



# SCHOOL DISTRICT OF MONROE

*Preparing for the Future, One Child at a Time*

## Geometry

### **Course Description:**

This course follows the guidelines of CPM Geometry including a focus on cooperative learning, problem based learning, and mixed spaced practice. All expectations of the [Wisconsin Common Core Math Standards](#) and the Mathematical Practices are embedded within the course. This course aims to formalize and extend the geometry that students have learned in previous courses. It does this by focusing on establishing triangle congruence criteria using rigid motions and formal constructions and building a formal understanding of similarity based on dilations and proportional reasoning. It also helps students develop the concepts of formal proof, explore the properties of two- and three-dimensional objects, work within the rectangular coordinate system to verify geometric relationships and prove basic theorems about circles. Students also use the language of set theory to compute and interpret probabilities for compound events.

On a daily basis, students in *Core Connections Geometry* are using problem-solving strategies, questioning, investigating, analyzing critically, gathering and constructing evidence, and communicating rigorous arguments justifying their thinking. Students learn in collaboration with others while sharing information, expertise, and ideas.

Upon completion of this course, students should be able to:

- Explain congruence, transformations, and constructions
- Prove and apply theorems involving similarity and trigonometric ratios
- Apply theorems about circles, arc lengths, and areas of sectors of circles.
- Express geometric properties and conic sections with equations
- Define measurement and dimension with two- and three-dimensional objects
- Model Geometric concepts
- Use Geometry probability models on probability concepts

### **Mastery Standards:**

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. (CCSS.MATH.CONTENT.HSG.CO.A.1)

Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. (CCSS.MATH.CONTENT.HSG.CO.A.5)

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. (CCSS.MATH.CONTENT.HSG.CO.B.7)

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. (CCSS.MATH.CONTENT.HSG.SRT.A.2)

Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.\* (CCSS.MATH.CONTENT.HSG.SRT.C.8)

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. (CCSS.MATH.CONTENT.HSG.C.A.2)

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.

(CCSS.MATH.CONTENT.HSG.C.B.5)

Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.\* (CCSS.MATH.CONTENT.HSG.GPE.B.7)

Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

(CCSS.MATH.CONTENT.HSG.GMD.A.3)

Use geometric shapes, their measures, and their properties to describe objects. (CCSS.MATH.CONTENT.HSG.MG.A.1)

Analyze decisions and strategies using probability concepts. (CCSS.MATH.CONTENT.HSS.MD.B.7)

| Unit  | Description of Unit and Learning Targets   |
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| <p><b>Unit 1: Shapes and Transformations</b></p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>Why is it important to communicate your ideas precisely to others?</li> </ul>  | <p>Students will.....</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to simplify algebraic expressions and solve algebraic equations</li> <li>Students will be able to recognize relationships with parallel and perpendicular lines</li> <li>Students will be able to apply rigid transformations with polygons on a coordinate grid</li> </ul> |
| <p><b>Unit 2: Angles and Measurements</b></p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>Why is it important to construct viable arguments to justify conclusions?</li> <li>How can critiquing the reasoning of others improve a student's own reasoning?</li> </ul> | <p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to evaluate relationships between angles formed by intersecting lines or those inside a triangle</li> <li>Students will be able to find perimeters and areas of polygons</li> <li>Students will be able to apply the Pythagorean theorem to appropriate triangles</li> </ul>  |
| <p><b>Unit 3: Justification and Similarity</b></p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>How can you use mathematics to model problems in everyday life?</li> </ul>   | <p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to show similarity in polygons and find missing side lengths using proportions</li> <li>Students will be able to prove triangles are similar using appropriate justifications</li> </ul>  |
| <p><b>Unit 4: Trigonometry and Probability</b></p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>Why is it important to strategically choose appropriate tools when solving problems?</li> </ul>  | <p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to use slope triangles and the tangent trig function to find missing sides of right triangles</li> <li>Students will be able to use probability diagrams and other methods to find probabilities of events</li> </ul>   |
| <p><b>Unit 5: Completing the triangle toolkit</b></p>   | <p>Students will...</p>  |

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| <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>Why is it important to strategically choose appropriate tools when solving for missing parts of triangles?</li> </ul>   | <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to right triangle trig ratios (or pythagorean theorem) to find missing side lengths and angle measures</li> <li>Students will be able to identify and utilize special right triangles to find missing side lengths</li> <li>Students will be able to utilize non-right triangle laws to find missing side lengths and angles</li> </ul>                |
| <p><b>Unit 6: Congruent Triangles</b></p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>How can I use information to construct arguments, justify my conclusions, and respond to the arguments presented by others?</li> </ul>                | <p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to construct arguments to prove congruent triangles</li> </ul>   |
| <p><b>Unit 7: Proof and Quadrilaterals</b></p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>How can I use the given information to construct arguments, justify my conclusions, and respond to the arguments presented by others?</li> </ul> | <p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to construct and find midpoints.</li> </ul>  |
| <p><b>Unit 8: Polygons and Circles</b></p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>How can finding shortcuts and generalizing rules help in finding perimeters and areas of polygons?</li> </ul>  | <p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to determine angle measurements and areas of regular polygons</li> <li>Students will be able to find the area of regular polygons and apply similarity scale factors</li> <li>Students will be able to find area and circumference of circles and sectors/arc lengths</li> </ul>   |
| <p><b>Unit 9: Solids and Constructions</b></p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>How can constructions help with visualizing appropriate tools to use when analyzing 3-D solids?</li> </ul>                                       | <p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to use various methods to find volume and surface area of solids</li> </ul>  |
| <p><b>Unit 10: Circles and Conditional Probability</b></p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>Why is it important to know what tools I have available when solving problems?</li> </ul>  | <p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to solve for angles, arcs, and line segments using circle properties</li> <li>Students will be able to calculate conditional probabilities and determine independence of events</li> <li>Students will use the Fundamental Principle of Counting to utilize permutations and combinations to solve complex problems</li> </ul> |
| <p><b>Unit 11: Solids and Circles</b></p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>How can I use past knowledge with new knowledge to help solve problems?</li> </ul>  | <p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> <li>Students will be able to volume and surface area of pyramids, cones, and spheres</li> <li>Students will be able to evaluate relationships created</li> </ul>   |

when tangents and secants intersect in a circle

**Unit 12: Conics and Closure**

Essential Questions:

- How can I connect new ideas with previous topics?
- How can I make concepts simpler or make generalizations?

Students will...

Learning Targets:

- Students will be able to write an algebraic equation for a circle