Important Prerequisite Math Standards to Support Math Planning

Now, more than ever, all students deserve access to engaging, challenging, grade-level math instruction. This is especially true for students who have been underserved such as students living in poverty, students from racially marginalized communities, students with learning differences, and students who are multilingual emergent. A commitment to equitable instruction requires that educators are intentional in identifying, celebrating, and building on knowledge that students have gained. It also requires that educators are strategic as they plan to address current and ongoing learning gaps. Starting the school year with weeks of review of prior-grade standards will result in a long-term loss of access to grade-level work that perpetuates inequities[1] for historically marginalized students. This resource demonstrates that **students who were impacted by interruptions to teaching and learning and subsequent learning losses are still able to access most grade-level standards this year without prior review,** and that missed content can usually be integrated in a minimally-invasive way.

- **What are the standards in this document?** This document highlights important prerequisites to standards in Grade 1 through Algebra I, as informed by the Coherence Map, high-quality instructional materials, and review by Student Achievement Partners. It is meant to support the *Understand, Diagnose, Take Action* approach to address unfinished learning, as described here. *As Geometry and Algebra II are less affected by learning loss in the prior year, they are not included here.*

- **How can these standards be used in planning for instruction?** Teachers can use this document to identify which standards in their grade have critical prerequisites from the **prior grade level** that may interfere with a student's ability to access grade-level content. In combination with **a diagnosis of student needs**, teachers can use this information to adjust long-range plans in anticipation of when more time will be needed to support students. This aligns with NCTM's push (pp. 3, 7-8) to determine necessary prior knowledge and "provide just-in-time interventions during the school day that do not replace daily, grade-level instruction and are designed on the basis of the results from effective formative assessments." Finally, suggestions are included for when to preserve or reduce instructional time in order to create space for instructional recovery to take place.

- **Is this document meant to be used beyond this school year?** While the categorization of prerequisites will remain relevant, the suggestions about instructional time – particularly those that call for certain standards to be deprioritized – should be considered unique to the current circumstances.

- **What should we make of standards that have an important prerequisite that needs to be addressed, but a reduction in instructional time is also recommended?** These considerations should be weighed together, along with the needs of your group of students. For example, the time spent on a standard might be reduced from five days to three days by de-emphasizing one part of the standard, but prior-grade needs might be addressed within the first lesson through strategic choice of tasks.

Category	Meaning	Example	Actions to take
Address **before** grade-level instruction	Without this prior knowledge, students most likely do not have a way to access the grade-level standard.	A 7th-grader who has not learned how to divide positive fractions (6.NS.A.1) needs to build that understanding before beginning to divide negative fractions (7.NS.A.2c).	Students may require **dedicated instruction** on prerequisite standards before the grade level instruction is taught. (Not every standard needs its own full lesson; multiple standards may be addressed at once, or a standard might be taught as a short mini-lesson.)

[1]*Disclaimer: Some of these links take you to external organizations. It is your responsibility to ensure you comply with any copyright or permissions restrictions before using these materials.*

Address **within** grade-level instruction	Students will have an entry point into grade-level content but will benefit from instruction that weaves in this prior-grade content.	A 4th-grader who struggles with recalling multiplication facts (3.OA.C.7) can still access grade-level, multi-step application problems (4.OA.A.3) when given a multiplication table, but will need small doses of continued support to attain fluency.	**Individual tasks or strategies** from these standards can be incorporated into grade-level lessons to address important content that was missed in the prior grade.

	5th Grade Math Important Prerequisites		
Prerequisite Standard Address before or within grade-level instruction	**Grade-Level Standard** ■ *Major* □ *Supporting* □ *Additional*	**Standard Language**	**Instructional Time** Preserve or reduce time in 20-21 as compared to a typical year, *per* [*SAP guidance*]
	□5.G.A.1 *Conceptual*	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).	*Incorporate foundational understandings of number lines (such as found in the work of 4.NF) into the work of extending number lines to the coordinate plane, as detailed in this cluster. Emphasize interpreting coordinate values of points in the context of a situation.*
	□5.G.A.2 *Conceptual, Application, Procedural*	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.	
4.G.A.1, 4.G.A.2	□5.G.B.3 *Conceptual*	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.*	*Combine lessons on classifying two-dimensional figures into categories based on properties in order to reduce the amount of time spent on this topic.*
	□5.G.B.4 *Conceptual*	Classify two-dimensional figures in a hierarchy based on properties.	
4.MD.A.1	□5.MD.A.1 *Procedural, Application*	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.	*Combine lessons on converting measurement units in order to reduce the amount of time spent on this topic.*
	□5.MD.B.2 *Application*	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*	*Eliminate lessons and problems on representing and interpreting data using line plots that do not strongly reinforce the*

			fraction work of this grade (5.NF).
	5.MD.C.3 *Conceptual*	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.	
	5.MD.C.3a *Conceptual*	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.	
	5.MD.C.3b *Conceptual*	A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.	
	5.MD.C.4 *Conceptual, Procedural*	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	
	5.MD.C.5 *Conceptual, Application, Procedural*	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.	
	5.MD.C.5a *Conceptual*	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.	
	5.MD.C.5b *Procedural, Application*	Apply the formulas V = l x w x h and V = b x 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.	
	5.MD.C.5c *Conceptual, Application*	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.	
4.NBT.A.1, 4.NF.C.5, 4.NF.C.6, 4.NF.C.7	5.NBT.A.1 *Conceptual*	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.	*Allow for time to develop students' understanding on foundation work of decimal fractions (4.NF.C) to support entry*

	■5.NBT.A.2 *Conceptual, Procedural*	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.	*into understanding the place value system with decimals (5.NBT.A.1, 3, and 4).*
4.NBT.A.2	■5.NBT.A.3 *Conceptual, Procedural*	Read, write, and compare decimals to thousandths.	
	■5.NBT.A.3a *Conceptual, Procedural*	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).	
	■5.NBT.A.3b *Conceptual*	Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	
4.NBT.A.3	■5.NBT.A.4 *Conceptual, Procedural*	Use place value understanding to round decimals to any place.	
4.NBT.B.5, 4.OA.A.3	■5.NBT.B.5 *Procedural*	Fluently multiply multi-digit whole numbers using the standard algorithm.	*Incorporate foundational work on multiplying and dividing multi-digit whole numbers (4.NBT.B.5 & 6) to support students' work operating with multi-digit whole numbers and decimals (5.NBT.B). In relation to fluency expectations for multiplying multi-digit numbers, eliminate problems in which either factor has more than three digits.*
4.NBT.B.6, 4.OA.A.3	■5.NBT.B.6 *Conceptual, Procedural*	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.	
4.NF.C.5, 4.NF.C.6, 4.NF.C.7, 4.OA.A.3	■5.NBT.B.7 *Conceptual, Procedural*	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	*Incorporate students' understanding of decimal fractions (4.NF.C) to support entry into the grade 5 work of operations with decimals.*

4.NF.A.1, 4.NF.B.3a-c	■5.NF.A.1 *Procedural*	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*	*Incorporate foundational work on equivalent fractions (4.NF.A.1) and on the conceptual understanding underlying fraction addition (4.NF.B.3) and to support students' work on adding and subtracting fractions with unlike denominators (5.NF.A).*
	■5.NF.A.2 *Application*	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7 by observing that 3/7 < 1/2.*	
	■5.NF.B.3 *Conceptual, Application*	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3 and that when 3 w*holes 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?*	
4.NF.B.4a-b	■5.NF.B.4 *Conceptual, Procedural*	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.	*Incorporate foundations for multiplying fractions by whole numbers (4.NF.B.4) to support students' work in multiplying fractions and whole numbers by fractions (5.NF.4).*
	■5.NF.B.4a *Conceptual, Application*	Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)*	
	■5.NF.B.4b *Conceptual*	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.	
4.OA.A.1, 4.OA.A.2	■5.NF.B.5 *Conceptual*	Interpret multiplication as scaling (resizing), by:	
	■5.NF.B.5a *Conceptual*	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.	

	■5.NF.B.5b *Conceptual*	Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n×a) / (n×b) to the effect of multiplying a/b by 1.	
	■5.NF.B.6 *Application*	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	
	■5.NF.B.7 *Conceptual, Application, Procedural*	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. 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.	
	■5.NF.B.7a *Conceptual, Application*	Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.*	
	■5.NF.B.7b *Conceptual, Application*	Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.*	
	■5.NF.B.7c *Application*	Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*	
	□5.OA.A.1 *Procedural*	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	*Combine lessons on writing and interpreting numerical expressions in order to reduce the amount of time spent on this topic.*
	□5.OA.A.2 *Conceptual*	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*	
	□5.OA.B.3 *Conceptual, Procedural*	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule*	*Eliminate lessons and problems on analyzing relationships between numerical patterns.*

		"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.	

6th Grade Math Important Prerequisites

Prerequisite Standard Address before or within grade-level instruction	Grade-Level Standard ■ *Major* □ *Supporting* □ *Additional*	Standard Language	Instructional Time Preserve or reduce time in 20-21 as compared to a typical year, *per* SAP guidance
5.NBT.A.2	■6.EE.A.1 *Procedural, Conceptual*	Write and evaluate numerical expressions involving whole-number exponents.	
5.OA.A.1, 5.OA.A.2, 5.OA.A.3	■6.EE.A.2 *Procedural, Conceptual*	Write, read, and evaluate expressions in which letters stand for numbers.	
	■6.EE.A.2a *Conceptual*	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.*	
	■6.EE.A.2b *Conceptual*	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.*	
	■6.EE.A.2c *Procedural, Application*	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.*	
	■6.EE.A.3 *Procedural, Conceptual*	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.*	

	6.EE.A.4 *Conceptual*	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.*	
5.NF.A.1, 5.NF.A.2, 5.NF.B.4a-b, 5.NF.B.6	6.EE.B.5 *Conceptual, Procedural*	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.	
	6.EE.B.6 *Conceptual, Application*	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.	
	6.EE.B.7 *Application, Procedural*	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.	
	6.EE.B.8 *Conceptual, Application*	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.	
	6.EE.C.9 *Application, Conceptual*	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.*	
	6.G.A.1 *Procedural, Application*	Find 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.	*Emphasize understanding of the reasoning leading to the triangle area formula. Instead of teaching additional area formulas as separate topics, emphasize problems that focus on finding areas in real-world problems by decomposing figures into triangles and rectangles.*

5.MD.C.4, 5.MD.C.5a-c	□6.G.A.2 *Conceptual, Procedural, Application*	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.	*Emphasize contextual problems, as detailed in the second sentence of the standard; eliminate lessons focused on the first sentence of the standard (finding the volume of a rectangular prism with fractional edge lengths by packing it with unit cubes).*
5.G.A.1, 5.G.A.2	□6.G.A.3 *Application, Procedural*	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.	*Eliminate lessons and problems involving polygons on the coordinate plane.*
	□6.G.A.4 *Conceptual, Application, Procedural*	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.	*Eliminate lessons and problems on constructing three-dimensional figures from nets and determining if nets can be constructed into three-dimensional figures during the study of nets and surface area.*
5.NF.B.7a-b	■6.NS.A.1 *Conceptual, Procedural, Application*	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?*	
5.NBT.B.6	□6.NS.B.2 *Procedural*	Fluently divide multi-digit numbers using the standard algorithm.	*Eliminate lessons on computing fluently by integrating these problems into spiraled practice throughout the year. Time should not be spent remediating multi-*
5.NBT.B.7	□6.NS.B.3 *Procedural*	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	

			digit calculation algorithms.
	6.NS.B.4 *Conceptual, Procedural*	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).*	
	6.NS.C.5 *Conceptual, Application*	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 represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	
	6.NS.C.6 *Conceptual*	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.	
	6.NS.C.6a *Conceptual*	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, and that 0 is its own opposite.	
	6.NS.C.6b *Conceptual*	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.	
	6.NS.C.6c *Procedural*	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.	
	6.NS.C.7 *Conceptual*	Understand ordering and absolute value of rational numbers.	
	6.NS.C.7a *Conceptual*	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.*	
	6.NS.C.7b *Conceptual, Application*	Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3C > -7C to express the fact that -3C is warmer than -7C.*	

	■6.NS.C.7c *Conceptual, Application*	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.*	
	■6.NS.C.7d *Conceptual*	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.*	
5.G.A.1, 5.G.A.2	■6.NS.C.8 *Application, Conceptual, Procedural*	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.	
5.NF.B.5a-b	■6.RP.A.1 *Conceptual*	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."*	
5.NF.B.3 5.NF.B.5a-b	■6.RP.A.2 *Conceptual*	Understand the concept of a unit rate a/b associated with a ratio a:b with b not equal to 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."*	
	■6.RP.A.3 *Application, Conceptual, Procedural*	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.	
5.G.A.1, 5.G.A.2	■6.RP.A.3a *Conceptual, Procedural*	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.	
	■6.RP.A.3b *Application*	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?*	
	■6.RP.A.3c *Conceptual, Procedural, Application*	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.	

	■6.RP.A.3d *Conceptual, Procedural, Application*	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	
	□6.SP.A.1 *Conceptual*	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.*	*Combine lessons about introductory statistical concepts so as to proceed more quickly to applying and reinforcing these concepts in context.*
	□6.SP.A.2 *Conceptual*	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.A.3 *Conceptual*	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.	
	□6.SP.B.4 *Application, Conceptual, Procedural*	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	*Reduce the amount of required student practice in calculating measures of center and measures of variation by hand, to emphasize the concept of a distribution and the usefulness of summary measures. Reduce the amount of time spent creating data displays by hand.*
	□6.SP.B.5 *Application, Conceptual*	Summarize numerical data sets in relation to their context.	
	□6.SP.B.5a *Application, Conceptual*	Summarize numerical data sets in relation to their context by reporting the number of observations.	
	□6.SP.B.5b *Application, Conceptual*	Summarize numerical data sets in relation to their context by describing the nature of the attribute under investigation, including how it was measured and its units of measurement.	
	□6.SP.B.5c *Application, Conceptual, Procedural*	Summarize numerical data sets in relation to their context by 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.	
	□6.SP.B.5d *Application, Conceptual*	Summarize numerical data sets in relation to their context by 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.	

7th Grade Math Important Prerequisites

Prerequisite Standard Address before or within grade-level instruction	Grade-Level Standard ■ *Major* □ *Supporting* □ *Additional*	Standard Language	Instructional Time Preserve or reduce time in 20-21 as compared to a typical year, *per* *SAP guidance*
6.EE.A.2a-b, 6.EE.A.3, 6.EE.A.4	■7.EE.A.1 *Conceptual, Procedural*	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	
	■7.EE.A.2 *Conceptual*	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."*	
	■7.EE.B.3 *Procedural, Application*	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 as strategies 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.*	
	■7.EE.B.4 *Conceptual, Procedural, Application*	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.	*Emphasize equations (7.EE.B.4a) relative to inequalities (7.EE.B.4b).*
6.EE.B.5, 6.EE.B.6, 6.EE.B.7	■7.EE.B.4a *Conceptual, Procedural, Application*	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, The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*	

6.EE.B.8	■7.EE.B.4b *Conceptual, Procedural, Application*	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.*	
6.G.A.1, 6.G.A.3	□7.G.A.1 *Procedural, Application*	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.	*Reduce time spent creating scale drawings by hand.*
	□7.G.A.2 *Conceptual, Procedural*	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.	*Eliminate lessons on drawing and constructing triangles as detailed in this standard.*
	□7.G.A.3 *Conceptual*	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	*Eliminate lessons on analyzing figures that result from slicing three-dimensional figures as detailed in this standard.*
	□7.G.B.4 *Conceptual, Procedural, Application*	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.	*Combine lessons on knowing and using the formulas for the area and circumference of a circle in order to reduce the amount of time spent on this topic. Limit the amount of required student practice.*
	□7.G.B.5 *Conceptual, Procedural*	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.	*Combine lessons to address key concepts and skills of unknown angles, area, volume, and surface area (7.G.B.5, 7.G.B.6). Reduce the amount of required student practice. Do not require students to use or draw nets to determine surface area.*
6.G.A.1, 6.G.A.2, 6.G.A.4	□7.G.B.6 *Procedural, Application*	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.	
6.NS.B.3,	■7.NS.A.1 *Conceptual, Procedural*	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.	

6.NS.C.6a, 6.NS.C.6c, 6.NS.C.7a-d	■7.NS.A.1a *Conceptual, Application*	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.*	
	■7.NS.A.1b *Conceptual, Application*	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.	
	■7.NS.A.1c *Conceptual, Application*	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.	
	■7.NS.A.1d *Conceptual, Procedural*	Apply properties of operations as strategies to add and subtract rational numbers.	
6.NS.A.1, 6.NS.B.3	■7.NS.A.2 *Conceptual, Procedural*	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	
	■7.NS.A.2a *Conceptual, Application*	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.	
	■7.NS.A.2b *Conceptual, Application*	Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then -(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts.	
	■7.NS.A.2c *Conceptual, Procedural*	Apply properties of operations as strategies to multiply and divide rational numbers.	
	■7.NS.A.2d *Conceptual, Procedural*	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	
	■7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.	

	Procedural, Application		
6.EE.C.9, 6.RP.A.1, 6.RP.A.2, 6.RP.A.3a-c, 6.RP.A.3d	■7.RP.A.1 *Procedural, Application*	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.*	
	■7.RP.A.2 *Conceptual, Application*	Recognize and represent proportional relationships between quantities.	
	■7.RP.A.2a *Conceptual*	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.	
	■7.RP.A.2b *Conceptual, Procedural, Application*	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	
	■7.RP.A.2c *Conceptual, Procedural, Application*	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.*	
	■7.RP.A.2d *Conceptual*	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.	
	■7.RP.A.3 *Application*	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.	
6.SP.A.1	□7.SP.A.1 *Conceptual*	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.	*Combine lessons on using random sampling to draw inferences about a population and using measures of center and variability to draw comparative inferences about two populations in order to reduce the amount of time spent on this topic. Limit the amount of required student practice.*
	□7.SP.A.2 *Conceptual, Application*	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.*	

6.SP.A.1, 6.SP.A.2	□7.SP.B.3 *Conceptual, Application*	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.*	*Eliminate lessons and problems on assessing the degree of overlap on data distributions as detailed in this standard.*
	□7.SP.B.4 *Conceptual, Application*	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.*	
	□7.SP.C.5 *Conceptual*	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 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.	*Combine lessons on developing, using and evaluating probability models in order to emphasize foundational concepts and reduce the amount of time spent on this topic. Limit the amount of required student practice.*
	□7.SP.C.6 *Conceptual, Application*	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.*	
	□7.SP.C.7 *Conceptual, Application*	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.	
	□7.SP.C.7a *Application*	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.*	
	□7.SP.C.7b *Application*	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?*	
	□7.SP.C.8 *Procedural, Application*	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	*Eliminate lessons and problems on finding probabilities of*

	7.SP.C.8a *Conceptual*	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.	*compound events as detailed in this standard.*
	7.SP.C.8b *Conceptual, Application*	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.	
	7.SP.C.8c *Application*	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 Math Important Prerequisites

Prerequisite Standard Address before or within grade-level instruction	**Grade-Level Standard** ■ *Major* □ *Supporting* □ *Additional*	**Standard Language**	**Instructional Time** Preserve or reduce time in 20-21 as compared to a typical year, *per* [*SAP guidance*]
	■8.EE.A.1 *Procedural*	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, 3^2 × 3^-5 = 3^-3 = 1/3^3 = 1/27.*	
	■8.EE.A.2 *Conceptual, Procedural*	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 sqrt(2) is irrational.	*Eliminate lessons and problems about cube roots.*
	■8.EE.A.3 *Conceptual, Application*	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.*	*Eliminate lessons and practice dedicated to calculating with scientific notation, but include examples of numbers expressed in scientific notation in lessons about integer exponents, as examples of how integer exponents are applicable outside of mathematics classes (8.EE.A.1).*
7.EE.B.3	■8.EE.A.4 *Conceptual, Procedural*	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.	
7.RP.A.1, 7.RP.A.2a-d	■8.EE.B.5 *Conceptual, Application*	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.*	

7.G.A.1, 7.RP.A.1, 7.RP.A.2a-d	■8.EE.B.6 *Conceptual, Procedural*	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.	
7.EE.A.1, 7.NS.A.1a-d, 7.NS.A.2a-d	■8.EE.C.7 *Procedural*	Solve linear equations in one variable.	
	■8.EE.C.7a *Conceptual*	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).	
	■8.EE.C.7b *Procedural*	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	
7.EE.B.4a	■8.EE.C.8 *Conceptual, Procedural*	Analyze and solve pairs of simultaneous linear equations.	
	■8.EE.C.8a *Conceptual*	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.	
	■8.EE.C.8b *Conceptual, Procedural*	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.*	*Limit the amount of required student practice in solving systems algebraically.*
	■8.EE.C.8c *Procedural, Application*	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.*	
	■8.F.A.1 *Conceptual*	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.	
	■8.F.A.2 *Conceptual*	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*	
	■8.F.A.3 *Conceptual*	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 = s^2 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.*	

	8.F.B.4 *Conceptual, Application*	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.	
	8.F.B.5 *Conceptual, Application*	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.	
	8.G.A.1 *Conceptual, Application*	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.	*Combine lessons to address key concepts in congruence and combine lessons to address key concepts in similarity of two-dimensional figures in order to reduce the amount of time on this topic.*
	8.G.A.1a *Conceptual*	Lines are taken to lines, and line segments to line segments of the same length.	
	8.G.A.1b *Conceptual*	Angles are taken to angles of the same measure.	
	8.G.A.1c *Conceptual*	Parallel lines are taken to parallel lines.	
	8.G.A.2 *Conceptual*	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.A.3 *Conceptual*	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	
	8.G.A.4 *Conceptual*	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.	
7.G.B.5	8.G.A.5 *Conceptual*	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.*	
	8.G.B.6 *Conceptual*	Explain a proof of the Pythagorean Theorem and its converse.	

7.G.B.6	■8.G.B.7 *Procedural, Application*	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	
	■8.G.B.8 *Procedural, Application*	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	*Eliminate lessons and problems dedicated to applying the Pythagorean Theorem to find the distance between two points in a coordinate system.*
7.G.B.4, 7.G.B.6	□8.G.C.9 *Conceptual, Procedural, Application*	Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real world and mathematical problems.	*Combine lessons to address key concepts with volume, with an emphasis on cylinders, in order to reduce the amount of time on this topic.*
7.NS.A.1a-d, 7.NS.A.2a-d	□8.NS.A.1 *Conceptual, Procedural*	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	*Integrate irrational numbers with students' work on square roots (8.EE.A.2) and the Pythagorean Theorem (8.G.B.7).*
	□8.NS.A.2 *Conceptual*	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., pi^2). *For example, by truncating the decimal expansion of sqrt(2), show that sqrt(2) is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	
	□8.SP.A.1 *Conceptual, Application*	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.	*Combine lessons for 8.SP.A.1, 2, and 4 to address key statistical concepts in order to reduce the amount of time on this topic. Limit the amount of required student practice.*
	□8.SP.A.2 *Conceptual, Application*	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.	

	☐8.SP.A.3 *Application*	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.*	*Emphasize using linear functions to model association in bivariate measurement data that suggest a linear association, using the functions to answer questions about the data.*
	☐8.SP.A.4 *Conceptual, Application*	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?*	*Combine lessons for 8.SP.A.1, 2, and 4 to address key statistical concepts in order to reduce the amount of time on this topic. Limit the amount of required student practice.*

Algebra I Important Prerequisites

Prerequisite Standard Address before or within grade-level instruction	Grade-Level Standard ■ *Major* □ *Supporting* □ *Additional*	Standard Language
8.EE.A.1	N.RN.A.1 *Conceptual*	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.*
	N.RN.A.2 *Procedural*	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
8.NS.A.1, 8.NS.A.2	N.RN.B.3 *Conceptual*	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
	N.Q.A.1 *Conceptual, Application*	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
	N.Q.A.2 *Conceptual, Application*	Define appropriate quantities for the purpose of descriptive modeling.
	N.Q.A.3 *Conceptual, Application*	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
	A.SSE.A.1 *Conceptual, Application*	Interpret expressions that represent a quantity in terms of its context.
	A.SSE.A.1a *Conceptual*	Interpret parts of an expression, such as terms, factors, and coefficients.
	A.SSE.A.1b *Conceptual*	Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.*

8.EE.A.2	A.SSE.A.2 *Conceptual, Procedural*	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
	A.SSE.B.3 *Conceptual, Procedural*	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
8.EE.A.2	A.SSE.B.3a *Conceptual, Procedural*	Factor a quadratic expression to reveal the zeros of the function it defines.
	A.SSE.B.3b *Conceptual, Procedural*	Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
	A.SSE.B.3c *Procedural*	Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
8.EE.A.1	A.APR.A.1 *Conceptual, Procedural*	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
8.EE.A.2, 8.EE.B.5, 8.EE.B.6, 8.F.B.4	A.CED.A.1 *Conceptual, Procedural Application*	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
	A.CED.A.2 *Conceptual, Procedural*	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	A.CED.A.3 *Conceptual, Application*	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
8.EE.C.7a-b	A.CED.A.4 *Conceptual, Procedural*	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law $V = IR$ to highlight resistance R.*
8.EE.C.7a-b	A.REI.A.1 *Conceptual*	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
8.EE.C.7a-b	A.REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

	Procedural	
8.EE.A.2	A.REI.B.4 *Procedural*	Solve quadratic equations in one variable.
	A.REI.B.4a *Conceptual. Procedural*	Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.
	A.REI.B.4b *Conceptual, Procedural*	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
8.EE.C.8a-c	A.REI.C.5 *Conceptual*	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
	A.REI.C.6 *Procedural*	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
	A.REI.C.7 *Procedural*	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line* $y = -3x$ *and the circle* $x^2 + y^2 = 3$.
	A.REI.D.10 *Conceptual*	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
	A.REI.D.11 *Conceptual. Procedural*	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
	A.REI.D.12 *Procedural*	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
8.F.A.1	F.IF.A.1 *Conceptual*	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y = f(x)*.
	F.IF.A.2 *Conceptual, Procedural*	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
	F.I.F.A.3 *Conceptual*	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by* $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ *for* $n \geq 1$.

8.F.B.5	F.IF.B.4 *Conceptual, Application*	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*
	F.IF.B.5 *Conceptual, Application*	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.**
8.F.B.4	F.IF.B.6 *Conceptual, Procedural, Application*	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
	F.IF.C.7 *Conceptual, Procedural*	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
	F.IF.C.7a *Conceptual, Procedural*	Graph linear and quadratic functions and show intercepts, maxima, and minima.
	F.IF.C.7b *Conceptual, Procedural*	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
	F.IF.C.7e *Conceptual, Procedural*	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
	F.IF.C.8 *Conceptual, Procedural*	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
	F.IF.C.8a *Conceptual, Procedural, Application*	Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
	F.IF.C.8b *Conceptual*	Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, *and classify them as representing exponential growth or decay.*

8.F.A.2	F.IF.C.9 *Conceptual*	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
	F.BF.A.1 *Conceptual, Procedural, Application*	Write a function that describes a relationship between two quantities.
	F.BF.A.1a *Conceptual, Procedural, Application*	Determine an explicit expression, a recursive process, or steps for calculation from a context.
	F.BF.A.1b *Conceptual, Procedural, Application*	Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*
	F.BF.A.2 *Conceptual, Procedural, Application*	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*
	F.BF.B.3 *Conceptual, Procedural*	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
	F.BF.B.4 *Procedural*	Find inverse functions.
	F.BF.B.4a *Procedural*	Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example,* $f(x) = 2x^3$ *or* $f(x) = (x+1)/(x-1)$ *for* $x \neq 1$.
8.EE.B.5, 8.EE.B.6, 8.F.A.3, 8.F.B.4	F.LE.A.1 *Conceptual*	Distinguish between situations that can be modeled with linear functions and with exponential functions.
	F.LE.A.1a *Conceptual*	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
8.F.A.3	F.LE.A.1b *Conceptual*	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
	F.LE.A.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.

	Conceptual	
8.EE.B.5, 8.EE.B.6, 8.F.B.4	F.LE.A.2 *Conceptual, Procedural, Application*	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
	F.LE.A.3 *Conceptual*	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
	F.LE.B.5 *Conceptual Application*	Interpret the parameters in a linear or exponential function in terms of a context.
	S.ID.A.1 *Procedural*	Represent data with plots on the real number line (dot plots, histograms, and box plots).
	S.ID.A.2 *Conceptual, Procedural*	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
	S.ID.A.3 *Conceptual, Application*	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
8.SP.A.4	S.ID.B.5 *Conceptual, Procedural, Application*	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
8.SP.A.1, 8.SP.A.2	S.ID.B.6 *Conceptual, Procedural, Application*	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
	S.ID.B.6a *Conceptual, Procedural, Application*	Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
8.SP.A.1, 8.SP.A.2	S.ID.B.6b *Conceptual, Procedural*	Informally assess the fit of a function by plotting and analyzing residuals.
	S.ID.B.6c *Procedural*	Fit a linear function for a scatter plot that suggests a linear association.

8.SP.A.3	S.ID.C.7 *Conceptual, Application*	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
	S.ID.C.8 *Conceptual, Procedural*	Compute (using technology) and interpret the correlation coefficient of a linear fit
	S.ID.C.9 *Conceptual*	Distinguish between correlation and causation.

About ANet

ANet is a nonprofit that partners with school and district leaders to support great teaching - teaching that is grounded in standards, shaped by data, and built upon the practices of great educators across the country. Founded as a collaborative improvement effort among seven schools in 2005, ANet is dedicated to educational equity for all students.

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