

## Geometry CR

State Standard Number	State Standard Area/Description	Unit Name	Course Topic Description
9.3	Geometry & Measurement		
9.3.1	Calculate measurements of plane and solid geometric figures; know that physical measurements depend on the choice of a unit and that they are approximations.		
9.3.1.1	Determine the surface area and volume of pyramids, cones and spheres. Use measuring devices or formulas as appropriate.	Perimeter and Area	Surface Area Volume
9.3.1.2	Compose and decompose two- and three-dimensional figures; use decomposition to determine the perimeter, area, surface area and volume of various figures.	Perimeter and Area	Surface Area Volume
9.3.1.3	Understand that quantities associated with physical measurements must be assigned units; apply such units correctly in expressions, equations and problem solutions that involve measurements; and convert between measurement systems.		
9.3.1.4	Understand and apply the fact that the effect of a scale factor $k$ on length, area and volume is to multiply each by $k$ , $k^2$ and $k^3$ , respectively.		
9.3.1.5	Make reasonable estimates and judgments about the accuracy of values resulting from calculations involving measurements.		
9.3.2	Construct logical arguments, based on axioms, definitions and theorems, to prove theorems and other results in geometry.		

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9.3.2.1	Understand the roles of axioms, definitions, undefined terms and theorems in logical arguments.	Reasoning and Introduction to Proof	Properties from Algebra and Proof
9.3.2.2	Accurately interpret and use words and phrases such as "if...then," "if and only if," "all," and "not." Recognize the logical relationships between an "if...then" statement and its inverse, converse and contrapositive.	Reasoning and Introduction to Proof	If-Then, Converses, and Postulates
9.3.2.3	Assess the validity of a logical argument and give counterexamples to disprove a statement.	Reasoning and Introduction to Proof	Deductive Reasoning
9.3.2.4	Construct logical arguments and write proofs of theorems and other results in geometry, including proofs by contradiction. Express proofs in a form that clearly justifies the reasoning, such as two-column proofs, paragraph proofs, flow charts or illustrations.	Reasoning and Introduction to Proof	Two-Column Proof with Segments and Angles
9.3.2.5	Use technology tools to examine theorems, test conjectures, perform constructions and develop mathematical reasoning skills in multi-step problems. The tools may include compass and straight edge, dynamic geometry software, design software or Internet applets.		
9.3.3	Know and apply properties of geometric figures to solve real-world and mathematical problems and to logically justify results in geometry.		
9.3.3.1	Know and apply properties of parallel and perpendicular lines, including properties of angles formed by a transversal, to solve problems and logically justify results.	Parallel Lines and Coordinate Plane	Lines and Points in a Plane
9.3.3.2	Know and apply properties of angles, including corresponding, exterior, interior, vertical, complementary and supplementary angles, to solve problems and logically justify results.	Parallel Lines and Coordinate Plane	Lines and Points in a Plane

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9.3.3.3	Know and apply properties of equilateral, isosceles and scalene triangles to solve problems and logically justify results.	Special Triangles	Isosceles Triangles Equilateral Triangles
9.3.3.4	Apply the Pythagorean Theorem and its converse to solve problems and logically justify results.	Special Triangles	Right Triangles and Pythagorean Theorem
9.3.3.5	Know and apply properties of right triangles, including properties of 45-45-90 and 30-60-90 triangles, to solve problems and logically justify results.	Special Triangles	Right Triangles and Pythagorean Theorem
9.3.3.6	Know and apply properties of congruent and similar figures to solve problems and logically justify results.	Similarity	Similar Figures
9.3.3.7	Use properties of polygons-including quadrilaterals and regular polygons-to define them, classify them, solve problems and logically justify results.	Quadrilaterals and Polygons	Squares and Rectangles
9.3.3.8	Know and apply properties of a circle to solve problems and logically justify results.	Circles	Arcs and Special Segments
9.3.4	Solve real-world and mathematical geometric problems using algebraic methods.		
9.3.4.1	Understand how the properties of similar right triangles allow the trigonometric ratios to be defined, and determine the sine, cosine and tangent of an acute angle in a right triangle.	Right Triangles and Trigonometry	Special Ratios in Right Triangles

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9.3.4.2	Apply the trigonometric ratios sine, cosine and tangent to solve problems, such as determining lengths and areas in right triangles and in figures that can be decomposed into right triangles. Know how to use calculators, tables or other technology to evaluate trigonometric ratios.	Right Triangles and Trigonometry	Special Ratios in Right Triangles
9.3.4.3	Use calculators, tables or other technologies in connection with the trigonometric ratios to find angle measures in right triangles in various contexts.	Right Triangles and Trigonometry	Special Ratios in Right Triangles
9.3.4.4	Use coordinate geometry to represent and analyze line segments and polygons, including determining lengths, midpoints and slopes of line segments.		
9.3.4.5	Know the equation for the graph of a circle with radius $r$ and center $(h,k)$ , $(x - h)^2 + (y - k)^2 = r^2$ , and justify this equation using the Pythagorean Theorem and properties of translations.		
9.3.4.6	Use numeric, graphic and symbolic representations of transformations in two dimensions, such as reflections, translations, scale changes and rotations about the origin by multiples of $90^\circ$ , to solve problems involving figures on a coordinate grid.		
9.3.4.7	Use algebra to solve geometric problems unrelated to coordinate geometry, such as solving for an unknown length in a figure involving similar triangles, or using the Pythagorean Theorem to obtain a quadratic equation for a length in a geometric figure.	Similarity	Similar Quadrilaterals and Polygons