

ACCRS/QUALITY CORE CORRELATION DOCUMENT: GEOMETRY

2010 ACOS GEOMETRY	QUALITYCORE COURSE STANDARD
Experiment with transformations in the plane.	
1. [G-CO1] Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	C.1.a Using Logic and Proof to Reason Mathematically; Logic and Proof; Use definitions, basic postulates, and theorems about points, segments, lines, angles, and planes to write proofs and to solve problems.
2. [G-CO2] Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	G.1.e Relating Geometric Ideas to the Coordinate Plane; Coordinate Geometry; Determine the effect of reflections, rotations, translations, and dilations and their compositions on the coordinate plane
3. [G-CO3] Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	
4. [G-CO4] Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	C.1.a Using Logic and Proof to Reason Mathematically; 1. Logic and Proof; Use definitions, basic postulates, and theorems about points, segments, lines, angles, and planes to write proofs and to solve problems.
	E.1.e Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Identify and draw images of transformations and use their properties to solve problems.
5. [G-CO5] Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	E.1.a Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Determine points or lines of symmetry and apply the properties of symmetry to figures.
	E.1.e Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Identify and draw images of transformations and use their properties to solve problems.
Understand congruence in terms of rigid motion. (Build on rigid motions as a familiar starting point for development of concept of geometric proof.)	
6. [G-CO6] Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	E.1.a Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Determine points or lines of symmetry and apply the properties of symmetry to figures.
7. [G-CO7] Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	C.1.g Using Logic and Proof to Reason Mathematically; Logic and Proof; Use the principle that corresponding parts of congruent triangles are congruent to solve problems.
	E.1.b Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Identify congruent figures and their corresponding parts.

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8. [G-CO8] Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	C.1.f Using Logic and Proof to Reason Mathematically; Logic and Proof; Prove that two triangles are congruent by applying the SSS, SAS, ASA, AAS, and HL congruence statements.
Prove geometric theorems. (Focus on validity of underlying reasoning while using variety of ways of writing proofs.)	
9. [G-CO9] Prove theorems about lines and angles. <i>Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</i>	C.1.a Using Logic and Proof to Reason Mathematically; Logic and Proof; Use definitions, basic postulates, and theorems about points, segments, lines, angles, and planes to write proofs and to solve problems.
	C.1.e Using Logic and Proof to Reason Mathematically; Logic and Proof; Read and write different types and formats of proofs including two-column, flowchart, paragraph, and indirect proofs.
	D.1.c Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Points, Lines, Planes, and Space; Identify corresponding, same-side interior, same-side exterior, alternate interior, and alternate exterior angle pairs formed by a pair of parallel lines and a transversal and use these special angle pairs to solve problems (e.g., solve equations, use in proofs)
	C.1.b Using Logic and Proof to Reason Mathematically; Logic and Proof; Use inductive reasoning to make conjectures and deductive reasoning to arrive at valid conclusions.
	D.1.b Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Points, Lines, Planes, and Space; Identify vertical, adjacent, complementary, and supplementary angle pairs and use them to solve problems (e.g., solve equations, use in proofs)
10. [G-CO10] Prove theorems about triangles. <i>Theorems include: measures of interior angles of a triangle sum to 180 degrees; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.</i>	C.1.e Using Logic and Proof to Reason Mathematically; Logic and Proof; Read and write different types and formats of proofs including two-column, flowchart, paragraph, and indirect proofs.
	D.2.b Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Polygons; Identify medians, altitudes, perpendicular bisectors, and angle bisectors of triangles and use their properties to solve problems.
	D.2.j Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Polygons; Apply the Isosceles Triangle Theorem and its converse to triangles to solve mathematical and real-world problems.

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<p>11. [G-CO11] Prove theorems about parallelograms. <i>Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.</i></p>	<p>C.1.e Using Logic and Proof to Reason Mathematically; Logic and Proof; Read and write different types and formats of proofs including two-column, flowchart, paragraph, and indirect proofs.</p> <p>C.1.i Using Logic and Proof to Reason Mathematically; Logic and Proof; Use properties of special quadrilaterals in a proof.</p> <p>D.2.g Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Polygons; Identify and classify quadrilaterals, including parallelograms, rectangles, rhombi, squares, kites, trapezoids, and isosceles trapezoids, using their properties.</p>
Make geometric constructions. (Formalize and explain processes.)	
<p>12. [G-CO12] Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Constructions include copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.</p>	<p>D.1.a Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Points, Lines, Planes, and Space; Identify and model plane figures, including collinear and noncollinear points, lines, segments, rays, and angles using appropriate mathematical symbols.</p> <p>D.1.c Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Points, Lines, Planes, and Space; Identify corresponding, same-side interior, same-side exterior, alternate interior, and alternate exterior angle pairs formed by a pair of parallel lines and a transversal and use these special angle pairs to solve problems (e.g., solve equations, use in proofs).</p> <p>D.1.d Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Points, Lines, Planes, and Space; Use construction techniques, including straightedge and compass, to bisect and trisect segments and to create parallel and perpendicular lines, perpendicular bisectors, and angle bisectors.</p>
<p>13. [G-CO13] Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.</p>	
Understand similarity in terms of similarity transformations.	
<p>14. [G-SRT1] Verify experimentally the properties of dilations given by a center and a scale factor:</p> <p>14a. [G-SRT1a] A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.</p> <p>14b. [G-SRT1b] The dilation of a line segment is longer or shorter in the ratio given by the scale factor.</p>	

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15. [G-SRT2] Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	<p>C.1.h Using Logic and Proof to Reason Mathematically; Logic and Proof; Use several methods, including AA, SAS, and SSS, to prove that two triangles are similar, corresponding sides are proportional, and corresponding angles are congruent.</p> <p>E.1.c Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Identify similar figures and use ratios and proportions to solve mathematical and real-world problems (e.g., finding the height of a tree using the shadow of the tree and the height and shadow of a person)</p> <p>E.1.d Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Use the definition of similarity to establish the congruence of angles, proportionality of sides, and scale factor of two similar polygons.</p>
16. [G-SRT3] Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	<p>C.1.h Using Logic and Proof to Reason Mathematically; Logic and Proof; Use several methods, including AA, SAS, and SSS, to prove that two triangles are similar, corresponding sides are proportional, and corresponding angles are congruent.</p>
Prove theorems involving similarity.	
17. [G-SRT4] Prove theorems about triangles. <i>Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.</i>	<p>D.2.e Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Polygons; Apply the Pythagorean Theorem and its converse to triangles to solve mathematical and real-world problems.</p>
18. [G-SRT5] Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	<p>D.2.d Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Polygons; Solve problems involving the relationships formed when the altitude to the hypotenuse of a right triangle is drawn.</p> <p>E.1.e Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Identify and draw images of transformations and use their properties to solve problems.</p> <p>E.1.g. Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Determine the geometric mean between two numbers and use it to solve problems (e.g., find the lengths of segments in right triangles.)</p>
Define trigonometric ratios and solve problems involving right triangles.	
19. [G-SRT6] Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	<p>H.1.b Investigating and Applying Basic Ideas of Trigonometry; Introduction to Trigonometry; Find the sine, cosine, and tangent ratios of acute angles given the side lengths of right triangles.</p>
20. [G-SRT7] Explain and use the relationship between the sine and cosine of complementary angles.	<p>H.1.b Investigating and Applying Basic Ideas of Trigonometry; Introduction to Trigonometry; Find the sine, cosine, and tangent ratios of acute angles given the side lengths of right triangles.</p>

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21. [G-SRT8] Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*	<p>D.2.e Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Polygons; Apply the Pythagorean Theorem and its converse to triangles to solve mathematical and real-world problems.</p> <p>H.1.b Investigating and Applying Basic Ideas of Trigonometry; Introduction to Trigonometry; Find the sine, cosine, and tangent ratios of acute angles given the side lengths of right triangles.</p> <p>H.1.c. Investigating and Applying Basic Ideas of Trigonometry; Introduction to Trigonometry; Use trigonometric ratios to find the sides or angles of right triangles and to solve real-world problems (e.g. use angles of elevation and depression to find missing measures).</p> <p>H.1.a Investigating and Applying Basic Ideas of Trigonometry; Introduction to Trigonometry; Apply properties of 45-45-90 and 30-60-90 triangle to determine lengths of right triangles.</p>
Apply trigonometry to general triangles.	
22. [G-SRT10] (+) Prove the Laws of Sines and Cosines and use them to solve problems.	D.2.f Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Polygons; Identify and use Pythagorean triples in right triangles to find lengths of the unknown side.
23. [G-SRT11](+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	
Understand and apply theorems about circles.	
24. [G-C1] Prove that all circles are similar.	
25. [G-C2] Identify and describe relationships among inscribed angles, radii, and chords. <i>Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.</i> [G-C2]	<p>D.3.a Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Circles; Identify and define lines segments associated with circles (e.g., radii, diameters, chords, secants, tangents)</p> <p>D.3.b Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Circles; Determine the measure of central and inscribed angles and their intercepted arcs.</p> <p>D.3.c Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Circles; Find segment lengths, angle measures, and intercepted arc measures formed by chords, secants, and tangents intersecting inside and outside circles.</p>
26. [G-C3] Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	<p>D.2.b Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Polygons; Identify medians, altitudes, perpendicular bisectors, and angle bisectors of triangles and use their properties to solve problems.</p> <p>D.3.d Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Circles; Solve problems using inscribed and circumscribed polygons.</p>

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27. [G-C4] (+) Construct a tangent line from a point outside a given circle to the circle.	D.3.c Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Circles; Find segment lengths, angle measures, and intercepted arc measures formed by chords, secants, and tangents intersecting inside and outside circles.
Find arc lengths and areas of sectors of circles. (Radian introduced only as unit of measure.)	
28. [G-C5] Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	F.1.d Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems; Area and Perimeter; Find arc lengths and circumferences of circles from given information (e.g., radius, diameter, coordinates)
	F.1.e Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems; Area and Perimeter; Find the area of a circle and the area of a sector of a circle from given information (e.g., radius, diameter, coordinates)
Translate between the geometric description and the equation for a conic section.	
29. [G-GPE1] Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	G.1.d Relating Geometric Ideas to the Coordinate Plane; Coordinate Geometry; Write equations for circles in standard form and solve problems using equations and graphs
	D.1.e Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Points, Lines, Planes, and Space; Locate, describe, and draw a locus in a plane or space.
Use coordinates to provide simple geometric theorems algebraically. (Include distance formula; relate to Pythagorean Theorem.)	
30. [G-GPE4] Use coordinates to prove simple geometric theorems algebraically.	G.1.b Relating Geometric Ideas to the Coordinate Plane; Coordinate Geometry; Apply the midpoint and distance formulas to points and segments to find midpoints, distances, and missing information
	G.1.c Relating Geometric Ideas to the Coordinate Plane; Coordinate Geometry; Use coordinate geometry to solve problems about geometric figures (e.g., segments, triangles, quadrilaterals)

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31. [G-GPE5] Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	C.1.d Using Logic and Proof to Reason Mathematically; Logic and Proof; Use various methods to prove that two lines are parallel or perpendicular (e.g., using coordinates, angle measures)
	D.1.f Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Points, Lines, Planes, and Space; Apply properties and theorems of parallel and perpendicular lines to solve problems.
	G.1.a Relating Geometric Ideas to the Coordinate Plane; Coordinate Geometry; Use slope to distinguish between and write equations for parallel and perpendicular lines.
	G.1.c Relating Geometric Ideas to the Coordinate Plane; Coordinate Geometry; Use coordinate geometry to solve problems about geometric figures (e.g., segments, triangles, quadrilaterals)
32. [G-GPE6] Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	G.1.c Relating Geometric Ideas to the Coordinate Plane; Coordinate Geometry; Use coordinate geometry to solve problems about geometric figures (e.g., segments, triangles, quadrilaterals)
33. [G-GPE7] Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.*	F.2.a Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems; Lateral Area, Surface Area, and Volume; Find the lateral area, surface area, and volume of prisms, cylinders, cone, and pyramids in mathematical and real-world settings.
	G.1.c Relating Geometric Ideas to the Coordinate Plane; Coordinate Geometry; Use coordinate geometry to solve problems about geometric figures (e.g., segments, triangles, quadrilaterals)
Use coordinates to provide simple geometric theorems algebraically. (AL)	
34. [AL] Determine areas and perimeters of regular polygons, including inscribed or circumscribed polygons, given the coordinates of vertices or other characteristics.	G.1.c Relating Geometric Ideas to the Coordinate Plane; Coordinate Geometry; Use coordinate geometry to solve problems about geometric figures (e.g., segments, triangles, quadrilaterals)

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Explain volume formulas and use them to solve problems.	
35. [G-GMD1] Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. <i>Use dissection arguments, Cavalieri's principle, and informal limit arguments.</i>	<p>D.4.a Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Solids; Identify and classify prisms, pyramids, cylinders, cones, and spheres and use their properties to solve problems.</p> <p>F.2.a Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems; Lateral Area, Surface Area, and Volume; Find the lateral area, surface area, and volume of prisms, cylinders, cone, and pyramids in mathematical and real-world settings.</p> <p>F.2.b Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems; Lateral Area, Surface Area, and Volume; Use cross sections of prisms, cylinders, pyramids, and cones to solve volume problems.</p> <p>E.1.f. Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Apply relationships between perimeters of similar figures, areas of similar figures, and volumes of similar figures, in terms of scale factor, to solve mathematical and real-world problems.</p> <p>E.1.h. Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Identify and give properties of congruent or similar solids.</p>
36. [G-GMD3] Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*	<p>D.4.a Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Solids; Identify and classify prisms, pyramids, cylinders, cones, and spheres and use their properties to solve problems.</p> <p>F.2.a Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems; Lateral Area, Surface Area, and Volume; Find the lateral area, surface area, and volume of prisms, cylinders, cone, and pyramids in mathematical and real-world settings.</p> <p>F.2.c Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems; Lateral Area, Surface Area, and Volume; Find the surface area and volume of a sphere in mathematical and real-world settings.</p>
37. [AL] Determine the relationship between surface areas of similar figures and volumes of similar figures.	<p>D.4.a Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Solids; Identify and classify prisms, pyramids, cylinders, cones, and spheres and use their properties to solve problems.</p> <p>F.2.a Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems; Lateral Area, Surface Area, and Volume; Find the lateral area, surface area, and volume of prisms, cylinders, cone, and pyramids in mathematical and real-world settings.</p> <p>F.2.c Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems; Lateral Area, Surface Area, and Volume; Find the surface area and volume of a sphere in mathematical and real-world settings.</p>

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Visualize relationships between two-dimensional and three-dimensional objects.	
38. [G-GMD4] Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	D.4.b Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Solids; Describe and draw cross sections of prisms, cylinders, pyramids, and cones
Apply geometric concepts in modeling situations.	
39. [G-MG1] Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*	D.1.a Identifying, Classifying, and Applying the Properties of Geometric Figures in Space; Points, Lines, Planes, and Space; Identify and model plane figures, including collinear and noncollinear points, lines, segments, rays, and angles using appropriate mathematical symbols. E.1.h. Comparing Congruent and Similar Geometric Figures; Similarity and Congruence; Identify and give properties of congruent or similar solids.
40. [G-MG2] Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, British Thermal Units (BTUs) per cubic foot)*	
41. [G-MG3] Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	
Use probability to evaluate outcomes of decision. (Introductory; apply counting rules.)	
42. [S-MD6] (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).*	F.1.c. Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems1. Area and Perimeter; Use area to solve problems involving geometric probability.
43. [S-MD7] (+) Analyze decisions and strategies using probability concepts (e.g, product testing, medical testing, pulling a hockey goalie at the end of the game).	F.1.c. Using Length, Area, Perimeter, and Volume to Find Quantities and Solve Problems1. Area and Perimeter; Use area to solve problems involving geometric probability.