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Operations & Algebraic Thinking	
Write and interpret numerical expressions. (5.OA.A) **5.OA.A.1:** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. **5.OA.A.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 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*	▪ I can use parentheses, brackets, or brackets to group an expression within a multi-step numerical expression. ▪ I can evaluate numerical expressions with parentheses, brackets or braces. ▪ I can represent a calculation expressed verbally with a numerical expression. ▪ I can analyze expressions without solving.
Analyze patterns and relationships. (5.OA.B) **5.OA.B.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 one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*	▪ I can generate two numerical patterns with the same starting number for two given rules. ▪ I can explain the relationship between the two numerical patterns by comparing how each pattern grows or by comparing the relationship between each of the corresponding terms from each pattern. ▪ I can form ordered pairs out of corresponding terms from each pattern and graph them on a coordinate plane.
Numbers & Operations in Base Ten	
Understand the place value system. (5.NBT.A) **5.NBT.A.1:** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it	▪ I can recognize that each place to the left is 10 times larger in a multi-digit number. ▪ I can recognize that each place to the right is 1/10 as much in a multi-digit number. ▪ I can represent a calculation expressed

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represents in the place to its right and 1/10 of what it represents in the place to its left. **5.NBT.A.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.A.3:** Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. **5.NBT.A.4:** Use place value understanding to round decimals to any place.	verbally with a numerical expression. ▪ I can express powers of 10 using whole-number exponents (e.g., 10 = 10^1, 100 = 10^2). ▪ I can illustrate and explain a pattern for how the number of zeros of a product – when multiplying a whole number by power of 10 – relates to the power of 10 (e.g., 500 – which is 5 x 100, or 5 x 10^2 – has two zeros in its produt.) ▪ I can illustrate and explain a pattern for how multiplying or dividing any decimal by a power of 10 relates to the placement of the decimal point (e.g., dividing 15.3 by 100, or 15.3 ÷ 10^2, results in 0.153 – where the decimal point in the quotient is 2 places to the left of where it was in the dividend.) ▪ I can read and write decimals to the thousandths in word form, base-ten numerals, and expanded form. ▪ I can compare two decimals to the thousandths using place value and record the comparison using symbols <, >, or =. ▪ I can explain how to use place value and what digits to look at to round decimals to any place. ▪ I can use the value of the digit to the right of the place to be rounded to determine whether to round up or down. ▪ I can round decimals to any place.
Perform operations with multi-digit whole numbers and with decimals to hundredths. (5.NBT.B) **5.NBT.B.5:** Fluently multiply multi-digit whole numbers using the standard algorithm. **5.NBT.B.6:** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using	▪ I can explain the standard algorithm for multi-digit whole number multiplication. ▪ I can use the standard algorithm to multiply multi-digit whole numbers with ease. ▪ I can demonstrate division of a whole numbers with four-digit dividends and two-digit divisors using place value, rectangular arrays, area model, and other strategies. ▪ I can solve division of a whole numbers

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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.B.7:** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	with four-digit dividends and two-digit divisors using properties of operations and equations. ▪ I can explain my chosen strategy. ▪ I can add, subtract, multiply, and divide decimals to hundredths using strategies based on place value, properties of operations, or other strategies. ▪ I can explain and illustrate strategies using concrete models or drawings when adding, subtracting, multiplying and dividing decimals to hundredths.
Number and Operations—Fractions	
Use equivalent fractions as a strategy to add and subtract fractions. (5.NF.A) **5.NF.A.1:** Add and subtract fractions with unlike denominators (including mixed numbers) 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, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **5.NF.A.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 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 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*	▪ I can determine common multiples of unlike denominators. ▪ I can create equivalent fractions using common multiples. ▪ I can add and subtract fractions with unlike denominators (including mixed numbers) using equivalent fractions. ▪ I can solve addition and subtraction word problems involving fractions using visual models or equations. ▪ I can use estimate strategies, benchmark fractions and number sense to check if my answer is reasonable.

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Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (5.NF.B) **5.NF.B.3:** Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ 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 3/4 as the result of dividing 3 by 4, noting that 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 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.B.4:** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product (*a*/*b*) × *q* as a parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a* × *q* ÷ *b*. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = 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	▪ I can explain that fractions (a/b) can be represented as a division of the numerator by the denominator (a ÷ b) and illustrate why a ÷ b can be represented by the fraction a/b. ▪ I can solve word problems involving the division of whole numbers and interpret the quotient – which could be a whole number, mixed number, or fraction – in the context of the problem. ▪ I can explain or illustrate my solution strategy using visual fraction models or equations that represent the problem. ▪ I can create story contexts for problems involving multiplication of a fractions and a whole number ((a/b) × q) or multiplication of two fractions ((a/b) × (c/d)) by interpreting mulliplication with fractions in the same way that I would interpret multiplication with whole numbers (e.g, 2/3 × 4 can be interpreted as, "If I need 2/3 cups of sugar for 1 batch of cookies, how much sugar do I need to make 4 batches of cookies?"). ▪ I can explain why (a/b × q = (a × q)/b by using visual models to show that q is partitioned into b equal parts, and a parts of each partition results in (a × q)/b. ▪ I can explain why (a/b) ×(c/d) = ▪ (a × b)/(c × d) by using visual models to show that c/d is partitioned into b equal parts, and a parts are needed which results in (a × b)/(c × d). (e.g., in 2/3 × 4.5, there is 4/5 of a whole that is partioined into thirds – which results in 4/5 looking like 4/15 + 4/15 + 4/15 – and two parts are needed (2 × 4/15 = 8/15)).

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areas. **5.NF.B.5)** Interpret multiplication as scaling (resizing), by: a. Comparing 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 *a/b = (n×a)/(n×b)* to the effect of multiplying *a/b* by 1. **5.NF.B.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.B.7:** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1] a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.*	▪ I can use unit fraction squares to prove the area of rectangles with fractional side lengths. ▪ I can determine the area of rectangles with fractional side lengths by multiplying the side lengths. ▪ I can interpret the relationship between the size of the factors to the size of the product. ▪ I can explain why multiplying a given number by a number or fraction greater than 1 results in a product greater than the given number. ▪ I can explain why multiplying a given number by a fraction less than 1 results in a product less than the given number. I can explain multiplication as scaling (to enlarge or reduce) using visual model. ▪ I can multiply a given fraction by 1 (e.g., 2/2 or 5/5) to find an equivalent fraction (e.g., 3/4 × 2/2 = 6/8). ▪ I can solve real world problems involving multiplication of fractions and mixed numbers and interpret the product in the context of the problem. ▪ I can explain or illustrate my solution strategy using visual fraction models or equations that represent the problem. ▪ I can create story contexts for problems involving division of a unit fraction by a whole number (1/b ÷ n) or division of a whole number by a unit fraction (n ÷ 1/b) by interpreting division with fractions in the same way that I would interpret division with whole numbers (e.g., 1/3 ÷ 4 can be interpreted as, "How big would each piece be if I had to share a 1/3 slice of pizza with 4 people?") ▪ I can solve real word problems involving division of unit fractions by non-zero

b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (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 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*	whole numbers and division of whole numbers by unit fractions, and interpret the quotient in the context of the problem. ▪ I can explain or illustrate my solution strategy using visual fraction models or equations that represent the problem.
Measurement & Data	
Convert like measurement units within a given measurement system. (5.MD.A) **5.MD.A.1**: Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.	▪ I can convert (change) measurement units within the same measurement system (e.g., 24 inches to 2 feet). ▪ I can solve multi-step word problems using measurement conversions.
Represent and interpret data. (5.MD.B) **5.MD.B.2:** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*	▪ I can create a line plot with a given set of unit fraction measurements. ▪ I can solve problems using data on line plots.

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Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (5.MD.C) **5.MD.C.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.C.4:** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. **5.MD.C.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 $V = l \times w \times h$ 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.	▪ I can identify volume as an attribute of a solid figure. ▪ I can recognize that a cube with 1 unit side length is "one cubic unit" of volume. ▪ I can explain a process fro finding the volume of a solid figure by filling it with unit cubes without gaps and overlaps. ▪ I can measure the volume of a hollow three-dimensional figure by filling it with unit cubes without gaps and counting the number of unit squares. ▪ I can use unit cubes to determine the volume of a rectangular prism. ▪ I can explain multiplication of the area of the base (l × w = b) by the height (b × h = V) will result in the volume. ▪ I can relate finding the product of three numbers to finding volume and relate both to the associative property of multiplication. ▪ I can use the formulas to determine the volume of rectangular prisms. ▪ I can decompose an irregular figure into non-overlapping rectangular prisms and find the volume of the irregular figure by finding the sum of the volumes of each of the decomposed prisms. ▪ I can solve real world problems involving volume.

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c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	
Geometry	
Graph points on the coordinate plane to solve real-world and mathematical problems. (5.G.A) **5.G.A.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). **5.G.A.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.	▪ I can construct a coordinate systems with two intersecting perpendicular lines and recognize that the intersection is called the origin and it is the point where 0 lies on each of the lines. ▪ I can recognize that the horizontal axis is generally labeled as the x-axis , and the vertical axis is generally labeled as the y-axis. ▪ I can identify an ordered pair (3,2) as an *x*-coordinate followed by a *y*-coordinate. ▪ I can explain the relationship between the ordered pair and the location on the coordinate plan. ▪ I can determine when a mathematical problem has a set of ordered pairs. ▪ I can graph points in the first quadrant of a coordinate plane using a set of ordered pairs. ▪ I can relate the coordinate values of any graphed point to the context of the problem.
Classify two-dimensional figures into categories based on their properties. (5.G.B) **5.G.B.3:** Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles*	▪ I can classify two-dimensional figures by their attributes. ▪ I can explain two-dimensional attributes can belong to several two-dimensional figures. ▪ I can identify subcategories using two-dimensional attributes.

have four right angles and squares are rectangles, so all squares have four right angles. **5.G.B.4:** Classify two-dimensional figures in a hierarchy based on properties.	▪ I can group together all shapes that share a single property, and then among these shapes, group together those that share a second property, and then among these group together those that share a third property, etc.

The Standards for Mathematical Practice

The standards for mathematical practice are really about teaching students to think and act like mathematicians and problem solvers:

1. Make sense of problems and persevere in solving them.
   What it means: Understand the problem, find a way to attack it, and work until it is done. Basically, you will find practice standard #1 in every math problem, every day. The hardest part is pushing students to solve tough problems by applying what they already know and to monitor themselves when problem-solving.

2. Reason abstractly and quantitatively
   What it means: Get ready for the words *contextualize* and *decontextualize*. If students have a problem, they should be able to break it apart and show it symbolically, with pictures, or in any way other than the standard algorithm. Conversely, if students are working a problem, they should be able to apply the "math work" to the situation.

3. Construct viable arguments and critique the reasoning of others.
   What it means: Be able to talk about math, using mathematical language, to support or oppose the work of others.

4. Model with mathematics.
   What it means: Use math to solve real-world problems, organize data, and understand the world around you.

5. Use appropriate tools strategically.
   What it means: Students can select the appropriate math tool to use and use it correctly to solve problems. In the real world, no one tells you that it is time to use the meter stick instead of the protractor.

6. Attend to precision
   What it means: Students speak and solve mathematics with exactness and meticulousness.

7. Look for and make use of structure

What it means: Find patterns and repeated reasoning that can help solve more complex problems. For young students this might be recognizing fact families, inverses, or the distributive property. As students get older, they can break apart problems and numbers into familiar relationships.

8. Look for and express regularity in repeated reasoning.
What it means: Keep an eye on the big picture while working out the details of the problem. You don't want kids that can solve the one problem you've given them; you want students who can generalize their thinking.

To hear an explanation of the importance of these standards for mathematical practices, watch this video from the Hunt Institute:
https://www.youtube.com/watch?v=m1rxkW8ucAI&list=PLD7F4C7DE7CB3D2E6