

## 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](http://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](http://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](http://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





# West Virginia College- and Career-Readiness Standards for Mathematics Correlation to *Eureka Math*™

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## GEOMETRY

The majority of the Geometry West Virginia College- and Career-Readiness Standards for Mathematics are fully covered by the Geometry *Eureka Math* curriculum. The areas where the Geometry West Virginia College- and Career-Readiness Standards for Mathematics and Geometry *Eureka Math* 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 that the West Virginia standard is fully addressed in *Eureka Math*.
-  Yellow indicates that the West Virginia standard may not be completely addressed in *Eureka Math*.
-  Red indicates that the West Virginia 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 West Virginia standards and in *Eureka Math*.

## Mathematical Habits of Mind

## Aligned Components of *Eureka Math*

### **MHM1: Make sense of problems and persevere in solving them.**

Mathematically proficient 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. They 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 calculator to get the information they need. Mathematically proficient students can explain correspondences between 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 solving 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 Mathematical Habit of Mind is analogous to the CCSSM Standards for Mathematical Practice 1, which is specifically addressed in the following modules:

Geometry M4: Connecting Algebra and Geometry Through Coordinates

Geometry M5: Circles With and Without Coordinates

## Mathematical Habits of Mind

## Aligned Components of *Eureka Math*

### **MHM2: 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: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and 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 Mathematical Habit of Mind is analogous to the CCSSM Standards for Mathematical Practice 2, which is specifically addressed in the following modules:

Geometry M4: Connecting Algebra and Geometry Through Coordinates

## Mathematical Habits of Mind

### **MHM3: Construct viable arguments and critique the reasoning of others.**

Mathematically proficient 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. They 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 later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense and ask useful questions to clarify or improve the arguments.

## Aligned Components of *Eureka Math*

Lessons in every module engage students in constructing viable arguments and critiquing the reasoning of others as required by this standard. This Mathematical Habit of Mind is analogous to the CCSSM Standards for Mathematical Practice 3, which is specifically addressed in the following modules:

Geometry M1: Congruence, Proof, and Constructions

Geometry M2: Similarity, Proof, and Trigonometry

Geometry M5: Circles With and Without Coordinates

## Mathematical Habits of Mind

## Aligned Components of *Eureka Math*

### **MHM4: Model with mathematics.**

Mathematically proficient 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, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student 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. They 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 Mathematical Habit of Mind is analogous to the CCSSM Standards for Mathematical Practice 4, which is specifically addressed in the following modules:

Geometry M1: Congruence, Proof, and Constructions

Geometry M4: Connecting Algebra and Geometry Through Coordinates

## Mathematical Habits of Mind

## Aligned Components of *Eureka Math*

### **MHM5: Use appropriate tools strategically.**

Mathematically proficient students consider the 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 their 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 website and use them 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 Mathematical Habit of Mind is analogous to the CCSSM Standards for Mathematical Practice 5, which is specifically addressed in the following modules:

Geometry M1: Congruence, Proof, and Constructions

## Mathematical Habits of Mind

## Aligned Components of *Eureka Math*

### **MHM6: Attend to precision.**

Mathematically proficient students try to communicate precisely to others. 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. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, 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 Mathematical Habit of Mind is analogous to the CCSSM Standards for Mathematical Practice 6, which is specifically addressed in the following modules:

Geometry M1: Congruence, Proof, and Constructions

Geometry M3: Extending to Three Dimensions



## Mathematical Habits of Mind

## Aligned Components of *Eureka Math*

### **MHM7: 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  $7 \times 8$  equals the well-remembered  $7 \times 5 + 7 \times 3$ , in preparation for learning about the distributive property. In the expression  $x^2 + 9x + 14$ , older students can see the 14 as  $2 \times 7$  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. They also can step back for an overview and shift perspective. They can see complicated things, such as 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 to realize that its value 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 Mathematical Habit of Mind is analogous to the CCSSM Standards for Mathematical Practice 7, which is specifically addressed in the following modules:

Geometry M2: Similarity, Proof, and Trigonometry

Geometry M3: Extending to Three Dimensions

Geometry M4: Connecting Algebra and Geometry Through Coordinates

Geometry M5: Circles With and Without Coordinates

## Mathematical Habits of Mind

## Aligned Components of *Eureka Math*

### **MHM8: 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 they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They 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 Mathematical Habit of Mind is analogous to the CCSSM Standards for Mathematical Practice 8, which is specifically addressed in the following modules:

Geometry M1: Congruence, Proof, and Constructions

Geometry M4: Connecting Algebra and Geometry Through Coordinates

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
<b>Congruence, Proof, and Constructions</b>	<b>Cluster: Experiment with transformations in the plane.</b>	
	<b>M.GHS.1</b> Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	Geometry M1 Topic A: Basic Constructions  Geometry M1 Topic G: Axiomatic Systems
	<b>M.GHS.2</b> Represent transformations in the plane using, for example, transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	Geometry M1 Topic C: Transformations/Rigid Motions  Geometry M2 Lesson 6: Dilations as Transformations of the Plane
	<b>M.GHS.3</b> Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	Geometry M1 Lesson 15: Rotations, Reflections, and Symmetry  Geometry M1 Lesson 21: Correspondence and Transformations
	<b>M.GHS.4</b> Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	Geometry M1 Lesson 12: Transformations—The Next Level  Geometry M1 Lesson 13: Rotations  Geometry M1 Lesson 14: Reflections  Geometry M1 Lesson 16: Translations

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>M.GHS.5</b> Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, for example, graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	Geometry M1 Topic C: Transformations/Rigid Motions
	<b>Cluster: Understand congruence in terms of rigid motions.</b>	
	<b>M.GHS.6</b> Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	Geometry M1 Lesson 15: Rotations, Reflections, and Symmetry  Geometry M1 Lesson 16: Translations  Geometry M1 Lesson 19: Construct and Apply a Sequence of Rigid Motions  Geometry M1 Lesson 21: Correspondence and Transformations

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>M.GHS.7</b> Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	Geometry M1 Lesson 16: Translations  Geometry M1 Lesson 19: Construct and Apply a Sequence of Rigid Motions  Geometry M1 Lesson 20: Applications of Congruence in Terms of Rigid Motions  Geometry M1 Lesson 21: Correspondence and Transformations  Geometry M1 Topic D: Congruence  Geometry M1 Topic G: Axiomatic Systems
	<b>M.GHS.8</b> Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	Geometry M1 Topic D: Congruence  Geometry M1 Topic G: Axiomatic Systems
	<b>Cluster: Prove geometric theorems.</b>	
	<b>M.GHS.9</b> Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.	Geometry M1 Topic B: Unknown Angles  Geometry M1 Lesson 18: Looking More Carefully at Parallel Lines  Geometry M1 Topic G: Axiomatic Systems

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>M.GHS.10</b> Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to $180^\circ$ ; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.	Geometry M1 Lesson 23: Base Angles of Isosceles Triangles  Geometry M1 Topic E: Proving Properties of Geometric Figures  Geometry M1 Topic G: Axiomatic Systems
	<b>M.GHS.11</b> Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.	Geometry M1 Lesson 28: Properties of Parallelograms  Geometry M1 Topic G: Axiomatic Systems
	<b>Cluster: Make geometric constructions.</b>	
	<b>M.GHS.12</b> Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.	Geometry M1 Topic A: Basic Constructions  Geometry M1 Topic C: Transformations/Rigid Motions

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>M.GHS.13</b> Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	Geometry M1 Lessons 1–2: Construct an Equilateral Triangle  Geometry M1 Topic F: Advanced Constructions
<b>Similarity, Proof, and Trigonometry</b>	<b>Cluster: Understand similarity in terms of similarity transformations.</b>	
	<b>M.GHS.14</b> Verify experimentally the properties of dilations given by a center and a scale factor.	
	a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.	Geometry M2 Lesson 3: Making Scale Drawings Using the Parallel Method  Geometry M2 Lesson 5: Scale Factors  Geometry M2 Topic B: Dilations
	b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	Geometry M2 Topic A: Scale Drawings  Geometry M2 Topic B: Dilations
	<b>M.GHS.15</b> Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	Geometry M2 Lesson 12: What Are Similarity Transformations, and Why Do We Need Them?  Geometry M2 Lesson 13: Properties of Similarity Transformations  Geometry M2 Lesson 14: Similarity

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>M.GHS.16</b> Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	Geometry M2 Lesson 15: The Angle-Angle (AA) Criterion for Two Triangles to Be Similar  Geometry M2 Lesson 17: The Side-Angle-Side (SAS) and Side-Side-Side (SSS) Criteria for Two Triangles to Be Similar
	<b>Cluster: Prove theorems involving similarity.</b>	
	<b>M.GHS.17</b> Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.	Geometry M2 Lesson 4: Comparing the Ratio Method with the Parallel Method  Geometry M2 Lesson 5: Scale Factors  Geometry M2 Topic B: Dilations  Geometry M2 Lesson 17: The Side-Angle-Side (SAS) and Side-Side-Side (SSS) Criteria for Two Triangles to Be Similar  Geometry M2 Lesson 18: Similarity and the Angle Bisector Theorem  Geometry M2 Lesson 19: Families of Parallel Lines and the Circumference of the Earth  Geometry M2 Topic D: Applying Similarity to Right Angles



Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>M.GHS.18</b> Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	Geometry M2 Lesson 16: Between-Figure and Within-Figure Ratios  Geometry M2 Lesson 17: The Side-Angle-Side (SAS) and Side-Side-Side (SSS) Criteria for Two Triangles to Be Similar  Geometry M2 Lesson 18: Similarity and the Angle Bisector Theorem  Geometry M2 Topic D: Applying Similarity to Right Triangles
	<b>Cluster: Define trigonometric ratios and solve problems involving right triangles.</b>	
	<b>M.GHS.19</b> Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	Geometry M2 Lesson 25: Incredibly Useful Ratios  Geometry M2 Lesson 26: The Definition of Sine, Cosine, and Tangent
	<b>M.GHS.20</b> Explain and use the relationship between the sine and cosine of complementary angles.	Geometry M2 Lesson 27: Sine and Cosine of Complementary Angles and Special Angles  Geometry M2 Lesson 28: Solving Problems Using Sine and Cosine  Geometry M2 Lesson 29: Applying Tangents
	<b>M.GHS.21</b> Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	Geometry M2 Topic E: Trigonometry

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>Cluster: Apply trigonometry to general triangles.</b>	
	<b>M.GHS.22</b> Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	Geometry M2 Lesson 31: Using Trigonometry to Determine Area  Precalculus and Advanced Topics M4 Lesson 7: An Area Formula for Triangles
	<b>M.GHS.23</b> Prove the Laws of Sines and Cosines and use them to solve problems.	Geometry M2 Lesson 32: Using Trigonometry to Find Side Lengths of an Acute Triangle  Precalculus and Advanced Topics M4 Topic B: Trigonometry and Triangles
	<b>M.GHS.24</b> Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles.	Geometry M2 Lesson 33: Applying the Laws of Sines and Cosines  Precalculus and Advanced Topics M4 Lesson 10: Putting the Law of Cosines and the Law of Sines to Use
<b>Extending to Three Dimensions</b>	<b>Cluster: Explain volume formulas and use them to solve problems.</b>	
	<b>M.GHS.25</b> Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.	Geometry M3: Extending to Three Dimensions
	<b>M.GHS.26</b> Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	Geometry M3: Extending to Three Dimensions

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>Cluster: Visualize the relation between two-dimensional and three-dimensional objects.</b>	
	<b>M.GHS.27</b> Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	Geometry M3: Extending to Three Dimensions
	<b>Cluster: Apply geometric concepts in modeling situations.</b>	
	<b>M.GHS.28</b> Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).	Geometry M2 Lesson 19: Families of Parallel Lines and the Circumference of the Earth  Geometry M2 Lesson 20: How Far Away Is the Moon?  Geometry M3 Lesson 5: Three-Dimensional Space  Geometry M3 Lesson 6: General Prisms and Cylinders and Their Cross-Sections  Geometry M3 Lesson 11: The Volume Formula of a Pyramid and Cone  Geometry M3 Lesson 12: The Volume Formula of a Sphere

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
<b>Connecting Algebra and Geometry Through Coordinates</b>	<b>Cluster: Use coordinates to prove simple geometric theorems algebraically.</b>	
	<b>M.GHS.29</b> Use coordinates to prove simple geometric theorems algebraically. (e.g., Prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$ .)	Geometry M4: Connecting Algebra and Geometry Through Coordinates  Geometry M5 Lesson 19: Equations for Tangent Lines to Circles
	<b>M.GHS.30</b> Prove the slope criteria for parallel and perpendicular lines and uses them to solve geometric problems. (e.g., Find the equation of a line parallel or perpendicular to a given line that passes through a given point.)	Geometry M4 Lesson 4: Designing a Search Robot to Find a Beacon  Geometry M4 Topic B: Perpendicular and Parallel Lines in the Cartesian Plane  Geometry M5 Lesson 19: Equations for Tangent Lines to Circles
	<b>M.GHS.31</b> Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	Geometry M4 Topic D: Partitioning and Extending Segments and Parameterization of Lines
	<b>M.GHS.32</b> Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. This standard provides practice with the distance formula and its connection with the Pythagorean theorem.	Geometry M4: Connecting Algebra and Geometry Through Coordinates

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>Cluster: Translate between the geometric description and the equation for a conic section.</b>	
	<b>M.GHS.33</b> Derive the equation of a parabola given a focus and directrix.	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?
<b>Circles With and Without Coordinates</b>	<b>Cluster: Understand and apply theorems about circles.</b>	
	<b>M.GHS.34</b> Prove that all circles are similar.	Geometry M5 Lesson 7: The Angle Measure of an Arc
	<b>M.GHS.35</b> Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.	Geometry M5: Circles With and Without Coordinates
	<b>M.GHS.36</b> Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	Geometry M5 Lesson 1: Thales' Theorem Geometry M5 Lesson 3: Rectangles Inscribed in Circles Geometry M5 Lesson 12: Tangent Segments Geometry M5 Topic E: Cyclic Quadrilaterals and Ptolemy's Theorem

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>M.GHS.37</b> Construct a tangent line from a point outside a given circle to the circle.	Precalculus and Advanced Topics M4 Lesson 5: Tangent Lines and the Tangent Function
	<b>Cluster: Find arc lengths and areas of sectors of circles.</b>	
	<b>M.GHS.38</b> Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	Geometry M5 Topic B: Arcs and Sectors
	<b>Cluster: Translate between the geometric description and the equation for a conic section.</b>	
	<b>M.GHS.39</b> Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	Geometry M5 Topic D: Equations for Circles and Their Tangents

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>Cluster: Use coordinates to prove simple geometric theorems algebraically.</b>	
	<b>M.GHS.40</b> Use coordinates to prove simple geometric theorems algebraically. (e.g., Prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$ .)	Geometry M4: Connecting Algebra and Geometry Through Coordinates  Geometry M5 Lesson 19: Equations for Tangent Lines to Circles
	<b>Cluster: Apply geometric concepts in modeling situations.</b>	
	<b>M.GHS.41</b> Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).	Geometry M2 Lesson 19: Families of Parallel Lines and the Circumference of the Earth  Geometry M2 Lesson 20: How Far Away Is the Moon?  Geometry M3 Lesson 5: Three-Dimensional Space  Geometry M3 Lesson 6: General Prisms and Cylinders and Their Cross-Sections  Geometry M3 Lesson 11: The Volume Formula of a Pyramid and Cone  Geometry M3 Lesson 12: The Volume Formula of a Sphere

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
Applications of Probability	<b>Cluster: Understand independence and conditional probability and use them to interpret data.</b>	
	<b>M.GHS.42</b> Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).	Algebra II M4 Topic A: Probability
	<b>M.GHS.43</b> Understand that two events $A$ and $B$ are independent if the probability of $A$ and $B$ occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	Algebra II M4 Lesson 6: Probability Rules
	<b>M.GHS.44</b> Recognize the conditional probability of $A$ given $B$ as $P(A \text{ and } B)/P(B)$ , and interpret independence of $A$ and $B$ as saying that the conditional probability of $A$ given $B$ is the same as the probability of $A$ , and the conditional probability of $B$ given $A$ is the same as the probability of $B$ .	Algebra II M4 Lesson 6: Probability Rules



Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>M.GHS.45</b> Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.	Algebra II M4 Lesson 2: Calculating Probabilities of Events Using Two-Way Tables  Algebra II M4 Lessons 3–4: Calculating Conditional Probabilities and Evaluating Independence Using Two-Way Tables
	<b>M.GHS.46</b> Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.	Algebra II M4 Topic A: Probability
	<b>Cluster: Use the rules of probability to compute probabilities of compound events in a uniform probability model.</b>	
	<b>M.GHS.47</b> Find the conditional probability of $A$ given $B$ as the fraction of $B$ 's outcomes that also belong to $A$ , and interpret the answer in terms of the model.	Algebra II M4 Lessons 3–4: Calculating Conditional Probabilities and Evaluating Independence Using Two-Way Tables
	<b>M.GHS.48</b> Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ , and interpret the answer in terms of the model.	Algebra II M4 Lesson 7: Probability Rules

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>M.GHS.49</b> Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$ , and interpret the answer in terms of the model.	Precalculus and Advanced Topics M5 Lesson 1: The General Multiplication Rule  Precalculus and Advanced Topics M5 Topic C: Using Probability to Make Decisions
	<b>M.GHS.50</b> Use permutations and combinations to compute probabilities of compound events and solve problems.	Precalculus and Advanced Topics M5: Probability and Statistics
	<b>Cluster: Use probability to evaluate outcomes of decisions.</b>	
	<b>M.GHS.51</b> Use probabilities to make fair decisions (e.g., drawing by lots and/or using a random number generator).	Precalculus and Advanced Topics M5 Lessons 13–14: Games of Chance and Expected Value  Precalculus and Advanced Topics M5 Lesson 15: Using Expected Values to Compare Strategies
	<b>M.GHS.52</b> Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, and/or pulling a hockey goalie at the end of a game).	Precalculus and Advanced Topics M5 Lessons 13–14: Games of Chance and Expected Value  Precalculus and Advanced Topics M5 Lesson 15: Using Expected Values to Compare Strategies

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
Modeling with Geometry	<b>Cluster: Visualize relationships between two-dimensional and three-dimensional objects and apply geometric concepts in modeling situations.</b>	
	<b>M.GHS.53</b> Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).	Geometry M2 Lesson 19: Families of Parallel Lines and the Circumference of the Earth  Geometry M2 Lesson 20: How Far Away Is the Moon?  Geometry M3 Lesson 5: Three-Dimensional Space  Geometry M3 Lesson 6: General Prisms and Cylinders and Their Cross-Sections  Geometry M3 Lesson 11: The Volume Formula of a Pyramid and Cone  Geometry M3 Lesson 12: The Volume Formula of a Sphere
	<b>M.GHS.54</b> Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	Geometry M3 Lesson 8: Definition and Properties of Volume  Geometry M3 Lesson 11: The Volume Formula of a Pyramid and Cone
	<b>M.GHS.55</b> Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	Geometry M2 Lesson 2: Making Scale Drawings Using the Ratio Method  Geometry M3 Lesson 11: The Volume Formula of a Pyramid and Cone  Geometry M3 Lesson 12: The Volume Formula of a Sphere  Geometry M3 Lesson 13: How Do 3D Printers Work?