Skills available for New York eighth-grade math standards

Standards are in bold, followed by a list of the IXL math skills that are aligned to that standard. Students can practice these skills online at www.ixl.com.

Standards: New York State P-12 Common Core Learning Standards

8NS The Number System

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

8NS.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.

- Identify rational and irrational numbers (Eighth grade - D.1)
- Convert between decimals and fractions or mixed numbers (Eighth grade - D.6)

8NS.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).

- Estimate positive and negative square roots (Eighth grade - F.15)
- Estimate cube roots (Eighth grade - F.20)

8EE Expressions and Equations

8 Work with radicals and integer exponents.

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

- Understanding exponents (Eighth grade - F.1)
- Evaluate exponents (Eighth grade - F.2)
- Exponents: solve for the variable (Eighth grade - F.3)
- Exponents with negative bases (Eighth grade - F.4)
- Exponents with decimal and fractional bases (Eighth grade - F.5)
- Understanding negative exponents (Eighth grade - F.6)
- Evaluate negative exponents (Eighth grade - F.7)
- Multiplication with exponents (Eighth grade - F.8)
- Division with exponents (Eighth grade - F.9)
- Multiplication and division with exponents (Eighth grade - F.10)
- Power rule (Eighth grade - F.11)
- Evaluate expressions involving exponents (Eighth grade - F.12)
- Multiply monomials (Eighth grade - Z.6)
- Divide monomials (Eighth grade - Z.7)
- Multiply and divide monomials (Eighth grade - Z.8)
- Powers of monomials (Eighth grade - Z.9)

8EE.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.

- Identify rational and irrational numbers (Eighth grade - D.1)
- Square roots of perfect squares (Eighth grade - F.13)
- Positive and negative square roots (Eighth grade - F.14)
- Relationship between squares and square roots (Eighth grade - F.16)
- Cube roots of perfect cubes (Eighth grade - F.18)

Solve equations involving cubes and cube roots (Eighth grade - F.19)

Evaluate radical expressions (Eighth grade - S.7)

8EE.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.

Convert between standard and scientific notation (Eighth grade - G.1)

Compare numbers written in scientific notation (Eighth grade - G.2)

8EE.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.

Convert between standard and scientific notation (Eighth grade - G.1)

Multiply numbers written in scientific notation (Eighth grade - G.3)

Divide numbers written in scientific notation (Eighth grade - G.4)

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

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

Unit rates (Eighth grade - H.5)

Do the ratios form a proportion? (Eighth grade - H.6)

Do the ratios form a proportion: word problems (Eighth grade - H.7)

Solve proportions (Eighth grade - H.8)

Solve proportions: word problems (Eighth grade - H.9)

Find the constant of proportionality from a graph (Eighth grade - I.3)

Graph proportional relationships (Eighth grade - I.5)

Solve problems involving proportional relationships (Eighth grade - I.8)

8EE.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.

Write equations for proportional relationships (Eighth grade - I.4)

Find the slope of a graph (Eighth grade - W.1)

Find the slope from two points (Eighth grade - W.2)

Find the slope of an equation (Eighth grade - W.4)

Graph a linear equation (Eighth grade - W.5)

Write a linear equation from a graph (Eighth grade - W.7)

Graph a line from an equation (Eighth grade - X.9)

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

8EE.7 Solve linear equations in one variable.

8EE.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).

Find the number of solutions (Eighth grade - U.12)

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

Solve equations involving squares and square roots (Eighth grade - F.17)

Model and solve equations using algebra tiles (Eighth grade - U.3)

Write and solve equations that represent diagrams (Eighth grade - U.4)

Solve one-step equations (Eighth grade - U.5)

Solve two-step equations (Eighth grade - U.6)

Solve multi-step equations (Eighth grade - U.7)

Solve equations involving like terms (Eighth grade - U.8)

Solve equations with variables on both sides (Eighth grade - U.9)

Solve equations: mixed review (Eighth grade - U.10)

Solve equations: word problems (Eighth grade - U.11)

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

8EE.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.

Is (x, y) a solution to the system of equations? (Eighth grade - Y.1)

Solve a system of equations by graphing (Eighth grade - Y.2)

Find the number of solutions to a system of equations by graphing (Eighth grade - Y.4)

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

Find the number of solutions to a system of equations (Eighth grade - Y.5)

Classify a system of equations by graphing (Eighth grade - Y.6)

Classify a system of equations (Eighth grade - Y.7)

Solve a system of equations using substitution (Eighth grade - Y.8)

Solve a system of equations using elimination (Eighth grade - Y.10)

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

Solve a system of equations by graphing: word problems (Eighth grade - Y.3)

Solve a system of equations using substitution: word problems (Eighth grade - Y.9)

Solve a system of equations using elimination: word problems (Eighth grade - Y.11)

8F Functions

8 Define, evaluate, and compare functions.

8F.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.

Identify functions (Eighth grade - X.1)

Complete a table for a linear function (Eighth grade - X.7)

Graph a line from a function table (Eighth grade - X.8)

Evaluate a function graphically (Eighth grade - X.10)

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

Graph a line from a function table (Eighth grade - X.8)

Graph a line from an equation (Eighth grade - X.9)

Write a linear function from a table (Eighth grade - X.11)

Identify linear and nonlinear functions (Eighth grade - X.14)

8F.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.

Graph a line from an equation (Eighth grade - X.9)

Identify linear and nonlinear functions (Eighth grade - X.14)

8 Use functions to model relationships between quantities.

8F.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.

- Find the constant of proportionality from a graph (Eighth grade - I.3)
- Write equations for proportional relationships (Eighth grade - I.4)
- Find the constant of proportionality: word problems (Eighth grade - I.7)
- Solve problems involving proportional relationships (Eighth grade - I.8)
- Find the slope of a graph (Eighth grade - W.1)
- Find the slope from two points (Eighth grade - W.2)
- Find a missing coordinate using slope (Eighth grade - W.3)
- Write a linear equation from a graph (Eighth grade - W.7)
- Write a linear equation from two points (Eighth grade - W.9)
- Rate of change (Eighth grade - X.4)
- Constant rate of change (Eighth grade - X.5)
- Write a linear function from a table (Eighth grade - X.11)
- Write linear functions: word problems (Eighth grade - X.12)

8F.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.

- Write linear functions: word problems (Eighth grade - X.12)

8G Geometry

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

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

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

- Identify reflections, rotations, and translations (Eighth grade - Q.1)
- Translations: graph the image (Eighth grade - Q.2)
- Reflections: graph the image (Eighth grade - Q.4)
- Rotations: graph the image (Eighth grade - Q.6)

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

- Identify reflections, rotations, and translations (Eighth grade - Q.1)
- Translations: graph the image (Eighth grade - Q.2)
- Reflections: graph the image (Eighth grade - Q.4)
- Rotations: graph the image (Eighth grade - Q.6)

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

- Identify reflections, rotations, and translations (Eighth grade - Q.1)
- Translations: graph the image (Eighth grade - Q.2)
- Reflections: graph the image (Eighth grade - Q.4)
- Rotations: graph the image (Eighth grade - Q.6)

8G.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.

- Similar and congruent figures (Eighth grade - N.10)

Congruent figures: side lengths and angle measures (Eighth grade - N.12)

Congruence statements and corresponding parts (Eighth grade - N.13)

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

Translations: find the coordinates (Eighth grade - Q.3)

Reflections: find the coordinates (Eighth grade - Q.5)

Rotations: find the coordinates (Eighth grade - Q.7)

Dilations: graph the image (Eighth grade - Q.8)

Dilations: find the coordinates (Eighth grade - Q.9)

8G.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.

Similar and congruent figures (Eighth grade - N.10)

Similar figures: side lengths and angle measures (Eighth grade - N.11)

8G.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.

Identify complementary, supplementary, vertical, adjacent, and congruent angles (Eighth grade - N.1)

Find measures of complementary, supplementary, vertical, and adjacent angles (Eighth grade - N.2)

Transversal of parallel lines (Eighth grade - N.3)

Find missing angles in triangles and quadrilaterals (Eighth grade - N.6)

Exterior Angle Theorem (Eighth grade - N.7)

Interior angles of polygons (Eighth grade - N.9)

Congruent triangles: SSS, SAS, and ASA (Eighth grade - N.14)

8 Understand and apply the Pythagorean Theorem.

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

Converse of the Pythagorean theorem: is it a right triangle? (Eighth grade - O.5)

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

Pythagorean theorem: find the length of the hypotenuse (Eighth grade - O.1)

Pythagorean theorem: find the missing leg length (Eighth grade - O.2)

Pythagorean theorem: find the perimeter (Eighth grade - O.3)

Pythagorean theorem: word problems (Eighth grade - O.4)

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

Distance between two points (Eighth grade - P.4)

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

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

Volume of cylinders and cones (Eighth grade - N.31)

Volume of spheres (Eighth grade - N.32)

8SP Statistics and Probability

8 Investigate patterns of association in bivariate data.

8SP.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.

Scatter plots (Eighth grade - AA.14)

Outliers in scatter plots (Eighth grade - BB.8)

8SP.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.

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

Find the slope of a graph (Eighth grade - W.1)

Constant rate of change (Eighth grade - X.5)

Graph a line from an equation (Eighth grade - X.9)

Write linear functions: word problems (Eighth grade - X.12)

8SP.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.

Interpret stem-and-leaf plots (Eighth grade - AA.9)

Interpret histograms (Eighth grade - AA.10)

Create histograms (Eighth grade - AA.11)

Create frequency charts (Eighth grade - AA.12)

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