Middle School Overview

Ratio & Proportional Relationships *and* Functions

The introduction of the Ratio & Proportional Relationships domain in 6^{th} and 7^{th} grades signals a shift in student thinking from additive reasoning in elementary grades to multiplicative reasoning. This domain builds from pattern work in the elementary domain of Operations & Algebraic Thinking. The understandings from the Ratio & Proportional Relationships build naturally into the Functions domain in 8^{th} grade.

Throughout the Ratio & Proportional Relationships and Functions Domains, many of the standards with multiple parts were rewritten using bullets to make the expectations clear and concise. All examples were removed from the standards. The removed examples will be placed in the instructional support documents.

Remember when reviewing this section:

1) Expectations expressed in a grade level are not repeated in other grade levels.
2) Further explanation of standards, such as “What types of ratio and percent problems are solved?” will be found in the instructional support documents.

6^{th} Grade	**7^{th} Grade**	**8^{th} Grade**
Most revisions in 6^{th} grade are the result of clarifying the intention of the standards. There are **<u>no</u>** additional concepts in the Ratio & Proportion Standards for 6^{th} grade. There are **<u>no</u>** removed concepts for the Ratio & Proportion Standards for 6^{th} grade. Clarity for expectations of understanding unit ratios was provided for **6.RP.2.**	Most revisions in 7^{th} grade are the result of clarifying the intention of the standards. There is **<u>1</u>** additional concept in the Ratio & Proportion Standards for 7^{th} grade. ● In **7.RP.2a**, the concept of comparing two different proportional relationship using tables, graph, equations, and verbal descriptions was added. This comparison was originally in **8.EE.5**. Since students compared ratios using tables in **6.RP.3**, and 7^{th} grade emphasized graphs and equations of proportional relationships, adding a comparison of proportional relationships in 7^{th} grade was a natural progression. Comparisons continue in 8^{th} grade with linear functions in **8.F.2**. There are **<u>no</u>** removed concepts for the Ratio & Proportion Standards for 7^{th} grade.	Most revisions in 8^{th} grade are the result of clarifying the intention of the standards. There are **<u>no</u>** additional concepts in the Function Standards for 8^{th} grade. There are **<u>no</u>** removed concepts for the Function Standards for 8^{th} grade.

The Number System

The Number System domain naturally builds from the elementary domains Operations & Algebraic Thinking, Number and Operations - Base Ten and Number and Operations - Fractions.

Throughout the Number System Domain, many of the standards with multiple parts were rewritten using bullets to make the expectation clear and concise. All examples were removed from the standards. The removed examples will be placed in the instructional support documents.

Remember when reviewing this section:

1) Expectations expressed in a grade level are not repeated in other grade levels. For example: Adding, subtracting, and multiplying fractions are part of the elementary standards. This means that even though these skills are necessary for problem solving in middle school, these skills will not be mentioned in the middle school standards.
2) Further explanation of standards, such as "What is the standard algorithm?" will be found in the instructional support documents.

6th Grade	7th Grade	8th Grade
Most revisions in 6th grade are the result of clarifying the intention of the standards. There are **<u>two</u>** additional concepts in the Number System Standards for 6th grade. • ***6.NS.4*** *- Finding the unique prime factorization for a whole number.* Prime factorization may be used to find unknown GCFs and LCMs and is part of the progression from working with primes and composite numbers in 4th grade. • ***6.NS.9*** *(New standard) - Adding and subtracting integers from -20 to 20 using models.* Adding this standard is to allow for more time for conceptual development. The limitation means that students should not memorize rules, but should start with physical models and move to visual models, such as number lines. There is an added focus on creating zero pairs using additive inverses. This will assist in using physical models and building conceptual understanding. This concept should also support the use of absolute value and equations in other 6th grade standards. There are **<u>no</u>** removed concepts for the Number System Standards for 6th grade.	Most revisions in 7th grade are the result of clarifying the intention of the standards. There are **<u>no</u>** additional concepts in the Number System Standards for 7th grade. There are **<u>no</u>** removed concepts for the Number System Standards for 7th grade. While adding and subtracting integers with models was placed into 6th grade, no concepts were removed as the 7th grade standards cover adding and subtracting with rational numbers.	Most revisions in 8th grade are the result of clarifying the intention of the standards. There are **<u>no</u>** additional concepts in the Number System Standards for 8th grade. There are **<u>no</u>** removed concepts for the Number System Standards for 8th grade. Some limitations were added into **8.NS.2**. In the original standard, students would work with all irrational numbers. The revision would limit students to working with square roots, cube roots and pi.

Expressions and Equations

The Expressions and Equations domain naturally builds from the elementary domain Operations & Algebraic Thinking.

Throughout the Expressions and Equations domain, many of the standards with multiple parts were rewritten using bullets to make the expectation clear and concise. All examples were removed from the standards. The removed examples will be placed in the instructional support documents.

Remember when reviewing this section:

1) Expectations expressed in a grade level are not repeated in other grade levels. For example: Order of operations (except for exponents) are part of the elementary standards. This means that even though these skills are necessary for rewriting expressions in middle school, these skills will not be mentioned in the middle school standards.
2) Further explanation of standards, such as "What does it mean to view a part of an expression as a single entity?" will be found in the instructional support documents.

6th Grade

Most revisions in 6th grade are the result of clarifying the intention of the standards.

There are **no** additional concepts in the Expressions and Equations Standards for 6th grade.

There are **no** removed concepts for the Expressions and Equations Standards for 6th grade.

While the **6.EE.9** was heavily revised for clarity, the focus on the vocabulary of dependent and independent variables has been removed. In 6th grade, students should understand equations as showing a relationship between quantities and that as one quantity changes, the other changes in a particular manner. This is the concept of covariation.

7th Grade

Most revisions in 7th grade are the result of clarifying the intention of the standards.

There are **no** additional concepts in the Expressions and Equations Standards for 7th grade.

There are **no** removed concepts for the Expressions and Equations Standards for 7th grade.

Clarity was provided in **7.EE.4** to define the expectations for solving equations and inequalities. In 7th grade the expectation is multi-step equations and inequalities with the variable on one side, including those generated from word problems.

8th Grade

Most revisions in 8th grade are the result of clarifying the intention of the standards.

There is **1** additional concept in the Expressions and Equations for 8th grade.

- Solving multi-step linear inequalities, with variables on both sides is now expected.

There are **3** removed concepts for the Expressions and Equations Standards for 8th grade.

- **8.EE.4** - Adding and subtracting numbers in scientific notation has been removed. (Multiplying and dividing remains in 8th grade.)
- **8.EE.5** - Comparing different proportional relationships was moved to 7th grade, **7.RP.2a**. (Interpreting the unit rate as slope remains in 8th grade.)
- **8.EE.8** - Solving a system of equations using substitution was removed, as it is part of the standards for NC Math 1. (Solving a system by graphing remains in 8th grade.)

Clarity was added to **8.EE.8**, stating that the linear equations for a system are to be in slope-intercept form.

A limitation of positive numbers less than or equal to 400 is now included **8.EE.2**.

Geometry
Geometry is the one domain that is found K-12 in the standards. Geometry becomes a part of the major work of the grade in 7th grade. The 6th grade standards continue the Geometry from elementary school with reasoning about relationships among shapes to determine area, surface area, and volume of figures created from polygons. The focus in 6th grade is on the development of formulas based on student experience with partitioning and composition in elementary school. This same work expands in 7th grade to work with figures that include circles. It is also where students begin to explore relationships between lines and angles laying the foundation for 8th grade work with transformations.

Throughout the Geometry domain, many of the standards with multiple parts were rewritten using bullets to make the expectation clear and concise. All examples were removed from the standards. The removed examples will be placed in the instructional support documents.

Remember when reviewing this section:
1) Expectations expressed in a grade level are not repeated in other grade levels.
2) Further explanation of standards will be found in the instructional support documents.

6th Grade	**7th Grade**	**8th Grade**
Most revisions in 6th grade are the result of clarifying the intention of the standards. There are **no** additional concepts in the Geometry Standards for 6th grade. There are **no** removed concepts for the Geometry Standards for 6th grade. There are no substantial revisions to the 6th grade standards.	Most revisions in 7th grade are the result of clarifying the intention of the standards. There are **no** additional concepts in the Geometry Standards for 7th grade. **7.G.3** was removed from the 7th grade math standards because there were no connections to cross sections within the middle grades standards and it doesn't appear in the high school standards until NC Math 3.	Most revisions in 8th grade are the result of clarifying the intention of the standards. There are **no** additional concepts in the Geometry Standards for 8th grade. There are **no** removed concepts for the Geometry Standards for 8th grade. The only significant revision in 8th grade was the adaptation of **8.G.1** to incorporate the development of similarity based on the properties of dilations. The original standard only examined congruence in terms of lines and angles, but there was no standard that addressed how the properties of dilations defined similarity.

Statistics and Probability

The Statistics and Probability domain builds on the Measurement and Data domain from elementary school. Middle school is where students develop the notion of ***statistical thinking*** making note of its distinction from ***mathematical thinking***. Students begin to explore data and examine the information that it conveys through multiple representations.

Throughout the Statistics and Probability domain, many of the standards with multiple parts were rewritten using bullets to make the expectation clear and concise. All examples were removed from the standards. The removed examples will be placed in the instructional support documents.

Additionally, each grade level in middle school addresses some portion of the statistical process shown below.

A statistical process is a problem-solving process consisting of four steps:

1. Formulating a statistical question that anticipates variability and can be answered by data. (6th grade - determining a statistical question)
2. Designing and implementing a plan that collects appropriate data. (7th grade - randomization addressed)
3. Analyzing the data by graphical and/or numerical methods. (6th, 7th and 8th grade)
4. Interpreting the analysis in the context of the original question. (6th, 7th and 8th grade)

The examination of statistics is from the lens of exploratory data analysis vs. an inferential perspective. This means that students make sense of the data and start to make meaning of variability in relationship to a statistical question. Sixth grade is primarily an introduction to statistics and 7th grade is where probability is first introduced. Both statistics and probability are continued in the high school standards.

Remember when reviewing this section:

1) Generally, expectations expressed in a grade level are not repeated in other grade levels as middle school is where the Statistics and Probability domain begins.
2) Further explanation of standards, definitions and understandings, such as understanding that the probability of a chance event occurring is between 0 and 1, will be found in the instructional support documents.

6th Grade	**7th Grade**	**8th Grade**
Most revisions in 6th grade are the result of clarifying the intention of the standards. There are **<u>no</u>** additional concepts in the Statistics and Probability Standards for 6th grade. There are **<u>no</u>** removed concepts for the Statistics and Probability Standards for 6th grade. There was some discussion of removal of measures of variability, specifically MAD, from 6th grade. However, the decision was made to leave it with a detailed explanation in the instructional support documents relating it to mean as a measure of center. With 6th grade's focus on examining data quantitatively	Most revisions in 7th grade are the result of clarifying the intention of the standards. There are **<u>no</u>** additional concepts in the Statistics and Probability Standards for 7th grade. There are **<u>no</u>** removed concepts for the Statistics and Probability Standards for 7th grade. **7.SP.5** was edited removing instructional guidance and definitions that would be more appropriate for the instructional support document. **7.SP.7** was rearranged adding a **7.SP.7c** to explicitly note comparing theoretical and experimental probability models noting possible	Most revisions in 8th grade are the result of clarifying the intention of the standards. There are **<u>no</u>** additional concepts in the Statistics and Probability Standards for 8th grade. There are **<u>no</u>** removed concepts for the Statistics and Probability Standards for 8th grade.

and visually, **6.SP.3** was rewritten into two separate standards **6.SP.3a** and **6.SP.3b** emphasizing the need to look at multiple quantitative measures and representations when describing distributions. This revision intends to fully develop understanding of the measures of center and measures of variability.	explanations for discrepancies between the two.	

6th Grade

Standards for Mathematical Practice

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.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Ratio and Proportional Relationships			
Current Standard Abbreviation	**Current Standard**	**Proposed Standard Abbreviation**	**First Draft Proposed Standard**
Understand ratio concepts and use ratio reasoning to solve problems.		**Understand ratio concepts and use ratio reasoning to solve problems.**	
6.RP.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*	NC.6.RP.1	Understand the concept of a ratio and use ratio language to • Describe a ratio as a multiplicative relationship between two quantities, • Model a ratio relationship using a variety of representations.
6.RP.2	Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."* (Note: Expectations for unit rates in this grade are limited to non-complex fractions.)	NC.6.RP.2	Understand that ratios can be expressed as equivalent unit ratios by finding and interpreting both unit ratios in context.
6.RP.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of	NC.6.RP.3	Use ratio reasoning with equivalent whole-number ratios to solve real-world and mathematical problems by: • Finding missing values in the tables.

	equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.		• Plotting the pairs of values on the coordinate plane. • Using a table to compare ratios. • Using unit ratio. • Converting and manipulating measurements using given ratios.
6.RP.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.	NC.6.RP.4	Use ratio reasoning to solve real-world and mathematical problems with percents by: • Using equivalent ratios, such as benchmark percents, to determine a part of any given quantity. • Finding a percent of a quantity as a rate per 100. • Finding the whole, given a part and the percent.

The Number System			
Current Standard Abbreviation	**Current Standard**	**Proposed Standard Abbreviation**	**First Draft Proposed Standard**
Apply and extend previous understandings of multiplication and division to divide fractions by fractions.		**Apply and extend previous understandings of multiplication and division to divide fractions by fractions.**	
6.NS.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*	NC.6.NS.1	Understand the concept of a ratio and use ratio language to • Describe a ratio as a multiplicative relationship between two quantities, • Model a ratio relationship using a variety of representations.
Compute fluently with multi-digit numbers and find common factors and multiples.		**Compute fluently with multi-digit numbers and find common factors and multiples.**	
6.NS.2	Fluently divide multi-digit numbers using the standard algorithm.	NC.6.NS.2	Fluently divide using long division with a minimum of a four-digit dividend.
6.NS.3	Fluently add, subtract, multiply, & divide multi-digit decimals using the standard algorithm for each operation.	NC.6.NS.3	Fluently add, subtract, multiply, & divide multi-digit decimals using the standard algorithm for each operation.
6.NS.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*	NC.6.NS.4	Understand and use prime factorization and the relationships between factors to: • Find the unique prime factorization for a whole number. • Find the greatest common factor of two whole numbers less than or equal to 100. • Find the least common multiple of two whole numbers less than or equal to 12. • Use the greatest common factors to rewrite numbers less than 200 using the distributive property.
Apply and extend previous understandings of numbers to the system of rational numbers.		**Apply and extend previous understandings of numbers to the system of rational numbers.**	
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to	NC.6.NS.5	Understand and use rational numbers to: • Describe quantities having opposite directions or values. • Represent quantities in real-world contexts, explaining the meaning of 0 in each situation.

	represent quantities in real-world contexts, explaining the meaning of 0 in each situation.		
6.NS.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, & that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	NC.6.NS.6	Understand rational numbers as points on the number line and as ordered pairs on a coordinate plane. a. On a number line: • Recognize opposite signs of numbers as indicating locations on opposite sides of 0 and that the opposite of the opposite of a number is the number itself. • Find and position rational numbers on a horizontal or vertical number line. b. On a coordinate plane: • Understand signs of numbers in ordered pairs as indicating locations in quadrants. • Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. • Find and position pairs of rational numbers on a coordinate plane.
6.NS.7	Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3° C > –7° C to express the fact that –3° C is warmer than –7° C.* c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.* d. Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.	NC.6.NS.7	Understand ordering and absolute value of rational numbers. a. Interpret statement of inequality as statements about the relative position of two numbers on a number line diagram. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. c. Understand the absolute value of a rational number as its distance from 0 on the number line to: • Interpret absolute value as magnitude for a positive or negative quantity in a real-world context. • Distinguish comparisons of absolute value from statements about order.

6.NS.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	NC.6.NS.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
	NEW STANDARD	NC.6.NS.9	Apply and extend previous understandings of addition and subtraction. a. Understand additive inverses when adding and subtracting integers. • Describe situations in which opposite quantities combine to make 0. • Understand $p + q$ as the number located a distance q from p, in the positive or negative direction depending on the sign of q. Show that a number and its additive inverse create a zero pair. • Understand subtraction of integers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two integers on the number line is the absolute value of their difference. b. Use models to add and subtract integers from -20 to 20 and describe real-world contexts using sums and differences.

Expressions and Equations			
Current Standard Abbreviation	**Current Standard**	**Proposed Standard Abbreviation**	**First Draft Proposed Standard**
Apply and extend previous understandings of arithmetic to algebraic expressions.		**Apply and extend previous understandings of arithmetic to algebraic expressions.**	
6.EE.1	Write and evaluate numerical expressions involving whole-number exponents.	NC.6.EE.1	Write and evaluate numerical expressions, with and without grouping symbols, involving whole-number exponents.
6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 – y b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms. c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas $V = s^3$ and $A = 6\ s^2$ to find the volume and surface area of a cube with sides of length s = 1/2	NC.6.EE.2	Write, read, and evaluate algebraic expressions. • Write expressions that record operations with numbers and with letters standing for numbers. • Identify parts of an expression using mathematical terms and view one or more of those parts as a single entity. • Evaluate expressions at specific values of their variables using expressions that arise from formulas used in real-world problems.
6.EE.3	Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.	NC.6.EE.3	Apply the properties of operations to generate equivalent expressions without exponents.
6.EE.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.	NC.6.EE.4	Identify when two expressions are equivalent.

Reason about and solve one-variable equations and inequalities.		**Reason about and solve one-variable equations.**	
6.EE.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	NC.6.EE.5	Use substitution to determine whether a given number in a specified set makes an equation true.
6.EE.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	NC.6.EE.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem.
6.EE.7	Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.	NC.6.EE.7	Solve real-world and mathematical problems by writing and solving equations of the form: • $x + p = q$ in which p, q and x are all nonnegative rational numbers; and, • $px = q$ for cases in which p, q and x are all nonnegative rational numbers.
		Reason about one-variable inequalities.	
6.EE.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	NC.6.EE.8	Reason about inequalities by: • Using substitution to determine whether a given number in a specified set makes an inequality true. • Writing an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. • Recognizing that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions. • Representing solutions of such inequalities on number line diagrams.
Represent and analyze quantitative relationships between dependent and independent variables.		**Represent and analyze quantitative relationships between dependent and independent variables.**	
6.EE.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.*	NC.6.EE.9	Represent and analyze quantitative relationships by: • Using variables to represent two quantities in a real-world problem that change in relationship to one another. • Analyze the relationship between quantities in different representations (context, equations, tables, and graphs).

Geometry			
Current Standard Abbreviation	**Current Standard**	**Proposed Standard Abbreviation**	**First Draft Proposed Standard**
Solve real-world and mathematical problems involving area, surface area, and volume.		**Solve real-world and mathematical problems involving area, surface area, and volume.**	
6.G.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	NC.6.G.1	Create geometric models to solve real-world and mathematical problems to: • Find the area of triangles by composing into rectangles and decomposing into right triangles. • Find the area of special quadrilaterals and polygons by decomposing into triangles, rectangles or other shapes.
6.G.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	NC.6.G.2	Apply and extend previous understandings of the volume of a right rectangular prism to find the volume of right rectangular prisms with fractional edge lengths. Apply this understanding to the context of solving real-world and mathematical problems.
6.G.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	NC.6.G.3	Use the coordinate plane to solve real-world and mathematical problems by: • Drawing polygons in the coordinate plane given coordinates for the vertices. • Using coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate.
6.G.4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	NC.6.G.4	Represent prisms and pyramids using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Statistics and Probability			
Current Standard Abbreviation	**Current Standard**	**Proposed Standard Abbreviation**	**First Draft Proposed Standard**
Develop understanding of statistical variability.		**Develop understanding of statistical variability.**	
6.SP.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*	NC.6.SP.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
6.SP.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	NC.6.SP.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
6.SP.3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	NC.6.SP.3	Understand that both measures of center and variability should be considered when describing a data set. a. Understand that a measure of center for a numerical data set summarizes allof its values with a single number. • Understand that a mean is a measure of center that represents a balance point or fair share of a data set and can be influenced by the presence of extreme values within the data set. • Understand the median as a measure of center that is the numerical middle of an ordered data set. b. Understand that a measure of variability of a data set describes how the values of the data set vary with a single number. • Understand the mean absolute deviation of a data set is a measure of variability that describes the average distance that points within a data set are from the mean of the data set. • Understand that the range describes the spread of the entire data set. • Understand that the interquartile range describes the spread of the middle 50% of the data.
Summarize and describe distributions.		**Summarize and describe distributions.**	
6.SP.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	NC.6.SP.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.5	Summarize numerical data sets in relation to their context, such as by:		Summarize numerical data sets in relation to their context. a. Describe the collected data by:

	a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.		• Reporting the number of observations in dot plots and histograms. • Communicating the nature of the attribute under investigation, how it was measured and the units of measurement. b. Analyze center and variability by: • Giving quantitative measures of center and corresponding measures of variability, describing any overall pattern, and noting any striking deviations. • Justifying the appropriate choice of measures of center and variability using the shape of the data distribution.

7th Grade

Standards for Mathematical Practice

9. Make sense of problems and persevere in solving them.
10. Reason abstractly and quantitatively.
11. Construct viable arguments and critique the reasoning of others.
12. Model with mathematics.
13. Use appropriate tools strategically.
14. Attend to precision.
15. Look for and make use of structure.
16. Look for and express regularity in repeated reasoning.

Ratio and Proportional Relationships

Current Standard Abbreviation	Current Standard	Proposed Standard Abbreviation	First Draft Proposed Standard
Analyze proportional relationships and use them to solve real-world and mathematical problems.		**Analyze proportional relationships and use them to solve real-world and mathematical problems.**	
7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(1/4) miles per hour, equivalently 2 miles per hour.*	NC.7.RP.1	Compute unit rates associated with ratios of fractions to solve real-world and mathematical problems.
7.RP.2	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	NC.7.RP.2	Recognize and represent proportional relationships between quantities. a. Understand that a proportion is a relationship of equality between ratios. • Represent proportional relationships using tables and graphs. • Recognize whether ratios are in a proportional relationship using tables and graphs.

	b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.* d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.		• Compare two different proportional relationships using tables, graphs, equations, and verbal descriptions. b. Identify the unit rate (constant of proportionality) within two quantities in a proportional relationship using tables, graphs, equations, and verbal descriptions. c. Represent proportional relationships with equations. d. Use a graphical representation of a proportional relationship in context to: • Explain the meaning of any point *(x, y)*. • Explain the meaning of (0, 0) and why it is included. • Understand that the *y*-coordinate of the ordered pair (1, *r*) corresponds to the unit rate and explain its meaning.
7.RP.3	Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*	NC.7.RP.3	Use proportional relationships to solve ratio and percent problems.

The Number System

Current Standard Abbreviation	Current Standard	Proposed Standard Abbreviation	First Draft Proposed Standard
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.		**Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.**	
7.NS.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers.	NC.7.NS.1	Apply and extend previous understandings of addition and subtraction. a. Understand additive inverses when adding and subtracting rational numbers. • Describe situations in which opposite quantities combine to make 0. • Understand $p + q$ as the number located a distance q from p, in the positive or negative direction depending on the sign of q. Show that a number and its opposite are additive inverses. • Understand subtraction of rational numbers as adding the additive inverse, $p – q = p + (–q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference. b. Apply properties of operations as strategies to add and subtract rational numbers and describe real-world contexts using sums and differences.
7.NS.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	NC.7.NS.2	Apply and extend previous understandings of multiplication and division. a. Understand that a rational number is any number that can be written as a quotient of integers with a non-zero divisor. b. Apply properties of operations as strategies to multiply and divide rational numbers and describe the product and quotient in real-world contexts. c. Use division and previous understandings of fractions and decimals. • Convert a rational number to a decimal using long division. • Understand that the decimal form of a rational number terminates in 0s or eventually repeats.

7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers. (NOTE: Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)	NC.7.NS.3	Solve real-world and mathematical problems involving numerical expressions with rational numbers using the four operations.

Expressions and Equations			
Current Standard Abbreviation	**Current Standard**	**Proposed Standard Abbreviation**	**First Draft Proposed Standard**
Use properties of operations to generate equivalent expressions.		**Use properties of operations to generate equivalent expressions.**	
7.EE.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	NC.7.EE.1	Apply properties of operations as strategies to • Add, subtract, and expand linear expressions with rational coefficients. • Factor linear expression with an integer GCF.
7.EE.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*	NC.7.EE.2	Understand that equivalent expressions can reveal contextual and mathematical relationships.
Solve real-life and mathematical problems using numerical and algebraic expressions and equations.		**Solve real-world and mathematical problems using numerical and algebraic expressions, equations, and inequalities.**	
7.EE.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	NC.7.EE.3	Solve multi-step real-world and mathematical problems posed with rational numbers in algebraic expressions. • Apply properties of operations to calculate with positive and negative numbers in any form. • Convert between different forms of a number and equivalent forms of the expression as appropriate.
7.EE.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example,	NC.7.EE.4	Use variables to represent quantities to solve real-world or mathematical problems. a. Construct equations to solve problems by reasoning about the quantities • Fluently solve multistep equations with the variable on one side, including those generated by word problems. • Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

	the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*		• Interpret the solution in context. b. Construct inequalities to solve problems by reasoning about the quantities. • Fluently solve multistep inequalities with the variable on one side, including those generated by word problems. • Compare an algebraic solution process for equations and an algebraic solution process for inequalities. • Graph the solution set of the inequality and interpret in context.

Geometry

Current Standard Abbreviation	Current Standard	Proposed Standard Abbreviation	First Draft Proposed Standard
Draw, construct, and describe geometrical figures and describe the relationships between them.		**Draw, construct, and describe geometrical figures and describe the relationships between them.**	
7.G.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	NC.7.G.1	Solve problems involving scale drawings of geometric figures by: • Building an understanding that angle measures remain the same and side lengths are proportional. • Using a scale factor to compute actual lengths and areas from a scale drawing. • Creating a scale drawing.
7.G.2	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	NC.7.G.2	Understand the characteristics of angles and side lengths that create a unique triangle, more than one triangle or no triangle. Build triangles from three measures of angles and/or sides.
7.G.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.		***STANDARD REMOVED***
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.		**Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.**	
7.G.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	NC.7.G.4	Understand area and circumference of a circle. • Understand the relationships between the radius, diameter, circumference, and area. • Apply the formulas for area and circumference of a circle to solve problems.
7.G.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	NC.7.G.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve equations for an unknown angle in a figure.
7.G.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	NC.7.G.6	Solve real-world and mathematical problems involving: • Area and perimeter of two-dimensional objects composed of triangles, quadrilaterals, and polygons. • Volume and surface area of pyramids, prisms, or three-dimensional objects composed of cubes, pyramids, and right prisms.

Statistics and Probability

Current Standard Abbreviation	Current Standard	Proposed Standard Abbreviation	First Draft Proposed Standard
Use random sampling to draw inferences about a population.		**Use random sampling to draw inferences about a population.**	
7.SP.1	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	NC.7.SP.1	Understand that statistics can be used to gain information about a population, by: • Examining a valid sample of the population. • Using random sampling to produce representative samples to support valid inferences.
7.SP.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*	NC.7.SP.2	Generate multiple random samples (or simulated samples) of the same size to gauge the variation in estimates or predictions, and use this data to draw inferences about a population with an unknown characteristic of interest.
Draw informal comparative inferences about two populations.		**Draw informal comparative inferences about two populations.**	
7.SP.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*	NC.7.SP.3	Informally assess the meaningfulness of the difference between two data sets by: • Visually examining the overlap and separation between the graphical representations of two data sets. • Expressing the difference between the measures of center as a multiple of the larger measure of variability.
7.SP.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*	NC.7.SP.4	Use measures of center and measures of variability from numerical data from random samples to draw comparative inferences about two populations.
Investigate chance processes and develop, use, and evaluate probability models.		**Investigate chance processes and develop, use, and evaluate probability models.**	
7.SP.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A	NC.7.SP.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.

	probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.		
7.SP.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*	NC.7.SP.6	Collect data to calculate the experimental probability of a chance event, observing its long-run relative frequency. Use this experimental probability to predict the approximate relative frequency.
7.SP.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*	NC.7.SP.7	Develop a probability model and use it to find probabilities of simple events. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. b. Develop a probability model (which may not be uniform) by repeatedly performing a chance process and observing frequencies in the data generated. c. Compare theoretical and experimental probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
7.SP.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.	NC.7.SP.8	Determine probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. For an event described in everyday language, identify the outcomes in the sample space which compose the event, when the sample space is represented using organized lists, tables, and tree diagrams. c. Design and use a simulation to generate frequencies for compound events.

	c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*		

8th Grade

Standards for Mathematical Practice

17. Make sense of problems and persevere in solving them.
18. Reason abstractly and quantitatively.
19. Construct viable arguments and critique the reasoning of others.
20. Model with mathematics.
21. Use appropriate tools strategically.
22. Attend to precision.
23. Look for and make use of structure.
24. Look for and express regularity in repeated reasoning.

The Number System			
Current Standard Abbreviation	**Current Standard**	**Proposed Standard Abbreviation**	**First Draft Proposed Standard**
Know that there are numbers that are not rational, and approximate them by rational numbers.		**Know that there are numbers that are not rational, and approximate them by rational numbers.**	
8.NS.1	Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.	NC.8.NS.1	Understand that every number has a decimal expansion. Know that an irrational number is defined as a non-repeating, non-terminating decimal.
8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π2). *For example, by truncating the decimal expansion of √2 show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	NC.8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers and locate them approximately on a number line. Estimate the value of expressions involving: • Square roots and cube roots to the tenths • π to the hundredths.

Expressions and Equations

Current Standard Abbreviation	Current Standard	Proposed Standard Abbreviation	First Draft Proposed Standard
Work with radicals and integer exponents.		**Work with radicals and integer exponents.**	
8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/2^7$.	NC.8.EE.1	Develop and apply the properties of integer exponents to generate equivalent numerical expressions.
8.EE.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that 2 is irrational.	NC.8.EE.2	Use square root and cube root symbols to: • Represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. • Evaluate square roots of perfect squares and cube roots of perfect cubes for positive numbers less than or equal to 400.
8.EE.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.	NC.8.EE.3	Use numbers expressed in scientific notation to estimate very large or very small quantities and to express how many times as much one is than the other.
8.EE.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	NC.8.EE.4	Perform multiplication and division with numbers expressed in scientific notation to solve real-world problems, including problems where both decimal and scientific notation are used.
Understand the connections between proportional relationships, lines, and linear equations.		**Understand the connections between proportional relationships, lines, and linear equations.**	
8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*	NC.8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. COMPARING PROPORTIONAL RELATIONSHIP MOVED TO 7.RP.2
8.EE.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a nonvertical line in the coordinate plane; derive the equation $y = mx$ for a line	NC.8.EE.6	***CONTENT MOVED TO 8.F.4***

	through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.		
Analyze and solve linear equations and pairs of simultaneous linear equations.		**Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.**	
8.EE.7	Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	NC.8.EE.7	Solve linear equations and inequalities in one variable. • Recognize linear equations in one variable as having one solution, infinitely many solutions, or no solutions. • Solve linear equations and inequalities with rational number coefficients, including multi-step equations and inequalities with the same variable on both sides.
8.EE.8	Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.* c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*	NC.8.EE.8	Analyze and solve a system of two linear equations in two variables in slope-intercept form. • Understand that solutions to a system of two linear equations correspond to the points of intersection of their graphs because the point of intersection satisfies both equations simultaneously. • Solve real-world and mathematical problems leading to systems of linear equations by graphing the equations. Solve simple cases by inspection.

Functions

Current Standard Abbreviation	Current Standard	Proposed Standard Abbreviation	First Draft Proposed Standard
Define, evaluate, and compare functions.		**Define, evaluate, and compare functions.**	
8.F.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Note: Function notation is not required in Grade 8.)	NC.8.F.1	Understand that a function is a rule that assigns to each input exactly one output. • Recognize functions when graphed as the set of ordered pairs consisting of an input and exactly one corresponding output. • Recognize functions given a table of values.
8.F.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	NC.8.F.2	Compare properties of two linear functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
8.F.3	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function A = s2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	NC.8.F.3	Identify linear functions from tables, equations, and graphs.
Use functions to model relationships between quantities.		**Use functions to model relationships between quantities.**	
8.F.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	NC.8.F.4	Analyze functions that model linear relationships. • Understand that a linear relationship can be generalized by $y = mx + b$. • Write an equation in slope-intercept form to model a linear relationship by determining the rate of change and the initial value, given at least two (x, y) values or a graph. • Construct a graph of a linear relationship given an equation in slope-intercept form. • Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
8.F.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	NC.8.F.5	Qualitatively analyze the functional relationship between two quantities. • Analyze a graph determining where the function is increasing or decreasing; linear or non-linear. • Sketch a graph that exhibits the qualitative features of a real-world function.

Geometry			
Current Standard Abbreviation	**Current Standard**	**Proposed Standard Abbreviation**	**First Draft Proposed Standard**
Understand congruence and similarity using physical models, transparencies, or geometry software.		**Understand congruence and similarity using physical models, transparencies, or geometry software.**	
8.G.1	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.	NC.8.G.1	Understand the effects of transformations. a. Verify experimentally the properties of rotations, reflections, and translations that create congruent figures. b. Verify experimentally the properties of dilations that create similar figures.
8.G.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	NC.8.G.2	Use transformations to define congruency. • Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; • Given two congruent figures, describe a sequence that exhibits the congruence between them.
8.G.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	NC.8.G.3	Describe the effect of dilations about the origin, translations, rotations about the origin, and reflections across the *x*-axis and *y*-axis on two-dimensional figures using coordinates.
8.G.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two dimensional figures, describe a sequence that exhibits the similarity between them.	NC.8.G.4	Use transformations to define similarity. • Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; • Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
8.G.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*	NC.8.G.5	Use informal arguments to analyze angle relationships. • Recognize relationships between interior and exterior angles of a triangle. • Recognize the relationships between the angles created when parallel lines are cut by a transversal. • Recognize the angle-angle criterion for similarity of triangles.

			• Solve real-world and mathematical problems involving angles.
Understand and apply the Pythagorean Theorem.		**Understand and apply the Pythagorean Theorem.**	
8.G.6	Explain a proof of the Pythagorean Theorem and its converse.	NC.8.G.6	Explain the Pythagorean Theorem and its converse.
8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	NC.8.G.7	Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.
8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	NC.8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.		**Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.**	
8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	NC.8.G.9	Understand how the formulas for the volumes of cones, cylinders, and spheres are related and use the relationship to solve real-world and mathematical problems.

Statistics and Probability

Current Standard Abbreviation	Current Standard	Proposed Standard Abbreviation	First Draft Proposed Standard
Investigate patterns of association in bivariate data.		**Investigate patterns of association in bivariate data.**	
8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	NC.8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Investigate and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
8.SP.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	NC.8.SP.2	Model the relationship between bivariate quantitative data to: • Informally fit a straight line for a scatter plot that suggests a linear association. • Informally assess the model fit by judging the closeness of the data points to the line.
8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*	NC.8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate, quantitative data, interpreting the slope and *y*-intercept.
8.SP.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*	NC.8.SP.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. • Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. • Use relative frequencies calculated for rows or columns to describe possible association between the two variables.