Course: 1206310 Geometry

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BASIC INFORMATION

Course Number:	1206310
Course Title:	Geometry
Course Abbreviated Title:	Geometry
Course Path:	**Section:**Grades PreK to 12 Education Courses» **Grade Group:**Grades 9 to 12 and Adult Education Courses » **Subject:**Mathematics » **SubSubject:**Geometry »
Number of Credits:	One credit (1)
Course Length:	Year
Course Type:	Core
Course Level:	2
Status:	State Board Approved

RELATED BENCHMARKS (51)

LA.1112.1.6.1:	The student will use new vocabulary that is introduced and taught directly;
LA.1112.1.6.2:	The student will listen to, read, and discuss familiar and conceptually challenging text;
LA.1112.1.6.5:	The student will relate new vocabulary to familiar words;
LA.910.1.6.1:	The student will use new vocabulary that is introduced and taught directly;
LA.910.1.6.2:	The student will listen to, read, and discuss familiar and conceptually challenging text;
LA.910.1.6.5:	The student will relate new vocabulary to familiar words;

MA.912.D.6.2:	Find the converse, inverse, and contrapositive of a statement
MA.912.D.6.3:	Determine whether two propositions are logically equivalent.
MA.912.D.6.4:	Use methods of direct and indirect proof and determine whether a short proof is logically valid.
MA.912.G.1.1:	Find the lengths and midpoints of line segments in two-dimensional coordinate systems.
MA.912.G.1.2:	Construct congruent segments and angles, angle bisectors, and parallel and perpendicular lines using a straight edge and compass or a drawing program, explaining and justifying the process used.
MA.912.G.1.3:	Identify and use the relationships between special pairs of angles formed by parallel lines and transversals.
MA.912.G.2.1:	Identify and describe convex, concave, regular, and irregular polygons.
MA.912.G.2.2:	Determine the measures of interior and exterior angles of polygons, justifying the method used.
MA.912.G.2.3:	Use properties of congruent and similar polygons to solve mathematical or real-world problems.
MA.912.G.2.4:	Apply transformations (translations, reflections, rotations, dilations, and scale factors) to polygons. to determine congruence, similarity, and symmetry. Know that images formed by translations, reflections, and rotations are congruent to the original shape. Create and verify tessellations of the plane using polygons.
MA.912.G.2.5:	Explain the derivation and apply formulas for perimeter and area of polygons (triangles, quadrilaterals, pentagons, etc.).

MA.912.G.2.7:	Determine how changes in dimensions affect the perimeter and area of common geometric figures.
MA.912.G.3.1:	Describe, classify, and compare relationships among quadrilaterals including the square, rectangle, rhombus, parallelogram, trapezoid, and kite.
MA.912.G.3.2:	Compare and contrast special quadrilaterals on the basis of their properties.
MA.912.G.3.3:	Use coordinate geometry to prove properties of congruent, regular, and similar quadrilaterals.
MA.912.G.3.4:	Prove theorems involving quadrilaterals.
MA.912.G.4.1:	Classify, construct, and describe triangles that are right, acute, obtuse, scalene, isosceles, equilateral, and equiangular.
MA.912.G.4.2:	Define, identify, and construct altitudes, medians, angle bisectors, perpendicular bisectors,orthocenter, centroid, incenter, and circumcenter.
MA.912.G.4.3:	Construct triangles congruent to given triangles.
MA.912.G.4.4:	Use properties of congruent and similar triangles to solve problems involving lengths and areas.
MA.912.G.4.5:	Apply theorems involving segments divided proportionally.
MA.912.G.4.6:	Prove that triangles are congruent or similar and use the concept of corresponding parts of congruent triangles.
MA.912.G.4.7:	Apply the inequality theorems: triangle inequality, inequality in one triangle, and the Hinge Theorem.
MA.912.G.5.1:	Prove and apply the Pythagorean Theorem and its converse.

MA.912.G.5.2:	State and apply the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle.
MA.912.G.5.3:	Use special right triangles (30° - 60° - 90° and 45° - 45° - 90°) to solve problems.
MA.912.G.5.4:	Solve real-world problems involving right triangles.
MA.912.G.6.2:	Define and identify: circumference, radius, diameter, arc, arc length, chord, secant, tangent and concentric circles.
MA.912.G.6.4:	Determine and use measures of arcs and related angles (central, inscribed, and intersections of secants and tangents).
MA.912.G.6.5:	Solve real-world problems using measures of circumference, arc length, and areas of circles and sectors.
MA.912.G.6.6:	Given the center and the radius, find the equation of a circle in the coordinate plane or given the equation of a circle in center-radius form, state the center and the radius of the circle.
MA.912.G.6.7:	Given the equation of a circle in center-radius form or given the center and the radius of a circle, sketch the graph of the circle.
MA.912.G.7.1:	Describe and make regular, non-regular, and oblique polyhedra, and sketch the net for a given polyhedron and vice versa.
MA.912.G.7.2:	Describe the relationships between the faces, edges, and vertices of polyhedra.
MA.912.G.7.4:	Identify chords, tangents, radii, and great circles of spheres
MA.912.G.7.5:	Explain and use formulas for lateral area, surface area, and volume of solids.
MA.912.G.7.6:	Identify and use properties of congruent and similar solids.

MA.912.G.7.7:	Determine how changes in dimensions affect the surface area and volume of common geometric solids.
MA.912.G.8.1:	Analyze the structure of Euclidean geometry as an axiomatic system. Distinguish between undefined terms, definitions, postulates, and theorems.
MA.912.G.8.2:	Use a variety of problem-solving strategies, such as drawing a diagram, making a chart, guess-and-check, solving a simpler problem, writing an equation, and working backwards.
MA.912.G.8.3:	Determine whether a solution is reasonable in the context of the original situation.
MA.912.G.8.4:	Make conjectures with justifications about geometric ideas. Distinguish between information that supports a conjecture and the proof of a conjecture.
MA.912.G.8.5:	Write geometric proofs, including proofs by contradiction and proofs involving coordinate geometry. Use and compare a variety of ways to present deductive proofs, such as flow charts, paragraphs, two-column, and indirect proofs.
MA.912.G.8.6:	Perform basic constructions using straightedge and compass, and/or drawing programs describing and justifying the procedures used. Distinguish between sketching, constructing, and drawing geometric figures.
MA.912.T.2.1:	Define and use the trigonometric ratios (sine, cosine, tangent, cotangent, secant, cosecant) in terms of angles of right triangles.

RELATED GLOSSARY TERM DEFINITIONS (100)

Altitude:	The perpendicular distance from the top of a geometric figure to its opposite side.

Angle:	Two rays or two line segments extending from a common end point called a vertex. Angles are measured in degrees, in radians, or in gradians.
Area:	The number of square units needed to cover a surface.
Arc:	Part of a circle.
Attribute:	A quality or characteristic, such as color, thickness, size, and shape.
Axiom:	Postulate, or axiom, indicates a statement or assumption that is taken to be true without proof; and which can be used to prove other statements or theorems.
Benchmark:	A point of reference from which other measurements or values may be made or judged.
Bisector:	A line segment, line, or plane that divides a geometric figure into two congruent halves.
Centroid:	For a triangle, this is the point at which the three medians intersect.
Chart:	A data display that presents information in columns and rows.
Chord:	A line segment whose endpoints lie on a circle.
Circumcenter:	The center of a circumcircle.
Circumference:	The distance around a circle.
Concave:	Defines a shape that curves inward; opposite of convex.
Concentric circles:	Circles that have the same center.
Cone:	A pyramid with a circular base.
Congruent:	Figures or objects that are the same shape and size.

Contrapositive:	Switching the hypothesis and conclusion of a conditional statement and negating both. “If p, then q.” becomes “If not q, then not p.” The contrapositve has the same truth value as the original statement.
Converse:	Switching the hypothesis and conclusion of a conditional statement. “If p, then q.” becomes “If q, then p.”
Coordinate plane:	A two-dimensional network of horizontal and vertical lines that are parallel and evenly-spaced; especially designed for locating points, displaying data, or drawing maps.
Coordinate:	Numbers that correspond to points on a coordinate plane in the form (x, y), or a number that corresponds to a point on a number line.
Cosine:	Cosine function is written as cos?. Cos(q) is the x-coordinate of the point on the unit circle so that the ray connecting the point with the origin makes an angle of q with the positive x-axis. When q is an angle of a right triangle, then cos(q) is the ratio of the adjacent side with the hypotenuse.
Cylinder:	A three dimensional figure with two parallel congruent circular bases and a lateral surface that connects the boundaries of the bases. More general definitions of cylinder may not require circular bases.
Diagonal:	A line segment that joins two non-adjacent vertices in a polygon.
Diameter:	A line segment from any point on the circle (or sphere) passing through the center to another point on the circle (or sphere).
Dilation:	Dilation of a figure is a transformation where the points of the figure is transformed from (x,y) to (kx,ky). The scale factor k is a positive real number. If k is bigger than 1, the transformation is an enlargement. If k is between 0 and 1, then it is a contraction.

Dimension:	The number of coordinates used to express a position.
e:	e=2.7182818284...., is an irrational number and the base of the natural logarithm. e is sometimes known as Napier's constant although the symbol e honors Euler.
Edge:	A line segment where two faces of a polyhedron meet.
Equal:	Having the same value (=).
Equation:	A mathematical sentence stating that the two expressions have the same value. Also read the definition of equality.
Equidistant:	Equally distant.
Equivalent:	Having the same value.
Euclidean geometry:	A geometry in which Euclid's fifth postulate holds, sometimes also called parabolic geometry. Two-dimensional Euclidean geometry is called plane geometry, and three-dimensional Euclidean geometry is called solid geometry. Euclid's fifth postulates: 1. A straight line segment can be drawn joining any two points. 2. Any straight line segment can be extended indefinitely in a straight line. 3. Given any straight line segment, a circle can be drawn having the segment as radius and one endpoint as center. 4. All right angles are congruent. 5. If two lines are drawn which intersect a third in such a way that the sum of the inner angles on one side is less than two right angles, then the two lines inevitably must intersect each other on that side if extended far enough. This postulate is equivalent to what is known as the parallel postulate.
Face:	One of the plane surfaces bounding a three-dimensional figure.

Formula:	A rule that shows the relationship between two or more quantities; involving numbers and/or variables.
Geometric solid:	A closed three-dimensional geometric figure.
Geometry:	The branch of mathematics that explores the position, size, and shape of figures.
Great circle:	Is a section of a sphere that contains a diameter of the sphere.
Height:	A line segment extending from the vertex or apex of a figure to its base and forming a right angle with the base or plane that contains the base.
Hypotenuse:	The longest side of a right triangle; the side opposite the right angle.
Image:	A figure that is the result of a transformation.
Incenter:	The center of a polygon’s inscribed circle
Interior angle:	An angle formed inside a plane figure.
Intersection:	The intersection of two sets A and B is the set of elements common to A and B. For lines or curves, it is the point at which lines or curves meet; for planes, it is the line where planes meet.
Isosceles triangle:	A triangle with at least two congruent sides and two congruent angles. An equilateral triangle is a special case of an isosceles triangle having not just two, but all three sides and angles equal.
Kite:	A quadrilateral with two distinct pairs of adjacent congruent sides.
Length:	A one-dimensional measure that is the measurable property of line segments.
Line:	A collection of an infinite number of points in a straight pathway with unlimited length and having no width.

Line segment:	A portion of a line that consists of two defined endpoints and all the point in between.
Median:	When the numbers are arranged from least to greatest, the middle number of a set of numbers, or the mean of two middle numbers when the set has two middle numbers is called median. Half of the numbers are above the median and half are below it.
Net:	A two-dimensional diagram that can be folded or made into a three-dimensional figure.
Oblique:	Tilted at an angle; neither vertical nor horizontal.
Orthocenter:	The point at which the three (possibly extended) altitudes of a triangle intersect.
Parallel lines:	Two lines in the same plane that are a constant distance apart. Parallel lines have equal slopes.
Parallelogram:	A quadrilateral in which both pairs of opposite sides are parallel.
Pentagon:	A polygon with five sides.
Perimeter:	The distance around a two dimensional figure.
Perpendicular:	Two lines, two line segments, or two planes are said to be perpendicular when they intersect at a right angle.
Plane:	An infinite two-dimensional geometric surface defined by three non-linear points or two distance parallel or intersecting lines.
Point:	A specific location in space that has no discernable length or width.
Polygon:	A closed plane figure, having at least three side that are line segments and are connected at their endpoints.
Postulate:	Postulate, or axiom, indicates a statement or assumption that is taken to be true without proof; and which can be used to prove other statements or theorems.

Procedure:	A specific prescription for carrying out a mathematical task such as adding, multiplying, simplifying, and factoring.
Proof:	A logical argument that demonstrates the truth of a given statement. In a formal proof, each step can be justified with a reason; such as a given, a definition, an axiom, or a previously proven property or theorem. A mathematical statement that has been proven is called a theorem.
Quadrilateral:	Any polygon with four sides, including parallelogram, rhombus, rectangle, square, trapezoid, kite.
Radius:	A line segment extending from the center of a circle or sphere to a point on the circle or sphere. Plural radii.
Rectangle:	A parallelogram with four right angles.
Reflection:	A transformation that produces the mirror image of a geometric figure over a line of reflection, also called a flip.
Regular polygon:	A polygon that is both equilateral (all sides congruent) and equiangular (all angles congruent).
Right triangle:	A triangle having an interior right angle.
Rotation:	A transformation of a figure by turning it about a center point or axis. The amount of rotation is usually expressed in the number of degrees (e.g., a 90° rotation). Also called a turn.
Scale factor:	The ratio of any two corresponding lengths in two similar geometric figures. The ratio of areas of two similar figures is the square of the scale factor and the ratio of the volumes of two similar figures is the cube of the scale factor.
Secant:	A line, ray, or segment that intersects a circle at two points (i.e. that contains a chord). A secant to a sphere is a line, ray, or segment that intersects a sphere at two points.

Set:	A set is a finite or infinite collection of distinct objects in which order has no significance.
Side:	The edge of a polygon (e.g., a triangle has three sides), the face of a polyhedron, or one of the rays that make up an angle.
Similarity:	A term describing figures that are the same shape but are not necessarily the same size or in the same position.
Sphere:	A three-dimensional figure in which all points on the figure are equidistant from a center point.
Square:	A rectangle with four congruent sides; also, a rhombus with four right angles.
Sum:	The result of adding numbers or expressions together.
Symmetry:	An intrinsic property of a mathematical object which causes it to remain invariant under certain classes of transformations (such as rotation, reflection, or translation).
Tessellation:	A covering of a plane with congruent copies of the same pattern with no holes and no overlaps.
Theorem:	A statement or conjecture that can be proven to be true based on postulates, definitions, or other proven theorems. The process of showing a theorem to be correct is called a proof.
Transformation:	An operation on a figure by which another image is created. Common transformations include reflections (flips), translations (slides), rotations (turns) and dilations.
Translation:	A transformation in which every point in a figure is moved in the same direction and by the same distance.
Transversal:	A line that intersects two or more lines at different points.

Triangle:	A polygon with three sides.
Circle:	A closed plane figure with all points of the figure the same distance from the center. The equation for a circle with center (h, k) and radius r is: $(x - h)^2 + (y - k)^2 = r^2$
Convex:	Defines a shape that curves outward; opposite of concave. A geometric figure is convex if every line segment connecting interior points is entirely contained within the figure's interior.
Hinge Theorem:	The hinge theorem says that if two triangles ?ABC and ?DEF have congruent sides AB=DE and AC=DF and mA>mD, then BC>EF.
Inequality:	A sentence that states one expression is greater than (>), greater than or equal to (), less than (<), less than or equal to (), another expression.
Pythagorean Theorem:	The square of the hypotenuse (c) of a right triangle is equal to the sum of the squares of the legs (a and b), as shown in the equation $c^2 = a^2 + b^2$.
sine:	Sine function is written as sinθ . Sin(q) is the y-coordinate of the point on the unit circle so that the ray connecting the point with the origin makes an angle of q with the positive x-axis. When q is an angle of a right triangle, then sin(q) is the ratio of the opposite side to the hypotenuse.
Slope:	The ratio of change in the vertical axis (y-axis) to each unit change in the horizontal axis (x-axis) in the form rise/run or ?y/?x. Also the constant, *m*, in the linear equation for the slope-intercept form $y = mx + b$, where $m = \frac{y_1 - y_2}{x_1 - x_2}$
Term:	A number, variable, product, or quotient in an expression (e.g. $5x^2$, -2y, 8). A term is not a sum or difference (For example, 5x2 + 6 has two terms, 5x2 and 6.)

Triangle Inequality:	The triangle inequality states that the sum of the lengths of any two sides of a triangle is greater than the length of the third side (a+b>c, a+c>b, and b+c>a, where a, b, and c are the side lengths of a triangle). Triangle inequality for vectors is defined as follows: Let x and y be vectors. Then the triangle inequality is given by $\|\mathbf{x}\| - \|\mathbf{y}\| \leq \|\mathbf{x}+\mathbf{y}\| \leq \|\mathbf{x}\| + \|\mathbf{y}\|$ Geometrically, the right-hand part of this inequality states that the sum of the lengths of any two sides of a triangle is greater than the length of the remaining side.
Vertex:	The point common to the two rays that form an angle; the point common to any two sides of a polygon; the point common to three or more edges of a polyhedron.
Volume:	A measure of the amount of space an object takes up; also the loudness of a sound or signal.
Width:	The shorter length of a two-dimensional figure. The width of a box is the horizontal distance from side to side (usually defined to be greater than the depth, the horizontal distance from front to back).
x-axis:	The horizontal number line on a rectangular coordinate system.

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