

Objectives

After completing *Chapter 1: Points, Lines, Planes, and Angles*, the student will be able to:

1. Use the undefined terms "point", "line", and "plane".
2. Use the terms "collinear", "coplanar", and "intersection".
3. Use the symbols for lines, segments, rays, and distances.
4. Find distances.
5. State and use the Ruler Postulate and the Segment Addition Postulate.
6. Name angles and find their measures.
7. State and use the Angle Addition Postulate.
8. Identify what can be concluded from a diagram.
9. Use postulates and theorems relating points, lines, and planes.

After completing *Chapter 2: Deductive Reasoning*, the student will be able to:

1. Identify the hypothesis and the conclusion of an if-then statement.
2. State the converse of an if-then statement.
3. Use a counterexample to disprove an if-then statement.
4. Understand the meaning of "if and only if".
5. Use properties from algebra and properties of congruence in proofs.
6. Use the Midpoint Theorem and the Angle Bisector Theorem.
7. Know the kinds of reasons that can be used in proofs.
8. Apply the definitions of complementary and supplementary angles.
9. State and use the theorem about vertical angles.
10. Apply the definition and theorems about perpendicular lines.
11. State and apply the theorems about angles supplementary to, or complementary to, congruent angles.
12. Plan proofs and write them in two-column form.

After completing *Chapter 3: Parallel Lines and Planes*, the student will be able to:

1. Distinguish between intersecting lines, parallel lines, and skew lines.
2. State and apply the theorem about the intersection of two parallel planes by a third plane.
3. Identify the angles formed when two lines are cut by a transversal.
4. State and apply the postulates and theorems about parallel lines.
5. State and apply the theorems about a parallel and a perpendicular to a given line through a point outside the line.
6. Classify triangles according to sides and to angles.
7. State and apply the theorem and the corollaries about the sum of the measures of the angles of a triangle.
8. State and apply the theorem about the measure of an exterior angle of a triangle.

9. Identify and name convex polygons and regular polygons.
10. Find the measures of interior angles and exterior angles of convex polygons.
11. Use inductive reasoning.

After completing *Chapter 4: Congruent Triangles*, the student will be able to

1. Identify the corresponding parts of congruent figures.
2. Prove two triangles congruent by using the SSS Postulate, the SAS Postulate, the ASA Postulate, and the AAS Theorem.
3. Deduce information about segments and angles after proving that two triangles are congruent.
4. Apply the theorems and corollaries about isosceles triangles.
5. Use the HL Theorem to prove two right triangles congruent.
6. Prove that two overlapping triangles are congruent.
7. Prove two triangles congruent by first proving two other triangles congruent.
8. Apply the definitions of the median and the altitude of a triangle and the perpendicular bisector of a segment.
9. State and apply the theorem about a point on the perpendicular bisector of a segment, and its converse.
10. State and apply the theorem about a point on the bisector of an angle, and its converse.

After completing *Chapter 5: Quadrilaterals*, the student will be able to

1. Apply the definition of a parallelogram and the theorems about properties of a parallelogram.
2. Prove that certain quadrilaterals are parallelograms.
3. Apply theorems about parallel lines.
4. Apply the midpoint theorems for triangles.
5. Apply the definitions and identify the special properties of a rectangle, a rhombus, and a square.
6. Determine when a parallelogram is a rectangle, rhombus, and/or square.
7. Apply the definitions and identify the properties of a trapezoid and an isosceles trapezoid.

After completing *Chapter 6: Inequalities in Geometry*, the student will be able to:

1. Apply properties of inequality to positive numbers, lengths of segments, and measures of angles.
2. State and use the Exterior Angle Inequality Theorem.
3. State the contrapositive and inverse of an if-then statement.
4. Understand the relationship between logically equivalent statements.
5. Draw correct conclusions from given statements.

6. Write indirect proofs in paragraph form.
7. State and apply the inequality theorems and corollaries for one triangle.
8. State and apply the inequality theorems for two triangles.

After completing *Chapter 7: Similar Polygons*, the student will be able to:

1. Express a ratio in simplest form.
2. Solve for an unknown term in a given proportion.
3. Express a given proportion in an equivalent form.
4. State and apply the properties of similar polygons.
5. Use the AA Similarity Postulate, the SAS Similarity Theorem, and the SSS Similarity Theorem to prove triangles similar.
6. Use similar triangles to deduce information about segments or angles.
7. Apply the Triangle Proportionality Theorem and its corollary.
8. State and apply the Triangle Angle-Bisector Theorem.

After completing *Chapter 8: Right Triangles*, the student will be able to:

1. Determine the geometric mean between two numbers.
2. State and apply the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle.
3. State and apply the Pythagorean Theorem.
4. State and apply the converse of the Pythagorean Theorem and related theorems about obtuse and acute triangles.
5. Determine the lengths of two sides of a 45-45-90 or a 30-60-90 triangle when the length of the third side is known.
6. Define the tangent ratio for an acute angle.
7. Define the sine and cosine ratios for an acute angle.
8. Solve right triangle problems by correct selection and use of the tangent, sine, and cosine ratios.

After completing *Chapter 9: Circles*, the student will be able to:

1. Define a circle, a sphere, and terms related to them.
2. Recognize inscribed polygons and circumscribed circles.
3. Apply theorems that relate tangents and radii.
4. Recognize circumscribed polygons and inscribed circles.
5. Define and apply properties of arcs and central angles.
6. Apply theorems about the chords of a circle.
7. Solve problems and prove statements involving inscribed angles.
8. Solve problems and prove statements involving angles formed by chords, secants, and tangents.
9. Solve problems involving lengths of chords, secant segments, and tangent segments.

After completing *Chapter 10: Constructions and Loci*, the student will be able to:

1. Perform fourteen basic constructions.
2. Use these basic constructions in original construction exercises.
3. State and apply theorems involving concurrent lines.
4. Describe the locus that satisfies one or more given condition(s).
5. Apply the concept of locus in the solution of construction exercises.

After completing *Chapter 11: Areas of Plane Figures*, the student will be able to:

1. Understand what is meant by the area of a polygon.
2. Understand the area postulates.
3. Know and use the formula for the area of special quadrilaterals, such as rectangles, parallelograms, triangles, rhombuses, and trapezoids.
4. Know and use the formula for the areas of regular polygons.
5. Know and use the formulas for the circumferences and areas of circles that are derived from the perimeter and area formulas for regular polygons.
6. Know and use the formulas for arc lengths and the areas of sectors of a circle.
7. Find the ratio of the areas of two triangles.
8. Understand and apply the relationship between scale factors, perimeters, and areas of similar figures.
9. Use areas to solve problems involving geometric probability.

After completing *Chapter 12: Areas and Volumes of Solids*, the student will be able to:

1. Identify the parts of prisms.
2. Find the lateral areas, total areas, and volumes of right prisms.
3. Identify the parts of pyramids.
4. Find lateral areas, total areas, and volumes of regular pyramids.
5. Find the lateral areas, total areas, and volumes of right cylinders and right cones.
6. Find the area and the volume of a sphere.
7. State and apply the properties of similar solids.

After completing *Chapter 13: Coordinate Geometry*, the student will be able to:

1. State and apply the distance formula.
2. State and apply the general equation of a circle.
3. State and apply the slope formula.
4. Determine whether two lines are parallel, perpendicular, or neither.
5. Understand the basic properties of vectors.

6. State and apply the midpoint formula.
7. Identify the slope and y-intercept of the line specified by a given equation.
8. Draw the graph of the line specified by a given equation.
9. Determine the intersection of two lines.
10. Write the equation of a line when given either one point and the slope of the line, or two points on the line.
11. Given a polygon, choose a convenient placement of coordinate axes and assign appropriate coordinates.
12. Prove statements by using coordinate geometry methods.

After completing *Chapter 14: Transformations*, the student will be able to:

1. Identify and use the terms "image," "preimage," "mapping," "one-to-one mapping," "transformation," "isometry," and "congruence mapping."
2. Identify the properties of the basic mappings.
3. Locate images of figures by reflection.
4. Locate images of figures by translation and glide reflection.
5. Locate images of figures by rotation.
6. Locate images of figures by dilation.
7. Locate the images of figures by composites of mappings.
8. Identify and use the terms "identity" and "inverse" in relation to mappings.
9. Describe the symmetry of figures and solids.