Precalculus | 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

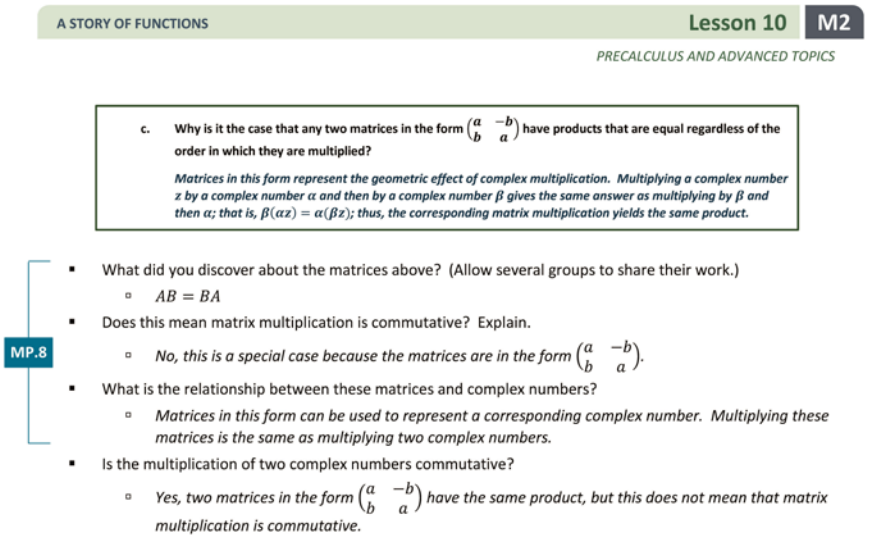
Schools and districts nationwide are experiencing student growth and impressive test scores after using *Eureka Math*. See their stories and data at greatminds.org/data.

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.	

Building Relationships among Complex Numbers, Vectors, and Matrices

Perform arithmetic operations with complex numbers.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.1 Find the conjugate of a complex number; use conjugates to find moduli (magnitude) and quotients of complex numbers.	Precalculus and Advanced Topics M1 Lesson 7: Complex Number Division Precalculus and Advanced Topics M1 Lesson 8: Complex Number Division Precalculus and Advanced Topics M1 Lesson 9: The Geometric Effect of Some Complex Arithmetic Precalculus and Advanced Topics M1 Lesson 17: The Geometric Effect of Multiplying by a Reciprocal

Building Relationships among Complex Numbers, Vectors, and Matrices

Represent complex numbers and their operations on the complex plane.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.2 Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers) and explain why the rectangular and polar forms of a given complex number represent the same number.	Precalculus and Advanced Topics M1 Lesson 4: An Appearance of Complex Numbers Precalculus and Advanced Topics M1 Lesson 5: An Appearance of Complex Numbers Precalculus and Advanced Topics M1 Lesson 6: Complex Numbers as Vectors Precalculus and Advanced Topics M1 Lesson 8: Complex Number Division Precalculus and Advanced Topics M1 Topic B: Complex Number Operations and Transformations Precalculus and Advanced Topics M1 Lesson 18: Exploiting the Connection to Trigonometry Precalculus and Advanced Topics M1 Lesson 19: Exploiting the Connection to Trigonometry Precalculus and Advanced Topics M1 Lesson 20: Exploiting the Connection to Cartesian Coordinates

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.3 Represent addition, subtraction, multiplication and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation.	Precalculus and Advanced Topics M1 Lesson 6: Complex Numbers as Vectors Precalculus and Advanced Topics M1 Lesson 9: The Geometric Effect of Some Complex Arithmetic Precalculus and Advanced Topics M1 Lesson 10: The Geometric Effect of Some Complex Arithmetic Precalculus and Advanced Topics M1 Lesson 14: Discovering the Geometric Effect of Complex Multiplication Precalculus and Advanced Topics M1 Lesson 15: Justifying the Geometric Effect of Complex Multiplication Precalculus and Advanced Topics M1 Lesson 16: Representing Reflections with Transformations Precalculus and Advanced Topics M1 Lesson 17: The Geometric Effect of Multiplying by a Reciprocal Precalculus and Advanced Topics M1 Lesson 18: Exploiting the Connection to Trigonometry Precalculus and Advanced Topics M1 Lesson 19: Exploiting the Connection to Trigonometry Precalculus and Advanced Topics M1 Lesson 20: Exploiting the Connection to Cartesian Coordinates
M.4HSTP.4 Calculate the distance between numbers in the complex plane as the modulus of the difference and the midpoint of a segment as the average of the numbers at its endpoints.	Precalculus and Advanced Topics M1 Lesson 11: Distance and Complex Numbers Precalculus and Advanced Topics M1 Lesson 12: Distance and Complex Numbers

Building Relationships among Complex Numbers, Vectors, and Matrices

Represent and model with vector quantities.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.5 Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments and use appropriate symbols for vectors and their magnitudes.	Precalculus and Advanced Topics M2 Lesson 17: Vectors in the Coordinate Plane Precalculus and Advanced Topics M2 Lesson 18: Vectors and Translation Maps Precalculus and Advanced Topics M2 Lesson 20: Vectors and Stone Bridges
M.4HSTP.6 Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	Precalculus and Advanced Topics M2 Lesson 19: Directed Line Segments and Vectors
M.4HSTP.7 Solve problems involving velocity and other quantities that can be represented by vectors.	Precalculus and Advanced Topics M2 Lesson 17: Vectors in the Coordinate Plane Precalculus and Advanced Topics M2 Lesson 20: Vectors and Stone Bridges Precalculus and Advanced Topics M2 Lesson 23: Why Are Vectors Useful?

Building Relationships among Complex Numbers, Vectors, and Matrices

Perform operations on vectors.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.8 Add and subtract vectors.	*This standard is fully addressed by the lessons aligned to its subsections.*
M.4HSTP.8.a Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.	Precalculus and Advanced Topics M2 Lesson 5: Coordinates of Points in Space Precalculus and Advanced Topics M2 Lesson 6: Linear Transformations as Matrices Precalculus and Advanced Topics M2 Lesson 17: Vectors in the Coordinate Plane Precalculus and Advanced Topics M2 Lesson 18: Vectors and Translation Maps Precalculus and Advanced Topics M2 Lesson 19: Directed Line Segments and Vectors Precalculus and Advanced Topics M2 Lesson 20: Vectors and Stone Bridges Precalculus and Advanced Topics M2 Lesson 23: Why Are Vectors Useful? Precalculus and Advanced Topics M2 Lesson 24: Why Are Vectors Useful?
M.4HSTP.8.b Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.	Precalculus and Advanced Topics M2 Lesson 20: Vectors and Stone Bridges Precalculus and Advanced Topics M2 Lesson 23: Why Are Vectors Useful? Precalculus and Advanced Topics M2 Lesson 24: Why Are Vectors Useful?
M.4HSTP.8.c Describe vector subtraction in terms of vector addition, represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.	Precalculus and Advanced Topics M2 Lesson 6: Linear Transformations as Matrices Precalculus and Advanced Topics M2 Lesson 17: Vectors in the Coordinate Plane Precalculus and Advanced Topics M2 Lesson 18: Vectors and Translation Maps Precalculus and Advanced Topics M2 Lesson 19: Directed Line Segments and Vectors Precalculus and Advanced Topics M2 Lesson 23: Why Are Vectors Useful? Precalculus and Advanced Topics M2 Lesson 24: Why Are Vectors Useful?

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.9 Multiply a vector by a scalar.	*This standard is fully addressed by the lessons aligned to its subsections.*
M.4HSTP.9.a Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise.	Precalculus and Advanced Topics M2 Lesson 5: Coordinates of Points in Space Precalculus and Advanced Topics M2 Lesson 6: Linear Transformations as Matrices Precalculus and Advanced Topics M2 Lesson 17: Vectors in the Coordinate Plane Precalculus and Advanced Topics M2 Lesson 18: Vectors and Translation Maps Precalculus and Advanced Topics M2 Lesson 20: Vectors and Stone Bridges
M.4HSTP.9.b Compute the magnitude of a scalar multiple of a vector.	Precalculus and Advanced Topics M2 Lesson 5: Coordinates of Points in Space Precalculus and Advanced Topics M2 Lesson 6: Linear Transformations as Matrices Precalculus and Advanced Topics M2 Lesson 17: Vectors in the Coordinate Plane Precalculus and Advanced Topics M2 Lesson 18: Vectors and Translation Maps Precalculus and Advanced Topics M2 Lesson 20: Vectors and Stone Bridges

Building Relationships among Complex Numbers, Vectors, and Matrices

Perform operations on matrices and use matrices in applications.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.10 Use matrices to represent and manipulate data.	Precalculus and Advanced Topics M2 Topic A: Networks and Matrices

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.11 Multiply matrices by scalars to produce new matrices.	Precalculus and Advanced Topics M2 Lesson 2: Networks and Matrix Arithmetic Precalculus and Advanced Topics M2 Lesson 3: Matrix Arithmetic in Its Own Right Precalculus and Advanced Topics M2 Lesson 4: Linear Transformations Review Precalculus and Advanced Topics M2 Lesson 5: Coordinates of Points in Space Precalculus and Advanced Topics M2 Lesson 6: Linear Transformations as Matrices Precalculus and Advanced Topics M2 Lesson 26: Projecting a 3-D Object onto a 2-D Plane Precalculus and Advanced Topics M2 Lesson 27: Designing Your Own Game
M.4HSTP.12 Add, subtract and multiply matrices of appropriate dimensions.	Precalculus and Advanced Topics M1 Lesson 22: Modeling Video Game Motion with Matrices Precalculus and Advanced Topics M1 Lesson 24: Matrix Notation Encompasses New Transformations! Precalculus and Advanced Topics M1 Lesson 25: Matrix Multiplication and Addition Precalculus and Advanced Topics M2 Lesson 2: Networks and Matrix Arithmetic Precalculus and Advanced Topics M2 Lesson 3: Matrix Arithmetic in Its Own Right Precalculus and Advanced Topics M2 Lesson 4: Linear Transformations Review Precalculus and Advanced Topics M2 Lesson 5: Coordinates of Points in Space Precalculus and Advanced Topics M2 Lesson 6: Linear Transformations as Matrices Precalculus and Advanced Topics M2 Lesson 8: Composition of Linear Transformations Precalculus and Advanced Topics M2 Lesson 9: Composition of Linear Transformations Precalculus and Advanced Topics M2 Lesson 11: Matrix Addition is Commutative Precalculus and Advanced Topics M2 Lesson 13: Using Matrix Operations for Encryption Precalculus and Advanced Topics M2 Topic E: First-Person Video Games—Projection Matrices

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.13 Demonstrate that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.	Precalculus and Advanced Topics M2 Lesson 10: Matrix Multiplication Is Not Commutative Precalculus and Advanced Topics M2 Lesson 12: Matrix Multiplication Is Distributive and Associative
M.4HSTP.14 Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.	Precalculus and Advanced Topics M1 Lesson 24: Matrix Notation Encompasses New Transformations! Precalculus and Advanced Topics M1 Lesson 25: Matrix Multiplication and Addition Precalculus and Advanced Topics M1 Lesson 26: Getting a Handle on New Transformations Precalculus and Advanced Topics M1 Lesson 27: Getting a Handle on New Transformations Precalculus and Advanced Topics M1 Lesson 28: When Can We Reverse a Transformation? Precalculus and Advanced Topics M1 Lesson 29: When Can We Reverse a Transformation? Precalculus and Advanced Topics M1 Lesson 30: When Can We Reverse a Transformation? Precalculus and Advanced Topics M2 Lesson 6: Linear Transformations as Matrices Precalculus and Advanced Topics M2 Lesson 13: Using Matrix Operations for Encryption Precalculus and Advanced Topics M2 Topic C: Systems of Linear Equations

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.15 Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.	Precalculus and Advanced Topics M1 Lesson 21: The Hunt for Better Notation Precalculus and Advanced Topics M1 Lesson 22: Modeling Video Game Motion with Matrices Precalculus and Advanced Topics M1 Lesson 23: Modeling Video Game Motion with Matrices Precalculus and Advanced Topics M2 Lesson 4: Linear Transformations Review Precalculus and Advanced Topics M2 Lesson 7: Linear Transformations Applied to Cubes Precalculus and Advanced Topics M2 Lesson 11: Matrix Addition Is Commutative Precalculus and Advanced Topics M2 Lesson 18: Vectors and Translation Maps Precalculus and Advanced Topics M2 Lesson 21: Vectors and the Equation of a Line Precalculus and Advanced Topics M2 Lesson 22: Linear Transformations of Lines Precalculus and Advanced Topics M2 Lesson 24: Why Are Vectors Useful? Precalculus and Advanced Topics M2 Topic E: First-Person Video Games—Projection Matrices
M.4HSTP.16 Work with 2×2 matrices as transformations of the plane and interpret the absolute value of the determinant in terms of area.	Precalculus and Advanced Topics M1 Lesson 21: The Hunt for Better Notation Precalculus and Advanced Topics M1 Lesson 22: Modeling Video Game Motion with Matrices Precalculus and Advanced Topics M1 Lesson 23: Modeling Video Game Motion with Matrices Precalculus and Advanced Topics M1 Lesson 26: Getting a Handle on New Transformations Precalculus and Advanced Topics M1 Lesson 27: Getting a Handle on New Transformations Precalculus and Advanced Topics M1 Lesson 28: When Can We Reverse a Transformation? Precalculus and Advanced Topics M1 Lesson 29: When Can We Reverse a Transformation? Precalculus and Advanced Topics M1 Lesson 30: When Can We Reverse a Transformation? Precalculus and Advanced Topics M2 Lesson 8: Composition of Linear Transformations

Building Relationships among Complex Numbers, Vectors, and Matrices

Solve systems of equations.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.17 Represent a system of linear equations as a single matrix equation in a vector variable.	Precalculus and Advanced Topics M2 Topic C: Systems of Linear Equations
M.4HSTP.18 Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater).	Precalculus and Advanced Topics M2 Topic C: Systems of Linear Equations

Trigonometric and Inverse Trigonometric Functions of Real Numbers

Extend the domain of trigonometric functions using the unit circle.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.19 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	Algebra II M2 Lesson 9: Awkward! Who Chose the Number 360, Anyway?

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.20 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	Algebra II M2 Lesson 1: Ferris Wheels—Tracking the Height of a Passenger Car Algebra II M2 Lesson 2: The Height and Co-Height Functions of a Ferris Wheel Algebra II M2 Lesson 3: The Motion of the Moon, Sun, and Stars—Motivating Mathematics Algebra II M2 Lesson 4: From Circle-ometry to Trigonometry Algebra II M2 Lesson 5: Extending the Domain of Sine and Cosine to All Real Numbers Algebra II M2 Lesson 7: Secant and the Co-Functions
M.4HSTP.21 Use special triangles to determine geometrically the values of sine, cosine, tangent for $\frac{\pi}{3}, \frac{\pi}{4}, \frac{\pi}{6}$, and , and use the unit circle to express the values of sine, cosine, and tangent for $\pi - x$, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.	Algebra II M2 Lesson 4: From Circle-ometry to Trigonometry Algebra II M2 Lesson 5: Extending the Domain of Sine and Cosine to All Real Numbers Algebra II M2 Lesson 6: Why Call It Tangent? Algebra II M2 Lesson 10: Basic Trigonometric Identities from Graphs Precalculus and Advanced Topics M4 Lesson 1: Special Triangles and the Unit Circle
M.4HSTP.22 Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	Precalculus and Advanced Topics M4 Lesson 2: Properties of Trigonometric Functions

Trigonometric and Inverse Trigonometric Functions of Real Numbers

Model periodic phenomena with trigonometric functions.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.23 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.	Algebra II M2 Lesson 11: Transforming the Graph of the Sine Function Algebra II M2 Lesson 12: Ferris Wheels—Using Trigonometric Functions to Model Cyclical Behavior Algebra II M2 Lesson 13: Tides, Sound Waves, and Stock Markets Algebra II M2 Lesson 14: Graphing the Tangent Function Precalculus and Advanced Topics M4 Lesson 6: Waves, Sinusoids, and Identities
M.4HSTP.24 Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.	Precalculus and Advanced Topics M4 Lesson 12: Inverse Trigonometric Functions
M.4HSTP.25 Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology and interpret them in terms of the context.	Precalculus and Advanced Topics M4 Lesson 12: Inverse Trigonometric Functions Precalculus and Advanced Topics M4 Lesson 13: Modeling with Inverse Trigonometric Functions Precalculus and Advanced Topics M4 Lesson 14: Modeling with Inverse Trigonometric Functions
M.4HSTP.26 Solve multi-step trigonometric equations that require factoring or the use of identities.	Precalculus and Advanced Topics M4 Lesson 12: Inverse Trigonometric Functions *Supplemental material is necessary to fully address this standard.*

Trigonometric and Inverse Trigonometric Functions of Real Numbers

Prove and apply trigonometric identities.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.27 Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$, given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$, and the quadrant of the angle.	Algebra II M2 Lesson 15: What Is a Trigonometric Identity? Algebra II M2 Lesson 16: Proving Trigonometric Identities
M.4HSTP.28 Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	Precalculus and Advanced Topics M4 Lesson 3: Addition and Subtraction Formulas Precalculus and Advanced Topics M4 Lesson 4: Addition and Subtraction Formulas Precalculus and Advanced Topics M4 Lesson 6: Waves, Sinusoids, and Identities

Analysis and Synthesis of Functions

Interpret functions that arise in applications in terms of a context.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.29 Select a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of quantities, and sketch graphs showing key features given a verbal description of the relationship. Relate the domain of a function to its graph based on the behavior of data and context, and, where applicable, to the quantitative relationship it describes.	Algebra II M1 Lesson 16: Modeling with Polynomials—An Introduction Algebra II M1 Lesson 17: Modeling with Polynomials—An Introduction Algebra II M3 Lesson 18: Graphs of Exponential Functions and Logarithmic Functions Algebra II M3 Lesson 20: Transformations of the Graphs of Logarithmic and Exponential Functions Algebra II M3 Lesson 21: The Graph of the Natural Logarithm Function Precalculus and Advanced Topics M4 Lesson 6: Waves, Sinusoids, and Identities

Analysis and Synthesis of Functions

Build a function that models a relationship between two quantities.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.30 Write a function that describes a relationship between two quantities, including composition of functions.	Precalculus and Advanced Topics M3 Lesson 16: Function Composition Precalculus and Advanced Topics M3 Lesson 17: Solving Problems by Functions Composition

Analysis and Synthesis of Functions

Analyze functions using different representations.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.31 Graph trigonometric and rational functions expressed symbolically and show key features of the graph.	*This standard is fully addressed by the lessons aligned to its subsections.*
M.4HSTP.31.a For trigonometric functions, focus on period, midline, amplitude, and phase shift.	Algebra II M2 Lesson 8: Graphing the Sine and Cosine Functions Algebra II M2 Lesson 11: Transforming the Graph of the Sine Function Algebra II M2 Lesson 12: Ferris Wheels—Using Trigonometric Functions to Model Cyclical Behavior Algebra II M2 Lesson 14: Graphing the Tangent Function Precalculus and Advanced Topics M4 Lesson 11: Revisiting the Graphs of the Trigonometric Functions
M.4HSTP.31.b For rational functions, focus on identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Analyze asymptotes and continuity informally using limits.	Precalculus and Advanced Topics M3 Lesson 12: End Behavior of Rational Functions Precalculus and Advanced Topics M3 Lesson 13: Horizontal and Vertical Asymptotes of Graphs of Rational Functions Precalculus and Advanced Topics M3 Lesson 14: Graphing Rational Functions Precalculus and Advanced Topics M3 Lesson 15: Transforming Rational Functions

Analysis and Synthesis of Functions

Build new functions from existing functions.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.32 Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. Observe the effect of multiple transformations on a single graph and the common effect of each transformation across function types and use transformations to model situations.	Algebra II M2 Lesson 11: Transforming the Graph of the Sine Function Algebra II M3 Lesson 20: Transformations of the Graphs of Logarithmic and Exponential Functions Precalculus and Advanced Topics M3 Lesson 15: Transforming Rational Functions Precalculus and Advanced Topics M4 Lesson 11: Revisiting the Graphs of the Trigonometric Functions
M.4HSTP.33 Find inverse functions.	Precalculus and Advanced Topics M3 Topic C: Inverse Functions
M.4HSTP.33.a Verify by composition that one function is the inverse of another.	Precalculus and Advanced Topics M3 Lesson 19: Restricting the Domain Precalculus and Advanced Topics M3 Lesson 20: Inverses of Logarithmic and Exponential Functions

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.33.b Read values of an inverse function from a graph or a table, given that the function has an inverse. Compute values of inverse functions from graphs and recognize the graph of an inverse function is the graph of the original function reflected about $y = x$.	Precalculus and Advanced Topics M3 Lesson 18: Inverse Functions Precalculus and Advanced Topics M3 Lesson 19: Restricting the Domain Precalculus and Advanced Topics M3 Lesson 20: Inverses of Logarithmic and Exponential Functions
M.4HSTP.33.c Produce an invertible function from a non-invertible function by restricting the domain.	Precalculus and Advanced Topics M3 Lesson 19: Restricting the Domain
M.4HSTP.34 Use an understanding of the inverse relationship between exponents and logarithmic functions to:	Algebra II M3 Lesson 19: The Inverse Relationship Between Logarithmic and Exponential Functions Precalculus and Advanced Topics M3 Lesson 20: Inverses of Logarithmic and Exponential Functions Precalculus and Advanced Topics M3 Lesson 21: Logarithmic and Exponential Problem Solving
M.4HSTP.34.a Graph logarithms,	Algebra II M3 Lesson 18: Graphs of Exponential Functions and Logarithmic Functions Algebra II M3 Lesson 20: Transformations of the Graphs of Logarithmic and Exponential Functions
M.4HSTP.34.b Derive properties of logarithms, and	Algebra II M3 Lesson 11: The Most Important Property of Logarithms Algebra II M3 Lesson 12: Properties of Logarithms

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.34.c Use these properties to model and solve problems and applications involving exponential and logarithmic functions.	Algebra II M3 Lesson 13: Changing the Base Algebra II M3 Lesson 14: Solving Logarithmic Equations Algebra II M3 Lesson 15: Why Were Logarithms Developed? Algebra II M3 Lesson 24: Solving Exponential Equations Algebra II M3 Lesson 27: Modeling with Exponential Functions Algebra II M3 Lesson 28: Newton's Law of Cooling, Revisited Precalculus and Advanced Topics M3 Lesson 21: Logarithmic and Exponential Problem Solving

Derivations in Analytic Geometry

Use conic sections to solve applications.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.35 Derive the equations of a parabola, circle, ellipses, and hyperbolas using their key components. Graph the equations of these conic sections.	Geometry M5 Lesson 17: Writing the Equation for a Circle Geometry M5 Lesson 18: Recognizing Equations of Circles Algebra II M1 Lesson 33: The Definition of a Parabola Algebra II M1 Lesson 34: Are All Parabolas Congruent? Algebra II M1 Lesson 35: Are All Parabolas Similar? Precalculus and Advanced Topics M3 Lesson 6: Curves in the Complex Plane Precalculus and Advanced Topics M3 Lesson 7: Curves from Geometry Precalculus and Advanced Topics M3 Lesson 8: Curves from Geometry
M.4HSTP.36 Solve problems and applications that model conic sections.	*Supplemental material is necessary to address this standard.*

Series and Informal Limits

Use sigma notations to evaluate finite sums.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.37 Develop sigma notation and use it to write series in equivalent form.	Algebra II M3 Topic E: Geometric Series and Finance
M.4HSTP.38 Apply the method of mathematical induction to prove summation formulas. For example, verify the sum of squares formula.	*Supplemental material is necessary to address this standard.*

Series and Informal Limits

Extend geometric series to infinite geometric series.

West Virginia College- and Career-Readiness Standards for Mathematics	Aligned Components of *Eureka Math*
M.4HSTP.39 Develop intuitively that the sum of an infinite series of positive numbers can converge and derive the formula for the sum of an infinite geometric series. Apply infinite geometric series models intuitively.	*Supplemental material is necessary to address this standard.*