; relate the strategy to a written method and explain the reasoning used. a. Add and subtract decimals, including decimals with whole numbers, (whole numbers through the hundreds place and decimals through the hundredths place). b. Multiply whole numbers by decimals (whole numbers through the hundreds place and decimals through the hundredths place). c. Divide whole numbers by decimals and decimals by whole numbers (whole numbers through the tens place and decimals less than one through the hundredths place using numbers whose division can be readily modeled). *For example, 0.75 divided by 5,18 divided by 0.6, or 0.9 divided by 3.*

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Standards taught during 3rd Quarter			
Number and Operations in Base Ten **Perform operations with multi-digit whole numbers and with decimals to hundredths.**	**Number and Operations-Fractions** **Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (Fractions need not be simplified).**	**Measurement and Data** **Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.**	**Geometry** **Classify two-dimensional figures into categories based on their properties.**
5.NBT.5 Fluently [G] multiply multi-digit whole numbers using a standard algorithm [G].	**5.NF.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product $(\frac{a}{b}) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show* $(\frac{2}{3}) \times 4 = \frac{8}{3}$, *and create a story context for this equation. Do the same with* $(\frac{2}{3}) \times (\frac{4}{5}) = \frac{8}{15}$. *(In general,* $(\frac{a}{b}) \times (\frac{c}{d}) = \frac{ac}{bd}$.)* b. Find the area of a rectangle with	**5.MD.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a "unit cube", is said to have "one cubic unit" of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. **5.MD.4** Measure volumes by counting unit cubes, using cubic cm,	**5.G.3** Identify and describe commonalities and differences between types of triangles based on angle measures (equiangular, right, acute, and obtuse triangles) and side lengths (isosceles, equilateral, and scalene triangles). **5.G.4** Identify and describe commonalities and differences between types of quadrilaterals based on angle measures, side lengths, and the presence or absence of parallel and perpendicular lines, e.g., squares, rectangles,

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	fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
	
	5.NF.5 Interpret multiplication as scaling (resizing).
	   a. Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
	   b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence
		cubic in, cubic ft., and improvised units.
		
		5.MD.5 Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume.
		   a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the Associative Property of Multiplication.
		   b. Apply the formulas $V = \ell \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real-world and mathematical problems.
		   c. Recognize volume as additive. Find volumes of solid figures composed of two non-
			parallelograms, trapezoids [G], and rhombuses.

	$\frac{a}{b} = \frac{(n \times a)}{(n \times b)}$) to the effect of multiplying $\frac{a}{b}$ by 1.	overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.	

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Standards taught during 4th Quarter			
Operations and Algebraic Thinking **Analyze patterns and relationships.**	**Number and Operations in Base Ten** **Perform operations with multi-digit whole numbers and with decimals to hundredths.**	**Number and Operations- Fractions** **Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (Fractions need not be simplified).**	**Geometry** **Graph points on the coordinate plane to solve real-world and mathematical problems. Classify two-dimensional figures into categories based on their properties.**
5.OA.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in*	**5.NBT.5** Fluently ^G multiply multi-digit whole numbers using a standard algorithm ^G.	**5.NF.6** Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. **5.NF.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. In general, students able to multiply fractions can develop strategies to divide fractions, by reasoning about the relationship between multiplication and division, but division of a fraction by a fraction is not a requirement at this grade. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For*	**5.G.1** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond, e.g., x-axis and x-coordinate, y-axis and y-coordinate.

one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.		*example, create a story context for* $(\frac{1}{3}) \div 4$, *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $(\frac{1}{3}) \div 4 = (\frac{1}{12})$ *because* $(\frac{1}{12}) \times 4 = (\frac{1}{3})$. b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for* $4 \div (\frac{1}{5})$, *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $4 \div (\frac{1}{5}) = 20$ *because* $20 \times (\frac{1}{5}) = 4$. c. Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share* $\frac{1}{2}$ *pound of chocolate equally? How many* $\frac{1}{3}$ *cup servings are in 2 cups of raisins?*	**5.G.2** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

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