

NYS Grade 6 to Grade 8 Mathematics Learning Standards

**Grade 8
The Number System**

		Standard Code	Current Standard	Revised Standard Recommendation for 2018-19	Additional Information/Notes
Clusters	A. Know that there are numbers that are not rational and approximate them by rational numbers.	8.NS.A.1	1. 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.	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.	The suggested language for this standard comes from the June 2010, Grade 6-8 Domain Progressions for Mathematics This replacement provides a understanding of the difference between rational and irrational numbers.
		8.NS.A.2	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., π^2). <i>For example, by truncating the decimal expansion of $\sqrt{2}$ (square root of 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.</i>	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, which includes, π^2 . <i>For example, by truncating the decimal expansion of $\sqrt{2}$ (square root of 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.</i>	Clarification

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Grade 8

Expressions and Equations (Inequalities)

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Clusters	A. Work with radicals and integer exponents.	8.EE.A.1	1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{(-5)} = 3^{(-3)} = \frac{1}{(3^3)} = \frac{1}{27}$.	1. No Change	
		8.EE.A.2	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 $\sqrt{2}$ is irrational.	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. Know square roots of perfect squares up to 225 and cube roots of perfect cubes up to 125. Know that the square root of a non-perfect square is irrational. <i>For example, the $\sqrt{2}$ is irrational.</i>	These additional expectations build conceptual development of square roots and cube roots necessary for this grade level and in high school.
		8.EE.A.3	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. <i>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.</i>	3. No Change	

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Expressions and Equations (Inequalities)

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Clusters	A. Work with radicals and integer exponents.	8.EE.A.4	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.	4. Perform operations with numbers expressed in scientific notation, including problems where both standard decimal form and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.	Clarification
	B. Understand the connections between proportional relationships, lines and linear equations.	8.EE.B.5	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.	5. No Change	
		8.EE.B.6	6. 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 .	6. 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 . Explore 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.	This standard interchanges the two concepts so the primary focus is on the progression from proportional relationships.

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Expressions and Equations (Inequalities)

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Clusters C. Analyze and solve linear equations and pairs of simultaneous linear equations.	8.EE.C.7	7. Solve linear equations in one variable.	7. No Change	
	8.EE.C.7a	7a. 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).	7a. No Change	
	8.EE.C.7b	7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms. This includes equations that contain variables on both sides of the equation.	Clarification

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Expressions and Equations (Inequalities)

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Clusters	C. Analyze and solve linear equations and pairs of simultaneous linear equations.	8.EE.C.8	8. Analyze and solve pairs of simultaneous linear equations.	8. No Change	
		8.EE.C.8a	8a. 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.	8a. No Change	
		8.EE.C.8b	8b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. <i>For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.</i>	8b. Solve systems of two linear equations in two variables with integral coefficients: graphically, numerically using a table, and algebraically by substitution. Note: Solving systems algebraically by substitution will be limited to at least one equation containing at least one variable whose coefficient is 1. Solve simple cases by inspection fluently . <i>For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.</i>	The solution of a system of equations algebraically by elimination will be covered in the Algebra I standard A.REI.C.5. Also, solving systems of equations with rational coefficients is an expectation of Algebra I. Note: Solving simple 2 x 2 systems by inspection is a fluency expectation in grade 8.
		8.EE.C.8c	8c. Solve real-world and mathematical problems leading to two linear equations in two variables. <i>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.</i>	8c. Solve real-world and mathematical problems involving systems of two linear equations in two variables with integral coefficients.	

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**Grade 8
Functions**

		Standard Code	Current Standard	Revised Standard Recommendation for 2018-19	Additional Information/Notes
Clusters	A. Define, evaluate and compare functions.	8.F.A.1	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. (Function notation is not required in Grade 8.)	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: The use of function notation and the terms domain and range are not required at this level.)	Clarification
		8.F.A.2	2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>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.</i>	2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a linear function represented by a table of values and a linear function represented by an algebraic equation, determine which function has the greater rate of change.</i>	Clarification
		8.F.A.3	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. <i>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.</i>	3. No Change	

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**Grade 8
Functions**

		Standard Code	Current Standard	Revised Standard Recommendation for 2018-19	Additional Information/Notes
Clusters	B. Use functions to model relationships between quantities.	8.F.B.4	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.	4. No Change	
		8.F.B.5	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.	5. Describe qualitatively the functional relationship between two quantities by analyzing a graph. For example, where the function is increasing or decreasing or whether the function is linear or nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described in a real-world context.	Clarification

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**Grade 8
Geometry**

		Standard Code	Current Standard	Revised Standard Recommendation for 2018-19	Additional Information/Notes
Clusters	A. Understand congruence and similarity using physical models, transparencies, or geometry software.	8.G.A.1	1. Verify experimentally the properties of rotations, reflections, and translations:	1. No Change	
		8.G.A.1a	1a. Lines are taken to lines, and line segments to line segments of the same length.	1a. No Change	
		8.G.A.1b	1b. Angles are taken to angles of the same measure.	1b. No Change	
		8.G.A.1c	1c. Parallel lines are taken to parallel lines.	1c. No Change	

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**Grade 8
Geometry**

	Standard Code	Current Standard	Revised Standard Recommendation for 2018-19	Additional Information/Notes
Clusters A. Understand congruence and similarity using physical models, transparencies, or geometry software.	8.G.A.2	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.	2. Know that a two-dimensional figure is congruent to another if the corresponding angles are congruent and the corresponding sides are congruent. Also, understand that the image can be obtained from the pre-image by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that maps the congruence between them.	Clarification
	8.G.A.3	3. Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	3. No Change	
	8.G.A.4	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.	4. Know that a two-dimensional figure is similar to another if the corresponding angles are congruent and the corresponding sides are in proportion. Also understand that the image can be obtained from the pre-image by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that maps the similarity between them.	Clarification
	8.G.A.5	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. <i>For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so.</i>	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. <i>For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so. (Note: This standard does not include formal geometric proof. Multiple representations may be used to demonstrate understanding.)</i>	Clarification

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**Grade 8
Geometry**

		Standard Code	Current Standard	Revised Standard Recommendation for 2018-19	Additional Information/Notes
Clusters	B. Understand and apply the Pythagorean Theorem.	8.G.B.6	6. Explain a proof of the Pythagorean Theorem and its converse.	6. Explore and understand a proof of the Pythagorean Theorem and its converse.	Clarification
		8.G.B.7	7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	7. No Change	
		8.G.B.8	8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	8. No Change	
	C. Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.	8.G.C.9	9. Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	9. Explore and use the formulas for the volume of cones, cylinders, and spheres and use them to solve simple real-world and mathematical problems with limited complexity.	Clarification

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**Grade 8
Statistics and Probability**

	Standard Code	Current Standard	Revised Standard Recommendation for 2018-19	Additional Information/Notes
Clusters	A. Investigate patterns of association in bivariate data.	8.SP.A.1 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.	1. No Change	
		8.SP.A.2 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.	2. Understand 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. (Note that lines of best fit are approximations.)	Clarification
		8.SP.A.3 3. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. <i>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.</i>	3. No Change	
		8.SP.A.4 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. <i>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?</i>	4. No Change	