RIO VALLEY CHARTER SCHOOL

A PACIFIC CHARTER INSTITUTE SCHOOL

Mathematics Arts State Standards Grade 8

Standards for Mathematical Practice – "HOW" My student can:

- ☐ make sense of problems, persevere in solving them, and check the reasonableness of answers.
- ☐ reason with and flexibly use math symbols, numbers, and operations.
- ☐ construct mathematical arguments (using stated assumptions, definitions, previously established results, and logical
- ☐ progressions) and critique the math reasoning of others.
- ☐ recognize math in everyday life and use math to solve real problems.
- ☐ use tools (e.g., protractor, calculator) strategically to solve problems and deepen understanding.
- ☐ calculate accurately, use precise math definitions and vocabulary, and express math ideas clearly.
- ☐ look for and make use of patterns and structure in math.
- ☐ discern when calculations are repeated and look both for general methods and for shortcuts.

Math Content Standards – "WHAT" The Number System My student can:

- ☐ understand that numbers that are not rational are called irrational. 8.NS.1
- ☐ understand informally that every number has a decimal expansion. 8.NS.1
- ☐ for rational numbers, show that the decimal expansion repeats eventually. NS.1
- ☐ convert a decimal expansion that repeats into a rational number. 8.NS.1
- ☐ determine rational approximations of irrational numbers. 8.NS.2
- ☐ locate irrational numbers approximately on a number line diagram. 8.NS.2
- ☐ use approximations to compare the size of the irrational numbers. 8.NS.2
- ☐ use approximations of irrational numbers to estimate the value of expressions (e.g., √2,). 8.NS.2
- ☐

Expressions and Equations

My student can:

- ☐ work with radicals and integer exponents. 8.EE.1-4
- ☐ 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.EE.1
- ☐ 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. 8.EE.2
- ☐ find the square roots of small perfect squares and the cube roots of small perfect cubes. 8.EE.2

- ☐ understand that the square roots of all non perfect squares are irrational (e.g., √2 is irrational). 8.EE.2
- ☐ 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.3
- ☐ compare numbers in scientific notation and express how many times as much one is than the other. 8.EE.3
- ☐ perform operations (+, -, x, ÷) with num 8.EE.4
- ☐ use scientific notation & choose appropriate units for measurements of very large or very small quantities. 8.EE.4
- ☐ interpret scientific notation that has been generated by technology. 8.EE.4
- ☐ understand the connections between proportional relationships, lines, and linear equations. 8.EE.5-6
- ☐ graph proportional relationships, identifying the unit rate as the slope; find the slope of a graph. 8.EE.5
- ☐ 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.EE.5
- ☐ 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.EE.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. 8.EE 6 solve linear equations in one variable. 8.EE.7
- ☐ give examples of linear equations with one solution, infinitely many solutions, or no solutions. 8.EE.7A
- ☐ solve linear equations with rational number coefficients. 8.EE.7B
- ☐ use the distributive property and collect like terms to solve linear equations. 8.EE.7B
- ☐ analyze and solve pairs of simultaneous linear equations. 8.EE.8
- ☐ solve systems of two linear equations in two variables algebraically; estimate solutions by graphing the equations; solve simple cases by inspection (e.g., 3x+2y=5 and 3x+2y=6 have no solution because 3x+2y cannot simultaneously be 5 and 6). 8.EE.8B
- ☐ 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. 8.EE.8A
- ☐ 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*. 8.EE.8B
- ☐ Solve real-world and mathematical problems leading to two linear equations in two variables. 8.EE.8C

Functions

My student can:

- ☐ define, evaluate, and compare functions. 8.F.1-3

- ☐ 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.1
- ☐ compare properties of two functions each represented in a different way (algebraically, on a graph, in a table, or by verbal descriptions). 8.F.2
- ☐ understand that the equation y = mx + b defines a linear function whose graph is a straight line. 8.F.3
- ☐ give examples of functions that are not linear. 8.F.3
- ☐ construct a function to model a linear relationship between two quantities. 8.F.4
- ☐ determine the rate of change and initial value of a linear function from a description of a relationship or from two (x,y) values, including values from a table or a graph. 8.F.4
- ☐ describe the functional relationship between two quantities by analyzing a graph. 8.F.5
- ☐ create a graph that shows the features of a function that has been described verbally. 8.F.5

Geometry

My student can:

- ☐ understand congruence and similarity using physical models, transparencies, or geometry software. 8.G.1-5
- ☐ understand and verify experimentally the properties of rotations, reflections, and translations 8.G.1
- ☐ 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. 8.G.2
- ☐ given two congruent figures, describe a sequence that exhibits the congruence between them. 8.G.2
- ☐ describe the effect of dilations, translations, rotations, & reflections on 2-D figures using coordinates. 8.G.3
- ☐ 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 8.G.4
- ☐ given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them 8.G.4
- ☐ use informal reasoning to establish facts about the angle sum and exterior angle of triangles. 8.G.5
- ☐ use arguments to establish facts about the angles created when parallel lines are cut by a transversal. 8.G.5
- ☐ use arguments to establish facts about the angle similarity of triangles. 8.G.5
- ☐ understand and apply the Pythagorean Theorem. 8.G.6-8
- ☐ explain a proof of the Pythagorean Theorem and its converse. 8.G.6 apply the Pythagorean Theorem to determine unknown side lengths in right triangles. 8.G.7
- ☐ apply the Pythagorean Theorem to find the distance between two points in a coordinate system. 8.G.8
- ☐ Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. 8.G.9

Statistics and Probability My student can:

- ☐ investigate patterns of association in bivariate data. 8.SP
- ☐ make and interpret a scatter plot for bivariate measurement data to investigate patterns of association. 8.SP.1
- ☐ describe patterns like clustering, outliers, positive/negative association, and linear & nonlinear association. 8.SP.1
- ☐ understand that straight lines are widely used to model relationships between two quantitative variables. 8.SP.2
- ☐ Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept 8.SP.3
- ☐ understand that patterns of association can also be seen in a bivariate categorical data by displaying frequencies and relative frequencies in a two-way table 8.SP.4
- ☐ Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. 8.SP.4
- ☐ Use relative frequencies calculated for rows or columns to describe possible association between the two variables. 8.SP.4