Math - Grade 8

Course Description:

The Indian Community School cultivates an enduring cultural identity and critical thinking by weaving indigenous teachings with a distinguished learning environment. The curriculum for this course is developed from the Common Core State Standards for Mathematics and the framework of the ICS Our Ways Cultural Calendar. In this course, eighth grade students will focus 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 linear 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.

Enduring Understandings:

- The linear equation y=mx + b is used to define linear functions and graphs of straight lines.
- Performing operations in scientific notation, including problems with both decimal and scientific notation, enhances the use of the properties of integer exponents and radicals.
- Classifying numbers as rational or irrational will determine if the value is exact or approximate as a decimal or fraction.
- Slope is calculated to connect proportional relationships, lines, and linear equations.
- Pairs of simultaneous linear equations, known as systems of equations, can be solved algebraically and graphically to represent and model real world problems.
- Functions are used to describe quantitative relationships where one quantity determines another by using graphs, tables, or algebraic descriptors.
- Solving linear equations with multiple steps can be used to solve different kinds of problems and apply to real life situations.
- Understanding and applying the Pythagorean Theorem and its converse connects the theorem to slope of a line, distance in a coordinate plane, and in three-dimensions.
- Constructing, describing, and interpreting scatter plots for bivariate measurement data creates an informal line of best fit for the data so that predictions can be made.
- Congruence and similarity can be expressed by using physical models and drawings to describe the effects of rotations, dilations, reflections, and translations.
- The formulas for volume of cylinders, cones, and spheres are used to solve real-world and mathematical problems.

FUNCTIONS
• I can explain how a function is a rule that assigns each input as exactly one output. (8.F.A.1) • I can graph functions as a set of ordered pairs consisting of an input and corresponding output. (8.F.A.1) • I can compare properties of two functions each represented in a different way involving algebraically, graphically, numerically in tables, and by verbal descriptions. (8.F.A.2) • I can interpret the equation y = mx + b as defining a linear function whose graph is a straight line. (8.F.A.3)

FUNCTIONS (continued)

- I can give examples of functions that are not linear. (8.F.A.3)
- I can construct a function to model a linear relationship between two quantities. (8.F.B.4)
- I can determine the rate of change 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. (8.F.B.4)
- I can determine the 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. (8.F.B.4)
- I can analyze a graph and describe qualitatively the functional relationship between two quantities. (8.F.B.5)
- I can sketch a graph to model a given verbal situation. (8.F.B.5)

THE NUMBER SYSTEM

- I can distinguish between rational and irrational numbers. (8.NS.A.1)
- I can show every number has a decimal expansion. (8.NS.A.1)
- I can show that the decimal representation of rational numbers terminates. (8.NS.A.1)
- I can convert a repeating decimal into a fraction. (8.NS.A.1)
- I can find rational approximations of irrational numbers to compare the size of irrational numbers. (8.NS.A.2)
- I can locate and compare rational and irrational numbers on a number line. (8.NS.A.2)
- I can estimate the value of an irrational expression. (8.NS.A.2)

EXPRESSIONS AND EQUATIONS

- I can infer the properties of integer exponents and use them to generate equivalent numerical expressions. (8.EE.A.1)
- I can use square root symbols to represent solutions to equations in the form $x^2 = p$ where p is a positive rational number. (8.EE.A.2)
- I can use cube root symbols to represent solutions to equations in the form $x^3 = p$ where p is a positive rational number. (8.EE.A.2)
- I can demonstrate understanding that $\sqrt{2}$ is irrational. (8.EE.A.2)
- I can express very small and very large numbers using the power of 10 and a power. (8.EE.A.3)
- I can compare quantities by expressing how many times more one is compared to the other. (8.EE.A.3)
- I can perform operations with numbers expressed in scientific notation including numbers in both decimal form and scientific notation. (8.EE.A.4)
- I can use scientific notation to choose units of appropriate size for measurement of very large or very small quantities. (8.EE.A.4)
- I can interpret scientific notation that has been generated by technology. (8.EE.A.4)

EXPRESSIONS AND EQUATIONS (continued)

- I can graph proportional relationships by interpreting the unit rate as the slope of the graph. (8.EE.B.5)
- I can compare two different proportional relationships represented in different ways. (8.EE.B.5)
- I can 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. (8.EE.B.6)
- I can derive the equation y = mx + b for a line through the origin and for intercepting the vertical axis b. (8.EE.B.6)
- I can solve linear equations in one variable. (8.EE.C.7)
- I can interpret the number of solutions to a linear equation, one variable with one solution, infinitely many solutions, or no solutions. (8.EE.C.7.A)
- I can solve linear equations with rational number coefficients, including equations, whose solutions require expanding expressions using the distributive property and collecting like terms. (8.EE.C.7.B)
- I can analyze and solve pairs of simultaneous linear equations. (8.EE.C.8)
- I can define the solution to a system of equations as the intersection of their lines on a graph. (8.EE.C.8.A)
- I can solve two linear equations by graphing the equations to show inspection and no solution. (8.EE.C.8.B)
- I can solve real world problems leading to two linear equations in two variables. (8.EE.C.8.C)

GEOMETRY

- I can rotate geometric shapes in the coordinate plane. (8.G.A.1)
- I can reflect geometric shapes in the coordinate plane. (8.G.A.1)
- I can translate geometric shapes in the coordinate plane. (8.G.A.1)
- I can verify that line segments that are rotated, reflected, and/or translated transform to line segments of the same length. (8.G.A.1.A)
- I can verify that angles that are rotated, reflected, and/or translated transform to angles of the same measure. (8.G.A.1.B)
- I can verify that parallel lines that are rotated, reflected, and/or translated transform to parallel lines. (8.G.A.1.C)
- I can describe how a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of transformations that exhibits the congruency between two figures. (8.G.A.2)
- I can describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. (8.G.A.3)
- 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 transformations involving rotations, reflections, translations, and dilations that exhibits the similarity between two figures. (8.G.A.4)
- I can describe a sequence that shows the similarity between two similar two-dimensional figures. (8.G.A.4)

GEOMETRY (continued)

- I can use exploration and deductive reasoning to determine relationships that exists between interior and exterior sums of triangles. (8.G.A.5)
- I can use exploration and deductive reasoning to determine relationships that exists between angles created when parallel lines are cut by a transversal. (8.G.A.5)
- I can use exploration and deductive reasoning to determine relationships that exists between the angle-angle criterion for similarity of triangles. (8.G.A.5)
- I can explain a proof of the Pythagorean Theorem and its converse. (8.G.B.6)
- I can apply the Pythagorean Theorem to determine unknown side lengths in right triangles in mathematical and real-world problems in two and three dimensions. (8.G.B.7)
- I can apply the Pythagorean Theorem to find the distance between two points in a coordinate system. (8.G.B.8)
- I can apply the formula for volume of a cone and use it to solve real-world and problems. (8.G.C.9)
- I can demonstrate understanding of the formula for volume of a cylinder and use it to solve real-world and problems. (8.G.C.9)
- I can demonstrate understanding of the formula for volume of a sphere and use it to solve real-world and problems. (8.G.C.9)

STATISTICS AND PROBABILITY

- I can construct and interpret a scatter plot for bivariate measurement data. (8.SP.A.1)
- I can describe patterns of association between two quantities in a scatter plot. (8.SP.A.1)
- I can recognize when a scatter plot represents a linear relationship. (8.SP.A.2)
- I can informally fit a straight line for scatter plots that suggest a linear association. (8.SP.A.2)
- I can informally assess the model fit by judging the closeness of the data to the points on the line. (8.SP.A.2)
- I can use the equation of a linear model to solve problems by interpreting the slope and y-intercept of the equation of a linear model in the context of the problem. (8.SP.A.3)
- I can recognize that categorical data can also be described numerically through the use of a two-way table. (8.SP.A.4)
- I can construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. (8.SP.A.4)
- I can use relative frequencies calculated for rows or columns to describe possible association between the two variables. (8.SP.A.4)