

**Montgomery County Framework Scope and Sequence of Indicators
Geometry**

Goal 2 Geometry, Measurement, And Reasoning

The student will demonstrate the ability to solve mathematical and real-world problems using measurement and geometric models and will justify solutions and explain processes used.

2.1 Expectation: The student will represent and analyze two- and three-dimensional figures using tools and technology when appropriate.

Indicators (Note: *Italics* designates an honors level indicator.)

2.1.1 The student will analyze properties of geometric figures.

The student will:

- 2.1.1.a identify and describe the basic undefined terms of geometry.
- 2.1.1.b represent and analyze line/segment/plane relationships including parallel, perpendicular, intersecting, bisecting, midpoint, median, and altitude.
- 2.1.1.c represent and analyze point relationships including collinear and coplanar.
- 2.1.1.d represent and analyze angles and angle relationships including vertical, adjacent, complementary, supplementary, obtuse, acute, right, interior, and exterior.
- 2.1.1.e represent and analyze angle relationships with parallel lines.
- 2.1.1.f represent and analyze polygons including regular, non-regular, composite, equilateral, and equiangular.
- 2.1.1.g represent and analyze geometric solids including cones, cylinders, prisms, pyramids, and composite figures.
- 2.1.1.h represent and analyze circles and spheres including radius, diameter, chord, tangent, secant, central/inscribed angle, inscribed and circumscribed.
 - 2.1.1.1 determine the sum of the measures of the interior and exterior angles of a convex polygon.
 - 2.1.1.2 determine the measure of each interior angle, each exterior angle and the number of sides, given a regular convex polygon,
 - 2.1.1.3 analyze the relationship between the length of the sides of a triangle and the size of the angles.

2.1.2 The student will identify and/or verify properties of geometric figures using the coordinate plane and concepts from algebra.

Properties and relationships include:

- 2.1.2.a line/segment relationships including parallel, perpendicular, intersecting, bisecting, midpoint, median, and altitude.
- 2.1.2.b collinear point relationships
- 2.1.2.c angles and angle relationships including obtuse, acute and right.
- 2.1.2.d polygons including regular, non-regular, equilateral, and equiangular.
- 2.1.2.e circle including radius, diameter, tangent, and chord.
 - 2.1.2.1 apply properties of transformation using coordinate geometry.

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2.1.3 The student will use transformations to move figures create designs, and/or demonstrate geometric properties.

Properties and relationships include:

2.1.3.a reflections, rotations, translations and dilations

2.1.3.b congruence, similarity and symmetry

2.1.3.1 describe the solid figure formed when a plane figure is rotated about a line.

2.1.4 The student will construct and/or draw and/or validate properties of geometric figures using appropriate tools and technology.

Properties and relationships include:

2.1.4.a line/segment relationships including parallel, perpendicular, intersecting, bisecting, midpoint, median, and altitude.

2.1.4.b collinear point relationships

2.1.4.c angles and angle relationships including obtuse, acute and right.

2.1.4.d polygons including regular, non-regular, equilateral, and equiangular.

2.1.4.1 solve problems using constructions

2.1.4.2 define and illustrate locus of points in both two and three dimensions.

2.2. Expectation: The student will apply geometric properties and relationships to solve problems using tools and technology when appropriate.

Indicators

2.2.1 The student will identify and/or verify congruent and similar figures and/or apply equality or proportionality of their corresponding parts.

The student will:

2.2.1.a identify and/or verify congruent figures and/or apply equality of their corresponding parts.

2.2.1.b identify and/or verify similar figures and/or apply proportionality of their corresponding parts.

2.2.1.c apply the properties of similar figures to area and volume problems.

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2.2.2 The student will solve problems using two-dimensional figures and/or right-triangle trigonometry.

The student will:

- 2.2.2.a identify and evaluate the sine, cosine and tangent ratios for an acute angle of a right triangle
- 2.2.2.b apply right triangle trigonometry to solve real world problems.
- 2.2.2.c solve problems using the Pythagorean Theorem
- 2.2.2.d solve problems involving special right triangles including the relationships (30°; 60°; 90°) and (45°; 45°; 90°).
 - 2.2.2.1 *apply the Law of Sines and the Law of Cosines to solve problems involving oblique triangles.*
 - 2.2.2.2 *determine the sine, cosine and tangent for a rotational angle.*
 - 2.2.2.3 *solve problems using vectors.*

2.2.3 The student will use inductive or deductive reasoning.

The student will:

- 2.2.3.a define and apply deductive reasoning.
- 2.2.3.b define and apply inductive reasoning.
- 2.2.3.c distinguish between inductive and deductive reasoning.
- 2.2.3.d develop direct proofs using a paragraph, flowchart, or 2-column format.
- 2.2.3.e develop indirect proofs using a paragraph or 2column format.
 - 2.2.3.1 prove properties of triangles and quadrilaterals using coordinate geometry.
 - 2.2.3.2 construct a logical argument.
 - 2.2.3.3 *determine the validity of a logical argument using truth tables.*
 - 2.2.3.4 solve problems deductively or inductively using the structure of logic.
 - 2.2.3.5 write and interpret conditional statements including the converse, inverse and contrapositive.

2.3 Expectation: The student will apply concepts of measurement using tools and technology when appropriate.

Indicators

2.3.1 The student will use algebraic and/or geometric properties to measure indirectly.

The student will:

- 2.3.1.a apply properties of proportionality and similarity to solve problems involving indirect measurements.
 - 2.3.1.1 determine the positive geometric mean between two numbers.
 - 2.3.1.2 *apply the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle.*

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2.3.2 The student will use techniques of measurement and will estimate, calculate, and/or compare perimeter, circumference, area, volume, and/or surface area of two-and three-dimensional figures and their parts.

The student will:

2.3.2.a apply techniques of measurement involving two-dimensional shapes, including polygons, circles and composite figures.

2.3.2.b apply techniques of measurement involving three-dimensional shapes, including cubes, prisms, pyramids, cylinders, cones, spheres, and composite figures.

2.3.2.c apply geometric properties and relationships.

2.3.2.1 calculate the length of a given arc of a circle.

2.3.2.2 solve problems using the areas of segments and sectors of circles.