

GEOMETRY

STANDARD 1: Logical Reasoning - The student will use deductive and inductive reasoning to solve problems.

1. Properties and Relationships of Figures

a. Identify the relationships of parallel lines with a transversal.

ACT Strand and Score Range: Graphical Representations 28-32 Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point. (No examples)

ACT Strand and Score Range: Plane Figures 24-27 Use several angle properties to find an unknown angle measure. (MCG p. 99)

b. Identify relationships between pairs of angles (e.g., adjacent, complementary, vertical).

ACT Strand and Score Range: Plane Figures 20-23 Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90° , 180° , and 360°). (MCG p. 25, 66)

2. Determine and use the relationships of congruency and similarity to determine unknown values.

ACT Strand and Score Range: Plane Figures 28-32 Apply properties of 30° - 60° - 90° , 45° - 45° - 90° , similar, and congruent triangles. (MCG p. 54, 66, 99)

ACT Strand and Score Range: Measurement 13-15 Estimate or calculate the length of a line segment based on other lengths given on a geometric figure. (MCG p. 68, 100)

3. Use logical reasoning skills (inductive and deductive) to make and test conjectures, formulate counter examples, follow logical arguments, judge the validity of arguments and construct simple valid arguments.

STANDARD 2: Properties of 2- and 3-Dimensional Figures - The student will use the properties and formulas of geometric figures to solve problems.

1. Polygons

a. Identify and describe polygons (i.e., convex, concave, regular)

b. Apply the interior and exterior angle sum of convex polygons to solve problems.

ACT Strand and Score Range: Plane Figures 20-23 Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90° , 180° , and 360°). (MCG p. 33, 99)

c. Develop and apply the properties of quadrilaterals to solve problems (e.g., rectangles, parallelograms, rhombi, trapezoids, kites).

ACT Strand and Score Range: Measurement 28-32 Use relationships involving area, perimeter, and volume of geometric figures to compute another measure. (MCG p. 101)

ACT Strand and Score Range: Plane Figure 28-32, 33-36 Apply properties of 30° - 60° - 90° , 45° - 45° - 90° , similar, and congruent triangles. (MCG p. 67) Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas. (MCG p. 86)

2. Draw and analyze 2- and 3-dimensional figures.

ACT Strand and Score Range: Graphical Representations 16-19 Locate points on the number line and in the first quadrant. (MCG p. 64)

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3. Use properties of 2- and 3-dimensional figures to determine unknown values (e.g., given the perimeter/circumference, find the area).

ACT Strand and Score Range: Measurement 24-27, 28-32 Compute areas and circumference of circles after identifying necessary information (MCG p. 68) Compute areas of rectangles and triangles when one or more additional simple steps are required (MCG p. 85) Compute the perimeter of simple composite geometric figures with unknown side lengths (MCG p. 100) Use relationships involving area, perimeter, and volume of geometric figures to compute another measure (MCG p. 55, 101)

4. Compute length, perimeter or circumference, area, volume, and surface area of geometric figures with missing information and correctly identify the appropriate unit of measure of each.

ACT Strand and Score Range: Measurement 24-27 Compute the perimeter of simple composite geometric figures with unknown side lengths. Compute areas of rectangles and triangles when one or more additional steps are required. (MCG p. 85, 100) Compute areas and circumferences of circles after identifying necessary information (MCG p. 34, 68)

5. Use geometric tools (e.g., protractor, compass, straight edge) to construct a variety of figures.

6. Find angle measures and arc measures related to circles.

ACT Strand and Score Range: Plane Figures 20-23, 24-27, 33-36 Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90° , 180° , and 360°) (MCG p. 66) Use several angle properties to find an unknown angle measure (MCG p. 66) Use relationships among angles, arcs, and distances in a circle. (No examples)

7. Chords, Secants and Tangents

- Identify and describe the relationship between two chords that intersect in the interior of a circle.
- Identify and describe the relationship between two secants that intersect in the exterior of a circle.
- Identify and describe the relationship between a secant and a tangent that intersect in the exterior of a circle.

STANDARD 3: Coordinate Geometry - The student will solve problems with geometric figures in the coordinate plane.

1. Use transformations (reflection, rotation, translation) within coordinate geometry (e.g., reflect points across the y-axis).

ACT Strand and Score Range: Graphical Representations 20-23 Locate points in the coordinate plane. (MCG p. 84)

2. Use coordinate geometry to find the distance between two points; the midpoint of a segment; and to calculate the slopes of parallel, perpendicular, horizontal, and vertical lines.

ACT Strand and Score Range: Graphical Representations 24-27, 28-32 Determine the slope of a line from points or equations. (MCG p. 53, 65) Find the midpoint of a line segment (no example) Use the distance formula (no example)

3. Given a set of points determine the type of figure based on its properties (e.g., parallelogram, isosceles triangle, regular octagon).

ACT Strand and Score Range: Graphical Representation 16-19 Locate points on the number line and in the first quadrant (MCG p. 64)

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STANDARD 4: Angles, Triangles and Similar Polygons - The student will use the properties of angles, right triangles and similar polygons to solve problems.

1. Solve problems using properties of angles (e.g., interior, exterior, complementary, vertical, angle sums, 30-60-90).

ACT Strand and Score Range: Plane Figures 20-23, 24-27 Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90° , 180° , and 360°) (MCG p. 25, 33, 66, 99) Use several angle properties to find an unknown angle measure (MCG p. 66, 99)

2. Use the Pythagorean Theorem and its converse to find missing side lengths and to determine acute, right, and obtuse triangles.

ACT Strand and Score Range: Plane Figures 28-32, 33-36 Use the Pythagorean theorem (MCG p. 54) Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas (MCG p. 99)

3. Apply the 45-45-90 and 30-60-90 right triangle relationships to solve problems.

ACT Strand and Score Range: Plane Figures 28-32 Apply properties of 30° - 60° - 90° , 45° - 45° - 90° , similar, and congruent triangles (MCG p. 67)

4. Express the trigonometric functions as ratios and derive the relationship between sine, cosine, and tangent ratios, and use to solve real-world problems.

ACT Strand and Score Range: Functions 24-27, 28-32, 33-36 Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths (MCG p. 102) Apply basic trigonometric ratios to solve right-triangle problems (no examples) Use trigonometric concepts and basic identities to solve problems (MCG p. 86)

5. Similar Polygons

- a. Use similar figures to construct ratios and solve for a missing side.

ACT Strand and Score Range: Measurement 13-15 Estimate or calculate the length of a line segment based on other lengths given on a geometric figure (MCG p. 68, 100)

- b. Use ratios of similar figures to find linear distance, perimeter, area, and volume.

ACT Strand and Score Range: Measurement 13-15, 33-36 Estimate or calculate the length of a line segment based on other lengths given on a geometric figure (MCG 68, 100) Use scale factors to determine the magnitude of a size change (MCG p. 101)