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	W02072G0.5022	Grade Level	9-12
Course Name	WOL-Geometry-B	# of Credits	0.5
SCED Code	02072G0.5022	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.2	Define appropriate quantities for the purpose of descriptive modeling.*
N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.*
F.TF.8	Prove the Pythagorean identity (sin A)^2 + (cos A)^2 = 1 and use it to find sin A, cos A, or tan A, given sin A, cos A, or tan A, and the quadrant of the angle.
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.SRT.1	Understand similarity in terms of similarity transformations. 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.
G.SRT.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.
G.SRT.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
G.SRT.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.
G.SRT.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
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.SRT.7	Explain and use the relationship between the sine and cosine of complementary angles.
G.SRT.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
G.SRT.9	(+)Derive the formula A = (1/2)ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
G.SRT.10	(+)Prove the Laws of Sines and Cosines and use them to solve problems.
G.SRT.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).
G.C.1	Prove that all circles are similar.

WYOMING CONTENT AND PERFORMANCE STANDARDS	
STANDARD#	BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets
G.C.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.
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.4	(+)Construct a tangent line from a point outside a given circle to the 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.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.
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, √3) lies on the circle centered at the origin and containing the point (0, 2).
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.GMD.2	(+)Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.
G.GMD.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*
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.
G.MG.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).*
G.MG.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).*

SCOPE AND SEQUENCE		
UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
Semester 2 Unit 1: Three-Dimensional Figures and Graphs • Semester Introduction • Solid Shapes and Three-Dimensional Drawing • Lines, Planes, and Polyhedra • Prisms • Coordinates in Three Dimensions • Equations of Lines and Planes in Space	G-GMD.4 G-MG.2	Draw and interpret basic three-dimensional figures as well as two-dimensional views of three-dimensional figures. Interpret a three-dimensional drawing. Define and use characteristics of three-dimensional drawing. Identify orthographic views of three-dimensional figures. Compute the surface area of a simple figure. Compute the volume of a figure comprised of uniform cubes. Identify the solid generated when a plane figure is revolved about an axis. Identify and define half-planes. Identify and define dihedral angles. Identify and define skew lines. Identify the faces, edges, and vertices of polyhedra. Define polyhedron. Create a figure from its net, and draw nets of polyhedra. Define polyhedron and identify the faces, edges, and vertices of polyhedra. Draw basic three-dimensional figures as well as two-dimensional views of three-dimensional figures. Define prism and the parts of a prism. Classify prisms. Solve problems that involve the diagonal of a right prism. Find the surface area and volume of prisms. Identify characteristics of a three-dimensional coordinate system. Locate and plot points in a three-dimensional coordinate system. Use the Distance and Midpoint Formulas for three dimensions Use intercepts to graph planes in space. Determine points that lie on a plane when given its equation. Find the equation for a plane when given its graph or other properties. Determine properties of planes. Write the equations of traces given the equation of a plane. Determine properties of traces of a given plane. Use parametric equations to plot lines in space. Review the concepts and skills learned in the unit.
Unit 2: Surface Area and Volume • Surface Area and Volume • Surface Area and Volume of Prisms • Surface Area and Volume of Pyramids • Surface Area and Volume of Cylinders • Surface Area and Volume of Cones • Surface Area and Volume of Spheres • Three-Dimensional Symmetry	N-Q.2 N-Q.3 G.GMD.1 G-GMD.2 G-GMD.3 G-MG.1 G-MG.2	Define and identify right prisms and the parts of a right prism. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Use formulas to calculate the surface areas of right rectangular prisms and cubes. Use formulas to calculate the volumes of right rectangular prisms and cubes. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Determine the changes in perimeter, area, surface area, and volume in common geometric figures or solids when the value of one or more lengths has changed. Find the surface area to volume ratios of figures. Solve problems using the ratio of surface area to volume Define and identify right prisms and the parts of a right prism. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Develop and use the formula for the surface area of a right prism. Find the volume of any prism. Develop and use Cavalieri's Principle. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres.

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		Define and identify pyramids and the parts of a pyramid. Define and identify parts of a pyramid. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Develop the formula for the surface area of a regular pyramid. Find the surface area of pyramids. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Find the volume of pyramids. Define and identify cylinders and the parts of a cylinder. Define and identify the parts of a cylinder. Develop and use the formula for the surface area of a cylinder. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Find the surface area and volume of a prism. Identify these figures and their parts: prisms, pyramids, and cylinders. Find the surface area and volume of a pyramid. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Find the surface area and volume of a cylinder. Develop and use the formula for the volume of a cylinder. Define and identify cones and the parts of a cone. Define and identify types of cones and their parts. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Develop and use the formula for the surface area of a right cone. Define and identify cones and the parts of a cone. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Develop the formula for the volume of a cone. Use the formula for the volume of a cone. Define and identify spheres and the parts of a sphere. Define and identify parts of a sphere. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Develop the formula for the volume of a sphere. Use the formula for the volume of a sphere. Develop and use formulas to find the surface areas and volumes of prisms, pyramids, cylinders, cones, and spheres. Develop the formula for the surface area of a sphere. Use the formula for the surface area of a sphere. Use volume to calculate density. Transform figures in three-dimensional space. Perform reflections and translations in three-dimensional space. Sketch solids of revolution.Visualize, recognize, and sketch solids of revolution. Identify planes of symmetry for solid figures.

SCOPE AND SEQUENCE		
UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
Unit 3: Similar Shapes • Dilations and Scale Factors • Similar Polygons • Triangle Similarity • Side-Splitting Theorem • Indirect Measurement and Additional Similarity Theorems • Area and Volume Ratios	N-Q.2 G-CO.2 G-SRT.1 G-SRT.2 G-SRT.3 G-SRT.4 G-SRT.5 G-C.1	Determine and use scale factors. Define dilation, center of dilation, and scale factor. Determine whether a dilation is an expansion or a contraction on the basis of its scale factor. Identify and draw contractions and expansions. Sketch images of dilations given the center of dilation and scale factor. Determine and use scale factors. Determine the coordinates of an image point that is the result of a dilation on a coordinate plane. Determine the scale factor of a dilation from a pre-image and image. Define proportion and the parts of a proportion. Define similar polygons. Determine whether two polygons are similar. Define similar polygons. Determine if polygons are similar. Describe the properties of similarity and proportions. Write and solve proportions to find missing measures in similar polygons. Find missing lengths in similar polygons. Use properties of similar figures to solve problems. Use the triangle similarity postulate and theorems to prove two triangles are similar. Use the Angle-Angle (AA) Similarity Postulate to determine if two triangles are similar. Determine and use scale factors. Define similar polygons. Write and solve proportions to find missing measures in similar polygons. Use the triangle similarity postulate and theorems to prove two triangles are similar. Use the Side-Side-Side (SSS) Similarity Theorem to determine if two triangles are similar. Use the Side-Angle-Side (SAS) Similarity Theorem to determine if two triangles are similar. Prove the Side-Splitting Theorem. Use the Side-Splitting Theorem to solve problems. Describe the nature and purpose of corollaries. Use the Two-Transversal Proportionality Corollary to solve problems. Use triangle similarity to measure distances indirectly. Identify and use the proportional relationships between parts of triangles. Use triangle similarity to measure distances indirectly. Identify and use the proportional relationships to find missing side lengths in triangles. Find and use ratios for areas of similar figures. Use areas to find the scale factor that relates two similar figures. Use ratios for areas to find missing dimensions and measures. Find and use ratios for volumes of similar solids. Find and use ratios between volumes of similar solids. Use ratios for volumes and weights to find missing dimensions and measures. Review the concepts and skills learned in the unit.

SCOPE AND SEQUENCE		
UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
Unit 4: Circles • Chords and Arcs • Tangents to Circles • Inscribed Angles and Arcs • Angles Formed by Secants and Tangents • Segments of Tangents, Secants, and Chords • Circles in the Coordinate Plane	G-C0.1 G-SRT.6 G-C.1 G-C.2 G-C.3 G-C.4 G-C.5 G-GPE.1 G.GPE.4	Identify parts of a circle. Define and name a circle and the parts of a circle. Identify and define major arcs, minor arcs, and semicircles. Find the degree measure of an arc and the length of an arc. Find the degree measure and length of an arc. Use the Chords and Arcs Theorem and its converse. Define and identify tangents and secants. Use theorems involving tangents, chords, and arcs to solve problems. Use the Tangent Theorem and its converse. Develop and use the Radius and Chord Theorem. Use theorems involving tangents, chords, and arcs to solve problems. Identify parts of a circle. Define and identify inscribed angles and their intercepted arcs. Find the degree measure of an arc and the length of an arc. Solve problems involving inscribed angles, central angles, and intercepted arcs. Use theorems involving tangents, chords, and arcs to solve problems. Use the Inscribed Angle Theorem and its corollaries to find measures of inscribed angles and intercepted arcs. Identify parts of a circle. Define and identify inscribed angles and their intercepted arcs. Find the degree measure of an arc and the length of an arc. Solve problems involving inscribed angles, central angles, and intercepted arcs. Use theorems involving tangents, chords, and arcs to solve problems. Use the Inscribed Angle Theorem and its corollaries to find measures of inscribed angles and intercepted arcs. Identify parts of a circle. Use the Inscribed Angle Theorem and its corollaries to find measures of inscribed angles and intercepted arcs. Solve problems involving inscribed angles, central angles, and intercepted arcs. Use theorems involving tangents, chords, and arcs to solve problems. Find the degree measure of an arc and the length of an arc. Define and identify inscribed angles and their intercepted arcs. Use properties of inscribed quadrilaterals. Use the relationship between the measures of angles and arcs formed by intersecting chords to find missing measures. Solve problems involving inscribed angles, central angles, and intercepted arcs. Use theorems involving tangents, chords, and arcs to solve problems. Use theorems involving secants, secant segments, tangent segments, and chord segments to find missing measures. Find the measures of intercepted arcs formed by intersecting tangents and secants. Find the measures of angles formed by intersecting tangents and secants. Find the measures of intercepted arcs formed by intersecting tangents and secants. Find the measures of angles formed by intersecting tangents and secants. Solve problems involving inscribed angles, central angles, and intercepted arcs. Use theorems involving tangents, chords, and arcs to solve problems. Use theorems involving secants, secant segments, tangent segments, and chord segments to find missing measures.

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		Define and identify tangent segments. Use theorems involving tangents, chords, and arcs to solve problems. Use theorems involving secants, secant segments, tangent segments, and chord segments to find missing measures. Use theorems about tangent segments to find missing segment lengths. Use theorems about chords to find missing segment lengths. Define and identify tangent segments, secant segments, and external secant segments. Use theorems involving tangents, chords, and arcs to solve problems. Use theorems involving secants, secant segments, tangent segments, and chord segments to find missing measures. Use theorems about tangents, secants, and chords to find missing segment lengths Write the equation of a circle and sketch a circle from its equation. Write the equation of a circle given its center and another point on the circle. Write the equation of a circle given its center and radius. Write the equation of a circle and sketch a circle from its equation. Sketch a circle given its equation. Find the intercepts of a circle. Translate a circle on the coordinate plane. Write the equation of a circle and sketch a circle from its equation Review the concepts and skills learned in the unit.
Unit 5: Trigonometry • Tangents • Sines and Cosines • Special Right Triangles • The Laws of Sines and Cosines	F-TF.8 G.SRT.6 G-SRT.7 G-SRT.8 G-SRT.9 G-SRT.10 G-SRT.11	Define the sine, cosine, and tangent ratios. Define the tangent ratio and express tangent ratios as fractions or decimals. Use a calculator to find the value of the tangent of an angle. Define the terms and concepts used to talk about trigonometric ratios. Use the sine, cosine, and tangent ratios to find missing angle measures and missing side lengths in right triangles. Use the tangent ratio to find the length of the side of a right triangle. Use the tangent ratio to find the length of a side of a right triangle. Use the sine, cosine, and tangent ratios to find missing angle measures and missing side lengths in right triangles. Find the measure of an angle, given its tangent value. Define the sine, cosine, and tangent ratios. Express the sine (sin) and cosine (cos) ratios of given angles as fractions or decimals. Use the sine, cosine, and tangent ratios to find missing angle measures and missing side lengths in right triangles. Use sine or cosine ratios to find missing side lengths in right triangles. Define the sine, cosine, and tangent ratios. Use the sine, cosine, and tangent ratios to find missing angle measures and missing side lengths in right triangles. Identify trigonometric identities. Use the relationships in 45-45-90 and 30-60-90 triangles to find trigonometric ratios and use those ratios to solve problems. Use trigonometric definitions and special right triangles to derive trigonometric ratios for 45-degree angles. Solve problems involving special right triangles by using trigonometric ratios. Use the relationships in 45-45-90 and 30-60-90 triangles to find trigonometric ratios and use those ratios to solve problems. Use trigonometric definitions and special right triangles to derive trigonometric ratios for 30 and 60 degree angles.

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		Solve problems involving special right triangles by using trigonometric ratios. Use the Law of Sines to find missing measures in triangles. Use the Laws of Sines and Cosines to find missing angle or side measures in triangles. Use the Law of Cosines to find a missing side length in a triangle. Use the Law of Cosines to find a missing angle measure in a triangle. Review the concepts and skills learned in the unit.
Unit 6: Beyond Euclidian Geometry • The Golden Rectangle • Taxicab Geometry • Graph Theory • Topology • Spherical Geometry • Fractal Geometry • Projective Geometry • Computer Logic		Define golden rectangle and golden ratio. Use the golden ratio to find a missing measure in a golden rectangle. Use the golden ratio to find missing side lengths of golden rectangles. Use the properties of golden rectangles and the golden ratio to solve problems. Calculate the taxidistance between two points, and sketch a taxicab circle. Develop and use the taxidistance formula. Use properties of taxicab geometry to solve problems. Draw or identify a taxicab circle. Draw or identify a taxicab perpendicular bisector. Identify an edge that is a bridge of a graph. Interpret a graph that represents a geometric figure or a problem-solving situation. Determine the degree of a vertex in a graph. Identify a circuit in a graph. Determine when a graph has an Euler path and an Euler circuit. Find Euler paths and circuits in graphs. Find Hamiltonian circuits in graphs. Identify topologically equivalent shapes. Identify topologically equivalent figures. Define topology. Use the Jordan Curve Theorem to determine if a point is inside or outside a closed curve. Use the Jordan Curve Theorem and Euler's formula to solve problems. Calculate the Euler characteristic for a polyhedron. Identify topologically equivalent shapes. Identify topologically equivalent figures. Use the Jordan Curve Theorem and Euler's Formula to solve problems. Identify a Mobius strip and a torus. Use the golden ratio to find a missing measure in a golden rectangle. Calculate the taxidistance between two points, and sketch a taxicab circle. Identify topologically equivalent shapes. Calculate the Euler characteristic for a polyhedron. Use the Jordan Curve Theorem to determine if a point is inside or outside a closed curve. Determine when a graph has an Euler path, an Euler circuit, or a Hamiltonian circuit. Explain how spherical geometry differs from Euclidean geometry. Define and identify triangles in spherical geometry. Identify properties of spherical geometry. Build and describe the properties of fractals. Define fractal. Build fractals. Build and describe the properties of fractals.Recognize and explain how to build the Sierpinski Triangle, Koch Snowflake, Cantor Dust, and Menger Sponge fractals.

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		Describe projective geometry. Use affine transformations and central projections to transform figures. Use Pappus's Theorem and Desargues' Theorem to describe relationships among points, lines, and triangles. Describe the implications of Pappus's Theorem and Desargues' Theorem. Define the binary number system and switch from base 2 to base 10. Convert a base 2 number to base 10. Complete and interpret input-output tables for logic gates or networks of logic gates. Create input-output tables for logic gates. Find the sum of two binary numbers. Write a logical expression for a network of gates. Create input-output tables for networks of logic gates. Review the concepts and skills learned in the unit.
Unit 7: Semester Review and Test • Semester Review • Semester Test		