

Geometry

Overview

Geometry introduces students to geometric concepts using inductive and deductive reasoning to prove properties of parallel lines, planes, triangles, quadrilaterals, and circles. They will also learn how to find the areas and volumes of solids and the areas of plane figures.

Course Rationale: This course serves as a prerequisite for Algebra II and Pre-Calculus. It covers material that is tested on the Michigan Merit Exam, which includes the ACT. The successful completion of Geometry is required by the State of Michigan as a graduation requirement.

Grades: 9-11 (typically taken after successful completion of Algebra I)

Prerequisites: Algebra I

Other: 2 Trimesters for complete course. Both trimesters must be completed with a 60% or higher in order to successfully complete the course.

Units of Study

<u>Unit Title</u>	<u>Length of Study</u>
Geometry A: Definitions/Constructions	4 weeks
Congruent Triangles	4 weeks
Similar Triangles	4 weeks
Geometry B: Quadrilaterals	3 weeks
Circles	4 weeks
Transformations	2 weeks
Modeling/Volume	3 weeks

Mathematics Core Units

Course Title: Geometry A

Unit Title: Definitions/Constructions

Length of Unit 20 days

Grade Level: 9th – 10th

Unit 1 of 7

COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p>G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on undefined notion of point, line, distance along a line, and distance around a circular arc.</p> <p>G.CO.9 Prove vertical angles are congruent</p> <p>G.CO.9 Prove points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints</p> <p>G.GPE.4 Use coordinates to prove geometric theorems algebraically</p> <p>G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them solve geometric problems</p> <p>G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio</p> <p>G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles</p> <p>G.CO.9 Prove when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent</p> <p>G.C.3 Construct the inscribed and circumscribed circles of a triangle</p> <p>G.CO.12 Make formal geometric constructions with a variety of tools and methods</p> <p>G.CO.13 Construct an equilateral triangle, a square, and regular hexagon inscribed in a circle</p>	<p>I can...</p> <p>...Explain the difference between a segment, ray, and line</p> <p>...Define congruent</p> <p>...Define similar</p> <p>...Explain the difference between congruent and similar</p> <p>...Explain properties of perpendicular bisectors</p> <p>...Find the slope between two points</p> <p>...Explain the difference in slopes of parallel and perpendicular lines</p> <p>...Identify Vertical, Straight Alternate Interior, Corresponding, and Same-Side Interior Angles</p> <p>...Use Vertical, Straight, Alternate Interior, Corresponding, and Same-Side Interior Angles to find angle measures</p> <p>...Use the distance formula to find lengths</p> <p>...Define regular polygon</p> <p>...Explain the difference between constructing a figure and drawing a figure</p> <p>...Construct various geometric figures</p>	<p>Alternate Interior</p> <p>Angle</p> <p>Angle</p> <p>Bisector</p> <p>Congruent</p> <p>Corresponding Angle</p> <p>Distance</p> <p>Line</p> <p>Midpoint</p> <p>Parallel</p> <p>Perpendicular</p> <p>Point</p> <p>Ray</p> <p>Same Side Interior</p> <p>Angle</p> <p>Segment</p> <p>Similar</p> <p>Slope</p> <p>Transversal</p> <p>Vertical Angle</p>	<ul style="list-style-type: none"> - Homework Assignments - Weekly Quizzes - Unit Test - Exit Tickets - 5-3-1 Reading Summary/Concept Check - "I Can..." Matrix - Comparison of student work vs exemplars - "I think I got it.." Self Assessment cards - Research and report on a real life application of basic geometric figures 	<p>TI-Nspire Calculators</p> <ul style="list-style-type: none"> - Geometry Pages <p>Geogebra.org</p> <ul style="list-style-type: none"> - Dynamic Exploration <p>Personal Website</p> <p>Kuta Software</p> <ul style="list-style-type: none"> - Naming angles - Information in Geometric Diagrams - Angle Pair Relationships <p>Emergent Math –Problem Based Learning</p> <ul style="list-style-type: none"> - Pizza Delivery Regions - Placing a Fire Hydrant - Transversals, tape, and post-its - Classroom Coordinate Geometry

Mathematics Core Units

Course Title: Geometry A

Unit Title: Congruent Triangles

Length of Unit 20 days

Grade Level: 9th – 10th

Unit 2 of 7

COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p>G.CO.6 Use definition of congruence in terms of rigid motions to decide if they are congruent</p> <p>G.CO.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 angles are congruent</p> <p>G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.</p> <p>G.CO.10 Prove the measures of interior angles of a triangle sum to 180°</p> <p>G.CO.10 Prove the base angles of an isosceles triangle are congruent</p> <p>G.CO.10 Prove the segment joining the midpoints of two sides of a triangle is parallel and half the length of the third side</p> <p>G.CO.10 Prove the medians of a triangle meet at a point</p>	<p>I can...</p> <p>...Define congruent</p> <p>...Determine if two triangles are congruent by ASA, AAS, SSS, SAS or HL</p> <p>...Define CPCTC</p> <p>...Use CPCTC after proving triangles congruent</p> <p>...Define Isosceles and Equilateral Triangles</p> <p>...Prove Isosceles Triangle Theorem</p> <p>...Prove Triangle Sum Theorem</p> <p>...Prove Midsegment Theorem</p> <p>...Use midsegment theorem to find lengths and angles in triangles</p> <p>...Define median</p> <p>...Explain properties of the centroid</p>	<p>AAS</p> <p>ASA</p> <p>Centroid</p> <p>Conditional</p> <p>Congruent</p> <p>CPCTC</p> <p>Equilateral Triangle</p> <p>HL</p> <p>Isosceles Triangle</p> <p>Median</p> <p>Midsegment</p> <p>Theorem</p> <p>Proof</p> <p>SAS</p> <p>SSS</p> <p>Triangle Angle Sum</p> <p>Truth Value</p>	<ul style="list-style-type: none"> - Homework Assignments - Weekly Quizzes - Unit Test - Exit Tickets - 5-3-1 Reading Summary/Concept Check - “I Can...” Matrix - Comparison of student work vs exemplars - “I think I got it..” Self Assessment cards - Research and report on a real life application of basic geometric figures 	<p>TI-Nspire Calculators</p> <ul style="list-style-type: none"> • Geometry Pages <p>Geogebra.org</p> <ul style="list-style-type: none"> • Dynamic Exploration <p>Personal Website</p> <p>Kuta Software</p> <ul style="list-style-type: none"> • Triangle Angle Sum • SSS,ASA, AAS,SAS Congruence • Isosceles and Equilateral Triangles • Medians <p>Emergent Math –Problem Based Learning</p> <ul style="list-style-type: none"> • Isosceles Triangle Problem • T.V. Space • Proofs of Pythagorean Theorem

Mathematics Core Units

Course Title: Geometry A

Unit Title: Similar Triangles

Length of Unit 20 days

Grade Level: 9th – 10th

Unit 3 of 7

COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p>G.SRT.2. 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</p> <p>G.SRT.3 Use properties of similarity transformations to establish the AA criterion for two triangles to be similar</p> <p>G. SRT.4 Prove a line parallel to one side of a triangle divides the other two proportionally</p> <p>G.SRT.4 Prove the Pythagorean Theorem using similarity</p> <p>G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures</p> <p>G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trig ratios</p> <p>G.SRT.7 Explain and use relationship between sine and cosine of complementary angles</p> <p>G.SRT.8 Use trig ratios and the Pythagorean Theorem to solve right triangles in applied problems</p>	<p>I can...</p> <p>...Define similar</p> <p>...Solve proportions</p> <p>...Create ratios of similar figures</p> <p>...Determine if two triangles are similar by AA~, SAS~, or SSS~</p> <p>...Use similar figures to find missing lengths</p> <p>...Find the geometric mean of two numbers</p> <p>...Use similarity in right triangles to solve for lengths of hypotenuse and altitude</p> <p>...Use side-splitter theorem to find missing lengths</p> <p>...Use Angle-Bisector Theorem to find missing lengths</p> <p>...State the Pythagorean Theorem</p> <p>...Use the Pythagorean Theorem to solve for missing lengths</p> <p>...Use similarity to express the trig ratios</p> <p>...Use trig ratios to find missing angles and lengths</p>	<p>Angle-Bisector Theorem</p> <p>Cosine</p> <p>Geometric Mean</p> <p>Hypotenuse</p> <p>Proportional</p> <p>Pythagorean Theorem</p> <p>Ratio</p> <p>Side-Splitter Theorem</p> <p>Similar</p> <p>Sine</p> <p>Tangent</p>	<ul style="list-style-type: none"> - Homework Assignments - Weekly Quizzes - Unit Test - Exit Tickets - 5-3-1 Reading Summary/Concept Check - “I Can...” Matrix - Comparison of student work vs exemplars - “I think I got it..” Self Assessment cards - Research and report on a real life application of basic geometric figures 	<p>TI-Nspire Calculators</p> <ul style="list-style-type: none"> • Geometry Pages <p>Geogebra.org</p> <ul style="list-style-type: none"> • Dynamic Exploration <p>Personal Website</p> <p>Kuta Software</p> <ul style="list-style-type: none"> • Similar Triangles • Similar Right Triangles • Proportional parts in triangles <p>Emergent Math –Problem Based Learning</p> <ul style="list-style-type: none"> • Windshield Wiper • Edgier Brownies • New York Minute

Mathematics Core Units

Course Title: Geometry B

Unit Title: Quadrilaterals

Length of Unit 15 days

Grade Level: 9th – 10th

Page 4 of 7

COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p>G.CO.11 Prove opposite sides of a parallelogram are congruent</p> <p>G.CO.11 Prove opposite angles of a parallelogram are congruent</p> <p>G.CO.11 Prove diagonals of a parallelogram bisect each other, and conversely</p> <p>G.CO.11 Prove rectangles are parallelograms with congruent diagonals</p> <p>G.GPE.4 Use coordinates to prove simple geometric theorems algebraically</p>	<p>I can...</p> <p>...Explain using the properties the difference between the types of quadrilaterals</p> <p>...Use the properties of quadrilaterals to solve for missing angles and lengths</p> <p>...Prove a quadrilateral is a parallelogram</p> <p>...Find the sum of the measures of the interior angles of a polygon</p> <p>...Find the measure of one interior angle of a regular polygon</p> <p>...Use distance, midpoint, and slope formulas to prove geometric theorems</p>	<p>Isosceles Trapezoid</p> <p>Kite</p> <p>Parallelogram</p> <p>Polygon Angle Sum Theorem</p> <p>Rectangle</p> <p>Regular Polygon</p> <p>Rhombus</p> <p>Square</p> <p>Trapezoid</p>	<ul style="list-style-type: none"> - Homework Assignments - Weekly Quizzes - Unit Test - Exit Tickets - 5-3-1 Reading Summary/Concept Check - “I Can...” Matrix - Comparison of student work vs exemplars - “I think I got it..” Self Assessment cards - Research and report on a real life application of basic geometric figures 	<p>TI-Nspire Calculators</p> <ul style="list-style-type: none"> • Geometry Pages <p>Geogebra.org</p> <ul style="list-style-type: none"> • Dynamic Exploration <p>Personal Website</p> <p>Kuta Software</p> <ul style="list-style-type: none"> • Classifying Quadrilaterals • Properties of Trapezoids • Polygons and Angles <p>Emergent Math –Problem Based Learning</p> <ul style="list-style-type: none"> • Complete the quadrilateral

Mathematics Core Units

Course Title: Geometry B

Unit Title: Circles

Length of Unit 20 days

Grade Level: 9th – 10th

Page 5 of 7

COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p>G.C.1 Prove that all circles are similar</p> <p>G.C.2 Identify and describe relationships among inscribed angles, radii, and chords</p> <p>G.C.3 Prove properties of angles for a quadrilateral inscribed in a circle</p> <p>G.C.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector</p> <p>G.GPE.1 Derive the equation of a circle of a given center and radius using the Pythagorean Theorem</p>	<p>I can...</p> <p>...Find the measure of an arc</p> <p>...Find the length of an arc</p> <p>...Find the measure of an inscribed angle</p> <p>...Use the properties of chords to find angle measurements and segment lengths</p> <p>...Write the equation of a circle knowing the center and radius</p> <p>...Use tangent lines to find angles and lengths</p> <p>...Use chords and secant lines to find angle measurements and segment lengths</p>	<p>Arc Length</p> <p>Arc Measurement</p> <p>Chord</p> <p>Circle</p> <p>Inscribed Angle</p> <p>Intercepted Arc</p> <p>Major Arc</p> <p>Minor Arc</p> <p>Radius</p> <p>Secant Line</p> <p>Semicircle</p> <p>Tangent Line</p>	<ul style="list-style-type: none"> - Homework Assignments - Weekly Quizzes - Unit Test - Exit Tickets - 5-3-1 Reading Summary/Concept Check - “I Can...” Matrix - Comparison of student work vs exemplars - “I think I got it..” Self Assessment cards - Research and report on a real life application of basic geometric figures 	<p>TI-Nspire Calculators</p> <ul style="list-style-type: none"> • Geometry Pages <p>Geogebra.org</p> <ul style="list-style-type: none"> • Dynamic Exploration <p>Personal Website</p> <p>Kuta Software</p> <ul style="list-style-type: none"> • Arcs and Central Angles • Arcs and Chords • Inscribed Angles • Equations of circles <p>Emergent Math –Problem Based Learning</p> <ul style="list-style-type: none"> • Dog on a leash • Bike Trail • Pew! Pew! • Pizza Challenge • Elmo’s Microwave Travel

Mathematics Core Units

Course Title: Geometry B

Unit Title: Transformations

Length of Unit 10 days

Grade Level: 9th – 10th

Page 6 of 7

COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p>G.CO.2 Represent transformations in the plane using a variety of methods; described 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</p> <p>G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe rotations and reflections that carry it onto itself</p> <p>G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments</p> <p>G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using a variety of methods</p> <p>G.SRT.1 Verify experimentally the properties of dilations by a center and a scale factor</p>	<p>I can...</p> <p>...Translate a pre-image by a given translation vector</p> <p>...Reflect a pre-image over a give line of reflection</p> <p>...Rotate a pre-image by a given angle and direction</p> <p>...Dilate a pre-image by a given scale factor</p> <p>...Determine what type of symmetry a figure has, if any</p> <p>...Compare and contrast transformations that are isometries to those that are not</p>	<p>Dilation</p> <p>Image</p> <p>Isometry</p> <p>Orientation</p> <p>Pre-image</p> <p>Reflection</p> <p>Rotation</p> <p>Symmetry</p> <p>Translation</p> <p>Translation Vector</p>	<ul style="list-style-type: none"> - Homework Assignments - Weekly Quizzes - Unit Test - Exit Tickets - 5-3-1 Reading Summary/Concept Check - “I Can...” Matrix - Comparison of student work vs exemplars - “I think I got it..” Self Assessment cards - Research and report on a real life application of basic geometric figures 	<p>TI-Nspire Calculators</p> <ul style="list-style-type: none"> • Geometry Pages <p>Geogebra.org</p> <ul style="list-style-type: none"> • Dynamic Exploration <p>Personal Website</p> <p>Kuta Software</p> <ul style="list-style-type: none"> • Translations • Rotations • Reflections • Combined Transformation <p>Emergent Math –Problem Based Learning</p>

Mathematics Core Units

Course Title: Geometry B

Unit Title: Modeling/Applications

Length of Unit 15 days

Grade Level: 9th – 10th

Page 7 of 7

COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p>G.GMD.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.</p> <p>G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems</p> <p>G.GMD.4 Identify the shapes of two-dimensional cross sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two dimensional objects.</p> <p>G.MG.1 Use geometric shapes, their measures, and their properties to describe objects</p> <p>G.MG.2 Apply concepts of density based on area and volume in modeling situations</p> <p>G.MG.3 Apply geometric methods to solve design problems</p>	<p>I can...</p> <p>...Find the volume of a prism</p> <p>...Find the volume a pyramid</p> <p>...Find the volume of a cone</p> <p>...Find the volume of a cylinder</p> <p>...Find the volume of sphere</p> <p>...Given a three dimensional shape give the two dimensional cross section</p> <p>...Explain the Cavalieri principle for three dimensional objects</p> <p>...Apply geometric theorems to solve real world situations</p> <p>...Apply geometric theorems to model real world situations</p>	<p>Cavalieri Principle</p> <p>Cone</p> <p>Cross Section</p> <p>Cylinder</p> <p>Prism</p> <p>Pyramid</p> <p>Slant height</p> <p>Sphere</p> <p>Volume</p>	<ul style="list-style-type: none"> - Homework Assignments - Weekly Quizzes - Unit Test - Exit Tickets - 5-3-1 Reading Summary/Concept Check - "I Can..." Matrix - Comparison of student work vs exemplars - "I think I got it.." Self Assessment cards - Research and report on a real life application of basic geometric figures 	<p>TI-Nspire Calculators</p> <ul style="list-style-type: none"> • Geometry Pages <p>Geogebra.org</p> <p>Personal Website</p> <ul style="list-style-type: none"> • Dynamic Exploration <p>Kuta Software</p> <ul style="list-style-type: none"> • Identifying Solid figures • Volume of Prisms and Cylinders • Volume of Pyramids and Cones <p>Emergent Math –Problem Based Learning</p> <ul style="list-style-type: none"> • Pop Box Design • Dog on a leash • Edgier Brownies • Calculating Volumes of Compound Objects <p>Hands – on Manipulatives</p>

