Kentucky Mathematics

Grade 8

Adopted 2019

Standards for Mathematical Practice

1. **Make sense of problems and persevere in solving them.** MP.1
2. **Reason abstractly and quantitatively.** MP.2
3. **Construct viable arguments and critique the reasoning of others.** MP.3
4. **Model with mathematics.** MP.4
5. **Use appropriate tools strategically.** MP.5
6. **Attend to precision.** MP.6
7. **Look for and make use of structure.** MP.7
8. **Look for and express regularity in repeated reasoning.** MP.8

Geometry

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

1. Verify experimentally the properties of rotations, reflections and translations: Lines are congruent to lines.
Line segments are congruent to line segments of the same length.
Angles are congruent to angles of the same measure.
Parallel lines are congruent to parallel lines. KY.8.G.1
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. KY.8.G.2
3. Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates. KY.8.G.3
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. KY.8.G.4
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. KY.8.G.5

Understand and apply the Pythagorean Theorem.

6. Explain a proof of the Pythagorean Theorem and its converse. KY.8.G.6
7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. KY.8.G.7
8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. KY.8.G.8

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

9. Apply the formulas for the volumes and surface areas of cones, cylinders and spheres and use them to solve real-world and mathematical problems. KY.8.G.9

The Number System

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

1. Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational. KY.8.NS.1
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. KY.8.NS.2

Expression and Equations

Work with radicals and integer exponents.

1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. KY.8.EE.1
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 perfect squares and perfect cubes are rational. KY.8.EE.2
3. Use numbers expressed in the form of a single digit times an integer power of 10 (Scientific Notation) to estimate very large or very small quantities and express how many times larger or smaller one is than the other. KY.8.EE.3
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. KY.8.EE.4

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

5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. KY.8.EE.5
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; know 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. KY.8.EE.6

Analyze and solve linear equations and pairs of simultaneous linear equations.

7. Solve linear equations in one variable. KY.8.EE.7
    a. 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). KY.8.EE.7.A
    b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms. KY.8.EE.7.B
8. Analyze and solve a system of two linear equations. KY.8.EE.8
    a. 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; understand that a system of two linear equations may have one solution, no solution, or infinitely many solutions. KY.8.EE.8.A
    b. Solve systems of two linear equations in two variables algebraically by using substitution where at least one equation contains at least one variable whose coefficient is 1 and by inspection for simple cases KY.8.EE.8.B
    c. Solve real-world and mathematical problems leading to two linear equations in two variables. KY.8.EE.8.C

Functions

Define, evaluate and compare functions.

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. KY.8.F.1
2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). KY.8.F.2
3. Understand properties of linear functions. KY.8.F.3
    a. Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line. KY.8.F.3.A
    b. Identify and give examples of functions that are not linear. KY.8.F.3.B

Use functions to model relationships between quantities.

4. Construct a function to model a linear relationship between two quantities. KY.8.F.4
    a. 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. KY.8.F.4.A
    b. 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. KY.8.F.4.B
5. Use graphs to represent functions. KY.8.F.5
    a. Describe qualitatively the functional relationship between two quantities by analyzing a graph. KY.8.F.5.A
    b. Sketch a graph that exhibits the qualitative features of a function that has been described verbally. KY.8.F.5.B

Statistics and Probability

Investigate patterns of association in bivariate data.

1. Construct and interpret scatter plots for bivariate numerical data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association and nonlinear association. KY.8.SP.1
2. Know that lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a line and informally assess the model fit by judging the closeness of the data points to the line. KY.8.SP.2
3. Use the equation of a linear model to solve problems in the context of bivariate numerical data, interpreting the slope and intercept. KY.8.SP.3