

Virginia High School Geometry
Mathematics Standards of Learning

Geometry Performance Standard	Boardworks High School Geometry presentation
2009 Standards, Implementation 2011–2012	
Reasoning, Lines, and Transformations	
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	
a) identifying the converse, inverse, and contrapositive of a conditional statement;	–
b) translating a short verbal argument into symbolic form;	–
c) using Venn diagrams to represent set relationships; and	–
d) using deductive reasoning.	–
G.2 The student will use the relationships between angles formed by two lines cut by a transversal to	
a) determine whether two lines are parallel;	Angles Lines
b) verify the parallelism, using algebraic and coordinate methods as well as deductive proofs; and	Angles Using angles Lines Parallel and perpendicular lines
c) solve real-world problems involving angles formed when parallel lines are cut by a transversal.	Using angles
G.3 The student will use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include	
a) investigating and using formulas for finding distance, midpoint, and slope;	Slopes and intercepts The distance between two points The midpoint of a line segment The equation of a straight line
b) applying slope to verify and determine whether lines are parallel or perpendicular;	Parallel and perpendicular lines
c) investigating symmetry and determining whether a figure is symmetric with respect to a line or a point; and	Reflection and rotational symmetry Reflection symmetry Rotational symmetry Reflection symmetry in 3-D shapes Rotational symmetry in 3-D shapes

	Reflection and rotational symmetry Reflection symmetry Rotational symmetry Combining transformations Reflection symmetry in 3-D shapes Rotation Rotational symmetry in 3-D shapes Translation Dilation
d) determining whether a figure has been translated, reflected, rotated, or dilated, using coordinate methods.	
G.4 The student will construct and justify the constructions of	
a) a line segment congruent to a given line segment;	Constructing triangles
b) the perpendicular bisector of a line segment;	Constructing bisecting lines and angles
c) a perpendicular to a given line from a point not on the line;	Constructing bisecting lines and angles Using construction
d) a perpendicular to a given line at a given point on the line;	Constructing bisecting lines and angles
e) the bisector of a given angle,	Constructing bisecting lines and angles
f) an angle congruent to a given angle; and	Constructing triangles
g) a line parallel to a given line through a point not on the given line.	–
Triangles	
G.5 The student, given information concerning the lengths of sides and/or measures of angles in triangles, will	
a) order the sides by length, given the angle measures;	Constructing triangles
b) order the angles by degree measure, given the side lengths;	Constructing triangles
c) determine whether a triangle exists; and	Triangles The Triangle Inequality Theorem
d) determine the range in which the length of the third side must lie.	Calculating sides of a triangle The Triangle Inequality Theorem
These concepts will be considered in the context of real-world situations.	Constructing triangles
G.6 The student, given information in the form of a figure or statement, will prove two triangles are congruent, using algebraic and coordinate methods as well as deductive proofs.	Congruence and similarity
G.7 The student, given information in the form of a figure or statement, will prove two triangles are similar, using algebraic and coordinate methods as well as deductive proofs.	Congruence and similarity Using congruence and similarity Similar right triangles

<p>G.8 The student will solve real-world problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry.</p>	<p>The Pythagorean Theorem Identifying right triangles Pythagorean triples Similar right triangles Calculating sides of a triangle Finding the length of diagonals using the Pythagorean Theorem Finding the height of triangles using the Pythagorean Theorem Using the Pythagorean Theorem to solve problems in context Finding the distance between two points using the Pythagorean Theorem Finding the diagonal in a rectangular prism Right triangles The sine ratio The cosine ratio The tangent ratio Trigonometry summary</p>
<p>Polygons and Circles</p>	
<p>G.9 The student will verify characteristics of quadrilaterals and use properties of quadrilaterals to solve real-world problems.</p>	<p>Quadrilaterals</p>
<p>G.10 The student will solve real-world problems involving angles of polygons.</p>	<p>Interior and exterior angles in polygons Polygons Using polygons</p>
<p>G.11 The student will use angles, arcs, chords, tangents, and secants to</p>	
<p>a) investigate, verify, and apply properties of circles;</p>	<p>Parts of a circle Radius and circumference Angles in a circle</p>
<p>b) solve real-world problems involving properties of circles; and</p>	<p>Radius and circumference The area of a sector</p>
<p>c) find arc lengths and areas of sectors in circles.</p>	<p>The length of an arc The area of a sector</p>
<p>G.12 The student, given the coordinates of the center of a circle and a point on the circle, will write the equation of the circle.</p>	<p>The equation of a circle</p>
<p>Three-Dimensional Figures</p>	

G.13 The student will use formulas for surface area and volume of three-dimensional objects to solve real-world problems.	Using length, area and volume formulas Surface area of rectangular prisms Volume of rectangular prisms Cylinders, cones and spheres Prisms Pyramids
G.14 The student will use similar geometric objects in two- or three-dimensions to	
a) compare ratios between side lengths, perimeters, areas, and volumes;	Area formulas and calculations Using length, area and volume formulas Radius and circumference The area of a circle
b) determine how changes in one or more dimensions of an object affect area and/or volume of the object;	Area formulas and calculations Using length, area and volume formulas
c) determine how changes in area and/or volume of an object affect one or more dimensions of the object; and	Area formulas and calculations Using length, area and volume formulas
d) solve real-world problems about similar geometric objects.	Using length, area and volume formulas Using congruence and similarity Dilation
2001 Standards	
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	
a) identifying the converse, inverse, and contrapositive of a conditional statement;	–
b) translating a short verbal argument into symbolic form;	–
c) using Venn diagrams to represent set relationships; and	–
d) using deductive reasoning, including the law of syllogism.	–
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	
a) investigating and using formulas for finding distance, midpoint, and slope;	The distance between two points The midpoint of a line segment Slopes and intercepts The equation of a straight line
b) investigating symmetry and determining whether a figure is symmetric with respect to a line or a point; and	Reflection and rotational symmetry Reflection symmetry Rotational symmetry

	Reflection and rotational symmetry Reflection symmetry Rotational symmetry Combining transformations Reflection symmetry in 3-D shapes Rotation Rotational symmetry in 3-D shapes Translation
c) determining whether a figure has been translated, reflected, or rotated.	
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.	Lines Angles Using angles Interior and exterior angles in polygons
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.	Angles Parallel and perpendicular lines
G.5 The student will	
a) investigate and identify congruence and similarity relationships between triangles; and	Congruence and similarity Using congruence and similarity
b) 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 proofs.	Congruence and similarity
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 of practical situations.	The Triangle Inequality Theorem

<p>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.</p>	<p>The Pythagorean Theorem Identifying right triangles Pythagorean triples Similar right triangles Calculating sides of a triangle Finding the length of diagonals using the Pythagorean Theorem Finding the height of triangles using the Pythagorean Theorem Using the Pythagorean Theorem to solve problems in context Finding the distance between two points using the Pythagorean Theorem Finding the diagonal in a rectangular prism Right triangles The sine ratio The cosine ratio The tangent ratio Trigonometry summary Special right triangles</p>
<p>G.8 The student will</p>	
<p>a) investigate and identify properties of quadrilaterals involving opposite sides and angles, consecutive sides and angles, and diagonals;</p>	<p>Quadrilaterals</p>
<p>b) prove these properties of quadrilaterals, using algebraic and coordinate methods as well as deductive reasoning; and</p>	<p>Quadrilaterals</p>
<p>c) use properties of quadrilaterals to solve practical problems.</p>	<p>Quadrilaterals</p>
<p>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.</p>	<p>Interior and exterior angles of polygons Tessellation Polygons Using polygons</p>
<p>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 the area of a sector, and may be drawn from applications of architecture, art, and construction.</p>	<p>Parts of a circle Radius and circumference The area of a circle The area of a sector The length of an arc Angles in a circle</p>

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, and an angle congruent to a given angle.	Constructing bisecting lines and angles
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, or computer simulations.	Dilation The center of dilation
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.	Using length, area and volume formulas Surface area of rectangular prisms Volume of rectangular prisms Cylinders, cones and spheres Prisms Pyramids
G.14 The student will	
a) use proportional reasoning to solve practical problems, given similar geometric objects; and	–
b) determine how changes in one dimension of an object affect area and/or volume of the object.	Area formulas and calculations Using length, area and volume formulas