

## MATHEMATICS

### Geometry

Grades 9-12		
<p>1. Students demonstrate an understanding by identifying and giving examples of undefined terms, axioms, theorems, and inductive and deductive reasoning.</p> <p>4. Students prove basic theorems involving congruence and similarity.</p> <p>7. Students prove and use theorems involving the properties of parallel lines cut by a transversal, the properties of quadrilaterals, and the properties of circles.</p> <p>10. Students compute areas of polygons including rectangles, scalene triangles, equilateral triangles, rhombi, parallelograms, and trapezoids.</p> <p>13. Students prove relationships between angles in polygons using properties of complementary, supplementary, vertical, and exterior angles.</p> <p>16. Students perform basic constructions with straightedge and compass, such as angle bisectors, perpendicular bisectors, and the line parallel to a given line through a point outside the line.</p>	<p>2. Students write geometric proofs, including proofs by contradiction.</p> <p>5. Students prove triangles are congruent or similar and are able to use the concept of corresponding parts of congruent triangles.</p> <p>8. Students know, derive, and solve problems involving perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures</p> <p>11. Students determine how changes in dimension affect the perimeter, area, and volume of common geometric figures and solids.</p> <p>14. Students prove the Pythagorean Theorem.</p> <p>17. Students prove theorems using coordinate geometry, including the midpoint of a line segment, distance formula, and various forms of equations of lines and circles.</p>	<p>3. Students construct and judge the validity of a logical argument. This includes giving counterexamples to disprove a statement.</p> <p>6. Students know and are able to use the Triangle Inequality Theorem.</p> <p>9. Students compute the volumes and surface areas of prisms, pyramids, cylinders, cones, and spheres.</p> <p>12. Students find and use measures of sides, interior and exterior angles of triangles, and polygons to classify figures and solve problems.</p> <p>15. Students use the Pythagorean Theorem to determine distance and find missing lengths of sides of right triangles.</p> <p>18. Students know the definitions of the basic trigonometry functions defined by the angles of a right triangle. They also know and are able to use elementary relationships between them (e.g., <math>\tan(x) = \sin(x)/\cos(x)</math>, <math>(\sin(x))^2 + (\cos(x))^2 = 1</math>).</p>

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<p><b>19. Students use trigonometric functions to solve for an unknown length of a side of a right triangle, given an angle and a length of a side. They can also solve for an angle of a right triangle, given two sides of the triangle.</b></p> <p><b>22. Students know the effect of rigid motions on figures in the coordinate plane and space, including rotations, translations, and reflections.</b></p>	<p><b>20. Students know and are able to use angle and side relationships in problems with special right triangles, such as 30-60-90 triangles, and 45-45-90 triangles.</b></p> <p><b>A1.24 Students use and know simple aspects of a logical argument.</b></p> <p style="padding-left: 40px;">A1.24.1 Students explain the difference between deductive and inductive reasoning, and identify and provide examples of each.</p> <p style="padding-left: 40px;">A1.24.2 Students identify the hypothesis and conclusion in logical deduction.</p> <p style="padding-left: 40px;">A1.24.3 Students use counterexamples to show that an assertion is false, and recognize that a single counterexample is sufficient to refute an assertion.</p> <p style="padding-left: 40px;">A1.24.4 Given a conditional statement, students can write the inverse, converse, and contrapositive, and can identify which are true and false</p>	<p><b>21. Students prove and solve problems regarding relationships among chords, secants, tangents, inscribed angles, and inscribed and circumscribed polygons of circles.</b></p>