| **Required Course Numbers** |
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| **Test Content Categories** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I. Properties of Geometric Plane Shapes, Congruence, Similarity, Proof, Constructions, and Trigonometry (48%) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| * 1. Properties of Geometric Plane Shapes, Congruence, Proof, and Constructions
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| 1. Knows properties of triangles, quadrilaterals (e.g., rectangle, rhombus, trapezoid), and other polygons
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| 1. Solves problems involving special triangles; e.g., isosceles, equilateral, right, 30-60-90
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| 1. Solves problems that involve medians, midpoints, and altitudes in triangles
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| 1. Identifies geometric properties of various quadrilaterals
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| 1. Identifies relationships among quadrilaterals
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| 1. Solves problems involving sides, angles, or diagonals of polygons
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| 1. Identifies the lines of symmetry in a polygon
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| 1. Knows the properties of lines (e.g., parallel, perpendicular, intersecting) and angles
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Solves problems involving parallel, perpendicular, and intersecting lines
2. Applies angle relationships (e.g., supplementary, vertical, alternate interior) to solve problems
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Understands how to solve problems involving perimeter and area of polygons
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| 1. Calculates and interprets perimeter and area of plane figures that can be composed of triangles and quadrilaterals
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| 1. Calculates changes in perimeter and area as the dimensions of plane figures change
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| 1. Understands rigid motions in a plane; e.g., translations, rotations, reflections
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| 1. Uses rigid motions (e.g., translations, rotations, reflections) to transform figures
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Recognizes that rigid motion transformations preserve distance and angle measure
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Specifies a sequence of transformations that will map a given figure onto another figure
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| 1. Given a figure, describes the transformations that map the figure onto itself
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| 1. Understands the concept of congruence
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| 1. Determines whether two figures are congruent using theorems (e.g., ASA, SAS, SSS)
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| 1. Determines whether two figures are congruent by directly mapping one figure onto another using a sequence of one or more rigid motions
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| 1. Uses congruence to solve problems with two-dimensional and three-dimensional figures
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| 1. Understands how to prove geometric theorems such as those about lines and angles, triangles, and parallelograms
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| 1. Proves theorems about lines and angles
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Proves theorems about triangles
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| 1. Proves theorems about parallelograms
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| 1. Understands the nature and structure of geometric proofs, including direct and indirect proofs
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| 1. Knows how geometric constructions are made
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| 1. Identifies and describes formal geometric constructions made with a variety of tools and methods; e.g., copying a segment or an angle; bisecting a segment or an angle; constructing parallel and perpendicular lines; constructing an equilateral triangle, a square, and a regular hexagon inscribed in a circle
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| * 1. Similarity, Proof, and Trigonometry
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| 1. Understands the concept of similarity
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| 1. Uses dilations to transform figures
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| 1. Recognizes that dilation transformations preserve angle measure but not distance
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| 1. Determines whether two figures are similar using theorems (e.g., AA criterion)
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Determines whether two figures are similar by directly mapping one figure onto another using a sequence of one or more transformations (dilations and/or rigid motions)
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Uses similarity to solve problems with two-dimensional and three-dimensional figures
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Understands how to prove theorems involving similarity
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Proves theorems about triangles
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| 1. Uses congruence and similarity criteria for triangles to prove relationships in geometric figures
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| 1. Understands how trigonometry and the Pythagorean theorem are applied to right triangles
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| 1. Understands 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
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| 1. Explains and uses the relationship between the sine and cosine of complementary angles
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Uses trigonometric ratios to solve right triangles in geometric or applied problems
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Uses the Pythagorean theorem to solve right triangles in geometric or applied problems
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| 1. Knows the values of trigonometric functions of special angles; e.g., 30°, 45°, 60°, 90°
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| 1. Understands how trigonometry is applied to general triangles
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| 1. Applies the Law of Sines and the Law of Cosines to find unknown measurements in triangles
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| II. Coordinate Geometry, Circles, Three-Dimensional Geometry, and Geometric Modeling (52%) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Coordinate Geometry
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Uses coordinates to prove simple geometric theorems algebraically
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| 1. Identifies the characteristics of ordered pairs located in quadrants and on the axes of the coordinate plane
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| 1. Uses coordinate geometry to represent and identify the properties of geometric shapes (e.g., Pythagorean theorem, area of a rectangle)
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| 1. Determines the distance between two points
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Determines the midpoint of the segment joining two points
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Uses the slope criteria for parallel and perpendicular lines to solve geometric problems
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| 1. Uses coordinates to compute perimeters of polygons and areas of triangles and quadrilaterals
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Uses coordinates to prove simple geometric theorems algebraically
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| 1. Circles
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| 1. Understands properties of circles
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| 1. Solves problems involving diameter and radius of a circle
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| 1. Solves problems involving measures of inscribed angles, central angles, circumscribed angles, and arcs
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Uses properties of tangent lines to circles to solve problems
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Proves theorems about circles
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Solves problems involving the inscribed and circumscribed circles of a triangle, a square, and a regular hexagon, including the constructions of the circles
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| 1. Understands how to solve problems involving length of arcs and area of sectors
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| 1. Solves problems involving circumference and area of a circle
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Solves problems involving length of arcs and area of sectors
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Knows how to translate between the geometric description and the equation for a circle
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| 1. Knows and uses the geometric description of a circle
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| 1. Determines and uses the equation of a circle of given center and radius
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| 1. Finds the center and radius of a circle given by an equation in standard form
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| 1. Completes the square to find the center and radius of a circle given by an equation
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| 1. Three-Dimensional Geometry and Geometric Modeling
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| 1. Knows how to solve problems involving surface area and volume of solids
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| 1. Calculates and interprets surface area and volume of solids; e.g., prisms, pyramids, cones, cylinders, spheres
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| 1. Calculates changes in surface area and volume as the dimensions of a solid change
 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Knows how to visualize relationships (e.g., cross section, nets, rotations) between two-dimensional and three-dimensional objects
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| 1. Identifies the shapes of two-dimensional cross sections of three-dimensional objects, and identifies three-dimensional objects generated by rotations of two-dimensional objects
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| 1. Uses two-dimensional representations of three-dimensional objects to visualize and solve problems
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| 1. Knows how to apply geometric concepts in real-world situations
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| 1. Uses geometric shapes, their measures, and their properties to describe objects
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| 1. Applies geometric methods to solve design problems
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