

# Cognitive Tutor® Geometry

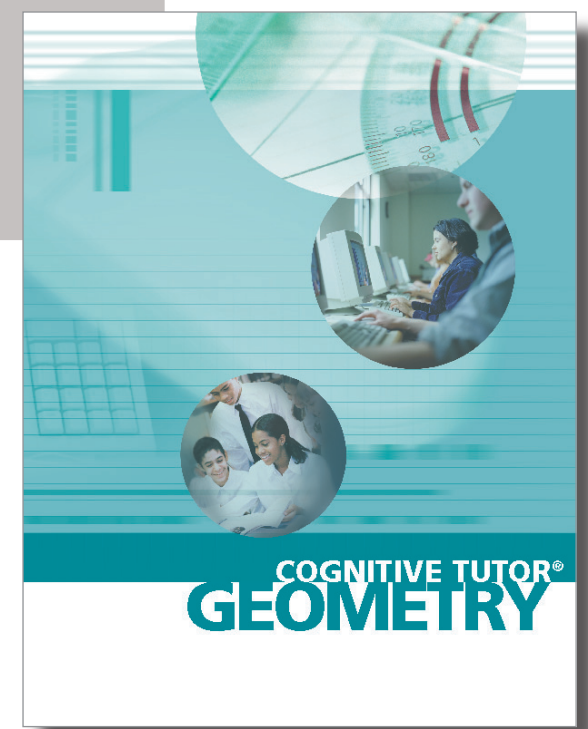
## Scope & Sequence

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1200 Penn Avenue, Suite 150, Pittsburgh, PA 15222

Classroom Lessons		Skills Covered
Print	Software	
Area and Perimeter	Units 1, 9, and 11 <ul style="list-style-type: none"> <li>• Area and Perimeter</li> <li>• Review Units 1A and 2A</li> </ul>	Students will develop a conceptual understanding of area and perimeter. Understand the proper units of measurement for area and perimeter. Relate the concepts of altitude and height. Discover the area formulas for rectangles, squares, parallelograms, triangles, trapezoids, and other polygons. Understand connections between the areas of various polygonal figures. Find the area, perimeter, base, or height of various polygonal figures. Use coordinate geometry to develop an understanding of properties of various polygonal figures. Explore the relationship between the circumference of a circle and its diameter, and identify this relationship as pi. Discover the area of a circle by relating it to the area of parallelograms. Find area, circumference, radius, or diameter of circles. Use problem-solving strategies to solve area composition problems.
The Pythagorean Theorem	Units 2, 3, 9, and 11 <ul style="list-style-type: none"> <li>• Pythagorean Theorem</li> <li>• Right Triangle Trigonometry</li> <li>• Review Units 1A and 2A</li> </ul>	Students will use a variety of methods to find the hypotenuse of a right triangle. Understand the properties of a right triangle. Apply the Pythagorean Theorem and its converse. Solve numerical and practical problems using the Pythagorean Theorem and its converse. View the distance formula as the Pythagorean Theorem. Calculate distances in the coordinate plane. Identify right triangles and special right triangles. Identify and use properties of a 45-45-90 (isosceles) right triangle and 30-60-90 right triangle. Identify and use the sine, cosine, and tangent ratios. Utilize these ratios of sides to solve problems. Understand square roots and squaring. Compute squares and square roots.
The Basics of Geometry	Units 4, 10, and 12 <ul style="list-style-type: none"> <li>• Angles</li> <li>• Review Units 1B and 2B</li> </ul>	Students will use many of the common notations and symbols from the field of geometry. Name and classify a variety of geometric objects and shapes using geometric naming and classification conventions. Measure angles accurately, and classify them correctly. Use the Triangle Sum Theorem to find missing angles in triangles. Classify triangles according to the measures of their angles and the lengths of their sides. Determine whether a triangle can be created from a set of lengths, using the Triangle Inequality Theorem. Determine whether a triangle can be created to fit a set of given conditions and justify any conclusions reached. Solve problems involving linear pairs, vertical, complementary, and supplementary angles. Define exterior angles. Use the relationship between the measure of an exterior angle of a triangle and its two remote interior angles. Solve practical problems involving the exterior and interior angles of a triangle. Find the measures of adjacent angles. Define and sketch angle bisectors. Construct an angle bisector. Define and sketch segment bisectors. Construct segment bisectors.
Parallel and Perpendicular Lines	Units 4, 10, and 12 <ul style="list-style-type: none"> <li>• Angles</li> <li>• Review Units 1B and 2B</li> </ul>	Students will define transversal, alternate interior angles, alternate exterior angles, corresponding angles, exterior angles on the same side of the transversal, and interior angles on the same side of the transversal. Recognize and identify special pairs of angles. Identify parallel lines. Calculate the measures of angles formed by the intersection of a transversal and two parallel lines. Construct the three altitudes of a given triangle using straightedge and compass. Identify perpendicular lines. Construct a perpendicular to a line through a point either on or not on the line. Determine if lines are parallel or perpendicular based upon measures of angles or based upon slopes of the lines in question. Connect the midpoints of the sides of a triangle and explore the properties of the mid-segments formed. Construct and judge the validity of a logical argument consisting of a set of premises and conclusion.

Classroom Lessons		Skills Covered
Print	Software	
Transformations and Symmetry	Unit 5 <ul style="list-style-type: none"> <li>• Geometric Transformations</li> </ul>	Students will classify transformation types, including reflections, translations, rotations, dilations, and glide reflections. Know the difference between isometries and other transformations. Perform reflections, translations, rotations, and dilations in the coordinate plane and out of the coordinate plane using simple geometric tools. Experience the fact that translations, rotations, and glide reflections are compositions of reflections over lines with certain relationships. Perform composite transformations. Identify types of symmetry in figures.
Similarity and Congruence	Units 6, 9, and 11 <ul style="list-style-type: none"> <li>• Similar Triangles</li> <li>• Review Units 1A and 2A</li> </ul>	Students will deduce whether two triangle are congruent, similar, or neither. Identify corresponding parts of similar or congruent figures. Find missing angles or sides in any similar or congruent figures. Construct similar triangles and congruent triangles. Apply this working knowledge to problems from outside the classroom, and expand this knowledge to two-dimensional and three-dimensional measurements. Use self-similar objects as a vehicle to create a fractal curve. Justify any conclusions based on conjectures concerning similar and congruent triangles. Recognize that congruency is a special case of similarity.
Quadrilaterals	Units 7, 10, and 12 <ul style="list-style-type: none"> <li>• Quadrilaterals</li> <li>• Review Units 1B and 2B</li> </ul>	Students will determine and use the properties of special quadrilaterals, including parallelograms, rhombi, rectangles, and squares in order to determine missing measurements of parts. Compare and contrast properties of quadrilaterals. Use the interrelationships between the special parallelograms to complete their understanding of quadrilaterals. Calculate the sum of the interior, each interior, each exterior, and the sum of the exterior angles in any given polygon. Justify conclusions based on the properties of special quadrilaterals. Use algebra and the properties of certain quadrilaterals to solve practical problems in geometry.
Surface Area and Volume		Students will calculate the volume and surface area of any prism, cylinder, pyramid, or cone. Apply these calculations to applications outside the mathematics classroom. Draw certain polyhedra. Use properties of prisms, cylinders, pyramids, and cones.
Circles	Units 8, 9, and 11 <ul style="list-style-type: none"> <li>• Circles</li> <li>• Review Units 1A and 2A</li> </ul>	Students will define a circle, and name and define parts of a circle. Calculate measures of angles in circles, including central angles, inscribed angles, interior angles, and exterior angles based upon the measures of the intercepted arcs. Calculate measures of intercepted arcs based upon measures of the angles in circles. Distinguish between major arcs, minor arcs, and semicircles. Calculate arc measure and arc length, and tell the difference between these two calculations. Calculate sector and circle segment areas. Use relationships among chords, radii, and tangents to determine angle and segment measures based upon those relationships. Solve problems involving tangent and secant lines with circles. Construct valid arguments consisting of a premise, reasons, and a conclusion dealing with properties of a circle.