8th Grade Common Core Mathematics Standards

The Number System

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

- NS.1
  - Understand the difference between rational numbers and irrational numbers
  - Know that every number has a decimal expansion, and be to differentiate between rational numbers' decimal expansion that repeats eventually and irrational numbers' decimal expansion
  - Be able to convert a decimal expansion, which repeats eventually into a rational number and a rational number into its decimal expansion.
- NS.2
  - Use rational numbers to approximate the size of an irrational number, to locate them on a number line, compare irrational numbers and estimate the value of an expression.

Expressions and Equations

Expressions and EquationsWork with radicals and integer exponents.

- EE.1
  - Apply properties of integer exponents to generate equivalent numerical expressions
- EE.2
  - Use algebra operations to solve for a variable raised to a power that set equal to a positive number.
  - Evaluate square roots of small perfect squares and cube roots of small perfect cubes.
- EE.3
  - Multiply ten to a whole number power by a single digit to estimate very large and very small quantities and to express how many times larger one is than the other.
- EE.4
  - Be able to perform operations with sscientific notation, and solve problems that include both decimals and scientific notation.
  - Use scientific notation to choose unites of appropriate size for measurements of very large or very small quantities.
  - Interpret scientific notation that has been generated by technology.

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

- EE.5
    - Graph proportional relationships and interpret the unit rate as the slope of the graph.
    - Compare two different proportional relationships represented in different ways, graph of a rate vs. an equation of the rate.
- EE.6
    - Use similar triangles to explain why the slopes between two different segments of the same non-vertical line in the coordinate plane are equal
    - Be able to derive y = mx as a line that bisects origin and y = mx + b as a line that intersects the vertical axis at b. Understand that b is the y-axis intercept.

<u>Analyze and solve linear equations and pairs of simultaneous linear equations.</u>

- EE.7
    - Solve linear equations with one variable that have one solution, infinite solutions or no solutions.
        - Show each case by simplifying each equation so that the variable equals the solution, the solution equals itself and the solution equals a different number
    - Solve linear equations with rational coefficients that may require the distributive property and combining like terms
- EE.8
    - Analyze and solve system of linear equations
        - Understand that the solutions for systems of linear equations with two variables are the intersections of both lines because the salutations satisfy both equations at the same time.
        - Be able to solve systems of linear equations with two variables algebraically, and estimate solutions by graphing the intersection
        - Solve systems of equations using knowledge of mathematics, for instance understand that the same equation with two variables that is equal to two different numbers will not intersect because the solutions for the variables will not solve both equations at the same time.
        - Use systems of linear equations with two variables to solve real-world and mathematical problems.
        - Given two ordered pairs, determine if both lines intersect.

<u>Define, evaluate, and compare functions.</u>

- 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.1
- F.2

- Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

- 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. For example, the function A = s2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

<u>Use functions to model relationships between quantities.</u>

- F.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.
- F.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.

<u>Geometry</u>

<u>Understand congruence and similarity using physical models, transparencies, or geometry software.</u>

- G.1
  - Verify experimentally the properties of rotations, reflections, and translations:
    - a. Lines are taken to lines, and line segments to line segments of the same length.
    - b. Angles are taken to angles of the same measure.
    - c. Parallel lines are taken to parallel lines.
- 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.
- G.3

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

- 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.
- 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-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.

<u>Understand and apply the Pythagorean Theorem.</u>

- G.6
  - Explain a proof of the Pythagorean Theorem and its converse.
- 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.
- G.8
  - Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

<u>Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.</u>

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

<u>Statistics and Probability</u>

<u>Investigate patterns of association in bivariate data.</u>

- SP.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.
- 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 line, and informally assess the model fit by judging the closeness of the data points to the line.

- SP.3
    - Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.
- 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 relative frequencies calculated for rows or columns to describe possible association between the two variables.