Missouri Learning Standards: Grade-Level Expectations for Mathematics (Adopted April 2016 for implementation in the 2016 – 2017 school year, assessed beginning in the 2017 – 2018 school year.)		Missouri Learning Standards: Mathematics (Adopted 2010, transitioning out, assessed through the 2016 – 2017 school year.)	
Code	**Adopted Standards**	**Code**	**Current MLS**
8.NS.A	**Know that there are numbers that are not rational, and approximate them by rational numbers.**		
8.NS.A.1	Explore the real number system. a. Know the differences between rational and irrational numbers. b. Understand that all rational numbers have a decimal expansion that terminates or repeats. c. Convert decimals which repeat into fractions and fractions into repeating decimals. d. Generate equivalent representations of rational numbers.	**8.NS.A.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.
8.NS.A.2	Estimate the value and compare the size of irrational numbers and approximate their locations on a number line.	**8.NS.A.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). *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.EEI.A	**Work with radicals and integer exponents.**		
8.EEI.A.1	Know and apply the properties of integer exponents to generate equivalent expressions.	**8.EE.A.1**	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.
8.EEI.A.2	Investigate concepts of square and cube roots. a. Solve equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. b. Evaluate square roots of perfect squares less than or equal to 625 and cube roots of perfect cubes less than or equal to 1000. c. Recognize that square roots of non-perfect squares are irrational.	**8.EE.A.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.
8.EEI.A.3	Express very large and very small quantities in scientific notation and approximate how many times larger one is than the other.	**8.EE.A.3**	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger*.

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8.EEI.A.4	Use scientific notation to solve problems. a. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. b. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.	**8.EE.A.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
8.EEI.B	**Understand the connections between proportional relationships, lines and linear equations.**		
8.EEI.B.5	Graph proportional relationships. a. Interpret the unit rate as the slope of the graph. b. Compare two different proportional relationships.	**8.EE.B.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.
8.EEI.B.6	Apply concepts of slope and y-intercept to graphs, equations and proportional relationships. a. Explain why the slope (m) is the same between any two distinct points on a non-vertical line in the Cartesian coordinate plane. b. 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.	**8.EE.B.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.
8.EEI.C	**Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.**		
8.EEI.C.7	Solve linear equations and inequalities in one variable. a. Create and identify linear equations with one solution, infinitely many solutions or no solutions. b. Solve linear equations and inequalities with rational number coefficients, including equations and inequalities whose solutions require expanding expressions using the distributive property and combining like terms.	**8.EE.C.7**	Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

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8.EEI.C.8	Analyze and solve systems of linear equations. a. Graph systems of linear equations and recognize the intersection as the solution to the system. b. Explain why solution(s) to a system of two linear equations in two variables correspond to point(s) of intersection of the graphs. c. Explain why systems of linear equations can have one solution, no solution or infinitely many solutions. d. Solve systems of two linear equations.	**8.EE.C.8**	Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6*. c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair*.
8.GM.A	**Understand congruence and similarity using physical models, transparencies or geometry software.**		
8.GM.A.1	Verify experimentally the congruence properties of rigid transformations. a. Verify that angle measure, betweeness, collinearity and distance are preserved under rigid transformations. b. Investigate if orientation is preserved under rigid transformations.	**8.G.A.1**	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.
8.GM.A.2	Understand that two-dimensional figures are congruent if a series of rigid transformations can be performed to map the pre-image to the image. a. Describe a possible sequence of rigid transformations between two congruent figures.	**8.G.A.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.
8.GM.A.3	Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	**8.G.A.3**	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
8.GM.A.4	Understand that two-dimensional figures are similar if a series of transformations (rotations, reflections, translations and dilations) can be performed to map the pre-image to the image. a. Describe a possible sequence of transformations between two similar figures.	**8.G.A.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.

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8.GM.A.5	Explore angle relationships and establish informal arguments. a. Derive the sum of the interior angles of a triangle. b. Explore the relationship between the interior and exterior angles of a triangle. c. Construct and explore the angles created when parallel lines are cut by a transversal. d. Use the properties of similar figures to solve problems.	**8.G.A.5**	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so*.
8.GM.B	**Understand and apply the Pythagorean Theorem.**		
8.GM.B.6	Use models to demonstrate a proof of the Pythagorean Theorem and its converse.	**8.G.B.6**	Explain a proof of the Pythagorean Theorem and its converse.
8.GM.B.7	Use the Pythagorean Theorem to determine unknown side lengths in right triangles in problems in two- and three-dimensional contexts.	**8.G.B.7**	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
8.GM.B.8	Use the Pythagorean Theorem to find the distance between points in a Cartesian coordinate system.	**8.G.B.8**	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8.GM.C	**Solve problems involving volume of cones, pyramids and spheres.**		
8.GM.C.9	Solve problems involving surface area and volume. a. Understand the concept of surface area and find surface area of pyramids. b. Understand the concepts of volume and find the volume of pyramids, cones and spheres.	**8.G.C.9**	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
8.DSP.A	**Investigate patterns of association in bivariate data.**		
8.DSP.A.1	Construct and interpret scatter plots of bivariate measurement data to investigate patterns of association between two quantities.	**8.SP.A.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.
8.DSP.A.2	Generate and use a trend line for bivariate data, and informally assess the fit of the line.	**8.SP.A.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.

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		8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height*.
8.DSP.A.3	Interpret the parameters of a linear model of bivariate measurement data to solve problems.	**8.SP.A.3**	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height*.
8.DSP.A.4	Understand the patterns of association in bivariate categorical data displayed in a two-way table. a. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. b. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.	**8.SP.A.4**	Understand that patters 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 whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*
8.F.A	**Define, evaluate and compare functions.**		
8.F.A.1	Explore the concept of functions. (The use of function notation is not required.) a. Understand that a function assigns to each input exactly one output. b. Determine if a relation is a function. c. Graph a function.	**8.F.A.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.
8.F.A.2	Compare characteristics of two functions each represented in a different way.	**8.F.A.2**	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*.

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8.F.A.3	Investigate the differences between linear and nonlinear functions. a. Interpret the equation y = mx + b as defining a linear function, whose parameters are the slope (m) and the y-intercept (b). b. Recognize that the graph of a linear function has a constant rate of change c. Give examples of nonlinear functions.	**8.F.A.3**	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ 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	**Use functions to model relationships between quantities.**		
8.F.B.4	Use functions to model linear relationships between quantities. a. Explain the parameters of a linear function based on the context of a problem. b. Determine the parameters of a linear function. c. Determine the x-intercept of a linear function.	**8.F.B.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.
8.F.B.5	Describe the functional relationship between two quantities from a graph or a verbal description.	**8.F.B.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.