

Grade 8 Mathematics

Full-Year Pacing Guide

11 units · 32 instructional weeks · all 28 Common Core standards. Every standard is scheduled after the standards it depends on.

WEEKS 1-3

Unit 1: Transformations & Congruence

Establish rigid motions and what they preserve, then define congruence as a sequence of those motions.

8.G.A.1 Properties of rigid transformations

Verify experimentally the properties of rotations, reflections, and translations:

8.G.A.2 Congruence through transformations

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.

8.G.A.3 Transformations using coordinates

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

WEEKS 4-6

Unit 2: Dilations, Similarity & Angles

Add dilations to build similarity, and establish the angle facts that make the angle-angle criterion work.

8.G.A.4 Similarity through transformations

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.

8.G.A.5 Angle relationships and AA similarity

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.

WEEKS 7-9

Unit 3: Proportional Relationships & Slope

Use similar triangles to show slope is constant, and derive $y = mx$ and $y = mx + b$.

8.EE.B.5 Graphing proportional relationships and slope

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

8.EE.B.6 Deriving $y = mx + b$

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 .

WEEKS 10-12

Unit 4: Linear Equations

Solve linear equations in one variable, including the cases with no solution or infinitely many.

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

Solve linear equations in one variable.

WEEKS 13-16

Unit 5: Functions

Define functions, compare them across representations, and model real situations with rate of change and initial value.

8.F.A.1 Definition of a function

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.A.2 Comparing functions across representations

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.

8.F.A.3 $y = mx + b$ as a linear function

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 $A = s^2$ 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.

8.F.B.4 Modeling linear relationships

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.

8.F.B.5 Qualitative graph analysis

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.

WEEKS 17-19

Unit 6: Systems of Equations

Read intersections as simultaneous solutions, solve systems algebraically and graphically, and apply them.

8.EE.C.8 Systems of two linear equations

Analyze and solve pairs of simultaneous linear equations.

WEEKS 20-22

Unit 7: Exponents & Scientific Notation

Build the integer exponent properties from patterns, then use powers of ten to handle very large and very small quantities.

8.EE.A.1 Properties of integer exponents

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.A.3 Powers of ten and magnitude

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.A.4 Operations in scientific notation

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.

WEEKS 23-24

Unit 8: Roots & Irrational Numbers

Introduce square and cube roots as inverse operations, and place irrational numbers on the number line.

8.EE.A.2 Square roots and cube roots

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 $\sqrt{2}$ is irrational.

8.NS.A.1 Rational vs. irrational numbers

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.

8.NS.A.2 Approximating irrational numbers

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., π^2).

WEEKS 25-27

Unit 9: Pythagorean Theorem

Prove the theorem and its converse, then apply it to lengths in two and three dimensions and to coordinate distance.

8.G.B.6 Proving the Pythagorean Theorem

Explain a proof of the Pythagorean Theorem and its converse.

8.G.B.7 Applying the Pythagorean Theorem

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

8.G.B.8 Distance in the coordinate plane

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

WEEKS 28-29

Unit 10: Volume

Apply the cone, cylinder and sphere volume formulas to real design problems.

8.G.C.9 Volume of cones, cylinders, and spheres

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

WEEKS 30-32

Unit 11: Bivariate Data

Build scatter plots, fit and interpret linear models, and read association in two-way tables.

8.SPA.1 Scatter plots and association

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.

8.SPA.2 Fitting a line to data

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.

8.SPA.3 Interpreting linear models

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

8.SPA.4 Two-way tables

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.
