Grade 8 | West Virginia College- and Career-Readiness Standards for Mathematics Correlation to *Eureka Math*®

About *Eureka Math*

Created by Great Minds®, a mission-driven Public Benefit Corporation, Eureka Math® helps teachers deliver unparalleled math instruction that provides students with a deep understanding and fluency in math. Crafted by teachers and math scholars, the curriculum carefully sequences the mathematical progressions to maximize coherence from Prekindergarten through Precalculus—a principle tested and proven to be essential in students' mastery of math.

Teachers and students using Eureka Math find the trademark "Aha!" moments in Eureka Math to be a source of joy and inspiration, lesson after lesson, year after year.

Aligned

Great Minds offers detailed analyses that demonstrate how each grade of Eureka Math aligns with specific state standards. Access these free alignment studies at greatminds.org/state-studies.

Data

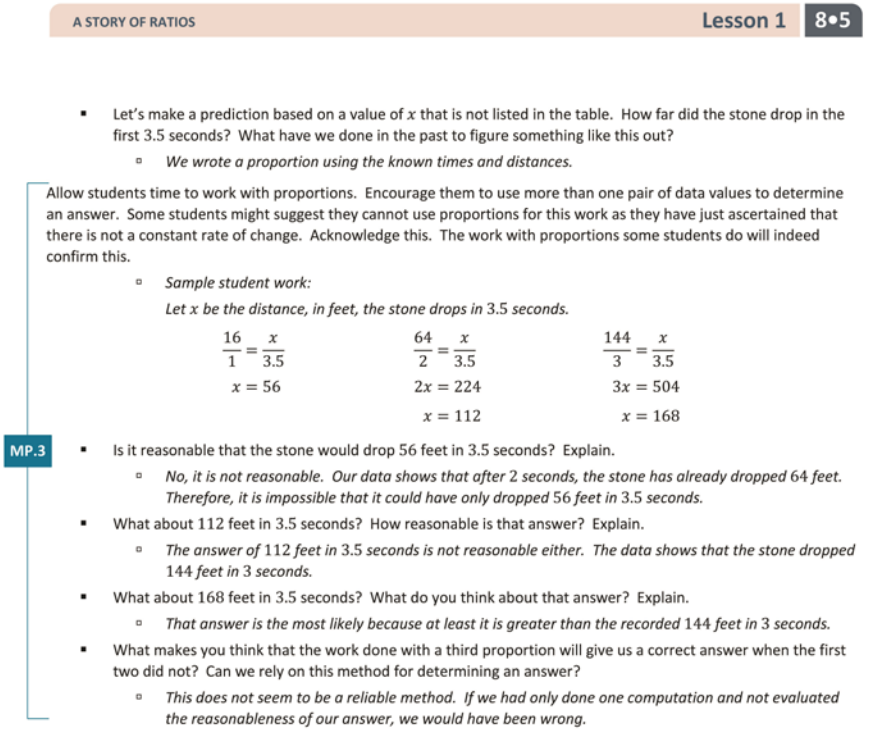
Schools and districts nationwide are experiencing student growth and impressive test scores after using Eureka Math. See their stories and data at greatminds.org/data.

Full Suite of Resources

Great Minds offers the Eureka Math curriculum as PDF downloads for free, noncommercial use. Access the free PDFs at greatminds.org/math/curriculum.

The teacher–writers who created the curriculum have also developed essential resources, available only from Great Minds, including the following:

- Printed material in English and Spanish
- Digital resources
- Professional development
- Classroom tools and manipulatives
- Teacher support materials
- Parent resources

Mathematical Habits of Mind	Aligned Components of *Eureka Math*
MHM.1 Make sense of problems and persevere in solving them.	Lessons in every module engage students in mathematical practices. These are designated in the Module Overview and labeled in lessons. For example: 
MHM.2 Reason abstractly and quantitatively.	
MHM.3 Construct viable arguments and critique the reasoning of others.	
MHM.4 Model with mathematics.	
MHM.5 Use appropriate tools strategically.	
MHM.6 Attend to precision.	
MHM.7 Look for and make use of structure.	
MHM.8 Look for and express regularity in repeated reasoning.	

- Let's make a prediction based on a value of x that is not listed in the table. How far did the stone drop in the first 3.5 seconds? What have we done in the past to figure something like this out?
  - *We wrote a proportion using the known times and distances.*

Allow students time to work with proportions. Encourage them to use more than one pair of data values to determine an answer. Some students might suggest they cannot use proportions for this work as they have just ascertained that there is not a constant rate of change. Acknowledge this. The work with proportions some students do will indeed confirm this.

- *Sample student work:*

  Let x be the distance, in feet, the stone drops in 3.5 seconds.

$$\frac{16}{1}=\frac{x}{3.5} \qquad \frac{64}{2}=\frac{x}{3.5} \qquad \frac{144}{3}=\frac{x}{3.5}$$
$$x=56 \qquad 2x=224 \qquad 3x=504$$
$$x=112 \qquad x=168$$

- Is it reasonable that the stone would drop 56 feet in 3.5 seconds? Explain.
  - *No, it is not reasonable. Our data shows that after 2 seconds, the stone has already dropped 64 feet. Therefore, it is impossible that it could have only dropped 56 feet in 3.5 seconds.*
- What about 112 feet in 3.5 seconds? How reasonable is that answer? Explain.
  - *The answer of 112 feet in 3.5 seconds is not reasonable either. The data shows that the stone dropped 144 feet in 3 seconds.*
- What about 168 feet in 3.5 seconds? What do you think about that answer? Explain.
  - *That answer is the most likely because at least it is greater than the recorded 144 feet in 3 seconds.*
- What makes you think that the work done with a third proportion will give us a correct answer when the first two did not? Can we rely on this method for determining an answer?
  - *This does not seem to be a reliable method. If we had only done one computation and not evaluated the reasonableness of our answer, we would have been wrong.*

The Number System

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

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.1 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.	G8 M7 Topic B: Decimal Expansions of Numbers
M.8.2 Apply approximations and properties of rational and irrational numbers to:	*This standard is addressed by the lessons aligned to its subsections.*
M.8.2.a Compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions such as π^2 (e.g., by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations).	G8 M7 Lesson 1: The Pythagorean Theorem G8 M7 Lesson 2: Square Roots G8 M7 Lesson 3: Existence and Uniqueness of Square Roots and Cube Roots G8 M7 Lesson 4: Simplifying Square Roots G8 M7 Lesson 11: The Decimal Expansion of Some Irrational Numbers G8 M7 Lesson 13: Comparing Irrational Numbers G8 M7 Lesson 14: Decimal Expansion of π

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M.8.2.b Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	*Supplemental material is necessary to address this standard.*

Expressions and Equations

Work with radicals and integer exponents.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.3 Know and apply the properties of integer exponents to generate equivalent numerical expressions (e.g., $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$).	G8 M1 Topic A: Exponential Notation and Properties of Integer Exponents
M.8.4 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.	G8 M7 Lesson 2: Square Roots G8 M7 Lesson 5: Solving Equations with Radicals G8 M7 Lesson 10: Converting Repeating Decimals to Fractions

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.5 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 (e.g., estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9; determine that the world population is more than 20 times larger).	G8 M1 Lesson 7: Magnitude G8 M1 Lesson 8: Estimating Quantities
M.8.6 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.	G8 M1 Lesson 9: Scientific Notation G8 M1 Lesson 10: Operations with Numbers in Scientific Notation G8 M1 Lesson 11: Efficacy of Scientific Notation G8 M1 Lesson 12: Choice of Unit G8 M1 Lesson 13: Comparison of Numbers Written in Scientific Notation and Interpreting Scientific Notation Using Technology

Expressions and Equations

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

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.7 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways (e.g., compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed).	G8 M4 Topic B: Linear Equations in Two Variables and Their Graphs G8 M4 Lesson 15: The Slope of a Non-Vertical Line G8 M4 Lesson 22: Constant Rates Revisited G8 M4 Lesson 24: Introduction to Simultaneous Equations
M.8.8 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.	G8 M4 Lesson 16: The Computation of the Slope of a Non-Vertical Line G8 M4 Lesson 17: The Line Joining Two Distinct Points of the Graph $y = mx + b$ Has Slope m G8 M4 Lesson 18: There Is Only One Line Passing Through a Given Point with a Given Slope G8 M4 Lesson 19: The Graph of a Linear Equation in Two Variables Is a Line G8 M4 Lesson 20: Every Line Is a Graph of a Linear Equation G8 M4 Lesson 21: Some Facts About Graphs of a Linear Equation in Two Variables G8 M4 Lesson 22: Constant Rates Revisited G8 M4 Lesson 23: The Defining Equation of a Line

Expressions and Equations

Analyze and solve linear equations, pairs of simultaneous linear equations, and linear inequalities in one variable.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.9 Analyze and solve real-world and mathematical problems utilizing linear equations in one variable.	*This standard is fully addressed by the lessons aligned to its subsections.*
M.8.9.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).	G8 M4 Lesson 3: Linear Equations in x G8 M4 Lesson 4: Solving a Linear Equation G8 M4 Lesson 6: Solutions of a Linear Equation G8 M4 Lesson 7: Classification of Solutions
M.8.9.b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms.	G8 M4 Lesson 4: Solving a Linear Equation G8 M4 Lesson 5: Writing and Solving Linear Equations G8 M4 Lesson 6: Solutions of a Linear Equation G8 M4 Lesson 7: Classification of Solutions G8 M4 Lesson 8: Linear Equations in Disguise G8 M4 Lesson 9: An Application of Linear Equations

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.10 Analyze and solve pairs of simultaneous linear equations by graphing, limiting to integer solutions. 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.	G8 M4 Lesson 24: Introduction to Simultaneous Equations G8 M4 Lesson 25: Geometric Interpretation of the Solutions of a Linear System G8 M4 Lesson 26: Characterization of Parallel Lines
M.8.11 Explain each step in solving a linear equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	Algebra I M1 Lesson 12: Solving Equations Algebra I M1 Lesson 13: Some Potential Dangers when Solving Equations Algebra I M1 Lesson 17: Equations Involving Factored Expressions Algebra I M1 Lesson 18: Equations Involving a Variable Expression in the Denominator
M.8.12 Analyze and solve real-world mathematical problems utilizing linear inequalities in one variable. Solve linear inequalities with rational number coefficients, including inequalities whose solutions require expanding expressions using the distributive property and combining like terms.	G7 M3 Lesson 12: Properties of Inequalities G7 M3 Lesson 13: Inequalities G7 M3 Lesson 14: Solving Inequalities G7 M3 Lesson 15: Graphing Solutions to Inequalities Algebra I M1 Lesson 14: Solving Inequalities Algebra I M1 Lesson 16: Solving and Graphing Inequalities Joined by “And” or “Or”

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.13 Rearrange formulas to isolate a given variable, using the same reasoning as in solving equations (e.g., rearrange Ohm's law $V = IR$ to isolate resistance R).	Algebra I M1 Lesson 19: Rearranging Formulas

Functions

Define, evaluate, and compare functions.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.14 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.	G8 M5 Lesson 1: The Concept of a Function G8 M5 Lesson 2: Formal Definition of a Function G8 M5 Lesson 4: More Examples of Functions G8 M5 Lesson 5: Graphs of Functions and Equations G8 M5 Lesson 6: Graphs of Linear Functions and Rate of Change G8 M5 Lesson 8: Graphs of Simple Nonlinear Functions

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.15 Compare properties of two functions each represented in a different way, such as algebraically, graphically, numerically in tables, or by verbal descriptions (e.g., 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).	G8 M5 Lesson 7: Comparing Linear Functions and Graphs
M.8.16 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 (e.g., 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).	G8 M5 Lesson 3: Linear Functions and Proportionality G8 M5 Lesson 5: Graphs of Functions and Equations G8 M5 Lesson 6: Graphs of Linear Functions and Rate of Change G8 M5 Lesson 7: Comparing Linear Functions and Graphs G8 M5 Lesson 8: Graphs of Simple Nonlinear Functions

Functions

Use functions to model relationships between quantities.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.17 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.	G8 M6 Lesson 1: Modeling Linear Relationships G8 M6 Lesson 2: Interpreting Rate of Change and Initial Value G8 M6 Lesson 3: Representations of a Line
M.8.18 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.	G8 M6 Lesson 2: Interpreting Rate of Change and Initial Value G8 M6 Lesson 3: Representations of a Line G8 M6 Lesson 4: Increasing and Decreasing Functions G8 M6 Lesson 5: Increasing and Decreasing Functions

Geometry

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

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.19 Verify experimentally the properties of rotations, reflections and translations:	*This standard is fully addressed by the lessons aligned to its subsections.*
M.8.19.a Lines are taken to lines, and line segments to line segments of the same length.	G8 M2 Topic A: Definitions and Properties of the Basic Rigid Motions
M.8.19.b Angles are taken to angles of the same measure.	G8 M2 Topic A: Definitions and Properties of the Basic Rigid Motions
M.8.19.c Parallel lines are taken to parallel lines.	G8 M2 Topic A: Definitions and Properties of the Basic Rigid Motions
M.8.20 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.	G8 M2 Topic B: Sequencing the Basic Rigid Motions G8 M2 Lesson 11: Definition of Congruence and Some Basic Properties

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.21 Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	G8 M3 Topic A: Dilation G8 M3 Lesson 8: Similarity *Supplemental material is necessary to fully address the effect of translations, rotations, and reflections on two-dimensional figures using coordinates.*
M.8.22 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.	G8 M3 Lesson 8: Similarity G8 M3 Lesson 9: Basic Properties of Similarity G8 M3 Lesson 11: More About Similar Triangles
M.8.23 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 (e.g., arrange three copies of the same triangle so that the sum of the three angles appears to form a line; give an argument in terms of transversals why this is so).	G8 M2 Lesson 12: Angles Associated with Parallel Lines G8 M2 Lesson 13: Angle Sum of a Triangle G8 M2 Lesson 14: More on the Angles of a Triangle G8 M3 Lesson 10: Informal Proof of AA Criterion for Similarity G8 M3 Lesson 11: More About Similar Triangles G8 M3 Lesson 12: Modeling Using Similarity

Geometry

Understand and apply the Pythagorean Theorem.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.24 Explain a proof of the Pythagorean Theorem and its converse.	G8 M2 Lesson 15: Informal Proof of the Pythagorean Theorem G8 M3 Topic C: The Pythagorean Theorem G8 M7 Lesson 15: Pythagorean Theorem, Revisited G8 M7 Lesson 16: Converse of the Pythagorean Theorem
M.8.25 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	G8 M2 Topic D: The Pythagorean Theorem G8 M3 Topic C: The Pythagorean Theorem G8 M7 Lesson 1: The Pythagorean Theorem G8 M7 Lesson 4: Simplifying Square Roots G8 M7 Lesson 5: Solving Equations with Radicals G8 M7 Lesson 17: Distance on the Coordinate Plane G8 M7 Lesson 18: Applications of the Pythagorean Theorem G8 M7 Lesson 19: Cones and Spheres G8 M7 Lesson 23: Nonlinear Motion
M.8.26 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	G8 M2 Lesson 16: Applications of the Pythagorean Theorem G8 M7 Lesson 17: Distance on the Coordinate Plane

Geometry

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

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.27 Know the formulas for the volumes of cones, cylinders and spheres and use them to solve real-world and mathematical problems.	G8 M5 Topic B: Volume G8 M7 Lesson 19: Cones and Spheres G8 M7 Lesson 20: Truncated Cones G8 M7 Lesson 21: Volume of Composite Solids

Statistics and Probability

Investigate patterns of association in bivariate data.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.28 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.	G8 M6 Lesson 6: Scatter Plots G8 M6 Lesson 7: Patterns in Scatter Plots G8 M6 Lesson 11: Using Linear Models in a Data Context G8 M6 Lesson 12: Nonlinear Models in a Data Context

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.29 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.	G8 M6 Lesson 8: Informally Fitting a Line G8 M6 Lesson 9: Determining the Equation of a Line Fit to Data G8 M6 Lesson 11: Using Linear Models in a Data Context G8 M6 Lesson 12: Nonlinear Models in a Data Context
M.8.30 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept (e.g., in a linear model for a biology experiment, interpret a slope of $1.5\ \text{cm/hr}$ as meaning that an additional hour of sunlight each day is associated with an additional $1.5\ \text{cm}$ in mature plant height).	G8 M6 Lesson 9: Determining the Equation of a Line Fit to Data G8 M6 Lesson 10: Linear Models G8 M6 Lesson 11: Using Linear Models in a Data Context G8 M6 Lesson 12: Nonlinear Models in a Data Context

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.8.31 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 (e.g., collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home; is there evidence that those who have a curfew also tend to have chores?).	G8 M6 Topic D: Bivariate Categorical Data