

Geometry

State Standard Number	State Standard Area/Description	Unit Name	Course Topic Description
MA.912.G	Geometry		
MA.912.G.1	Understand geometric concepts, applications, and their representations with coordinate systems. Find lengths and midpoints of line segments, slopes, parallel and perpendicular lines, and equations of lines. Using a compass and straightedge, patty paper, a drawing program or other techniques, students also construct lines and angles, explaining and justifying the processes used.		
MA.912.G.1.1	Find the lengths and midpoints of line segments in two-dimensional coordinate systems.	Lines and the Coordinate Plane	The Coordinate Plane
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.	Lines and the Coordinate Plane	The Coordinate Plane Graphing the Equation of a Line
MA.912.G.1.3	Identify and use the relationships between special pairs of angles formed by parallel lines and transversals.	Introduction to Geometry	Parallel and Perpendicular Lines
MA.912.G.1.4	Use coordinate geometry to find slopes, parallel lines, perpendicular lines, and equations of lines.	Lines and the Coordinate Plane	Graphing the Equation of a Line
MA.912.G.2	Identify and describe polygons (triangles, quadrilaterals, pentagons, hexagons, etc.), using terms such as regular, convex, and concave. Find measures of angles, sides, perimeters, and areas of polygons, justifying the methods used. Apply transformations to polygons. Relate geometry to algebra by using coordinate geometry to determine		

Geometry

	transformations. Use algebraic reasoning to determine congruence, similarity, and symmetry. Create and verify tessellations of the plane using polygons.		
MA.912.G.2.1	Identify and describe convex, concave, regular, and irregular polygons.	Quadrilaterals and Polygons	Polygons
MA.912.G.2.2	Determine the measures of interior and exterior angles of polygons, justifying the method used.	Quadrilaterals and Polygons	Polygons
MA.912.G.2.3	Use properties of congruent and similar polygons to solve mathematical or real-world problems.	Similarity	Similar Polygons
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.	Transformations	Translations and Reflections
MA.912.G.2.5	Explain the derivation and apply formulas for perimeter and area of polygons (triangles, quadrilaterals, pentagons, etc.).	Quadrilaterals and Polygons	Squares, Rectangles and Rhombii
MA.912.G.2.6	Use coordinate geometry to prove properties of congruent, regular and similar polygons, and to perform transformations in the plane.	Triangles	Congruent Triangles
MA.912.G.2.7	Determine how changes in dimensions affect the perimeter and area of common geometric figures.	Quadrilaterals and Polygons	Squares, Rectangles and Rhombii

Geometry

MA.912.G.3	Classify and understand relationships among quadrilaterals (rectangle, parallelogram, kite, etc.). Relate geometry to algebra by using coordinate geometry to determine regularity, congruence, and similarity. Use properties of congruent and similar quadrilaterals to solve problems involving lengths and areas, and prove theorems involving quadrilaterals		
MA.912.G.3.1	Describe, classify, and compare relationships among quadrilaterals including the square, rectangle, rhombus, parallelogram, trapezoid, and kite.	Quadrilaterals and Polygons	Covered throughout unit
MA.912.G.3.2	Compare and contrast special quadrilaterals on the basis of their properties.	Quadrilaterals and Polygons	Covered throughout unit
MA.912.G.3.3	Use coordinate geometry to prove properties of congruent, regular and similar quadrilaterals.	Quadrilaterals and Polygons	Squares, Rectangles and Rhombii
MA.912.G.3.4	Prove theorems involving quadrilaterals.	Quadrilaterals and Polygons	Parallelograms
MA.912.G.4	Identify and describe various kinds of triangles (right, acute, scalene, isosceles, etc.). Define and construct altitudes, medians, and bisectors, and triangles congruent to given triangles. Prove that triangles are congruent or similar and use properties of these triangles to solve problems involving lengths and areas. Relate		

Geometry

	geometry to algebra by using coordinate geometry to determine regularity, congruence, and similarity. Understand and apply the inequality theorems of triangles.		
MA.912.G.4.1	Classify, construct, and describe triangles that are right, acute, obtuse, scalene, isosceles, equilateral, and equiangular.	Triangles	Introduction to Triangles
MA.912.G.4.2	Define, identify, and construct altitudes, medians, angle bisectors, perpendicular bisectors, orthocenter, centroid, incenter, and circumcenter.	Triangles	Introduction to Triangles
MA.912.G.4.3	Construct triangles congruent to given triangles.	Triangles	Congruent Triangles
MA.912.G.4.4	Use properties of congruent and similar triangles to solve problems involving lengths and areas.	Triangles	Congruent Triangles
MA.912.G.4.5	Apply theorems involving segments divided proportionally.	Similarity	Ratios and Proportions
MA.912.G.4.6	Prove that triangles are congruent or similar and use the concept of corresponding parts of congruent triangles.	Triangles	Congruent Triangles
MA.912.G.4.7	Apply the inequality theorems: triangle inequality, inequality in one triangle, and the Hinge Theorem.	Triangles	Triangle Inequalities

Geometry

MA.912.G.4.8	Use coordinate geometry to prove properties of congruent, regular, and similar triangles.	Triangles	Congruent Triangles
MA.912.G.5	Apply the Pythagorean Theorem to solving problems, including those involving the altitudes of right triangles and triangles with special angle relationships. Use special right triangles to solve problems using the properties of triangles.		
MA.912.G.5.1	Prove and apply the Pythagorean Theorem and its converse.	Triangles	Right Triangles and the Pythagorean Theorem
MA.912.G.5.2	State and apply the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle.	Similarity	Similar Triangles
MA.912.G.5.3	Use special right triangles ($30^\circ - 60^\circ - 90^\circ$ and $45^\circ - 45^\circ - 90^\circ$) to solve problems.	Triangles	Right Triangles and the Pythagorean Theorem
MA.912.G.5.4	Solve real-world problems involving right triangles.	Triangles	Right Triangles and the Pythagorean Theorem
MA.912.G.6	Define and understand ideas related to circles (radius, tangent, chord, etc.). Perform constructions, and prove theorems related to circles. Find measures of arcs and angles related to them, as well as measures of circumference and area. Relate geometry to algebra by finding the equation of a circle in the coordinate plane.		

Geometry

MA.912.G.6.1	Determine the center of a given circle. Given three points not on a line, construct the circle that passes through them. Construct tangents to circles. Circumscribe and inscribe circles about and within triangles and regular polygons.	Circles	Special Segments in Circles
MA.912.G.6.2	Define and identify: circumference, radius, diameter, arc, arc length, chord, secant, tangent and concentric circles.	Circles	Covered throughout unit
MA.912.G.6.3	Prove theorems related to circles, including related angles, chords, tangents, and secants.	Circles	Special Segments in Circles
MA.912.G.6.4	Determine and use measures of arcs and related angles (central, inscribed, and intersections of secants and tangents).	Circles	Special Angles and Arcs in Circles
MA.912.G.6.5	Solve real-world problems using measures of circumference, arc length, and areas of circles and sectors.	Circles	Circumference and Area of a Circle
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.	Circles	Equations of a 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.	Circles	Equations of a Circle
MA.912.G.7	Describe and make regular and nonregular polyhedra (cube, pyramid, tetrahedron, octahedron, etc.). Explore relationships among the faces, edges, and vertices of polyhedra. Describe sets of points on spheres, using terms such as		

Geometry

	great circle. Describe symmetries of solids, and understand the properties of congruent and similar solids.		
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.	Surface Area and Volume	Surface and Volume of Prisms and Cylinders
MA.912.G.7.2	Describe the relationships between the faces, edges, and vertices of polyhedra.	Surface Area and Volume	Covered through unit
MA.912.G.7.3	Identify, sketch, find areas and/or perimeters of cross sections of solid objects.	Surface Area and Volume	Surface Area and Volume of Spheres
MA.912.G.7.4	Identify chords, tangents, radii, and great circles of spheres.	Surface Area and Volume	Surface Area and Volume of Spheres
MA.912.G.7.5	Explain and use formulas for lateral area, surface area, and volume of solids.	Surface Area and Volume	Covered through unit
MA.912.G.7.6	Identify and use properties of congruent and similar solids.	Surface Area and Volume	Surface and Volume of Prisms and Cylinders
MA.912.G.7.7	Determine how changes in dimensions affect the surface area and volume of common geometric solids.	Surface Area and Volume	Surface and Volume of Pyramids and Cones

Geometry

MA.912.G.8	In a general sense, mathematics is problem solving. In all mathematics, use problem-solving skills, choose how to approach a problem, explain the reasoning, and check the results. At this level, apply these skills to making conjectures, using axioms and theorems, constructing logical arguments, and writing geometric proofs. Learn about inductive and deductive reasoning and how to use counterexamples to show that a general statement is false.		
MA.912.G.8.1	Analyze the structure of Euclidean geometry as an axiomatic system. Distinguish between undefined terms, definitions, postulates and theorems.	Introduction to Proof	Informal and Two-Column Proofs
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.	Covered throughout course	Covered throughout course
MA.912.G.8.3	Determine whether a solution is reasonable in the context of the original situation.	Covered throughout course	Covered throughout course
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.	Introduction to Proof	Informal and Two-Column Proofs
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.	Introduction to Proof	Reasoning in Geometry Informal and Two-Column Proofs



Geometry

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.	Introduction to Geometry	Rays and Angles
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