

Geometry Curriculum

Course Description: Geometry provides an analysis of plane, solid, and coordinate geometry. Points, lines and planes form the foundations of geometry. From this foundation we use inductive and deductive reasoning to make conclusions. Students explore both abstract mathematical concepts as well as real-world applications. Technological tools and manipulatives will be used to discover and explore more complex geometric situations. This allows students to deepen their understanding of geometric relationships as they move toward formal mathematical arguments. As students encounter challenging problems, and practice asking for help and a willingness to learn from others, they build the social emotional learning competencies of self-management, self awareness, relationship skills, and social awareness.

Grades: 9th Grade, 10th Grade

Course Resources & Materials: Math Medic, Delta Math

Course Essential Questions:

- How do you logically think through problems?
- How can geometric properties be used to prove relationships between lines and angles?
- Why is it important to prove every logical step in a proof?
- Why might there be more than one correct way to write a proof?
- How do you recognize symmetry in a figure?
- How will knowing the formulas for area and perimeter help in your daily life?
- What is the Golden Ratio and how does it fit into your daily life?
- What is the relationship between area and volume?

Course Priority Standards:

G.CO.A.5: Experiment with transformations in the plane. Demonstrate the ability to rotate, reflect or translate a figure, and determine a possible sequence of transformations between two congruent figures.

G.CO.B.6: Understand congruence in terms of rigid motions. Develop the definition of congruence in terms of rigid motions.

G.CO.C.10: Prove geometric theorems. Prove theorems about polygons.

G.CO.D.11: Make geometric constructions. Construct geometric figures using various tools and methods.

G.SRT.B.4: Prove theorems involving similarity. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

G.SRT.C.7: Define trigonometric ratios, solve problems involving right triangles. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles.

G.GPE.B.3: Use coordinates to prove geometric theorems algebraically.

G.GMD.A.2: Explain volume formulas and use them to solve problems. Use volume formulas for cylinders, pyramids, cones, spheres and composite figures to solve problems.

G.MG.A.3: Apply geometric concepts in modeling situations. Apply geometric methods to solve design mathematical modeling problems.

Course Enduring Understandings, Goals, & Objectives:

- Students will use the Pythagorean Theorem.
- Students will write logical statements.
- Students will find missing angles and lengths from a diagram.
- Students will construct geometric figures.
- Students will prove theorems.
- Students will calculate volume and surface area of prisms, spheres, pyramids, cones, and cylinders.

Course Essential Vocabulary: conditional, converse, counterexample, postulate, theorem, hypotenuse, hypothesis, acute angle, adjacent angle, angle bisector, collinear points, complementary angles, coplanar points, intersection, linear pair, noncollinear points, noncoplanar points, plane, point, postulate, segment, segment bisector, theorem, undefined, vertex, vertical angles, addition property of equality, alternate interior angle theorem, alternate interior angles, angle addition postulate, angle bisector theorem, consecutive interior angles (same-side interior angles), corresponding angle postulate, corresponding angles, midpoint, angle bisector, distance, division property of equality, hypotenuse, hypothesis, midpoint theorem, multiplication property of equality, reflexive property, same-side interior angle theorem, segment addition postulate, substitution property, subtraction property of equality, supplementary angles, transitive property, transversal, vertical angle theorem, line of reflection, origin, point of rotation, preimage, preserve, reflection, translation, rigid motion, rotation, transformation, AAS, ASA, corresponding parts, CPCTC, angle bisector, equiangular, equilateral, exterior angle, isosceles triangle theorem, reflexive property, remote interior angles, vertical angle theorem, bisect, diagonals, regular, equiangular, parallel, isosceles trapezoid, base angles, altitude, circumference, cubic units, diameter, hypotenuse, isosceles trapezoid, linear units, median of a trapezoid, pi, radius, sector area, AA similarity, congruent, corresponding, dilation, proportion, proportional, ratio, reduction, SAS similarity theorem, scale Factor, similar, SSS similarity theorem, 30 – 60 – 90 Triangle, 45 – 45 – 90 Triangle, altitude, angle of depression, angle of elevation, converse, hypotenuse, inverse, law of cosines, law of sines, Pythagorean theorem, Pythagorean triple, radical, rationalize, SAS, SOHCAHTOA, special right triangles, SSS, tangent, trigonometry, bisect, center, central angle, chord, circumscribed polygon, concentric circles, equation of a circle, inscribed angle, inscribed polygon, major arc, minor arc, point of tangency, secant, base area, lateral area, lateral edge, lateral face, slant height

Intro Unit	Reasoning in Geometry (2 Weeks)
Intro Unit Big Ideas	Geometric thinking involves developing, attending to, and learning how to work with imagery. Building definitions requires moving back and forth between the verbal and the visual. Valid inductive and deductive reasoning are used to develop and prove conjectures.
Intro Unit Guiding & Essential Questions	How do you explain your reasoning in Geometry? How do you create definitions? How do you logically think through problems?
Intro Unit Student Learning Goals	• Students will use the Pythagorean Theorem. • Students will write logical statements. • Students will use inductive and deductive reasoning to make predictions.
Intro Unit Vocabulary	conclusion, conditional, converse, counterexample, postulate, theorem, hypotenuse, hypothesis, right triangle, leg, definition
Intro Unit Missouri Learning Standards	G.CO.C.8: Prove geometric theorems. Prove theorems about lines and angles.
Intro Unit Common Core State Standards	HSG-CO.C.9- Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.
Intro Unit Assessments	This is a smaller assessment that not only tests their knowledge but introduces them to question types that they will see throughout the year. Specific topics covered: • <i>Schoology</i> section over key concepts • Writing a conditional statement and providing a counterexample • Using the Pythagorean Theorem • Applying to a new situation: 2 ACT questions • Justify with Reasoning: CER
Curricular Resources Utilized in Intro Unit	Math Medic

Unit 1	Foundations in Geometry (3 Weeks)
Unit 1 Big Ideas	Points, lines, and planes are the foundations of geometry. Geometry allows measurement of things that can't be measured easily using traditional methods.
Unit 1 Guiding & Essential Questions	What are the building blocks of geometry? How can geometric properties be used to prove relationships between lines and angles? How can you describe the attributes of a segment and an angle?
Unit 1 Student Learning Goals	• Students will sketch accurate diagrams. • Students will find missing angles and lengths from a diagram. • Students will construct geometric figures. • Students will use geometric relationships to set up and solve equations. • Students will apply geometry relationships to coordinate geometry.
Unit 1 Vocabulary	acute angle, adjacent angle, angle bisector, collinear points, complementary angles, congruent, coplanar points, distance, equidistant, horizontal lines, intersection, line, linear pair, midpoint of a segment, noncollinear points, noncoplanar points, obtuse angle, plane, point, postulate, ray, right angle, segment, segment bisector, slope, space, straight angle, supplementary angles, theorem, undefined, vertex of an angle, vertical angles, vertical lines
Unit 1 Missouri Learning Standards	G.MG.A.1: Apply geometric concepts in modeling situations. Use geometric shapes, their measures and their properties to describe objects.
	G.CO.A.1 - Define angle, circle, perpendicular line, parallel line, line segment and ray based on the undefined notions of point, line, distance along a line and distance around a circular arc.
	G.CO.D.11: Make geometric constructions. Construct geometric figures using various tools and methods.
Unit 1 Common Core State Standards	HSG-CO.A.1- Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
	HSG-CO.D.12- Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.
	HSG-CO.D.13- Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

Unit 1 Assessments	Specific topics covered: • <i>Schoolology</i> section over key concepts • Applying to a new situation: 2 ACT questions • Justify with Reasoning: CER • Marking diagrams accurately • Find missing angles • Setting up and solving equations using geometric relationships • Coordinate Geometry
Curricular Resources Utilized in Unit 1	Math Medic

Unit 2	Deductive Reasoning (3 Weeks)
Unit 2 Big Ideas	Logic, in combination with facts, theorems and formulas can be used to draw conclusions about geometric figures. A proof is a formal argument supported by postulates, theorems and definitions; it uses logical reasoning to come to its conclusion.
Unit 2 Guiding & Essential Questions	• How can you make a conjecture and prove that it is true? • Why is it important to prove every logical step in a proof? • Why might there be more than one correct way to write a proof?
Unit 2 Student Learning Goals	• Students will find missing angles and lengths from a diagram. • Students will construct geometric figures. • Students will use geometric relationships to set up and solve equations. • Students will apply geometry relationships to coordinate geometry. • Student will prove theorems.
Unit 2 Vocabulary	addition property of equality, alternate interior angle theorem, alternate interior angles, angle addition postulate, angle bisector theorem, consecutive interior angles (same-side interior angles), corresponding angle postulate, corresponding angles, definition of a midpoint, definition of angle bisector, distance, distributive property, division property of equality, hypotenuse, hypothesis, midpoint theorem, multiplication property of equality, parallel lines, perpendicular lines, reflexive property, same-side interior angle theorem, segment addition postulate, substitution property, subtraction property of equality, supplementary angles, transitive property, transversal, vertical angle theorem

Unit 2 Missouri Learning Standards	G.CO.C.8: Prove geometric theorems. Prove theorems about lines and angles.
Unit 2 Common Core State Standards	HSG-CO.C.9- Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.
Unit 2 Assessments	Specific topics covered: • <i>Schoology</i> section over key concepts • Applying to a new situation: 2 ACT questions • Justify with Reasoning: CER • Find missing angles • Setting up and solving equations using geometric relationships • Prove Theorems
Curricular Resources Utilized in Unit 2	Math Medic

Unit 3	Rigid Motions (3 Weeks)
Unit 3 Big Ideas	Geometric ideas can be communicated using a variety of representations. Congruence, similarity, and symmetry can be understood from the perspective of geometric transformation.
Unit 3 Guiding & Essential Questions	• How can you change a figure's position without changing its size and shape? • How can you represent a transformation in a coordinate plane? • How do you recognize symmetry in a figure? • How are transformations related to symmetry and tessellations?
Unit 3 Student Learning Goals	• Students will write a rule for a rigid motion. • Students will identify symmetries. • Students will perform rigid motions (translation, reflection, rotation, composition). • Students will apply inverse transformations.
Unit 3 Vocabulary	axis, composition, counterclockwise, image, line of reflection, origin, point of rotation, preimage, preserve, quadrant, reflection, translation, rigid motion, rotation, transformation

Unit 3 Missouri Learning Standards	G.CO.A.2 - Represent transformations in the plane, and describe them as functions that take points in the plane as inputs and give other points as outputs.
	G.CO.A.3 - Describe the rotational symmetry and lines of symmetry of two-dimensional figures.
	G.CO.A.4 - Develop definitions of rotations, reflections and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments.
	G.CO.A.5 - Demonstrate the ability to rotate, reflect or translate a figure, and determine a possible sequence of transformations between two congruent figures.
	G.CO.B.6: Understand congruence in terms of rigid motions. Develop the definition of congruence in terms of rigid motions.
Unit 3 Common Core State Standards	HSG-CO.A.2- Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch)
	HSG-CO.A.3- Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
	HSG-CO.A.4-Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
	HSG-CO.A.5- Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
	HSG-CO.B.6- Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
Unit 3 Assessments	Specific topics covered: • <i>Schoolology</i> section over key concepts • Applying to a new situation: 2 ACT questions • Justify with Reasoning: CER • Identify symmetry • Describe transformations • Write a rule for rigid motions • Perform transformations

Curricular Resources Utilized in Unit 3	Math Medic
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Unit 4	Congruent Triangles (4 Weeks)
Unit 4 Big Ideas	Relationships that exist between the angles and segments of triangles can be proven.
Unit 4 Guiding & Essential Questions	• How do you identify corresponding parts of congruent triangles? • How do you show that two triangles are congruent? • How can triangles fall into more than one triangle classification? • What are the “shortcuts” to prove that two triangles are congruent? • Under what conditions are similar figures congruent? • How do I choose a method to use to prove two triangles congruent? • In what ways can I use congruent triangles to justify many geometric constructions?
Unit 4 Student Learning Goals	• Students will find missing angles and lengths from a diagram (simple). • Students will construct geometric figures. • Students will use geometric relationships to set up and solve equations. • Students will prove triangles congruent. • Students will prove parts of triangles congruent. • Students will extend parts proofs. • Students will find the interior and exterior angles of polygons. • Students will prove and use theorems about triangles. • Students will classify triangles by sides and by angles. • Students will find interior and exterior angle measures of triangles. • Students will use rigid motion to show that two triangles are congruent. • Students will identify corresponding parts of congruent polygons. • Students will use rigid motions to prove the SAS Congruence Theorem. • Students will prove and use theorems about equilateral triangles. • Students will use rigid motions to prove the SSS Congruence Theorem. • Students will use rigid motions to prove the AAS Congruence Theorem. • Students will use congruent triangles to prove statements. • Students will place figures in a coordinate plane.
Unit 4 Vocabulary	AAS, Acute triangle, alternate interior angle theorem, ASA, corresponding parts, CPCTC, definition of angle bisector, definition of isosceles triangle, definition of midpoint, definition of perpendicular lines, equiangular,

	equilateral, exterior angle, isosceles triangle, isosceles triangle theorem, obtuse triangle, reflexive property, regular, remote interior angles, right triangle, SAS, scalene triangle, SSS, vertical angle theorem
Unit 4 Missouri Learning Standards	G.CO.B.7: Understand congruence in terms of rigid motions. Develop the criteria for triangle congruence from the definition of congruence in terms of rigid motions.
	G.CO.C.9: Prove geometric theorems. Prove theorems about triangles.
	G.SRT.B.4: Prove theorems involving similarity. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
Unit 4 Common Core State Standards	HSG-CO.B.6- Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent
	HSG-CO.B.7- Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
	HSG-CO.B.8- Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.
	HSG-CO.C.10- Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180° ; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.
	HSG-SRT.B.5- Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
Unit 4 Assessments	Specific topics covered: • <i>Schoology</i> section over key concepts • Applying to a new situation: 2 ACT questions • Justify with Reasoning: CER • Finding interior angles and exterior angles of a polygon • Find missing angles • Setting up and solving equations using geometric relationships • Prove triangle congruent • Prove parts of triangles congruent • Prove extensions of triangles congruent
Curricular Resources	Math Medic

Utilized in Unit 4	
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Unit 5	Quadrilaterals (4 Weeks)
Unit 5 Big Ideas	Congruent triangles help identify properties of quadrilaterals. Coordinate geometry can be used to represent and verify geometric/algebraic relationships. Coordinate geometry provides visualization and measurement to geometric theorems.
Unit 5 Guiding & Essential Questions	- Given a quadrilateral, how is it determined that it is a parallelogram? - How do you determine which special parallelogram is given using the properties and not a figure of the parallelogram? - Why is a trapezoid not a special parallelogram, even though it has parallel sides?
Unit 5 Student Learning Goals	- Students will prove properties of parallelograms. - Students will solve problems involving parallelograms in the coordinate plane. - Students will prove that a quadrilateral is a parallelogram. - Students will find missing lengths that make a quadrilateral a parallelogram. - Students will show that a quadrilateral in the coordinate plane is a parallelogram. - Students will identify special quadrilaterals. - Students will explain how special parallelograms are related. - Students will identify trapezoids and kites. - Students will use properties of trapezoids and kites to solve problems.
Unit 5 Vocabulary	bisect, midpoint, diagonals, perpendicular, parallelogram, rectangle, rhombus, square, opposite angles, opposite sides, consecutive sides, consecutive angles, regular, equilateral, equiangular, parallel, isosceles trapezoid, base angles, bases, legs, polygon, trapezoid
Unit 5 Missouri Learning Standards	G.CO.C.10: Prove geometric theorems. Prove theorems about polygons.
	G.GPE.B.3: Use coordinates to prove geometric theorems algebraically.
	G.GPE.B.4: Use coordinates to prove geometric theorems algebraically. Prove the slope criteria for parallel and perpendicular lines and use them to solve problems.
	G.GPE.B.6: Use coordinates to prove geometric theorems algebraically. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.
	G.MG.A.1: Apply geometric concepts in modeling situations. Use geometric shapes, their measures and their

	properties to describe objects.
Unit 5 Common Core State Standards	HSG-CO.C.11- Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.
	HSG-GPE.B.4- Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$.
	HSG-GPE.B.5- Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
	HSG-GPE.B.7- Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula
Unit 5 Assessments	Specific topics covered: • Exam ○ Find missing angle and lengths from a diagram ○ Set up and solve equations using geometric relationships • Project ○ Apply knowledge of coordinate geometry to quadrilateral
Curricular Resources Utilized in Unit 5	Math Medic

Unit 6	Area (4 Weeks)
Unit 6 Big Ideas	Objects can be broken down and analyzed in terms of its two dimensional parts.
Unit 6 Guiding & Essential Questions	• Can you find the area and perimeter of irregular shapes? • What is the difference between perimeter and area of a 2-dimensional figure? • How will knowing the formulas for area and perimeter help in your daily life?

	• How are units used for area and perimeter different?
Unit 6 Student Learning Goals	• Students will apply area and perimeter formulas for rectangles • Students will apply area and perimeter formulas for triangles • Students will apply area and perimeter formulas for trapezoids and parallelograms • Students will apply area and perimeter formulas for circles • Students will calculate sector area and arc length • Students will maximize area of quadrilaterals • Students will calculate area and perimeter of irregular shapes
Unit 6 Vocabulary	altitude, arc length, area, base, circle, circumference, cubic units, diameter, distance, height, hypotenuse, isosceles trapezoid, leg, length, linear units, median of a trapezoid, parallelogram, perimeter, pi, polygon, radius, rectangle, rhombus, right triangle, sector area, square, square units, surface area, trapezoid, triangle, volume
Unit 6 Missouri Learning Standards	G.GMD.A.1: Explain volume formulas and use them to solve problems. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid and cone.
Unit 6 Common Core State Standards	HSG-C.B.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
	HSG-GMD.A.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone
Unit 6 Assessments	Specific topics covered: • <i>Schoology</i> section over key concepts • Applying to a new situation: 2 ACT questions • Justify with Reasoning: CER • Find the area and perimeter of rectangles • Find the area of a triangle • Find the area of trapezoids and parallelograms • Find area and circumference of circles • Find sector area and arc length • Maximize the area quadrilaterals • Calculate the area and perimeter of irregular shapes
Curricular Resources Utilized in Unit 6	Math Medic

Unit 7	Similarity (4 Weeks)
Unit 7 Big Ideas	Ratios and proportions between two polygons can determine if the polygons are similar.
Unit 7 Guiding & Essential Questions	• How can you set up and solve proportions? • What does it mean for two or more figures to be similar? • What is the relationship between perimeters and area of similar 2-dimensional figures? • What is the Golden Ratio and how does it fit into your daily life?
Unit 7 Student Learning Goals	• Students will apply concepts to a new situation. • Students will justify with reasoning. • Students will solve proportions. • Students will find the ratios of perimeter and area of two similar figures. • Students will use geometric relationships to set up and solve proportions. • Students will identify similar triangles. • Students will perform dilations. • Students will find corresponding lengths in similar polygons. • Students will determine whether polygons are similar. • Students will use angle measures of triangles to determine whether triangles are similar.
Unit 7 Vocabulary	AA similarity, area, complementary, congruent, corresponding, dilation, enlargement, in proportion, perimeter, proportion, proportional, ratio, reduction, SAS similarity theorem, scale Factor, similar, SSS similarity theorem, supplementary
Unit 7 Missouri Learning Standards	G.SRT.A.1: Understand similarity in terms of similarity transformations. Construct and analyze scale changes of geometric figures.
	G.SRT.A.2: Understand similarity in terms of similarity transformations. Use the definition of similarity to decide if figures are similar and to solve problems involving similar figures.
	G.SRT.A.3: Understand similarity in terms of similarity transformations. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
	G.SRT.B.4: Prove theorems involving similarity. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Unit 7 Common Core State Standards	HSG-SRT.A.1- Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
	HSG-SRT.A.2- Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
	HSG-SRT.A.3- Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
	HSG-SRT.B.4- Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity
Unit 7 Assessments	Specific topics covered: • <i>Schoology</i> section over key concepts • Applying to a new situation: 2 ACT questions • Justify with Reasoning: CER • Solve proportions • Find the ratios of perimeter and area of two similar figures • Use geometric relationships to set up and solve proportions ◦ Word Problem ◦ Similar Triangles ◦ Similar figures • Identify similar triangles • Perform dilations
Curricular Resources Utilized in Unit 7	Math Medic

Unit 8	Trigonometry (4 Weeks)
Unit 8 Big Ideas	Relationships that exist between the angles and segments of right triangles can be used to set up and solve problems.
Unit 8 Guiding & Essential Questions	• How do you use the Pythagorean Theorem to find missing lengths on a right triangle? • What are the specific properties for 30-60-90 and 45-45-90 triangles? • How do you use Sine, Cosine, and Tangent to find missing values in a right triangle?

	• How can you use angle measurements in a triangle to find side lengths of the triangle without measuring them? • How can you find the height of Mount Everest?
Unit 8 Student Learning Goals	• Students will justify with reasoning. • Students will find sine, cosine, and tangent. • Students will simplify Radicals. • Students will use the Law of Sines and Law of Cosines to find missing sides and angles. • Students will use SOH CAH TOA to find missing sides and angles. • Students will use SOH CAH TOA in a word problem. • Students will find side lengths in 40-45-90 triangles. • Students will find side lengths in 30-60-90 triangles. • Students will use special right triangles to solve real-world problems. • Students will solve real-life problems by solving right triangles.
Unit 8 Vocabulary	30 – 60 – 90 Triangle, 45 – 45 – 90 Triangle, AAS, acute triangle, adjacent, altitude, angle of depression, angle of elevation, area, ASA, converse, cosine, denominator, diagonal, equilateral triangle, hypotenuse, Inverse, isosceles triangle, law of cosines, law of sines, leg, numerator, obtuse triangle, opposite, perfect square, perimeter, proportion, Pythagorean theorem, Pythagorean triple, radical, rationalize, right triangle, SAS, sine, SOHCAHTOA, special right triangles, SSS, tangent, trigonometry
Unit 8 Missouri Learning Standards	G.SRT.C.5: Define trigonometric ratios, solve problems involving right triangles. Understand that side ratios in right triangles define the trigonometric ratios for acute angles.
	G.SRT.C.6: Define trigonometric ratios, solve problems involving right triangles. Explain and use the relationship between the sine and cosine of complementary angles.
	G.SRT.C.7: Define trigonometric ratios, solve problems involving right triangles. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles.
Unit 8 Common Core State Standards	HSG-SRT.C.6- Understand 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.
	HSG-SRT.C.7- Explain and use the relationship between the sine and cosine of complementary angles.
	HSG-SRT.C.8- Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
	HSG-SRT.D.11- Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

Unit 8 Assessments	Specific topics covered: • Schoology section over key concepts • Applying to a new situation: 2 ACT questions • Justify with Reasoning: CER • Simplify radicals • Find sine, cosine, and tangent • Find missing sides and angles using Special Triangles • Find missing sides and angles using Trigonometry • Apply Trigonometry to a word problem Project • Apply Law of sines and law of cosines
Curricular Resources Utilized in Unit 8	Math Medic

Unit 9	Circles (4 Weeks)
Unit 9 Big Ideas	Relationships exist between the angle measures and segment lengths of circles. Circles can be used to describe angles and prove a variety of geometric theorems.
Unit 9 Guiding & Essential Questions	• How can you prove relationships between angles and arcs in a circle? • When lines intersect a circle, or within a circle, how do you find the measures of resulting angles, arcs, and segments? • How do you find the equation of a circle in the coordinate plane? • Why are manhole covers circles?
Unit 9 Student Learning Goals	• Students will apply concepts to a new situation. • Students will justify with reasoning. • Students will construct geometric figures. • Students will calculate sector area and arc length. • Students will find the measurements of arcs, central angles, and inscribed angles. • Students will apply tangent relationships to find lengths. • Students will apply the relationship between chords perpendicular to a radius to find angles, arcs, and lengths. • Students will apply relationships between secants and tangents to find angles and lengths. • Students will graph a circle given an equation.

	• Students will use the formula for the circumference of a circle to find measures. • Students will find arc lengths and use arc lengths to find measures. • Students will solve real-life problems involving circumference. • Students will find areas of sectors of circles. • Students will solve problems involving areas of sectors.
Unit 9 Vocabulary	arc, bisect, center, central angle, chord, circle, circumscribed polygon, concentric circles, congruent circles, diameter, equation of a circle, inscribed angle, inscribed polygon, major arc, minor arc, perpendicular, point of tangency, Pythagorean Theorem, radius, secant, semicircle, tangent
Unit 9 Missouri Learning Standards	G.C.A.2: Understand and apply theorems about circles. Identify and describe relationships among inscribed angles, radii and chords of circles.
	G.C.A.3: Understand and apply theorems about circles. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
	G.C.B.4: Find arc lengths and areas of sectors of circles. Derive the formula for the length of an arc of a circle.
	G.C.B.5: Find arc lengths and areas of sectors of circles. Derive the formula for the area of a sector of a circle.
	G.GPE.A.1: Translate between the geometric description and the equation for a conic section. Derive the equation of a circle.
Unit 9 Common Core State Standards	HSG-C.A.2- Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.
	HSG-C.A.1- Prove that all circles are similar.
	HSG-C.A.3- Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
	HSG-C.A.4- Construct a tangent line from a point outside a given circle to the circle.
	HSG-GPE.A.1- Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation
Unit 9 Assessments	Specific topics covered: • <i>Schoolology</i> section over key concepts • Applying to a new situation: 2 ACT questions • Justify with Reasoning: CER

	• Find the measurements of arcs, central angles, and inscribed angles • Apply tangent relationship to find lengths • Apply relationship between chord perpendicular to a radius to find angles, arcs, and lengths • Apply relationships between secants and tangents to find angles and lengths • Graph a circle given an equation • Calculate sector area and arc length
Curricular Resources Utilized in Unit 9	Math Medic

Unit 10	Volume and Surface Area (4 Weeks)
Unit 10 Big Ideas	Objects can be broken down and analyzed in terms of its two-dimensional and three dimensional parts. Geometric figures can be compared by their relative values.
Unit 10 Guiding & Essential Questions	• What is the relationship between area and volume? • What is volume exactly? • How does change in height affect the volume or surface area of a prism or pyramid? • How are the volumes between a prism and cylinder similar? Different? • How are the volumes between a pyramid and cone similar? Different? • Why is a sphere so unique compared to a prism, cylinder, cone or pyramid?
Unit 10 Student Learning Goals	• Students will calculate the volume and surface area of prisms. • Students will calculate the volume and surface area of spheres. • Students will calculate the volume and surface area of pyramids. • Students will calculate the volume and surface area of cylinders. • Students will calculate the volume and surface area of cones. • Students will calculate volume and surface area of irregular shapes. • Students will find the ratios of volume of two similar solids.
Unit 10 Vocabulary	altitude, base, base area, circle, cone, cubic units, cylinder, diameter, face, lateral area, lateral edge, lateral face, polygon, prism, pyramid, radius, rectangle, slant height, sphere, square units, surface area, triangle, volume
Unit 10 Missouri Learning Standards	G.GMD.A.2: Explain volume formulas and use them to solve problems. Use volume formulas for cylinders, pyramids, cones, spheres and composite figures to solve problems.

	G.GMD.A.1: Explain volume formulas and use them to solve problems. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid and cone.
	G.MG.A.2: Apply geometric concepts in modeling situations. Apply concepts of density based on area and volume in modeling situations.
	G.MG.A.3: Apply geometric concepts in modeling situations. Apply geometric methods to solve design mathematical modeling problems.
Unit 10 Common Core State Standards	HSG-MG.A.1- Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
	HSG-GMD.A.3- Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems
	HSG-MG.A.2- Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot)
	HSG-MG.A.3- Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios)
Unit 10 Assessments	Specific topics covered: • <i>Schoology</i> section over key concepts • Applying to a new situation: 2 ACT questions • Justify with Reasoning: CER • Calculate volume and surface area of prisms • Calculate volume and surface area of spheres • Calculate volume and surface area of pyramids • Calculate volume and surface area of cylinders • Calculate volume of cones • Calculate volume and surface area of irregular shapes
Curricular Resources Utilized in Unit 10	Math Medic