Mathematics (Grade 8)

Course Description:

The curriculum from this course is developed from: common-core-math-standards.pdf. This is a required course. The information in this course overview outlines what students should understand and be able to do by the end of the semester/year. *Core Connections, Course 3* is the third of a three-year sequence of courses designed to prepare students for a rigorous college preparatory high school mathematics course.
On a daily basis, students in *Core Connections, Course 3* use problem-solving strategies, questioning, investigating, analyzing critically, gathering and constructing evidence, and communicating rigorous arguments justifying their thinking. Under teacher guidance, students learn in collaboration with others while sharing information, expertise, and ideas. The course helps students to develop multiple strategies to solve problems and to recognize the connections between concepts. The lessons in the course meet all of the content standards and embed the "Mathematical Practices" of the Common Core State Standards released in June 2010.

Mastery Standards:

Expressions and Equations:

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 (CCSS.MATH.CONTENT.8.EE.A.4)

Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3-5 = 3-3 = 1/33 = 1/27. (CCSS.MATH.CONTENT.8.EE.A.1)

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. (CCSS.MATH.CONTENT.8.EE.B.5)

Solve linear equations in one variable. (CCSS.MATH.CONTENT.8.EE.C.7)

Analyze and solve pairs of simultaneous linear equations. (CCSS.MATH.CONTENT.8.EE.C.8)

Functions:

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. (CCSS.MATH.CONTENT.8.F.B.4)

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. (CCSS.MATH.CONTENT.8.F.A.3)
Geometry:

Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (CCSS.MATH.CONTENT.8.G.B.7)

Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. (CCSS.MATH.CONTENT.8.G.C.9)

Verify experimentally the properties of rotations, reflections, and translations. (CCSS.MATH.CONTENT.8.G.A.1)

Statistics and Probability:

Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. (CCSS.MATH.CONTENT.8.SP.A.3)

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. (CCSS.MATH.CONTENT.8.SP.A.2)

Unit	Description of Unit and Learning Targets
Unit Title: Problem Solving Essential Questions: ● How can I solve a problem that I have never seen before? ● How can I describe my process?	Students will… Learning Targets: ● I can insert a line of best fit into a data set. ● I can graph proportional relationships. ● I can solve proportions.
Unit Title: Simplifying Variables Essential Questions: ● Why are variables necessary?(Changed this question) ● What can I do with a variable? ● How can I solve for a variable?	Students will… Learning Targets: ● I can collect like terms. ● I can use the distributive property to multiply with variables. ● I can collect like terms on one side of an equation and solve for the variable. ● I can collect like terms on both sides of an equation and solve for a variable. ● I can apply the distributive property to simplify algebraic expressions. ● I can use the distributive property to solve equations with one variable.
Unit Title: Graphs and Equations Essential Questions: ● What is the pattern? ● How many different ways can I represent it? ● How can I solve it?	Students will… Learning Targets: ● I can classify functions as linear or nonlinear. ● I can compare properties of two functions, each represented in a different way (table, graph, rule, verbal description).\ ● I can sketch a graph that exhibits the qualitative features of a function that has been described verbally. ● I can collect like terms on one side of an equation and solve for the variable. ● I can collect like terms on both sides of an equation and solve for a variable. ● I can use the distributive property to solve equations with one variable. ● I can determine when an equation has infinitely many solutions or no solution.
Unit Title: Multiple Representations	Students will…

Essential Questions: ● Is there a pattern? ● How many different ways can it be represented? ● How does the pattern appear in the table, graph, rule, and situation?	Learning Targets: ● I can classify functions as linear or nonlinear. ● I can compare properties of two functions, each represented in a different way (table, graph, rule, verbal description). ● I can sketch a graph that exhibits the qualitative features of a function that has been described verbally. ● I can graph proportional relationships and interpret the unit rate as the slope of the graph. ● I can compare two different proportional relationships represented in different ways. ● I can find the rate of change and initial value of a function from a description of a relationship or from two values, including reading these from a table or a graph. ● I can 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.
Unit Title: Systems of Equations Essential Questions: ● What does the point of intersections mean? (This has multiple answers) ● How does the pattern appear in the table, graph, rule, and situation?	Students will... Learning Targets: ● I can rearrange multi-variable equations. ● I can solve equations with fractions. ● I can describe that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because the points of intersection satisfy both equations simultaneously. ● I can estimate solutions by graphing the equations. ● I can solve real-world and mathematical problems leading to two linear equations in two variables.
Unit Title: Transformations and Similarity Essential Questions: ● How can the position of a figure change? ● How do I transform figures and describe those transformations to show similarity or congruence? (Changed this question)	Students will... Learning Targets: ● I can verify experimentally that under rotations, reflections, and translations, lines are taken to lines, segments to segments, and angles to angles of the same measure. ● I can describe 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. ● I can describe a sequence of rotations, reflections, and translations that exhibits that two figures are congruent. ● I can describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. ● I can describe 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. ● I can describe a sequence of dilations, rotations, reflections, and translations that exhibit that two figures are similar. ● I can find missing side lengths of a two-dimensional figure by using a scale factor.
Unit Title: Slope and Association Essential Questions: ● What would a graph of this data look like? ● Can I make a prediction?	Students will... Learning Targets: ● I can classify a scatter plot as having a positive, negative, or no correlation or association. ● I can analyze a scatter plot to decide if it has a linear or

● Is there a relationship? ● What is slope?(There are many answers to this question) ● What information is needed to find the equation of a line?(There are many answers to this question)	nonlinear association. ● I can decide if a scatter plot has clustering or outliers. ● I can model relationships between two variables using straight lines. ● I can write an approximate equation for a line of best fit. ● I can solve problems in the context of data, interpreting the slope and intercept. ● I can find the slope of a line on a graph. ● I can find the slope of a line given two points.
Unit Title: Exponents and Functions <u>Essential Questions:</u> ● How is it changing? ● What pattern can I see? ● How can I describe it?	Students will... <u>Learning Targets:</u> ● I can show that any number to the zero power is equal to 1. ● I can explain and apply the properties of negative exponents. ● I can explain and apply the multiplication properties of exponents. ● I can write a number in scientific notation and explain that it is used for very large or very small numbers. ● I can perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. ● I can choose scientific notation to express how many times as much one is than the other.
Unit Title: Angles and the Pythagorean Theorem <u>Essential Questions:</u> ● What are some applications of the Pythagorean Theorem and its converse?(I changed this question) ● How can the Pythagorean Theorem and angle relationships be used to solve problems in real life?	Students will... <u>Learning Targets:</u> ● I can use the square root symbol to represent solutions to equations of the form $x^2 = p$, where p is a positive rational number. ● I can evaluate square roots of small perfect squares. ● I can describe relationships among the angles created when parallel lines are cut by a transversal. ● I can discover the interior and exterior angle sum of triangles. ● I can explain the Pythagorean Theorem. ● I can apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. ● I can apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Unit Title: Surface Area and Volume <u>Essential Questions:</u> ● How much will it hold? ● How can volume and surface area formulas be used to solve problems in real life?	Students will... <u>Learning Targets:</u> ● I can use the cube root symbol to represent solutions to equations of the form $x^3=p$, where p is a positive rational number. ● I can evaluate square roots of small perfect cube roots of small perfect cubes. ● I can recall the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. ● I can find the surface area and volume of a cylinder. ● I can find the volume of cones and pyramids. ● I can find the volume of a sphere. ● I can apply the formulas for volume to real-world problems.