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 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 academic 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

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Alabama Course of Study: Mathematics Correlation to *Eureka Math*®

ALGEBRA II WITH STATISTICS

The majority of the Algebra II with Statistics Alabama Course of Study: Mathematics Learning Standards are fully covered by the Algebra II *Eureka Math* curriculum. The areas where Alabama's Algebra II with Statistics standards and *Eureka Math* Algebra II do not align will require the use of *Eureka Math* content from other courses. A detailed analysis of alignment is provided in the table below.

INDICATORS

GREEN	indicates the Alabama standard is addressed in *Eureka Math*.
YELLOW	indicates the Alabama standard may not be completely addressed in *Eureka Math*.
RED	indicates the Alabama standard is not addressed in *Eureka Math*.
BLUE	indicates there is a discrepancy between the grade level at which this standard is addressed in Alabama and in *Eureka Math*.

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Standards for Mathematical Practice	Aligned Components of *Eureka Math*
1. Make sense of problems and persevere in solving them. These students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. These students consider analogous problems and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculators to obtain the information they need. Mathematically proficient students can explain correspondences among equations, verbal descriptions, tables, and graphs, or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solve complex problems and identify correspondences between different approaches.	Lessons in every module engage students in making sense of problems and persevering in solving them as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 1, which is specifically addressed in the following modules: Algebra II M1: Polynomial, Rational, and Radical Relationships Algebra II M2: Trigonometric Functions Algebra II M3: Exponential and Logarithmic Functions

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Standards for Mathematical Practice	Aligned Components of *Eureka Math*
2. Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships. One is the ability to *decontextualize*, to abstract a given situation, represent it symbolically, and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents. The second is the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	Lessons in every module engage students in reasoning abstractly and quantitatively as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 2, which is specifically addressed in the following modules: Algebra II M1: Polynomial, Rational, and Radical Relationships Algebra II M2: Trigonometric Functions Algebra II M3: Exponential and Logarithmic Functions Algebra II M4: Inferences and Conclusions from Data

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Standards for Mathematical Practice	Aligned Components of *Eureka Math*
3. Construct viable arguments and critique the reasoning of others. These students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. These students justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments; distinguish correct logic or reasoning from that which is flawed; and, if there is a flaw in an argument, explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until the middle or upper grades. Later, students learn to determine domains to which an argument applies. Students in all grades can listen to or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	Lessons in every module engage students in constructing viable arguments and critiquing the reasoning of others as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 3, which is specifically addressed in the following modules: Algebra II M2: Trigonometric Functions Algebra II M4: Inferences and Conclusions from Data

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Standards for Mathematical Practice	Aligned Components of *Eureka Math*
4. Model with mathematics. These students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, students might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, students might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts, and formulas and can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	Lessons in every module engage students in modeling with mathematics as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 4, which is specifically addressed in the following modules: Algebra II M1: Polynomial, Rational, and Radical Relationships Algebra II M2: Trigonometric Functions Algebra II M3: Exponential and Logarithmic Functions Algebra II M4: Inferences and Conclusions from Data

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Standards for Mathematical Practice	Aligned Components of *Eureka Math*
5. Use appropriate tools strategically. Mathematically proficient students consider available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and the tools' limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a Web site, and use these to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.	Lessons in every module engage students in using appropriate tools strategically as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 5, which is specifically addressed in the following modules: Algebra II M1: Polynomial, Rational, and Radical Relationships Algebra II M4: Inferences and Conclusions from Data

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Standards for Mathematical Practice	Aligned Components of *Eureka Math*
6. Attend to precision. These students try to communicate mathematical ideas and concepts precisely. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. Mathematically proficient students are careful about specifying units of measure and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, and express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.	Lessons in every module engage students in attending to precision as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 6, which is specifically addressed in the following modules: Algebra II M1: Polynomial, Rational, and Radical Relationships Algebra II M2: Trigonometric Functions Algebra II M3: Exponential and Logarithmic Functions Algebra II M4: Inferences and Conclusions from Data

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Standards for Mathematical Practice	Aligned Components of *Eureka Math*
7. Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. These students also can pause and reflect for an overview or a shift in perspective. They can observe the complexities of mathematics, such as seeing some algebraic expressions as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that mental picture to realize that the value of the expression cannot be more than 5 for any real numbers x and y.	Lessons in every module engage students in looking for and making use of structure as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 7, which is specifically addressed in the following modules: Algebra II M1: Polynomial, Rational, and Radical Relationships Algebra II M2: Trigonometric Functions Algebra II M3: Exponential and Logarithmic Functions

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Standards for Mathematical Practice	Aligned Components of *Eureka Math*
8. Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y-2)/(x-1)=3$. Noticing the regularity in the way terms cancel when expanding $(x-1)(x+1)$, $(x-1)(x^2+x+1)$, and $(x-1)(x^3+x^2+x+1)$ might lead them to the general formula for the sum of a geometric series. As students work to solve a problem, mathematically proficient students maintain oversight of the process while attending to the details and continually evaluate the reasonableness of their intermediate results.	Lessons in every module engage students in looking for and expressing regularity in repeated reasoning as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 8, which is specifically addressed in the following modules: Algebra II M1: Polynomial, Rational, and Radical Relationships Algebra II M2: Trigonometric Functions Algebra II M3: Exponential and Logarithmic Functions

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
Number and Quantity		**Essential Concept: Together, irrational numbers and rational numbers complete the real number system, representing all points on the number line, while there exist numbers beyond the real numbers called complex numbers.**		
		1. Identify numbers written in the form $a + bi$, where a and b are real numbers and $i^2 = -1$, as complex numbers. a. Add, subtract, and multiply complex numbers using the commutative, associative, and distributive properties.		Algebra II M1 Topic D: A Surprise from Geometry—Complex Numbers Overcome All Obstacles
		Essential Concept: Matrices are a useful way to represent information.		
		2. Use matrices to represent and manipulate data.		Precalculus and Advanced Topics M2 Topic A: Networks and Matrices
		3. Multiply matrices by scalars to produce new 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 10: Matrix Multiplication is Not Commutative

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Content Area	Focus	Standards for Mathematical Content	Aligned Components of *Eureka Math*
		4. Add, subtract, and multiply matrices of appropriate dimensions.	Precalculus and Advanced Topics M2 Lesson 10: Matrix Multiplication is Not Commutative Precalculus and Advanced Topics M2 Lesson 11: Matrix Addition is Commutative Precalculus and Advanced Topics M2 Lesson 12: Matrix Multiplication Is Distributive and Associative Precalculus and Advanced Topics M2 Lesson 13: Using Matrix Operations for Encryption
		5. Describe the roles that zero and identity matrices play in matrix addition and multiplication, recognizing that they are similar to the roles of 0 and 1 in the real numbers. a. Find the additive and multiplicative inverses of square matrices, using technology as appropriate. b. Explain the role of the determinant in determining if a square matrix has a multiplicative inverse.	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?

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
Algebra and Functions	**Focus 1: Algebra**	**Essential Concept: Expressions can be rewritten in equivalent forms by using algebraic properties, including properties of addition, multiplication, and exponentiation, to make different characteristics or features visible.**		
		6. Factor polynomials using common factoring techniques, and use the factored form of a polynomial to reveal the zeros of the function it defines.		Algebra II M1 Topic B: Factoring—Its Use and Its Obstacles
		7. Prove polynomial identities and use them to describe numerical relationships.		Algebra II M1 Topic A: Polynomials—From Base Ten to Base X
		Essential Concept: Finding solutions to an equation, inequality, or system of equations or inequalities requires the checking of candidate solutions, whether generated analytically or graphically, to ensure that solutions are found and that those found are not extraneous.		
		8. Explain why extraneous solutions to an equation may arise and how to check to be sure that a candidate solution satisfies an equation. Extend to radical equations.		Algebra II M1 Topic C: Solving and Applying Equations—Polynomial, Rational, and Radical

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
		Essential Concept: The structure of an equation or inequality (including, but not limited to, one-variable linear and quadratic equations, inequalities, and systems of linear equations in two variables) can be purposefully analyzed (with and without technology) to determine an efficient strategy to find a solution, if one exists, and then to justify the solution.		
		9. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where *a, c,* and *d* are real numbers and the *base b* is 2 or 10; evaluate the logarithm using technology to solve an exponential equation.		Algebra II M3 Topic B: Logarithms
		Essential Concept: Expressions, equations, and inequalities can be used to analyze and make predictions, both within mathematics and as mathematics is applied in different contexts—in particular, contexts that arise in relation to linear, quadratic, and exponential situations.		
		10. Create equations and inequalities in one variable and use them to solve problems. Extend to equations arising from polynomial, trigonometric (sine and cosine), logarithmic, radical, and general piecewise functions.		Algebra II M1 Topic C: Solving and Applying Equations—Polynomial, Rational, and Radical Algebra II M3 Topic B: Logarithms
		11. Solve quadratic equations with real coefficients that have complex solutions.		Algebra II M1 Lesson 38: Complex Numbers as Solutions to Equations

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
		12. Solve simple equations involving exponential, radical, logarithmic, and trigonometric functions using inverse functions.		Algebra II M1 Topic C: Solving and Applying Equations—Polynomial, Rational, and Radical Algebra II M2 Topic B: Understanding Trigonometric Functions and Putting Them to Use Algebra II M3 Topic C: Exponential and Logarithmic Functions and their Graphs
		13. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales and use them to make predictions. Extend to polynomial, trigonometric (sine and cosine), logarithmic, reciprocal, radical, and general piecewise functions.		Algebra II M1 Topic C: Solving and Applying Equations—Polynomial, Rational, and Radical Algebra II M3 Topic B: Logarithms

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
	Focus 2: Connecting Algebra to Functions	**Essential Concept: Graphs can be used to obtain exact or approximate solutions of equations, inequalities, and systems of equations and inequalities—including systems of linear equations in two variables and systems of linear and quadratic equations (given or obtained by using technology).**		
		14. Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$. **a.** Find the approximate solutions of an equation graphically, using tables of values, or finding successive approximations, using technology where appropriate. Extend to cases where $f(x)$ and/or $g(x)$ are polynomial, trigonometric (sine and cosine), logarithmic, radical, and general piecewise functions.		Algebra II M1 Lesson 31: Systems of Equations Algebra II M1 Lesson 32: Graphing Systems of Equations Algebra II M2 Lesson 8: Graphing the Sine and Cosine Functions Algebra II M2 Lesson 14: Graphing the Tangent Function Algebra II M3 Lesson 17: Graphing the Logarithm Function Algebra II M3 Lesson 18: Graphs of Exponential Functions and Logarithmic Functions Algebra II M3 Lesson 21: The Graph of the Natural Logarithm Function

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
	Focus 3: Functions	**Essential Concept: Functions can be described by using a variety of representations: mapping diagrams, function notation (e.g., $f(x) = x^2$), recursive definitions, tables, and graphs.**		
		15. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). Extend to polynomial, trigonometric (sine and cosine), logarithmic, radical, and general piecewise functions.		Algebra II M3 Topic C: Exponential and Logarithmic Functions and their Graphs Algebra II M2 Topic A: The Story of Trigonometry and Its Contexts
		Essential Concept: Functions that are members of the same family have distinguishing attributes (structure) common to all functions within that family.		
		16. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k \cdot f(x)$, $f(k \cdot x)$, 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. Extend to polynomial, trigonometric (sine and cosine), logarithmic, reciprocal, radical, and general piecewise functions.		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

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Content Area	Focus	Standards for Mathematical Content	Aligned Components of *Eureka Math*
		Essential Concept: Functions can be represented graphically, and key features of the graphs, including zeros, intercepts, and, when relevant, rate of change and maximum/minimum values, can be associated with and interpreted in terms of the equivalent symbolic representation.	
		17. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Note: Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; maximums and minimums; symmetries (including even and odd); end behavior; and periodicity. Extend to polynomial, trigonometric (sine and cosine), logarithmic, reciprocal, radical, and general piecewise functions.	Algebra I M1 Topic A: Introduction to Functions Studied This Year—Graphing Stories Algebra I M3 Topic B: Functions and Their Graphs Algebra I M4 Topic B: Using Different Forms for Quadratic Functions Algebra I M4 Topic C: Function Transformations and Modeling
		18. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. Extend to polynomial, trigonometric (sine and cosine), logarithmic, reciprocal, radical, and general piecewise functions.	Algebra I M3 Topic B: Functions and Their Graphs

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of Eureka Math
		19. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. Extend to polynomial, trigonometric (sine and cosine), logarithmic, reciprocal, radical, and general piecewise functions.		Algebra II M3 Topic A: Real Numbers
		20. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Extend to polynomial, trigonometric (sine and cosine), logarithmic, reciprocal, radical, and general piecewise functions. a. Graph polynomial functions expressed symbolically, identifying zeros when suitable factorizations are available, and showing end behavior. b. Graph sine and cosine functions expressed symbolically, showing period, midline, and amplitude. c. Graph logarithmic functions expressed symbolically, showing intercepts and end behavior. d. Graph reciprocal functions expressed symbolically, identifying horizontal and vertical asymptotes. e. Graph square root and cube root functions expressed symbolically		Algebra I M1 Topic A: Introduction to Functions Studied This Year—Graphing Stories Algebra I M3 Topic B: Functions and Their Graphs Algebra I M4 Lesson 16: Graphing Quadratic Equations from the Vertex Form, $y = a(x - h)^2 + k$ (E) Algebra I M4 Lesson 17: Graphing Quadratic Foundations from the Standard Form, $f(x) = ax^2 + bx + c$ (P) Algebra I M4 Lesson 18: Graphing Cubic, Square Root, and Cube Root Functions Algebra II M2 Lesson 8: Graphing the Sine and Cosine Functions Algebra II M3 Lesson 17: Graphing the Logarithm Function

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of Eureka Math
		f. Compare the graphs of inverse functions and the relationships between their key features, including but not limited to quadratic, square root, exponential, and logarithmic functions.		Algebra II M3 Lesson 18: Graphs of Exponential Functions and Logarithmic Functions Algebra II M3 Lesson 19: The Inverse Relationship Between Logarithmic and Exponential Functions
		21. 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, building on work with non-right triangle trigonometry.		Algebra II M2 Topic A: The Story of Trigonometry and Its Contexts
		Essential Concept: Functions model a wide variety of real situations and can help students understand the processes of making and changing assumptions, assigning variables, and finding solutions to contextual problems.		
		22. Use the mathematical modeling cycle to solve real-world problems involving polynomial, trigonometric (sine and cosine), logarithmic, radical, and general piecewise functions, from the simplification of the problem through the solving of the simplified problem, the interpretation of its solution, and the checking of the solution's feasibility.		Algebra II M3 Topic D: Using Logarithms in Modeling Situations Algebra II M3 Topic E: Geometric Series and Finance

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
Data Analysis, Statistics, and Probability	**Focus 1: Quantitative Literacy**	**Essential Concept: Mathematical and statistical reasoning about data can be used to evaluate conclusions and assess risks.**		
		23. Use mathematical and statistical reasoning about normal distributions to draw conclusions and assess risk; limit to informal arguments.		Algebra II M4 Topic B: Modeling Data Distributions
		Essential Concept: Making and defending informed data-based decisions is a characteristic of a quantitatively literate person.		
		24. Design and carry out an experiment or survey to answer a question of interest, and write an informal persuasive argument based on the results.		Algebra II M4 Lesson 1: Chance Experiments, Sample Spaces, and Events Algebra II M4 Topic D: Drawing Conclusions Using Data from an Experiment

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
	Focus 2: Visualizing and Summarizing Data	**Essential Concept: Distributions of quantitative data (continuous or discrete) in one variable should be described in the context of the data with respect to what is typical (the shape, with appropriate measures of center and variability, including standard deviation) and what is not (outliers), and these characteristics can be used to compare two or more subgroups with respect to a variable.**		
		25. From a normal distribution, use technology to find the mean and standard deviation and estimate population percentages by applying the empirical rule. a. Use technology to determine if a given set of data is normal by applying the empirical rule. b. Estimate areas under a normal curve to solve problems in context, using calculators, spreadsheets, and tables as appropriate.		Algebra II M4 Lesson 9: Using a Curve to Model a Data Distribution Algebra II M4 Lesson 10: Normal Distributions Algebra II M4 Lesson 11: Normal Distributions Algebra II M4 Topic C: Drawing Conclusions Using Data from a Sample
	Focus 3: Statistical Inference	**Essential Concept: Study designs are of three main types: sample survey, experiment, and observational study.**		
		26. Describe the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.		Algebra II M4 Topic D: Drawing Conclusions Using Data from an Experiment

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
		Essential Concept: The role of randomization is different in randomly selecting samples and in randomly assigning subjects to experimental treatment groups.		
		27. Distinguish between a statistic and a parameter and use statistical processes to make inferences about population parameters based on statistics from random samples from that population.		Algebra II M4 Topic C: Drawing Conclusions Using Data from a Sample
		28. Describe differences between randomly selecting samples and randomly assigning subjects to experimental treatment groups in terms of inferences drawn regarding a population versus regarding cause and effect.		Algebra II M4 Lesson 23: Experiments and the Role of Random Assignment Algebra II M4 Lesson 24: Differences Due to Random Assignment Alone
		Essential Concept: The scope and validity of statistical inferences are dependent on the role of randomization in the study design.		
		29. Explain the consequences, due to uncontrolled variables, of non-randomized assignment of subjects to groups in experiments.		Algebra II M4 Topic D: Drawing Conclusions Using Data from an Experiment

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
		Essential Concept: Bias, such as sampling, response, or nonresponse bias, may occur in surveys, yielding results that are not representative of the population of interest.		
		30. Evaluate where bias, including sampling, response, or nonresponse bias, may occur in surveys, and whether results are representative of the population of interest.		Algebra II M4 Lesson 20: Margin of Error When Estimating a Population Mean Algebra II M4 Lesson 21: Margin of Error When Estimating a Population Mean Algebra II M4 Lesson 22: Evaluating Reports Based on Data from a Sample
		Essential Concept: The larger the sample size, the less the expected variability in the sampling distribution of a sample statistic.		
		31. Evaluate the effect of sample size on the expected variability in the sampling distribution of a sample statistic. a. Simulate a sampling distribution of sample means from a population with a known distribution, observing the effect of the sample size on the variability. b. Demonstrate that the standard deviation of each simulated sampling distribution is the known standard deviation of the population divided by the square root of the sample size.		Algebra II M4 Topic C: Drawing Conclusions Using Data from a Sample

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
		Essential Concept: The sampling distribution of a sample statistic formed from repeated samples for a given sample size drawn from a population can be used to identify typical behavior for that statistic. Examining several such sampling distributions leads to estimating a set of plausible values for the population parameter, using the margin of error as a measure that describes the sampling variability.		
		32. Produce a sampling distribution by repeatedly selecting samples of the same size from a given population or from a population simulated by bootstrapping (resampling with replacement from an observed sample). Do initial examples by hand, then use technology to generate a large number of samples. a. Verify that a sampling distribution is centered at the population mean and approximately normal if the sample size is large enough. b. Verify that 95% of sample means are within two standard deviations of the sampling distribution from the population mean. c. Create and interpret a 95% confidence interval based on an observed mean from a sampling distribution.		Algebra II M4 Topic C: Drawing Conclusions Using Data from a Sample

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Content Area	Focus	Standards for Mathematical Content	Aligned Components of *Eureka Math*
		33. Use data from a randomized experiment to compare two treatments; limit to informal use of simulations to decide if an observed difference in the responses of the two treatment groups is unlikely to have occurred due to randomization alone, thus implying that the difference between the treatment groups is meaningful.	Algebra II M4 Topic D: Drawing Conclusions Using Data from an Experiment
Geometry and Measurement	**Focus 1: Measurement**	**Essential Concept: When an object is the image of a known object under a similarity transformation, a length, area, or volume on the image can be computed by using proportional relationships.**	
		34. Define the radian measure of an angle as the constant of proportionality of the length of an arc it intercepts to the radius of the circle; in particular, it is the length of the arc intercepted on the unit circle.	Algebra II M2 Lesson 9: Awkward! Who Chose the Number 360, Anyway?
	Focus 4: Solving Applied Problems and Modeling in Geometry *Note: There are no Algebra II with Statistics standards in Focus 2 or 3*	**Essential Concept: Constructing approximations of measurements with different tools, including technology, can support an understanding of measurement.**	
		35. Choose trigonometric functions (sine and cosine) to model periodic phenomena with specified amplitude, frequency, and midline.	Algebra II M2 Lesson 5: Extending the Domain of Sine and Cosine to All Real Numbers Algebra II M2 Lesson 8: Graphing the Sine and Cosine Functions
		36. Prove the Pythagorean identity $sin^2 (\theta) + cos^2 = 1$ and use it to calculate trigonometric ratios.	Algebra II M2 Lesson 17: Trigonometric Identity Proofs

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Content Area	Focus	Standards for Mathematical Content		Aligned Components of *Eureka Math*
		37. Derive and apply the formula $A = \frac{1}{2} \cdot ab \cdot sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side, extending the domain of sine to include right and obtuse angles.		Algebra II M2 Lesson 15: What Is a Trigonometric Identity? Algebra II M2 Lesson 16: Proving Trigonometric Identities
		38. Derive and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles. Extend the domain of sine and cosine to include right and obtuse angles.		Geometry M2 Topic E: Trigonometry

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