

Wyoming Department of Education Required Virtual Education Course Syllabus

2201000 - Washakie County School District No. 1

Program Name	Washakie #1 Online	Content Area	MA
Course ID	W02072G0.5012	Grade Level	9-12
Course Name	WOL-Geometry-A	# of Credits	0.5
SCED Code	02072G0.5012	Curriculum Type	K-12 Fuel Education

COURSE DESCRIPTION

In this comprehensive course, students are challenged to recognize and work with geometric concepts in various contexts. They build on ideas of inductive and deductive reasoning, logic, concepts, and techniques of Euclidean plane and solid geometry. They develop deeper understandings of mathematical structure, method, and applications of Euclidean plane and solid geometry. Students use visualizations, spatial reasoning, and geometric modeling to solve problems. Topics of study include points, lines, and angles; triangles; right triangles; quadrilaterals and other polygons; circles; coordinate geometry; three-dimensional solids; geometric constructions; symmetry; the use of transformations; and non-Euclidean geometries.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets
N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.*
G.CO.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.
G.CO.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).
G.CO.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
G.CO.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
G.CO.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.
G.CO.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.
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 corresponding pairs of angles are congruent.
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.
G.CO.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.
G.CO.10	Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180 degrees; 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.
G.CO.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.
G.CO.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.
G.CO.13	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

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G.SRT.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.
G.C.3	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
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 the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
G.GPE.4	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 $(0, 2)$.
G.GPE.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).
G.GPE.6	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
G.GPE.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.*
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. Use dissection arguments, Cavalieri's principle, and informal limit arguments.
G.MG.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).*

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
Semester 1 Unit 1: An Introduction <ul style="list-style-type: none"> • Semester Introduction • Basic Geometric Terms and Concepts • Measuring Length • Measuring Angles • Bisectors and Line Relationships • Relationships between Triangles and Circles • Transformations • Using Algebra to Describe Geometry 	G-CO.1 G-CO.2 G-CO.4 G-CO.5 G-CO.9 G-CO.10 G-CO.12 G-C.3 G-GPE.6	<p>Describe and name points, lines, and planes.</p> <p>Describe basic properties of points, lines, and planes.</p> <p>Define and describe basic properties of line segments and rays.</p> <p>Identify collinear and coplanar points.</p> <p>Identify the intersection of two lines or of two planes.</p> <p>Understand the difference between a postulate and a theorem and how proofs are used in Euclidean geometry.</p> <p>Describe the difference between postulates and theorems and how they are used in proofs.</p> <p>Identify the components and purpose of a proof.</p> <p>Define and measure line segments on a number line.</p> <p>Measure segments and angles.</p> <p>Perform basic constructions with a straightedge and a compass.</p> <p>Determine if line segments are congruent.</p> <p>Identify and use the Segment Addition Postulate and the Segment Congruence Postulate.</p> <p>Identify a point that is between two other points.</p> <p>Define and identify an angle, the parts of an angle, and angle pairs.</p> <p>Measure segments and angles.</p> <p>Measure and classify angles.</p> <p>Identify and use the Angle Addition Postulate, the Angle Congruence Postulate, and the Linear Pair Postulate.</p> <p>Measure segments and angles.</p> <p>Classify angles by their measures and identify special angle pairs.</p> <p>Measure and classify angles.</p> <p>Define angle pairs.</p> <p>Define and construct parallel and perpendicular lines.</p> <p>Describe and name points, lines, and planes.</p> <p>Understand the difference between a postulate and a theorem and how proofs are used in Euclidean geometry.</p> <p>Measure segments and angles.</p> <p>Classify angles by their measures and identify special angle pairs.</p> <p>Define and construct perpendicular lines, segment midpoints, and angle bisectors.</p> <p>Use compass and straightedge or technology to perform constructions.</p> <p>Define and make geometric conjectures.</p> <p>Use compass and straightedge or technology to perform basic constructions.</p> <p>Use compass and straightedge or technology to test conjectures.</p> <p>Define and identify the points of intersection associated with triangles.</p> <p>Identify and construct inscribed and circumscribed circles.</p> <p>Use compass and straightedge or technology to construct points of intersection in triangles, and circumscribed and inscribed circles of triangles.</p> <p>Define and identify the points of intersection associated with triangles.</p> <p>Use compass and straightedge or technology to construct points of intersection in triangles, and circumscribed and inscribed circles of triangles.</p> <p>Identify and construct inscribed and circumscribed circles.</p> <p>Identify and define reflections, rotations, and translations.</p> <p>Determine whether a transformation is isometric.</p> <p>Identify and construct basic transformations.</p> <p>Perform transformations on geometric figures.</p> <p>Describe properties of translations.</p> <p>Identify a rotation or translation that could produce a given image from a pre-image.</p>

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>Describe properties of rotations. Identify and construct basic transformations. Identify and graph points in the coordinate plane. Identify and describe parts and properties of the coordinate plane. Use the coordinate plane to graph points and perform transformations. Use the coordinate plane to graph points and perform transformations. Use algebraic operations on the coordinates of a pre-image to perform translations, reflections, and rotations. Use algebraic notation to describe transformations in the coordinate plane. Describe the result of an algebraic transformation.</p>
<p>Unit 2: Methods of Proof and Logic</p> <ul style="list-style-type: none"> • Reasoning, Arguments, and Proof • Conditional Statements • Compound Statements and Indirect Proof • Definitions and Biconditionals • Algebraic Logic • Inductive and Deductive Reasoning 	<p>N-Q.2</p>	<p>Distinguish between formal and informal methods of proof and explain why deductive reasoning is considered proof. Understand the difference between inductive and deductive reasoning. Define and identify tools for informal reasoning such as observation, measurement, and experimentation. Describe the properties of proofs. Identify premises and conclusions in an argument. Identify and develop syllogisms and other valid arguments. Determine whether an argument is valid or invalid. Identify parts of conditional statements. Identify and define a conditional statement and form the inverse, converse, and contrapositive of the statement. Write and identify forms of conditional statements. Write conditional statements. Identify and define a conditional statement and form the inverse, converse, and contrapositive of the statement. Create truth tables for conditional statements and compound sentences. Create and interpret truth tables for conditional statements. Use the Law of Contrapositives. Create or interpret Euler diagrams that model conditional statements. Reach conclusions from logical chains. Use the Law of Contrapositives and the If-Then Transitive Property. Create truth tables for conditional statements and compound sentences. Identify and create truth tables for conjunctions, disjunctions, and compound statements. Identify and write compound statements including conjunctions and disjunctions. Understand the difference between inclusive or and exclusive or. Identify and define a conditional statement and form the inverse, converse, and contrapositive of the statement. Identify parts of conditional statements. Distinguish between formal and informal methods of proof and explain why deductive reasoning is considered proof. Identify and define a conditional statement and form the inverse, converse, and contrapositive of the statement. Create truth tables for conditional statements and compound sentences. Reach conclusions from logical chains. Determine whether an argument is valid or invalid. Define and identify tools for informal reasoning such as observation, measurement, and experimentation. Describe the properties of proofs. Write and identify forms of conditional statements. Prove statements indirectly. Prove statements indirectly by use of a counterexample.</p>

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>Determine whether a statement is a definition and create definitions. Determine if a statement is a definition. Define and identify adjacent angles and biconditional statements. Write the converse of a given statement. Determine whether a statement is a definition and create definitions. Use Euler diagrams to analyze definitions. Write a converse and biconditional for a given statement. Identify and use the algebraic and equivalence properties of equality. Use proven properties, including Properties of Equality and Properties of Congruence, to justify mathematical statements. Draw conclusions based on given properties, including Properties of Equality and Properties of Congruence. Write proofs in two-column and paragraph formats. Use the two-column or paragraph format for proofs. Identify and use inductive and deductive reasoning. Identify and use vertical angles. Understand the difference between inductive and deductive reasoning. Write proofs in two-column and paragraph formats. Write two-column and paragraph proofs. Use the relationship between vertical angles to solve problems. Use constructions with compass and straightedge or technology to relate multiple reflections to translations or rotations. Write proofs in two-column and paragraph formats. Write two-column proofs. Practice skills and reinforce concepts taught in this course.</p>
<p>Unit 3: Polygon Basics</p> <ul style="list-style-type: none"> • Polygons and Symmetry • Quadrilaterals and Their Properties • Parallel Lines and Transversals • Converses of Parallel Line Properties • The Triangle Sum Theorem • Angles in Polygons • Midsegments • Slope 	<p>N-Q.2 G-CO.3 G-CO.5 G-CO.9 G-CO.10 G-GPE.5</p>	<p>Define and classify polygons. Identify properties of polygons. Classify polygons by their angles and by their sides. Classify triangles by their sides. Identify and draw figures with reflection symmetry and with rotation symmetry. Identify and draw axes of symmetry or a center of rotation for a figure with symmetry. Identify and define special quadrilaterals and their properties. Define and identify special quadrilaterals. Identify the properties of special quadrilaterals. Identify the relationships among special quadrilaterals and among their properties. Use properties of special quadrilaterals to solve problems. Identify special angle pairs formed from two lines and a transversal. Identify and use the Corresponding Angles Postulate. Identify special angle pairs formed from two lines and a transversal. Identify and use the Corresponding Angles Postulate. Use properties of parallel lines and transversals to solve problems and prove theorems. Use properties of parallel lines intersected by a transversal to determine angle measures and recognize angle measures that produce parallel lines. Use properties of parallel lines intersected by a transversal to determine angle measures and recognize angle measures that produce parallel lines. Identify the converses of the transversal postulate and theorems. Use postulates and theorems about parallel lines to solve problems. Define and classify polygons. Identify and define special quadrilaterals and their properties. Identify and draw lines of symmetry or a center of rotation for a figure with symmetry.</p>

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UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>Use properties of parallel lines intersected by a transversal to solve problems or prove theorems.</p> <p>Use the Triangle Sum Theorem to solve problems.</p> <p>Use the Triangle Sum Theorem to solve problems.</p> <p>Determine whether a polygon is convex or concave.</p> <p>Develop and use formulas for finding interior and exterior angle measures of a polygon.</p> <p>Find the sum of the measures of interior angles of a convex polygon.</p> <p>Develop and use formulas for finding interior and exterior angle measures of a polygon.</p> <p>Find the measure of each exterior angle of a regular polygon.</p> <p>Use properties of polygons to solve problems.</p> <p>Define and classify polygons.</p> <p>Find the measure of each interior angle of a regular polygon.</p> <p>Find the lengths of mid-segments of triangles and trapezoids.</p> <p>Identify the bases, legs, or midsegment of a triangle or trapezoid.</p> <p>Find the length of the midsegment of a triangle or trapezoid.</p> <p>Find the midpoint of a line segment.</p> <p>Find the lengths of mid-segments of triangles and trapezoids.</p> <p>Find the length of the midsegment of a trapezoid.</p> <p>Find the length of the midsegment of a triangle.</p> <p>Find the midpoint of a line segment.</p> <p>Solve problems involving the midsegment of a trapezoid or triangle.</p> <p>Find the slope of a line.</p> <p>Use the slope formula to solve problems.</p> <p>Use the Parallel Lines Theorem to solve problems.</p> <p>Find the slope of a line.</p> <p>Use the Perpendicular Lines Theorem to solve problems.</p> <p>Use the Midpoint Formula to solve problems.</p> <p>Review the concepts and skills learned in the unit.</p>
<p>Unit 4: Congruent Polygons and Special Quadrilaterals</p> <ul style="list-style-type: none"> • Congruent Polygons and Their Corresponding Parts • Triangle Congruence: SSS, SAS, and ASA • Isosceles Triangles and Corresponding Parts • Triangle Congruence: AAS and HL • Using Triangles to Understand Quadrilaterals • Types of Quadrilaterals • Constructions with Polygons • The Triangle Inequality Theorem 	<p>G-CO.6</p> <p>G-CO.7</p> <p>G-CO.8</p> <p>G-CO.10</p> <p>G-CO.11</p> <p>G-CO.12</p> <p>G-CO.13</p> <p>G.SRT.6</p>	<p>Prove that rotations, reflections, and translations preserve congruence.</p> <p>Identify congruent polygons.</p> <p>Identify congruent polygons and corresponding parts of congruent polygons.</p> <p>Identify corresponding parts of congruent polygons.</p> <p>Use the Polygon Congruence Postulate.</p> <p>Identify congruent polygons and corresponding parts of congruent polygons.</p> <p>Use postulates and theorems to prove triangles congruent.</p> <p>Use the Polygon Congruence Postulate to solve problems and to complete proofs.</p> <p>Use postulates and theorems to prove triangles congruent.</p> <p>Identify the Side-Side-Side, Side-Angle-Side, and Angle-Side-Angle Congruence Postulates.</p> <p>Identify included angles and included sides in triangles.</p> <p>Use postulates and theorems to prove triangles congruent.</p> <p>Use the Side-Side-Side, Side-Angle-Side, and Angle-Side-Angle Congruence Postulates.</p> <p>Use CPCTC to prove congruence of corresponding parts.</p> <p>Identify and use the properties of isosceles triangles.</p> <p>Identify the parts of an isosceles triangle.</p> <p>Identify and use the properties of isosceles triangles.</p> <p>Use postulates and theorems to prove triangles congruent.</p> <p>Use the converse of the Isosceles Triangle Theorem.</p> <p>Use the Isosceles Triangle Theorem.</p>

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		<p>Use postulates and theorems to prove triangles congruent. Identify the congruence postulate or theorem that proves that two triangles are congruent. Use the Hypotenuse-Leg (HL) or AAS Congruence Theorems to prove congruence. Identify congruent polygons and corresponding parts of congruent polygons. Use postulates and theorems to prove triangles congruent. Identify and use the properties of isosceles triangles. Explore angle-side combinations that do not prove congruence. Use properties of special quadrilaterals to solve problems. Use congruent triangles to prove properties of special quadrilaterals. Use triangle congruence postulates and theorems to prove properties of special quadrilaterals. Use properties of special quadrilaterals to solve problems. Use congruent triangles to prove properties of special quadrilaterals. Use properties of special quadrilaterals in proofs. Identify and use properties of parallelograms. Use congruent triangles to prove properties of special quadrilaterals. Use the properties of a figure to determine when a parallelogram is a rectangle, rhombus, or square. Use properties of a figure to identify the special type of quadrilateral it is. Use computer technology or compass and straightedge to construct segments, angles, perpendicular lines, and parallel lines. Use compass and straightedge to construct regular polygons. Use technology to draw regular polygons. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. Compare angle measures when given side lengths or comparisons. Compare side lengths when given angle comparisons or measures. Develop and use the Triangle Inequality Theorem. Describe and use the Triangle Inequality Theorem. Review the concepts and skills learned in the unit.</p>
<p>Unit 5: Perimeter, Area, and Right Triangles</p> <ul style="list-style-type: none"> • Perimeter and Area • Areas of Triangles and Quadrilaterals • Circumference and Area of Circles • The Pythagorean Theorem • Areas of Special Triangles and Regular Polygons • Using the Distance Formula • Proofs and Coordinate Geometry 	<p>N-Q.2 N-Q.3 G-CO.1 G-CO.10 G-C.5 G-GPE.4 G-GPE.7 G-GMD.1 G-MG.3</p>	<p>Develop and use formulas to find the perimeters of rectangles, parallelograms, triangles, and trapezoids. Calculate the perimeter of a rectangle. Calculate the perimeter of a figure made up of rectangles. Develop and use formulas to find the areas of rectangles, parallelograms, triangles, and trapezoids. Define area and find the area of rectangles. Use the Area Sum Postulate to find the area of polygons formed by non-overlapping rectangles. Develop and use formulas to find the areas of rectangles, parallelograms, triangles, and trapezoids. Identify altitudes and bases of triangles. Use the area formula for triangles. Develop and use formulas to find the areas of rectangles, parallelograms, triangles, and trapezoids. Identify altitudes and bases of trapezoids and parallelograms. Find the area of parallelograms. Find the area of trapezoids. Define circle, radius, diameter, and pi. Find the circumference of circles. Use polygons to approximate circumference of circles. Develop and use formulas to find the areas and circumferences of circles.</p>

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		<p>Use polygons to approximate area of circles. Find the area of circles. Develop and use formulas to find the areas and circumferences of circles. Define sector of a circle. Find the population density for a region. Classify triangles by their angles. Use the Pythagorean Theorem to find lengths of missing sides of right triangles. Use the Pythagorean Theorem to solve problems. Use the Pythagorean Theorem to find lengths of missing sides of right triangles. Use the Pythagorean Theorem and its converse. Determine if triangles are right, acute, or obtuse by studying the lengths of their sides. Given three sides of a triangle, determine if it is right, obtuse, or acute. Identify the 45-45-90 and 30-60-90 triangle theorems. Find the lengths of missing sides in 45-45-90 and 30-60-90 triangles. Solve problems involving geometric design. Find the areas of regular polygons. Define apothem. Find the area of a regular polygon. Use the Distance Formula to find the distance between two points in a coordinate plane. Use the Distance Formula to solve problems. Identify how to place a figure on a coordinate plane for use in a coordinate proof. Write or evaluate a coordinate proof of a theorem. Use the Triangle Midsegment Theorem to solve problems. Identify how to place a figure on a coordinate plane for use in a coordinate proof. Write or evaluate a coordinate proof of a theorem. Use coordinate proofs to prove theorems. Review the concepts and skills learned in the unit.</p>
Unit 6: Semester Review and Test • Semester Review • Semester Test		