William G. Rohrer Middle School
Course Overview

Subject: Mathematics
Course: Math 8

Summary: Math 8 focuses on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving liner equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

Unit Title	Student Learning Targets	Standards	Resources	Assessment
Unit 1: The Real Number System	**Learners will demonstrate the ability to:** ● Identify irrational numbers ● Use long division to show the decimal expansion of a number ● Convert between decimal expansions and rational numbers ● Approximate irrational numbers using rational numbers ● Compare irrational numbers ● Locate irrational numbers on a number line ● Generate equivalent expressions by applying exponent rules	**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 rational number. **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.	iPads Calculator Program Resources	Standard Check(s) Mastery Assessment(s)

	● Use scientific notation to model very large and very small quantities ● Compare quantities written in scientific notation ● Add, subtract, multiply, and divide numbers expressed in scientific notation	**8.EE.1 –** Know and apply the properties of integer exponents to generate equivalent numerical expressions. **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. **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. Interpret scientific notation that has been generated by technology.		
Unit 2: Linear Equations and Functions	**Learners will demonstrate the ability to:** ● Compare the properties of functions ● Graph proportional relationships ● Interpret the unit rate as the slope of a graph	**8.F.2 –** Compare properties of two functions each represented **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.	iPads Graphing Software Program Resources	Standard Check(s) Mastery Assessment(s)

	● Compare proportional relationships represented in different forms ● Represent proportional relationships using tables, graphs, and equations ● Represent linear relationships using tables, graphs, and equations ● Define a function relationship ● Determine if a given relationship represents a function ● Compare functions represented in different ways ● Identify relationships that are linear based on tables, graphs, and equations ● Generate examples of functions that are not linear	**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 $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intersecting the vertical axis at b. **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. **8.F.2 –** Compare properties of two functions each represented in different ways. **8.F.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.		
Unit 3: Solving Linear equations and Systems of Linear Equations	**Learners will demonstrate the ability to:** ● Solve linear equations by applying the properties of equality ● Solve two-step equations ● Solve multi-step equations	**8.EE.7 –** Solve linear equations in one variable. **8.EE.8 –** Analyze and solve pairs of simultaneous linear equations.	iPad Graphing Software Program Resources	Standard Check(s) Mastery Assessment(s)

	● Solve equations with variables on both sides ● Determine when an equation has one solution, no solution, or infinitely many solutions ● Analyze pairs of simultaneous linear equations ● Interpret the solution of a system of linear equations ● Solve systems of linear equations by graphing ● Solve systems of linear equations by substitution ● Determine when a system of equations has one solution, no solution, and infinitely many solutions			
Unit 4: Geometry	**Learners will demonstrate the ability to:** ● Apply the properties of rotations, reflections, and translations ● Determine if two figures are congruent ● Describe the sequence of rotations, reflections, and translations that would produce two congruent figures ● Describe the effect of dilations, translations, rotations, and reflections using coordinates	**8.G.1 –** Verify experimentally the properties of rotations, reflections, and translations. **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.	iPad Transparencies Graphing Software Program Resources	Standard Check(s) Mastery Assessment(s)

	● Determine if two figures are similar ● Describe the sequence of rotations, reflections, translations, and dilations that would produce two congruent figures ● Apply facts about angle sums and exterior angles of a triangle to determine missing angle measures ● Use information about angles created when two parallel lines are cut by a transversal to determine missing angle measures ● Determine if two triangles are similar ● Apply knowledge of volume of cones, cylinders, and spheres to solve real-world and mathematical problems	**8.G.3 –** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **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 **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 criterion for similar triangles. **8.G.9 –** Know the formula for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.		
Unit 5: Statistics and Probability	**Learners will demonstrate the ability to:** ● Construct scatter plots	**8.SP.1 –** Construct and interpret scatter plots for bivariate measurement data to investigate	iPad	Standard Check(s)

	● Interpret scatter plots ● Determine the patterns of association between two quantities using scatter plots ● Describe patterns of association as positive, negative, linear, and non-linear ● Identify outliers of a data set ● Use lines of best fit to represent patterns of association in scatter plots ● Use the equation of a line of best fit to solve real-world and mathematical problems ● Interpret the slope and y-intercept of the equation of a line of best fit in the context of a real-world or mathematical problem ● Construct and interpret data in two-way tables ● Use two-way tables to compare patterns in data	patterns of association between two quantities. Describe patters such as clustering, outliers, positive or negative association, linear association, or non-linear association. **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 like, and informally assess the model fit by judging the closeness of the data points to the line. **8.SP.3 –** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercepts. **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	Graphing Software Program Resources	Mastery Assessment(s)

		relative frequencies calculated for rows or columns to describe possible association between the two variables.		
Unit 6: Geometry	**Learners will demonstrate the ability to:** ● Solve equations by calculate square roots and cube roots. ● Evaluate perfect squares and perfect cubes ● Prove the Pythagorean Theorem and its converse ● Apply the Pythagorean theorem to find missing side lengths of right triangles ● Apply the Pythagorean theorem to calculate the distance between two points graphed in the coordinate plane ● Use the formulas for volume of cones, cylinders, and spheres to solve real-world and mathematical problems	**8.EE.2 –** Use square root and cube root symbols to represent the 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.G.6 –** Explain a proof of the Pythagorean Theorem and its converse. **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. **8.G.8 –** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. **8.G.9 –**Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve	iPad 3D Figure Models Program Resources	Standard Check(s) Mastery Assessment(s)

		real-world and mathematical problems.		