

5th Grade

Standards for Mathematical Practice

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| 1. Make sense of problems and persevere in solving them. | 5. Use appropriate tools strategically. |
| 2. Reason abstractly and quantitatively. | 6. Attend to precision. |
| 3. Construct viable arguments and critique the reasoning of others. | 7. Look for and make use of structure. |
| 4. Model with mathematics. | 8. Look for and express regularity in repeated reasoning. |

Operations and Algebraic Thinking

Current Standard Abbreviation	Current Standard	Proposed Standard Abbreviation	Final Draft Proposed Standard
Write and interpret numerical expressions.		Write and interpret numerical expressions.	
5.OA.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.		STANDARD INCORPORATED IN NC.5.OA.2
5.OA.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. <i>For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.</i>	NC.5.OA.2	Write, explain, and evaluate numerical expressions involving the four operations to solve up to two-step problems. Include expressions involving: <ul style="list-style-type: none"> • Parentheses, using the order of operations • Commutative, associative and distributive properties
Analyze patterns and relationships.		Analyze patterns and relationships.	
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. <i>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>	NC.5.OA.3	Generate two numerical patterns using two given rules. <ul style="list-style-type: none"> • Identify apparent relationships between corresponding terms. • Form ordered pairs consisting of corresponding terms from the two patterns. • Graph the ordered pairs on a coordinate plane.

Number and Operations in Base Ten

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Understand the place value system.		Understand the place value system.	
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 1/10 of what it represents in the place to its left.	NC.5.NBT.1	<p>Explain the patterns in the place value system from one million to the thousandths place.</p> <ul style="list-style-type: none"> Explain 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 1/10 of what it represents in the place to its left. Explain patterns in products and quotients when numbers are multiplied by 1,000, 100, 10, 0.1, and 0.01 and/or divided by 10 and 100.
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.		STANDARD INCORPORATED INTO NC.5.NBT.1 AND NC.6.EE.1
5.NBT.3	<p>Read, write, and compare decimals to thousandths.</p> <p>a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.</p> <p>b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p>	NC.5.NBT.3	<p>Read, write, and compare decimals to thousandths.</p> <ul style="list-style-type: none"> Write decimals using base-ten numerals, number names, and expanded form. Compare two decimals to thousandths based on the value of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
5.NBT.4	Use place value understanding to round decimals to any place.		STANDARD INCORPORATED INTO NC.5.NBT.7
Perform operations with multi-digit whole numbers and decimals to hundredths.		Perform operations with multi-digit whole numbers.	
5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.	NC.5.NBT.5	Demonstrate fluency with the multiplication of two whole numbers up to a three-digit number by a two-digit number using the standard algorithm.
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.	NC.5.NBT.6	Find quotients with remainders when dividing whole numbers with up to four-digit dividends and two-digit divisors using rectangular arrays, area models, repeated subtraction, partial quotients, and/or the relationship between multiplication and division. Use models to make connections and develop the algorithm.
5.NBT.7	Add, subtract, multiply, and divide decimals to hundredths, using	Perform operations with decimals.	

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	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.	NC.5.NBT.7	<p>Compute and solve real-world problems with multi-digit whole numbers and decimal numbers.</p> <ul style="list-style-type: none"> • Add and subtract decimals to thousandths using models, drawings or strategies based on place value. • Multiply decimals with a product to thousandths using models, drawings, or strategies based on place value. • Divide a whole number by a decimal and divide a decimal by a whole number, using repeated subtraction or area models. Decimals should be limited to hundredths. • Use estimation strategies to assess reasonableness of answers.

Number and Operations – Fractions

Current Standard Abbreviation	Current Standard	Proposed Standard Abbreviation	Final Draft Proposed Standard
Use equivalent fractions as a strategy to add and subtract fractions.		Use equivalent fractions as a strategy to add and subtract fractions.	
5.NF.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. <i>For example, $2/3 + 5/4 = 8/12 + 15/12 = 23/12$. (In general, $a/b + c/d = (ad + bc)/bd$.)</i>	NC.5.NF.1	<p>Add and subtract fractions, including mixed numbers, with unlike denominators using related fractions: halves, fourths and eighths; thirds, sixths, and twelfths; fifths, tenths, and hundredths.</p> <ul style="list-style-type: none"> • Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. • Solve one- and two-step word problems in context using area and length models to develop the algorithm. Represent the word problem in an equation.
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 or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. <i>For example, recognize an incorrect result $2/5 + 1/2 = 3/7$, by observing that $3/7 < 1/2$.</i>		<i>STANDARD INCORPORATED INTO NC.5.NF.1</i>
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.		Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	

Number and Operations – Fractions

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5.NF.3	Interpret a fraction as the division of numerator by the denominator ($a/b = a \div b$). 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. <i>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?</i>	NC.5.NF.3	Use fractions to model and solve division problems. <ul style="list-style-type: none"> • Interpret a fraction as an equal sharing context, where a quantity is divided into equal parts. • Model and interpret a fraction as the division of the numerator by the denominator. • Solve one-step word problems involving division of whole numbers leading to answers in the form of fractions and mixed numbers, with denominators of 2, 3, 4, 5, 6, 8, 10, and 12,-using area, length, and set models or equations.
5.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. <ol style="list-style-type: none"> a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. <i>For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)</i> 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. 	NC.5.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction, including mixed numbers. <ul style="list-style-type: none"> • Use area and length models to multiply two fractions, with the denominators 2, 3, 4. • Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number and when multiplying a given number by a fraction less than 1 results in a product smaller than the given number. • Solve one-step word problems involving multiplication of fractions using models to develop the algorithm.
5.NF.5	Interpret multiplication as scaling (resizing), by: <ol style="list-style-type: none"> 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 $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1. 		<i>STANDARD INCORPORATED INTO NC.5.NF.4</i>
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.		<i>STANDARD INCORPORATED INTO NC.5.NF.4</i>

Number and Operations – Fractions

Current Standard Abbreviation	Current Standard	Proposed Standard Abbreviation	Final Draft Proposed Standard
5.NF.7	<p>Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. <i>(Note: Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.)</i></p> <ol style="list-style-type: none"> a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. <i>For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.</i> b. Interpret division of a whole number by a unit fraction, and compute such quotients. <i>For example, create a story context for $4 \div (1/5)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$.</i> 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. <i>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?</i> 	NC.5.NF.7	Solve one-step word problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions using area and length models, and equations to represent the problem.

Measurement and Data

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Convert like measurement units within a given measurement system.		Convert like measurement units within a given measurement system.	
5.MD.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.	NC.5MD.1	Given a conversion chart, use multiplicative reasoning to solve one-step conversion problems within a given measurement system.
Represent and interpret data.		Represent and interpret data.	



Measurement and Data

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5.MD.2	Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots. <i>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>	NC.5.MD.2	Represent and interpret data. <ul style="list-style-type: none"> • Collect data by asking a question that yields data that changes over time. • Make and interpret a representation of data using a line graph. • Determine whether a survey question will yield categorical or numerical data, or data that changes over time.
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.		Understand concepts of volume.	
5.MD.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. <ol style="list-style-type: none"> 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. 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.		<i>STANDARD INCORPORATED INTO NC.5.MD.4</i>
5.MD.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	NC.5.MD.4	Recognize volume as an attribute of solid figures and measure volume by counting unit cubes, using cubic centimeters, cubic inches, cubic feet, and improvised units.
5.MD.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. <ol style="list-style-type: none"> 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. 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. 	NC.5.MD.5	Relate volume to the operations of multiplication and addition. <ul style="list-style-type: none"> • Find the volume of a 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. • Build understanding of the volume formula for rectangular prisms with whole-number edge lengths in the context of solving problems. • Find volume of solid figures with one-digit dimensions composed of two non-overlapping rectangular prisms.

Geometry



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Graph points on the coordinate plane to solve real-world and mathematical problems.		Understand the coordinate plane.	
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).	NC.5.G.1	Graph points in the first quadrant of a coordinate plane, and identify and interpret the x and y coordinates to solve problems.
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.		<i>STANDARD INCORPORATED INTO NC.5.G.1</i>
Classify two-dimensional figures into categories based on their properties.		Classify quadrilaterals.	
5.G.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.	NC.5.G.3	Classify quadrilaterals into categories based on their properties. <ul style="list-style-type: none"> • Explain that attributes belonging to a category of quadrilaterals also belong to all subcategories of that category. • Classify quadrilaterals in a hierarchy based on properties.
5.G.4	Classify two-dimensional figures in a hierarchy based on properties.		<i>STANDARD INCORPORATED INTO NC.5.G.3</i>