



# Alignment Document

## State of Virginia And Aventa Learning Geometry

### Geometry 2005-2007 Benchmark Blueprint

State Standard Number	State Standard Area / Description	Unit Name	Course Topic Description
0	Geometry		
0	Lines and Angles		
G.3	The student will solve practical problems involving complementary, supplementary, and congruent angles that include vertical angles, angles formed when parallel lines are cut by a transversal, and angles in polygons.		
G.3.1	Classify the types of angles formed by two lines and a transversal.	Language of Geometry	Classifying Angles
		Language of Geometry	Pairs of Angles
		Parallel Lines and Coordinate Plane	Lines and Points in a Plane
G.3.2	State the relationships between pairs of angles, including a linear pair, vertical angles, corresponding angles, alternate interior angles, same-side (consecutive) interior angles, complementary angles, and supplementary angles.	Language of Geometry	Pairs of Angles
		Parallel Lines and Coordinate Plane	Lines and Points in a Plane
G.3.3	Solve practical problems involving intersecting and parallel lines in a plane.	Parallel Lines and Coordinate Plane	Lines and Points in a Plane
		Parallel Lines and Coordinate Plane	Equations of Lines in Coordinate Plane
G.3.4	Find the sum of the measures of the interior and exterior angles of a convex polygon.	Quadrilaterals and Polygons	Polygons (interior only)
G.3.5	Find the measure of each interior and exterior angle of a regular polygon.	Quadrilaterals and Polygons	Polygons (interior only)



G.3.6	Solve practical problems by using the relationships between pairs of angles such as vertical angles, corresponding angles, alternate interior angles, same-side interior angles, complementary angles, and supplementary angles.	Parallel Lines and Coordinate Plane	Lines and Points in a Plane
		Language of Geometry	Pairs of Angles
G.4	The student will use the relationships between angles formed by two lines cut by a transversal to determine if two lines are parallel and verify, using algebraic and coordinate methods as well as deductive proofs.		
G.4.1	Use properties, postulates, and theorems to determine whether two lines are parallel.	Parallel Lines and Coordinate Plane	Lines and Points in a Plane
		Parallel Lines and Coordinate Plane	Equations of Lines in Coordinate Plane
G.4.2	Use algebraic, coordinate, and deductive methods to determine whether two lines are parallel.	Parallel Lines and Coordinate Plane	Equations of Lines in Coordinate Plane
G.11	The student will construct a line segment congruent to a given line segment, the bisector of a line segment, a perpendicular to a given line from a point not on the line, a perpendicular to a given line at a point on the line, the bisector of a given angle.		
G.11.1	Construct		
G.11.1.a	a line segment congruent to a given line segment;		
G.11.1.b	the bisector of a line segment;	Language of Geometry	Bisecting a Segment
G.11.1.c	a perpendicular to a given line from a point not on the line;		
G.11.1.d	a perpendicular to a given line at a point on the line;		
G.11.1.e	the bisector of a given angle; and	Language of Geometry	Rays and Angles
G.11.1.f	an angle congruent to a given angle.		
0	Triangles and Logic		
G.1	The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include identifying the converse, inverse, and contrapositive of a conditional statement; translating a short verbal argument.		
G.1.1	Identify the converse, inverse, and contrapositive of a conditional statement.	Reasoning and Introduction to Proof	If-Then Statements, Converses, and Postulates



G.1.2	Translate short verbal arguments into symbolic form, such as $(p \rightarrow q)$ and $(\sim p \rightarrow \sim q)$ .	Reasoning and Introduction to Proof	If-Then Statements, Converses, and Postulates
G.1.3	Use and interpret Venn diagrams.		
G.1.4	Determine the validity of a logical argument.	Reasoning and Introduction to Proof	If-Then Statements, Converses, and Postulates
G.1.5	Use valid forms of deductive reasoning, including the law of syllogism.	Reasoning and Introduction to Proof	Deductive Reasoning
G.1.6	Select and use various types of reasoning and methods of proof, as appropriate.	Reasoning and Introduction to Proof	Inductive Reasoning
		Reasoning and Introduction to Proof	If-Then Statements, Converses, and Postulates
		Reasoning and Introduction to Proof	Two Column Proof With Segments and Angles
G.5	The student will investigate and identify congruence and similarity relationships between triangles; and prove two triangles are congruent or similar, given information in the form of a figure or statement, using algebraic and coordinate as well as deductive		
G.5.1	Use definitions, postulates, and theorems to determine whether triangles are congruent.	Triangles: Basic Closed Figures in Geometry	Congruent Triangles and Congruence Tests
G.5.2	Use definitions, postulates, and theorems to determine whether triangles are similar.	Similarity	Similar Triangles
G.5.3	Use algebraic methods, such as properties of proportions, to prove that triangles are similar.	Similarity	Similar Figures
G.5.4	Use coordinate methods, such as the distance formula and the slope formula, to prove two triangles are congruent.		
G.6	The student, given information concerning the lengths of sides and/or measures of angles, will apply the triangle inequality properties to determine whether a triangle exists and to order sides and angles. These concepts will be considered in the context		
G.6.1	Given the lengths of three segments, determine whether a triangle could be formed.		
G.6.2	Arrange the angles of a triangle in order from smallest to largest when given the lengths of the sides.		
G.6.3	Arrange the sides of a triangle in order from smallest to largest when given the measures of the angles.	Special Triangles and Special Relationships in Triangles	Triangle Inequalities



G.6.4	Given the lengths of two sides of a triangle, determine the range in which the length of the third side must lie.	Special Triangles and Special Relationships in Triangles	Triangle Inequalities
G.7	The student will solve practical problems involving right triangles by using the Pythagorean Theorem, properties of special right triangles, and right triangle trigonometry. Solutions will be expressed in radical form or as decimal approximations.		
G.7.1	Given the lengths of two sides of a right triangle, use the Pythagorean Theorem to find the length of the third side.	Right Triangle and Trigonometry	Review of Pythagorean Theorem
		Special Triangles and Special Relationships in Triangles	Right Triangles and Pythagorean Theorem
G.7.2	Determine whether a triangle formed with three given lengths is a right triangle.		
G.7.3	Solve for missing lengths in geometric figures, using properties of $45^\circ$ - $45^\circ$ - $90^\circ$ triangles.	Special Triangles and Special Relationships in Triangles	Right Triangles and Pythagorean Theorem
G.7.4	Solve for missing lengths in geometric figures, using properties of $30^\circ$ - $60^\circ$ - $90^\circ$ triangles.	Special Triangles and Special Relationships in Triangles	Right Triangles and Pythagorean Theorem
G.7.5	Solve problems involving right triangles, using sine, cosine, and tangent ratios.		
G.7.6	Solve practical problems, using right triangle trigonometry and properties of right triangles.		
0	Polygons and Circles		
G.8	The student will investigate and identify properties of quadrilaterals involving opposite sides and angles, consecutive sides and angles, and diagonals; prove these properties of quadrilaterals, using algebraic and coordinate methods as well as deductive		
G.8.1	Solve practical problems, using the properties specific to parallelograms, rectangles, rhombi, squares, and trapezoids.	Quadrilaterals and Polygons	Squares and Rectangles
		Quadrilaterals and Polygons	Parallelograms
		Quadrilaterals and Polygons	The Rhombus and Trapezoid



G.8.2	Prove that quadrilaterals have specific properties, using coordinate and algebraic methods, such as the distance formula, slope, and midpoint formula.		
G.8.3	Prove the properties of quadrilaterals, using deductive reasoning.	Quadrilaterals and Polygons	Squares and Rectangles
		Quadrilaterals and Polygons	Parallelograms
		Quadrilaterals and Polygons	The Rhombus and Trapezoid
G.9	The student will use measures of interior and exterior angles of polygons to solve problems. Tessellations and tiling problems will be used to make connections to art, construction, and nature.		
G.9.1	Solve problems involving the measures of interior and exterior angles of polygons.		
G.9.2	Identify tessellations in art, construction, and nature.		
G.10	The student will investigate and solve practical problems involving circles, using properties of angles, arcs, chords, tangents, and secants. Problems will include finding arc length and area of a sector, and may be drawn from applications of architecture		
G.10.1	Given two intersecting chords or two intersecting tangents, find missing lengths.	Circles	Arcs and Special segments
G.10.2	Calculate the area of a sector of a circle, using proportions.		
G.10.3	Given the measure of a central angle in degrees and the radius of the circle, find the related arc length.	Circles	Special Angles in Circles
G.10.4	Solve practical problems associated with circles, using properties of angles and arcs.	Circles	Arcs and Special segments
		Circles	Special Angles in Circles
0	Three-Dimensional Figures		
G.12	The student will make a model of a three-dimensional figure from a two-dimensional drawing and make a two-dimensional representation of a three-dimensional object. Models and representations will include scale drawings, perspective drawings, blueprints, o		
G.12.1	Use properties of three-dimensional objects to make models.		



G.12.2	Make a model of a three-dimensional figure from a two-dimensional drawing.		
G.12.3	Make a two-dimensional representation of a three-dimensional object.		
G.12.4	Solve problems, using scale drawings, perspective drawings, blueprints, or computer drawings as models of three-dimensional objects.		
G.12.5	Identify a three-dimensional object from different positions, such as the top view, side view, and front view.		
G.13	The student will use formulas for surface area and volume of three-dimensional objects to solve practical problems. Calculators will be used to find decimal approximations for results.		
G.13.1	Find the total surface area of cylinders, prisms, pyramids, cones, and spheres, using the appropriate formulas.		
G.13.2	Calculate the volume of cylinders, prisms, pyramids, cones, and spheres, using the appropriate formulas.		
G.13.3	Solve practical problems involving total surface area and volume of cylinders, prisms, pyramids, cones, and spheres as well as combinations of three-dimensional figures.		
G.14	The student will use proportional reasoning to solve practical problems, given similar geometric objects; and determine how changes in one dimension of an object affect area and/or volume of the object.		
G.14.1	Compare perimeters and areas of similar two-dimensional figures, using proportions.		
G.14.2	Describe how a change in one measure affects other measures of an object. Measures of an object may include perimeter, area, total surface area, and volume.		
G.14.3	Solve practical problems involving similar objects.	Similarity	Similar Figures
		Similarity	Similar Quadrilaterals
		Similarity	Ratios and Proportions
0	Coordinate Relations and Transformations		



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G.2	The student will use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include investigating and using formulas for finding distance, midpoint,		
G.2.1	Given an image and pre-image, identify the transformation that has taken place as a reflection, rotation, or translation.		
G.2.2	Apply the distance formula to find the length of a line segment when given the coordinates of the endpoints.	Parallel Lines and Coordinate Plane	Lines and Points in Coordinate Plane
G.2.3	Find the coordinates of the midpoint of a segment, using the midpoint formula.	Parallel Lines and Coordinate Plane	Lines and Points in Coordinate Plane
G.2.4	Find the slope of a line, given the graph or the coordinates of two points on the line.	Parallel Lines and Coordinate Plane	Equations of Lines in Coordinate Plane
G.2.5	Determine whether a figure has point symmetry, line symmetry, or neither.		