Common Core Skill Alignment

8TH GRADE MATH

8.NS The Number System

8.NS.A Know that there are numbers that are not rational, and approximate them by rational numbers.

8.NS.A.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.

- **D.5** Identify rational and irrational numbers

8.NS.A.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., pi^2).

- **F.16** Estimate positive and negative square roots
- **F.21** Estimate cube roots

8.EE Expressions and Equations

8.EE.A Work with radicals and integer exponents.

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

- **F.4** Exponents with negative bases
- **F.6** Understanding negative exponents
- **F.7** Evaluate negative exponents
- **F.12** Evaluate expressions using properties of exponents
- **F.13** Identify equivalent expressions involving exponents

8.EE.A.2 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. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that the square root of 2 is irrational.

- **F.14** Square roots of perfect squares
- **F.15** Positive and negative square roots
- **F.17** Relationship between squares and square roots
- **F.19** Cube roots of perfect cubes
- **F.20** Solve equations involving cubes and cube roots

8.EE.A.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.

- **G.1** Convert between standard and scientific notation
- **G.2** Compare numbers written in scientific notation

8.EE.A.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.

- **G.3** Multiply numbers written in scientific notation
- **G.4** Divide numbers written in scientific notation

8.EE.B Understand the connections between proportional relationships, lines, and linear equations.

8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

- **I.1** Find the constant of proportionality from a table
- **I.4** Find the constant of proportionality from a graph
- **I.7** Graph proportional relationships

8.EE.B.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 intercepting the vertical axis at b.

- **Y.1** Find the slope of a graph
- **Y.2** Find the slope from two points
- **Y.4** Find the slope of a linear equation
- **Y.5** Graph a line using slope
- **Y.6** Graph a line from an equation in slope-intercept form
- **Y.8** Write a linear equation from a graph

8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.

8.EE.C.7 Solve linear equations in one variable.

8.EE.C.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 x = a, a = a, or a = b results (where a and b are different numbers).

- **W.14** Find the number of solutions
- **W.15** Create equations with no solutions or infinitely many solutions

8.EE.C.7b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

- **W.3** Model and solve equations using algebra tiles
- **W.7** Solve two-step equations
- **W.8** Solve multi-step equations
- **W.9** Solve equations involving like terms
- **W.10** Solve equations with variables on both sides
- **W.11** Solve equations: mixed review
- **W.12** Solve equations: complete the solution
- **W.13** Solve equations: word problems

8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.

8.EE.C.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.

- **AA.1** Is (x, y) a solution to the system of equations?
- **AA.2** Solve a system of equations by graphing
- **AA.4** Find the number of solutions to a system of equations by graphing

8.EE.C.8b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.

- **AA.5** Find the number of solutions to a system of equations
- **AA.8** Solve a system of equations using substitution
- **AA.10** Solve a system of equations using elimination

8.EE.C.8c Solve real-world and mathematical problems leading to two linear equations in two variables.

- **AA.3** Solve a system of equations by graphing: word problems
- **AA.9** Solve a system of equations using substitution: word problems
- **AA.11** Solve a system of equations using elimination: word problems

8.F Functions

8.F.A Define, evaluate, and compare functions.

8.F.A.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.

- **I.8** Interpret graphs of proportional relationships
- **Z.1** Identify functions
- **Z.2** Does (x, y) satisfy the linear function?
- **Z.6** Evaluate a linear function

- [ ] **Z.7** Complete a table for a linear function
- [ ] **Z.8** Complete a table and graph a linear function
- [ ] **Z.9** Interpret the graph of a linear function: word problems
- [ ] **Z.17** Find values using function graphs
- [ ] **Z.18** Complete a table for a function graph

8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

- [ ] **Z.11** Compare linear functions: graphs, tables, and equations

8.F.A.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.

- [ ] **Y.6** Graph a line from an equation in slope-intercept form
- [ ] **Z.14** Identify linear and nonlinear functions

8.F.B Use functions to model relationships between quantities.

8.F.B.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 (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.

- [ ] **I.2** Write equations for proportional relationships from tables
- [ ] **I.5** Write equations for proportional relationships from graphs
- [ ] **Y.1** Find the slope of a graph
- [ ] **Y.2** Find the slope from two points
- [ ] **Y.4** Find the slope of a linear equation
- [ ] **Y.5** Graph a line using slope
- [ ] **Y.7** Write a linear equation from a slope and y-intercept
- [ ] **Y.8** Write a linear equation from a graph
- [ ] **Y.9** Write a linear equation from a slope and a point
- [ ] **Y.10** Write a linear equation from two points

- [ ] **Z.5** Constant rate of change
- [ ] **Z.10** Write a linear function from a table
- [ ] **Z.12** Write linear functions: word problems

8.F.B.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.

- [ ] **Z.12** Write linear functions: word problems

8.G Geometry

8.G.A Understand congruence and similarity using physical models, transparencies, or geometry software.

8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations:

8.G.A.1a Lines are taken to lines, and line segments to line segments of the same length.

- [ ] **P.2** Identify reflections, rotations, and translations
- [ ] **P.3** Translations: graph the image
- [ ] **P.5** Reflections: graph the image
- [ ] **P.7** Rotations: graph the image

8.G.A.1b Angles are taken to angles of the same measure.

- [ ] **P.2** Identify reflections, rotations, and translations
- [ ] **P.3** Translations: graph the image
- [ ] **P.5** Reflections: graph the image
- [ ] **P.7** Rotations: graph the image

8.G.A.1c Parallel lines are taken to parallel lines.

- [ ] **P.2** Identify reflections, rotations, and translations

- [ ] **P.3** Translations: graph the image
- [ ] **P.5** Reflections: graph the image
- [ ] **P.7** Rotations: graph the image

8.G.A.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.

- [ ] **P.9** Congruence statements and corresponding parts
- [ ] **P.10** Side lengths and angle measures of congruent figures
- [ ] **Q.1** Similar and congruent figures

8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

- [ ] **P.4** Translations: find the coordinates
- [ ] **P.6** Reflections: find the coordinates
- [ ] **P.8** Rotations: find the coordinates
- [ ] **Q.2** Dilations: graph the image
- [ ] **Q.3** Dilations: find the coordinates

8.G.A.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.

- [ ] **Q.1** Similar and congruent figures
- [ ] **Q.5** Side lengths and angle measures of similar figures

8.G.A.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.

- [ ] **O.6** Find missing angles in triangles
- [ ] **O.8** Exterior Angle Theorem
- [ ] **O.12** Transversal of parallel lines

8.G.B Understand and apply the Pythagorean Theorem.

8.G.B.6 Explain a proof of the Pythagorean Theorem and its converse.

- [ ] **R.5** Converse of the Pythagorean theorem: is it a right triangle?

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

- [ ] **R.1** Pythagorean theorem: find the length of the hypotenuse
- [ ] **R.2** Pythagorean theorem: find the missing leg length
- [ ] **R.3** Pythagorean theorem: find the perimeter
- [ ] **R.4** Pythagorean theorem: word problems

8.G.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

- [ ] **N.4** Find the distance between two points

8.G.C Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

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

- [ ] **T.9** Volume of cylinders
- [ ] **T.10** Volume of cones
- [ ] **T.13** Volume of spheres

8.SP Statistics and Probability

8.SP.A Investigate patterns of association in bivariate data.

8.SP.A.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.

- **CC.14** Scatter plots
- **DD.8** Outliers in scatter plots

8.SP.A.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.

- **DD.9** Scatter plots: line of best fit

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

- **DD.9** Scatter plots: line of best fit

8.SP.A.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.