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| **Semester 1** | | | |
| **Standards for Mathematical Practice** | | | |
| 1 Make sense of problems and persevere in solving them.  2 Reason abstractly and quantitatively.  3 Construct viable arguments and critique the reasoning of others.  4 Model with mathematics. | | 5 Use appropriate tools strategically.  6 Attend to precision.  7 Look for and make use of structure.  8 Look for and express regularity in repeated reasoning. | |
| **Unit 1** | **Unit 2** | **Unit 3** | **Unit 4** |
| **Transformations, Congruence and Similarity** | **Exponents and Equations** | **Geometric Applications of Exponents** | **Functions** |
| **Days** | **Days** | **Days** | **Days** |
| **Understand congruence and similarity using physical models, transparencies, or geometry software.**  **MCC.8.G.1** Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.  M**CC.8.G.2** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.  **MCC.8.G.3** Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.  **MCC.8.G.4** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.  **MCC.8.G.5** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.  **Additional Standards for Advanced**  **MCC9-12.G.CO.1** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.  **MCC9-12.G.CO.2** Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). | **Work with radicals and integer exponents.**  **MCC.8.EE.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3(–5) = 3(–3) = 1/(33) = 1/27.  **MCC.8.EE.2** Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.  **MCC.8.EE.3** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.  **MCC.8.EE.4** Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.  **MCC.8.EE.7** Solve linear equations in one variable.  **MCC.8.EE.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 , , or  results (where  and  are different numbers).  **MCC.8.EE.7b** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.  **Know that there are numbers that are not rational, and approximate them by rational numbers.**  **MCC.8.NS.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 ratio of integers.  **MCC.8.NS.2** Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π2). | **Understand and apply the Pythagorean Theorem.**  **MCC.8.G.6 Explain a proof of the Pythagorean Theorem and its converse.**  **MCC.8.G.7** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.  **MCC.8.G.8** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.  **Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.**  **MCC.8.G.9** Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.  **Work with radicals and integer exponents.**  **MCC.8.EE.2** Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. | **Define, evaluate, and compare functions.**  **MCC.8.F.1** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.  **MCC.8.F.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.*  **Additional Standards for Advanced**  **MCC9-12.F.IF.1** 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).* *(Draw examples from linear functions.)*  **MCC9-12.F.IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. *(Draw examples from linear functions.)*  **MCC9-12.F.IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. |

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| **Semester 2** | | | |
| **Standards for Mathematical Practice** | | | |
| 1 Make sense of problems and persevere in solving them.  2 Reason abstractly and quantitatively.  3 Construct viable arguments and critique the reasoning of others.  4 Model with mathematics. | | 5 Use appropriate tools strategically.  6 Attend to precision.  7 Look for and make use of structure.  8 Look for and express regularity in repeated reasoning. | |
| **Unit 5** | **Unit 6** | | **Unit 7** |
| **Linear Functions** | **Linear Models and Tables** | | **Solving Systems of Equations** |
| **Days** | **Days** | | **Days** |
| **Understand the connections between proportional relationships, lines, and linear equations.**  **MCC.8.EE.5** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.  **MCC.8.EE.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 for a line through the origin and the equation for a line intercepting the vertical axis at b.  **Define, evaluate, and compare functions.**  **MCC.8.F.3** Interpret the equation as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.  **Additional Standards for Advanced**  **MCC9-12.A.REI.10** 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). *(Focus on linear equations and be able to adapt and apply that learning to other types of equations in future courses.)*  **MCC9-12.A.REI.11** 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~~, ~~exponentia~~l, ~~and logarithmic~~ functions.★ | **Use functions to model relationships between quantities.**  **MCC.8.F.4** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two 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.  **MCC.8.F.5** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.    **Investigate patterns of association in bivariate data.**  **MCC.8.SP.1** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.  **MCC.8.SP.2** Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.  **MCC.8.SP.3** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.  **MCC.8.SP.4** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables**.** | | **Analyze and solve linear equations and pairs of simultaneous linear equations.**  **MCC.8.EE.8** Analyze and solve pairs of simultaneous linear equations.  **MCC.8.EE.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.  **MCC.8.EE.8b** Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.  **MCC.8.EE.8c** Solve real-world and mathematical problems leading to two linear equations in two variables.  **Additional Standards for Advanced**  **MCC9-12.G.GPE.5** Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). |