



Geometry

Diocese of Greensburg Curriculum

Unit	Standards	Content	Skills
<p>Tools of Geometry</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Expressing Geometric Properties with Equations HSG-GPE.B. Use coordinates to prove simple geometric theorems algebraically</p> <p>HSG-GPE.B.4. Use coordinates to prove simple geometric theorems algebraically.</p> <p>Modeling with Geometry HSG-MG.A. Apply geometric concepts in modeling situations</p> <p>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).</p> <p>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).</p> <p>HSG-MG.A.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy constraints or minimize cost; working with typographic grid systems based on ratios).</p> <p>Mathematical Practice MP.The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.</p> <p>MP.1. Make sense of problems and persevere in solving them.</p>	<ul style="list-style-type: none"> • Points, Lines, Rays, Segments, and Planes <ul style="list-style-type: none"> ○ Opposite Rays ○ Distance on a line • Measuring <ul style="list-style-type: none"> ○ Angles with a protractor ○ Lines in metric and standard • Coordinate Geometry <ul style="list-style-type: none"> ○ Midpoint ○ Slope • Angle Relationships • Angle Pairs <ul style="list-style-type: none"> ○ Complimentary ○ Supplementary ○ Vertical • Naming Shapes <ul style="list-style-type: none"> ○ Triangles by sides ○ Triangles by angles ○ By number of sides • Convex and Concave Polygons 	<p>The students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> • Define point, line, plane, ray, and segment • Define midpoint and slope • Define an angle <p>Comprehension</p> <ul style="list-style-type: none"> • Identify and describe point, line, line segment, ray, plane, and angles • Identify and describe adjacent, vertical, complementary, and supplementary angles • Identify various triangles by sides and angles. • Identify various shapes based upon the number of sides. <p>Application</p> <ul style="list-style-type: none"> • Calculate measures of pairs of angles • Calculate the midpoint, distance and slope. <p>Analysis</p> <ul style="list-style-type: none"> • Model complementary, supplementary, and vertical angles

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	<p>MP.4. Model with mathematics.</p> <p>NCTM: Mathematics NCTM: Grades 9 - 12</p> <hr/> <p>Geometry Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships</p> <p>explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them;</p> <p>Specify locations and describe spatial relationships using coordinate geometry and other representational systems</p> <p>use Cartesian coordinates and other coordinate systems, such as navigational, polar, or spherical systems, to analyze geometric situations;</p> <p>investigate conjectures and solve problems involving two- and three-dimensional objects represented with Cartesian coordinates.</p> <p>Use visualization, spatial reasoning, and geometric modeling to solve problems</p> <p>draw and construct representations of two- and three-dimensional geometric objects using a variety of tools;</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>		<ul style="list-style-type: none"> • Measure angles and segments <p>Synthesis</p> <ul style="list-style-type: none"> • Create convex and concave polygons

Unit	Standards	Content	Skills
<p>Reasoning and Proof</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Congruence HSG-CO.C. Prove geometric theorems</p> <p>HSG-CO.C.9. Prove theorems about lines and angles.</p> <p>Mathematical Practice MP.The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.</p> <p>MP.2. Reason abstractly and quantitatively.</p> <p>MP.3. Construct viable arguments and critique the reasoning of others.</p> <p>MP.8. Look for and express regularity in repeated reasoning.</p> <hr/> <p>NCTM: Mathematics NCTM: Grades 9 - 12</p> <p>Geometry Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships</p> <p>explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them;</p>	<ul style="list-style-type: none"> • Patterns • Conditionals • Converses • Inverses • Contrapositives • Biconditionals • Deductive Reasoning • Algebraic Proofs • Using Angles in Proofs <ul style="list-style-type: none"> ○ Vertical Angles ○ Supplementary Angles ○ Complimentary Angles • Inductive Reasoning 	<p>The students will be able to:</p> <p>Comprehension</p> <ul style="list-style-type: none"> • Understand conditionals, converses, inverses, and contrapositives • Understand the difference between deductive and inductive reasoning <p>Application</p> <ul style="list-style-type: none"> • Write inverse, converse, and contrapositive of a conditional statement • Apply bi-conditional statements in the context of logical reasoning <p>Analysis</p> <ul style="list-style-type: none"> • Utilize inductive reasoning to determine patterns • Determine counterexamples to disprove conjectures • Determine truth values of conditional statements, converses and contrapositives • Utilize properties of equality and congruence within a deductive argument <p>Synthesis</p> <ul style="list-style-type: none"> • Hypothesize using inductive reasoning • Create two column proofs <p>Evaluation</p>

Unit	Standards	Content	Skills
	<p>establish the validity of geometric conjectures using deduction, prove theorems, and critique arguments made by others;</p> <p>Process Standards Reasoning and Proof</p> <p>Recognize reasoning and proof as fundamental aspects of mathematics</p> <p>Make and investigate mathematical conjectures</p> <p>Develop and evaluate mathematical arguments and proofs</p> <p>Select and use various types of reasoning and methods of proof</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>		<ul style="list-style-type: none"> Determine truth values of converse, inverse, and contrapositives
<p>Parallel and Perpendicular</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Congruence HSG-CO.A. Experiment with transformations in the plane</p> <p>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.</p> <p>HSG-CO.C. Prove geometric theorems</p> <p>HSG-CO.C.11. Prove theorems about parallelograms.</p> <p>Expressing Geometric Properties with Equations HSG-GPE.B. Use coordinates to prove simple geometric theorems algebraically</p>	<ul style="list-style-type: none"> Transversals Corresponding Angles Alternate Interior/Exterior Angles Same-Side Interior/Exterior Angles Converse of Transversals Perpendicular Transversals Interior and Exterior Angles of a Triangle Slopes of Parallel and Perpendicular Lines 	<p>The students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Identify characteristics of parallel, perpendicular, and skew lines Identify pairs of angles formed by intersecting lines <p>Comprehension</p> <ul style="list-style-type: none"> Determine slopes of parallel and perpendicular lines <p>Application</p> <ul style="list-style-type: none"> Apply theorems about angles formed by parallel lines,

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	<p>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).</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>		<p>transversals and perpendicular lines</p> <p>Analysis</p> <ul style="list-style-type: none"> Determine angle measures given parallel lines and transversals <p>Synthesis</p> <ul style="list-style-type: none"> Generate new equations of lines given a point, parallel and/or perpendicular lines Generate new equations of lines using point-slope, slope-intercept, and standard forms of equations
<p>Congruent Triangles</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Congruence HSG-CO.B. Understand congruence in terms of rigid motions</p> <p>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.</p> <p>HSG-CO.C. Prove geometric theorems</p> <p>HSG-CO.C.10. Prove theorems about triangles.</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>	<ul style="list-style-type: none"> Acute, right, equiangular, and obtuse triangles Scalene, isosceles, and equilateral triangles Congruent SSS, SAS, ASA AAS, HL CPCTC Isosceles Triangle Theorems Overlapping Parts 	<p>The students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Define congruent <p>Comprehension</p> <ul style="list-style-type: none"> Justify triangle congruence based upon sides lengths and angle measure <p>Application</p> <ul style="list-style-type: none"> Classify triangles by side length and angle measure <p>Analysis</p>

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			<ul style="list-style-type: none"> Infer congruency of triangles with overlapping parts <p>Evaluation</p> <ul style="list-style-type: none"> Compare and contrast properties about isosceles and equilateral triangles
<p>Relationships in Triangles</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Congruence HSG-CO.D. Make geometric constructions</p> <p>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.</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>	<ul style="list-style-type: none"> Median and Altitude Perpendicular Bisector and Angle Bisector Triangle Inequalities ($a+b>c$) Pythagorean Theorem Converse of the Pythagorean Theorem 	<p>The students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Define median, altitude, perpendicular bisector, and angle bisector <p>Comprehension</p> <ul style="list-style-type: none"> Explain the triangle inequality theorem <p>Application</p> <ul style="list-style-type: none"> Apply theorems about perpendicular bisectors Apply properties of medians and altitudes in triangle. Apply properties of triangle mid-segments. Solve triangle inequalities using compound inequalities <p>Synthesis</p>

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			<ul style="list-style-type: none"> Construct median, altitude, perpendicular bisector, and angle bisector
<p>Polygons and Quadrilaterals</p>	<p>NCTM: Mathematics NCTM: Grades 6 - 8</p> <hr/> <p>Geometry Specify locations and describe spatial relationships using coordinate geometry and other representational systems</p> <p>use coordinate geometry to examine special geometric shapes, such as regular polygons or those with pairs of parallel or perpendicular sides.</p> <p>NCTM: Grades 9 - 12</p> <hr/> <p>Geometry Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships</p> <p>analyze properties and determine attributes of two- and three-dimensional objects;</p> <p>explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them;</p> <p>Used with permission of the National Council of Teachers of Mathematics. This use does not imply endorsement of materials or validation of alignment.</p>	<ul style="list-style-type: none"> Polygon Angle Summation Theorems Properties of Parallelograms Prove Quadrilaterals to be Parallelograms Diagonals of Rhombus, Rectangle, or a Square Prove that a Shape is a Rhombus, Rectangle, or a Square Trapezoids and Kites Polygons in Coordinate Geometry 	<p>The students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Define types of polygons <p>Comprehension</p> <ul style="list-style-type: none"> Classify types of polygons <p>Application</p> <ul style="list-style-type: none"> Solve for polygon angle measurements Apply properties of special quadrilaterals to solve for angles or <p>Analysis</p> <ul style="list-style-type: none"> Determine if a quadrilateral is special given properties
<p>Similarity</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/>	<ul style="list-style-type: none"> Ratios and Proportions Similar Polygons AA, SSS, SAS 	<p>The students will be able to:</p> <p>Knowledge</p>

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	<p>Similarity, Right Triangles, & Trigonometry HSG-SRT.A. Understand similarity in terms of similarity transformations</p> <p>HSG-SRT.A.1. Verify experimentally the properties of dilations:</p> <p>HSG-SRT.A.1b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.</p> <p>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 pairs of angles and the proportionality of all pairs of sides.</p> <p>HSG-SRT.A.3. Use the properties of similarity transformations to establish the AA criterion for similarity of triangles.</p> <p>HSG-SRT.B. Prove theorems involving similarity</p> <p>HSG-SRT.B.4. Prove theorems about triangles using similarity transformations.</p> <p>HSG-SRT.B.5. Use triangle congruence and similarity criteria to solve problems and to prove relationships in geometric figures.</p> <p>HSG-SRT.C. Define trigonometric ratios and solve problems involving right triangles</p> <p>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.</p> <p>NCTM: Mathematics NCTM: Grades 9 - 12</p> <hr/> <p>Geometry</p>	<ul style="list-style-type: none"> • Triangle Proportionality Theorem • Triangle Angle-Bisector Theorem • Geometric Mean • Right Triangles 	<ul style="list-style-type: none"> • Define properties of similar polygons • Define ratios and proportions <p>Comprehension</p> <ul style="list-style-type: none"> • Explain similarity • Explain AA, SSS, and SAS • Explain the triangle proportionality and angle-bisector theorem <p>Application</p> <ul style="list-style-type: none"> • Apply proportionality and triangle angle bisector theorems to find missing triangle parts • Apply similarity properties <p>Analysis</p> <ul style="list-style-type: none"> • Manipulate scale drawings to solve problems <p>Synthesis</p> <ul style="list-style-type: none"> • Deduce similar triangles utilizing the triangles similarity theorems (AA, SAS, SSS) <p>Evaluation</p> <ul style="list-style-type: none"> • Justify similar figures

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	<p>Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships</p> <p>explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them;</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>		
<p>Right Triangles and Trigonometry</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Similarity, Right Triangles, & Trigonometry</p> <p>HSG-SRT.B. Prove theorems involving similarity</p> <p>HSG-SRT.B.4. Prove theorems about triangles using similarity transformations.</p> <p>HSG-SRT.B.5. Use triangle congruence and similarity criteria to solve problems and to prove relationships in geometric figures.</p> <p>HSG-SRT.C. Define trigonometric ratios and solve problems involving right triangles</p> <p>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.</p> <p>HSG-SRT.C.7. Explain and use the relationship between the sine and cosine of complementary angles.</p>	<ul style="list-style-type: none"> • Special Right Triangles • Sine, Cosine, and Tangent • Angles of Elevation and Depression 	<p>The students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> • Memorize SOH CAH TOA <p>Comprehension</p> <ul style="list-style-type: none"> • Demonstrate knowledge of geometric means to determine segment lengths • Explain the sine, cosine, and tangent ratios <p>Application</p> <ul style="list-style-type: none"> • Solve similarity relationships for right triangles • Apply trigonometric ratios to find side lengths and angles of right triangles • Apply Pythagorean Theorem to determine triangle classification • Determine unknown side lengths using Pythagorean Theorem

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	<p>HSG-SRT.C.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.</p> <p>NCTM: Mathematics NCTM: Grades 9 - 12</p> <hr/> <p>Geometry Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships</p> <p>use trigonometric relationships to determine lengths and angle measures.</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>		<ul style="list-style-type: none"> • Deduce sine, cosine, and tangent functions of acute angles <p>Analysis</p> <ul style="list-style-type: none"> • Use special right triangle properties to solve for missing sides <p>Evaluation</p> <ul style="list-style-type: none"> • Use angles of elevation and depression to determine distances
<p>Area</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Circles HSG-C.B. Find arc lengths and areas of sectors of circles</p> <p>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.</p> <p>Expressing Geometric Properties with Equations HSG-GPE.B. Use coordinates to prove simple geometric theorems algebraically</p> <p>HSG-GPE.B.7. Use coordinates to compute perimeters of polygons and areas for triangles and rectangles, e.g. using the distance formula.</p> <p>NCTM: Mathematics NCTM: Grades 9 - 12</p> <hr/>	<ul style="list-style-type: none"> • Parallelogram • Trapezoid • Rhombus • Triangles • Kites • Regular Polygons • Circles (sectors and arc length) • Irregular Polygons • Similar Polygons • Geometric Probability 	<p>The students will be able to:</p> <p>Comprehension</p> <ul style="list-style-type: none"> • Understand area <p>Application</p> <ul style="list-style-type: none"> • Calculate areas of triangles, quadrilaterals and higher order polygons using trigonometry and auxiliary lines such as radius, apothem, sides, and diagonals • Calculate area of sectors and lengths of arcs <p>Analysis</p>

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	<p>Measurement Apply appropriate techniques, tools, and formulas to determine measurements</p> <p>understand and use formulas for the area, surface area, and volume of geometric figures, including cones, spheres, and cylinders</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>		<ul style="list-style-type: none"> Extrapolate and calculate arc lengths from circumference of circles <p>Synthesis</p> <ul style="list-style-type: none"> Create geometric probability problems <p>Evaluation</p> <ul style="list-style-type: none"> Determine geometric probability based on area
<p>Surface Area and Volume</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Geometric Measurement & Dimension HSG-GMD.A. Explain volume formulas and use them to solve problems</p> <p>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. Use dissection arguments, Cavalieri's principle, and informal limit arguments.</p> <p>HSG-GMD.A.2. (+) Given an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.</p> <p>HSG-GMD.A.3. Use volume formulas for cylinders, pyramids, cones and spheres to solve problems.</p> <p>NCTM: Mathematics NCTM: Grades 9 - 12</p> <hr/> <p>Geometry Use visualization, spatial reasoning, and geometric modeling to solve problems</p>	<ul style="list-style-type: none"> Prisms Pyramids Spheres Similar objects 	<p>The students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Define volume Define surface area <p>Comprehension</p> <ul style="list-style-type: none"> Distinguish and categorize polyhedra, their parts and cross sections Understand surface area and volume <p>Application</p> <ul style="list-style-type: none"> Synthesize and calculate volume and surface area for compound three dimensional objects. <p>Analysis</p>

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	<p>visualize three-dimensional objects and spaces from different perspectives and analyze their cross sections;</p> <p>use geometric models to gain insights into, and answer questions in, other areas of mathematics;</p> <p>use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture</p> <p>Measurement Apply appropriate techniques, tools, and formulas to determine measurements</p> <p>understand and use formulas for the area, surface area, and volume of geometric figures, including cones, spheres, and cylinders</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>		<ul style="list-style-type: none"> Convert different measurements into a standard unit of measurement <p>Synthesis</p> <ul style="list-style-type: none"> Manipulate 3-D figures to determine surface area and volume <p>Evaluation</p> <ul style="list-style-type: none"> Compare and contrast areas and volumes of similar figures
<p>Transformations</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Congruence HSG-CO.A. Experiment with transformations in the plane</p> <p>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).</p> <p>HSG-CO.A.3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.</p> <p>HSG-CO.A.4. Develop definitions of rotations, reflections, and translations in terms of angles,</p>	<ul style="list-style-type: none"> Translation Rotation Reflection with Reflectional Symmetry Dilation 	<p>The students will be able to: Knowledge</p> <ul style="list-style-type: none"> Define translation, rotation, reflection, and dilation <p>Comprehension</p> <ul style="list-style-type: none"> Distinguish lines of symmetry within figures Distinguish rotational symmetry of figures <p>Synthesis</p> <ul style="list-style-type: none"> Formulate a reflected figure over any given line Construct a rotational image about a given point

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	<p>circles, perpendicular lines, parallel lines, and line segments.</p> <p>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.</p> <p>HSG-CO.B. Understand congruence in terms of rigid motions</p> <p>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.</p> <p>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.</p> <p>Similarity, Right Triangles, & Trigonometry</p> <p>HSG-SRT.A. Understand similarity in terms of similarity transformations</p> <p>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 pairs of angles and the proportionality of all pairs of sides.</p> <p>NCTM: Mathematics NCTM: Grades 9 - 12</p> <hr/> <p>Geometry Apply transformations and use symmetry to analyze mathematical situations</p> <p>understand and represent translations, reflections, rotations, and dilations of objects in</p>		<ul style="list-style-type: none"> • Create dilations of figures • Manipulate a figure using vectors

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	<p>the plane by using sketches, coordinates, vectors, function notation, and matrices;</p> <p>use various representations to help understand the effects of simple transformations and their compositions.</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>		
<p>Circles</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Circles HSG-C.A. Understand and apply theorems about circles</p> <p>HSG-C.A.1. Prove that all circles are similar.</p> <p>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.</p> <p>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.</p> <p>HSG-C.A.4. (+) Construct a tangent line from a point outside a given circle to the circle.</p> <p>HSG-C.B. Find arc lengths and areas of sectors of circles</p> <p>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.</p>	<ul style="list-style-type: none"> • Chords • Arcs • Tangents • Inscribed Angles • Circumscribed Angles • Angle Measures and Segment Lengths 	<p>The students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> • Define chord, arc, tangent line, inscribed angle, circumscribed angle, <p>Application</p> <ul style="list-style-type: none"> • Extrapolate and calculate arc lengths from circumference of circles • Calculate angle measures of central, inscribed, and circumscribed angles. • Formulate the equation of a circle with center (h,k) and radius r <p>Analysis</p> <ul style="list-style-type: none"> • Find missing parts of a diagram with the aforementioned parts

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	<p>Expressing Geometric Properties with Equations HSG-GPE.A. Translate between the geometric description and the equation for a conic section</p> <p>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.</p> <p>Geometric Measurement & Dimension HSG-GMD.A. Explain volume formulas and use them to solve problems</p> <p>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. Use dissection arguments, Cavalieri's principle, and informal limit arguments.</p> <p>NCTM: Mathematics NCTM: Grades 6 - 8</p> <hr/> <p>Measurement Apply appropriate techniques, tools, and formulas to determine measurements</p> <p>develop and use formulas to determine the circumference of circles and the area of triangles, parallelograms, trapezoids, and circles and develop strategies to find the area of more-complex shapes;</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>		
<p>Constructions</p>	<p>CCSS: Mathematics CCSS: HS: Geometry</p> <hr/> <p>Congruence HSG-CO.D. Make geometric constructions</p>	<ul style="list-style-type: none"> • Bisect a Segment • Bisect an Angle • Construct an Equilateral Triangle • Construct a Square 	<p>The students will be able to: Synthesis</p> <ul style="list-style-type: none"> • Construct geometric objects using a compass and a straight edge

Unit	Standards	Content	Skills
	<p>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.</p> <p>HSG-CO.D.13. Construct an equilateral triangle, a square and a regular hexagon inscribed in a circle.</p> <p>Similarity, Right Triangles, & Trigonometry HSG-SRT.A. Understand similarity in terms of similarity transformations</p> <p>HSG-SRT.A.1a. 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.</p> <p>Mathematical Practice MP.The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.</p> <p>MP.5. Use appropriate tools strategically.</p> <p>MP.6. Attend to precision.</p> <p>MP.7. Look for and make use of structure.</p> <p>NCTM: Mathematics NCTM: Grades 9 - 12 <hr/> Geometry</p>		<ul style="list-style-type: none"> Construct different shapes using a compass and a straight edge

Unit	Standards	Content	Skills
	<p>Use visualization, spatial reasoning, and geometric modeling to solve problems</p> <p>visualize three-dimensional objects and spaces from different perspectives and analyze their cross sections;</p> <p>use vertex-edge graphs to model and solve problems;</p> <p>use geometric models to gain insights into, and answer questions in, other areas of mathematics;</p> <p>use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture</p> <p>© Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.</p>		