EUREKA MATH™

GREAT MINDS

ABOUT *EUREKA MATH*

Created by the nonprofit Great Minds, *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

Eureka Math is the only curriculum found by EdReports.org to align fully with the Common Core State Standards for Mathematics for all grades, Kindergarten through Grade 8. Great Minds offers detailed analyses which 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

As a nonprofit, 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

PRECALCULUS

Many of the Precalculus Texas Essential Knowledge and Skills for Mathematics will require the use of *Eureka Math* content from other courses or supplemental materials. A detailed analysis of alignment is provided in the table below. With strategic placement of supplemental materials, *Eureka Math* can ensure students are successful in achieving the proficiencies of the Texas Essential Knowledge and Skills for Mathematics while still benefiting from the coherence and rigor of *Eureka Math*.

INDICATORS

Green indicates that the Texas standard is fully addressed in *Eureka Math*.

Yellow indicates that the Texas standard may not be completely addressed in *Eureka Math*.

Red indicates that the Texas standard is not addressed in *Eureka Math*.

Blue indicates there is a discrepancy between the grade level at which this standard is addressed in the Texas standards and in *Eureka Math*.

Mathematical Process Standards		Aligned Components of *Eureka Math*
(1) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:		
a. apply mathematics to problems arising in everyday life, society, and the workplace;		This process standard is analogous to the CCSSM Standards for Mathematical Practice 1, which is specifically addressed in the following modules: Precalculus and Advanced Topics M1: Complex Numbers and Transformations Precalculus and Advanced Topics M4: Trigonometry
b. use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;		This process standard is analogous to the CCSSM Standards for Mathematical Practice 1, which is specifically addressed in the following modules: Precalculus and Advanced Topics M1: Complex Numbers and Transformations Precalculus and Advanced Topics M4: Trigonometry

Mathematical Process Standards	Aligned Components of *Eureka Math*
c. select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	This process standard is analogous to the CCSSM Standards for Mathematical Practice 5, which is specifically addressed in the following modules: Precalculus and Advanced Topics M2: Vectors and Matrices Precalculus and Advanced Topics M4: Trigonometry Precalculus and Advanced Topics M5: Probability and Statistics
d. communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;	This process standard is analogous to the CCSSM Standards for Mathematical Practice 4, which is specifically addressed in the following modules: Precalculus and Advanced Topics M1: Complex Numbers and Transformations Precalculus and Advanced Topics M2: Vectors and Matrices Precalculus and Advanced Topics M4: Trigonometry Precalculus and Advanced Topics M5: Probability and Statistics

Mathematical Process Standards	Aligned Components of *Eureka Math*
e. create and use representations to organize, record, and communicate mathematical ideas;	This process standard is analogous to the CCSSM Standards for Mathematical Practice 6, which is specifically addressed in the following modules: Precalculus and Advanced Topics M1: Complex Numbers and Transformations Precalculus and Advanced Topics M2: Vectors and Matrices Precalculus and Advanced Topics M3: Rational and Exponential Functions
f. analyze mathematical relationships to connect and communicate mathematical ideas; and	This process standard is analogous to the CCSSM Standards for Mathematical Practice 2, which is specifically addressed in the following modules: Precalculus and Advanced Topics M1: Complex Numbers and Transformations Precalculus and Advanced Topics M2: Vectors and Matrices Precalculus and Advanced Topics M5: Probability and Statistics

Mathematical Process Standards	Aligned Components of *Eureka Math*
g. display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	This process standard is analogous to the CCSSM Standards for Mathematical Practice 3, which is specifically addressed in the following modules: Precalculus and Advanced Topics M1: Complex Numbers and Transformations Precalculus and Advanced Topics M3: Rational and Exponential Functions Precalculus and Advanced Topics M4: Trigonometry Precalculus and Advanced Topics M5: Probability and Statistics

Skill	Expectations		Aligned Components of *Eureka Math*
Functions	**111.42.2** The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. The student expected to:		
	a. use the composition of two functions to model and solve real-world problems;		Precalculus and Advanced Topics M3 Lesson 16: Function Composition Precalculus and Advanced Topics M3 Lesson 17: Solving Problems by Function Composition Precalculus and Advanced Topics M3 Lesson 21: Logarithmic and Exponential Problem Solving
	b. demonstrate that function composition is not always commutative;		Precalculus and Advanced Topics M3 Lesson 16: Function Composition Precalculus and Advanced Topics M3 Lesson 17: Solving Problems by Function Composition Precalculus and Advanced Topics M3 Topic C: Inverse Functions

Skill	Expectations	Aligned Components of *Eureka Math*
	c. represent a given function as a composite function of two or more functions;	Precalculus and Advanced Topics M3 Lesson 16: Function Composition Precalculus and Advanced Topics M3 Lesson 17: Solving Problems by Function Composition Precalculus and Advanced Topics M3 Topic C: Inverse Functions
	d. describe symmetry of graphs of even and odd functions;	Algebra II M2 Lesson 8: Graphing the Sine and Cosine Functions Algebra II M2 Lesson 10: Basic Trigonometric Identities from Graphs Algebra II M2 Lesson 11: Transforming the Graph of the Sine Function Algebra II M2 Lesson 14: Graphing the Tangent Function Precalculus and Advanced Topics M3 Lesson 12: End Behavior of Rational Functions Precalculus and Advanced Topics M4 Lesson 11: Revisiting the Graphs of the Trigonometric Functions
	e. determine an inverse function, when it exists, for a given function over its domain or a subset of its domain and represent the inverse using multiple representations;	Precalculus and Advanced Topics M3 Topic C: Inverse Functions

Skill	Expectations		Aligned Components of *Eureka Math*
	f. graph exponential, logarithmic, rational, polynomial, power, trigonometric, inverse trigonometric, and piecewise defined functions, including step functions;		Precalculus and Advanced Topics M3: Rational and Exponential Functions Precalculus and Advanced Topics M4 Topic C: Inverse Trigonometric Functions
	g. graph functions, including exponential, logarithmic, sine, cosine, rational, polynomial, and power functions and their transformations, including $af(x)$, $f(x) + d$, $f(x - c)$, $f(bx)$ for specific values of a, b, c, and d, in mathematical and real-world problems;		Precalculus and Advanced Topics M1 Lesson 3: Which Real Number Functions Define a Linear Transformation? Precalculus and Advanced Topics M3: Rational and Exponential Functions Precalculus and Advanced Topics M4 Topic C: Inverse Trigonometric Functions
	h. graph arcsin x and arccos x and describe the limitations on the domain;		Precalculus and Advanced Topics M4 Topic C: Inverse Trigonometric Functions
	i. determine and analyze the key features of exponential, logarithmic, rational, polynomial, power, trigonometric, inverse trigonometric, and piecewise defined functions, including step functions such as domain, range, symmetry, relative maximum, relative minimum, zeros, asymptotes, and intervals over which the function is increasing or decreasing;		Algebra II M1 Lesson 14: Graphing Factored Polynomials Algebra II M1 Lesson 15: Structure in Graphs of Polynomial Functions Precalculus and Advanced Topics M3: Rational and Exponential Functions Precalculus and Advanced Topics M4 Topic C: Inverse Trigonometric Functions

Skill	Expectations	Aligned Components of *Eureka Math*
	j. analyze and describe end behavior of functions, including exponential, logarithmic, rational, polynomial, and power functions, using infinity notation to communicate this characteristic in mathematical and real-world problems;	Algebra II M1 Lesson 14: Graphing Factored Polynomials Algebra II M1 Lesson 15: Structure in Graphs of Polynomial Functions Precalculus and Advanced Topics M3: Rational and Exponential Functions
	k. analyze characteristics of rational functions and the behavior of the function around the asymptotes, including horizontal, vertical, and oblique asymptotes;	Precalculus and Advanced Topics M3 Topic B: Rational Functions and Composition of Functions
	l. determine various types of discontinuities in the interval $(-\infty, \infty)$ as they relate to functions and explore the limitations of the graphing calculator as it relates to the behavior of the function around discontinuities;	Algebra II M3 Lesson 17: Graphing the Logarithm Function Algebra II M3 Lesson 18: Graphs of Exponential Functions and Logarithmic Functions Precalculus and Advanced Topics M3 Topic B: Rational Functions and Composition of Functions Precalculus and Advanced Topic M4 Topic C: Inverse Trigonometric Functions
	m. describe the left-sided behavior and the right-sided behavior of the graph of a function around discontinuities;	Precalculus and Advanced Topics M3 Topic B: Rational Functions and Composition of Functions
	n. analyze situations modeled by functions, including exponential, logarithmic, rational, polynomial, and power functions, to solve real-world problems;	Precalculus and Advanced Topics M3: Rational and Exponential Functions

Skill	Expectations		Aligned Components of *Eureka Math*
	o. develop and use a sinusoidal function that models a situation in mathematical and real-world problems; and		Precalculus and Advanced Topics M4 Lesson 6: Waves, Sinusoids, and Identities
	p. determine the values of the trigonometric functions at the special angles and relate them in mathematical and real-world problems.		Geometry M2 Topic E: Trigonometry
Relations and Geometric Reasoning	**111.42.3** The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. The student is expected to:		
	a. graph a set of parametric equations;		*Eureka Math* does not address graphing parametric equations.
	b. convert parametric equations into rectangular relations and convert rectangular relations into parametric equations;		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?

Skill	Expectations		Aligned Components of *Eureka Math*
	c. use parametric equations to model and solve mathematical and real-world problems;		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? Note: Supplemental material is necessary to address real-world problems.
	d. graph points in the polar coordinate system and convert between rectangular coordinates and polar coordinates;		Precalculus and Advanced Topics M1 Lesson 13: Trigonometry and Complex Numbers Precalculus and Advanced Topics M1 Lessons 18–19: Exploiting the Connection to Trigonometry
	e. graph polar equations by plotting points and using technology;		*Eureka Math* does not address graphing polar equations.
	f. determine the conic section formed when a plane intersects a double-napped cone;		*Eureka Math* does not address these conic sections formed when a plane intersects a double-napped cone.

Skill	Expectations	Aligned Components of *Eureka Math*
	g. make connections between the locus definition of conic sections and their equations in rectangular coordinates;	Geometry Module 5 Lesson 17: Writing the Equation for a Circle Algebra II Module 1 Lesson 33: The Definition of a Parabola Algebra II Module 1 Lesson 34: Are All Parabolas Congruent? Algebra II Module 1 Lesson 35: Are All Parabolas Similar? Precalculus and Advanced Topics Module 3 Lesson 7: Curves from Geometry Precalculus and Advanced Topics Module 3 Lesson 8: Curves from Geometry
	h. use the characteristics of an ellipse to write the equation of an ellipse with center (h, k); and	Precalculus and Advanced Topics M3 Lesson 6: Curves in the Complex Plane Precalculus and Advanced Topics M3 Lesson 7: Curves from Geometry
	i. use the characteristics of a hyperbola to write the equation of a hyperbola with center (h, k).	Precalculus and Advanced Topics M3 Lesson 6: Curves in the Complex Plane Precalculus and Advanced Topics M3 Lesson 8: Curves from Geometry

Skill	Expectations		Aligned Components of *Eureka Math*
Number and Measure	**111.42.4** The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. The student is expected to:		
	a. determine the relationship between the unit circle and the definition of a periodic function to evaluate trigonometric functions in mathematical and real-world problems;		Algebra II M2 Topic A: The Story of Trigonometry and Its Contexts Precalculus and Advanced Topics M4 Lesson 1: Special Triangles and the Unit Circle Precalculus and Advanced Topics M4 Lesson 2: Properties of Trigonometric Functions
	b. describe the relationship between degree and radian measure on the unit circle;		Algebra II M2 Lesson 9: Awkward! Who Chose the Number 360, Anyway? Precalculus and Advanced Topics M4 Lesson 1: Special Triangles and the Unit Circle Precalculus and Advanced Topics M4 Lesson 2: Properties of Trigonometric Functions
	c. represent angles in radians or degrees based on the concept of rotation and find the measure of reference angles and angles in standard position;		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 9: Awkward! Who Chose the Number 360, Anyway?

Skill	Expectations	Aligned Components of *Eureka Math*
	d. represent angles in radians or degrees based on the concept of rotation in mathematical and real-world problems, including linear and angular velocity;	Algebra II M2 Lesson 9: Awkward! Who Chose the Number 360, Anyway? Note: Supplemental material is necessary to address linear and angular velocity.
	e. determine the value of trigonometric ratios of angles and solve problems involving trigonometric ratios in mathematical and real-world problems;	Geometry M2 Topic E: Trigonometry Algebra II M2 Lesson 13: Tides, Sound Waves, and Stock Markets Precalculus and Advanced Topics M4 Lesson 7: An Area Formula for Triangles
	f. use trigonometry in mathematical and real-world problems, including directional bearing;	Precalculus and Advanced Topics M4: Trigonometry
	g. use the Law of Sines in mathematical and real-world problems;	Precalculus and Advanced Topics M4 Lesson 8: Law of Sines Precalculus and Advanced Topics M4 Lesson 10: Putting the Law of Cosines and the Law of Sines to Use
	h. use the Law of Cosines in mathematical and real-world problems;	Precalculus and Advanced Topics M4 Lesson 9: Law of Cosines Precalculus and Advanced Topics M4 Lesson 10: Putting the Law of Cosines and the Law of Sines to Use

Skill	Expectations		Aligned Components of *Eureka Math*
	i. use vectors to model situations involving magnitude and direction;		Precalculus and Advanced Topics M2 Lesson 20: Vectors and Stone Bridges Precalculus and Advanced Topics M2 Lesson 23: Why Are Vectors Useful?
	j. represent the addition of vectors and the multiplication of a vector by a scalar geometrically and symbolically; and		Precalculus and Advanced Topics M2 Topic D: Vectors in Plane and Space
	k. apply vector addition and multiplication of a vector by a scalar in mathematical and real-world problems.		Precalculus and Advanced Topics M2 Topic D: Vectors in Plane and Space
Algebraic Reasoning	**111.42.5** The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. The student is expected to:		
	a. evaluate finite sums and geometric series, when possible, written in sigma notation;		Algebra II M3 Topic E: Geometric Series and Finance
	b. represent arithmetic sequences and geometric sequences using recursive formulas;		Algebra II M3 Lesson 6: Euler's Number, *e* Algebra II M3 Lesson 25: Geometric Sequences and Exponential Growth and Decay Algebra II M3 Topic E: Geometric Series and Finance

Skill	Expectations	Aligned Components of *Eureka Math*
	c. calculate the n^{th} term and the n^{th} partial sum of an arithmetic series in mathematical and real-world problems;	Algebra I M3 Lesson 2: Recursive Formulas for Sequences
	d. represent arithmetic series and geometric series using sigma notation;	Algebra II M3 Lesson 25: Geometric Sequences and Exponential Growth and Decay Algebra II M3 Topic E: Geometric Series and Finance
	e. calculate the n^{th} term of a geometric series, the n^{th} partial sum of a geometric series, and sum of an infinite geometric series when it exists;	Algebra II M3 Lesson 25: Geometric Sequences and Exponential Growth and Decay Algebra II M3 Topic E: Geometric Series and Finance Note: Supplemental material is necessary to address the sum of an infinite geometric series.
	f. apply the Binomial Theorem for the expansion of $(a + b)^n$ in powers of a and b for a positive integer n, where a and b are any numbers;	Precalculus and Advanced Topics M3 Lessons 4–5: The Binomial Theorem
	g. use the properties of logarithms to evaluate or transform logarithmic expressions;	Algebra II M3 Topic B: Logarithms
	h. generate and solve logarithmic equations in mathematical and real-world problems;	Algebra II M3 Lesson 14: Solving Logarithmic Equations Note: Supplemental material is necessary to address solving real-world problems.

Skill	Expectations		Aligned Components of *Eureka Math*
	i. generate and solve exponential equations in mathematical and real-world problems;		Algebra II M3 Lesson 24: Solving Exponential Equations Algebra II M3 Lesson 28: Newton's Law of Cooling, Revisited Algebra II M3 Topic E: Geometric Series and Finance
	j. solve polynomial equations with real coefficients by applying a variety of techniques in mathematical and real-world problems;		Algebra II M1 Lesson 11: The Special Role of Zero in Factoring Algebra II M1 Lesson 12: Overcoming Obstacles in Factoring Precalculus and Advanced Topics M3 Lesson 1: Solutions to Polynomial Equations
	k. solve polynomial inequalities with real coefficients by applying a variety of techniques and write the solution set of the polynomial inequality in interval notation in mathematical and real-world problems;		*Eureka Math* does not address solving polynomial inequalities.
	l. solve rational inequalities with real coefficients by applying a variety of techniques and write the solution set of the rational inequality in interval notation in mathematical and real-world problems;		*Eureka Math* does not address solving rational inequalities.

Skill	Expectations		Aligned Components of *Eureka Math*
	m. use trigonometric identities such as reciprocal, quotient, Pythagorean, cofunctions, even/odd, and sum and difference identities for cosine and sine to simplify trigonometric expressions; and		Precalculus and Advanced Topics M4 Topic A: Trigonometric Functions Precalculus and Advanced Topics M4 Lesson 11: Revisiting the Graphs of the Trigonometric Functions
	n. generate and solve trigonometric equations in mathematical and real-world problems.		Algebra II M2 Lesson 13: Tides, Sound Waves, and Stock Markets Precalculus and Advanced Topics M4 Lesson 12: Inverse Trigonometric Functions