Wyoming Department of Education Required Virtual Education Course Syllabus

Sheridan County School District # 1

Program Name	Sheridan County School District #1 Virtual School	Content Area	MA
Course ID	AC02072	Grade Level	10 - 12
Course Name	Geometry-CCSS	# of Credits	1
SCED Code	02072	Curriculum Type	Acellus

COURSE DESCRIPTION

Acellus Geometry provides students with a knowledge of geometric concepts and guides them through the process of developing important mathematical reasoning and proof skills. Students also gain a perspective of how geometry is an integral part of everyday life. Geometry is A-G Approved through the University of California.

STANDARD #	BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets
N.Q.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.*
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.
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.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.
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.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.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).*
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).*
S.CP.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or compliments of other events ("or," "and," "not").
S.CP.2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.*
S.CP.3	Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.*
S.CP.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science
S.CP.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*
S.CP.6	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.*
S.CP.7	Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.*

S.CP.8	(+)Apply the general Multiplication Rule in a uniform probability model, P(A and B) = [P(A)]x[P(B|A)] =[P(B)]x[P(A|B)], and interpret the answer in terms of the model.*
S.CP.9	(+)Use permutations and combinations to compute probabilities of compound events and solve problems.*
S.MD.6	(+)Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).*
S.MD.7	(+)Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).*

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
Unit 1 – Tools of Geometry	N.Q.1, G.CO.1, G.CO.12, G.GPE.4, G.GPE.6, G.GPE.7	In this unit students learn about nets and perspective drawings, points, lines, and planes. They also learn about measuring segments and angles, angle pairs, basic construction, the coordinate plane, perimeter, circumference, and area.
Unit 2 – Reasoning and Proof	G.CO.9, G.CO.10, G.CO.11	In this unit students learn about inductive reasoning and conditional statements. They also learn about biconditionals, deductive reasoning, and proofs.
Unit 3 – Parallel and Perpendicular Lines	G.CO.1, G.CO.9, G.CO.10, G.CO.12, G.CO.13, G.GPE.5, G.MG.3	In this unit students learn about transversals, parallel lines, proving parallel lines, parallel and perpendicular, and angle sum theorem. They also learn about more constructions, equations of lines, and slopes of parallel and perpendicular lines.
Unit 4 – Congruent Triangles	G.CO.10, G.CO.12, G.CO.13, G.SRT.5	In this unit students learn about congruent figures, SSS and SAS, ASA and SAA, and corresponding parts. They also learn about isosceles and equilateral, right triangles, and overlapping triangles.
Unit 5 – Relationships Within Triangles	G.CO.9, G.CO.10, G.CO.12, G.SRT.5, G.C.3	In this unit students learn about midsegments, bisectors, and centers of triangles. They also learn about indirect proof, and inequalities in one and in two triangles.
Unit 6 – Polygons	G.CO.11, G.SRT.5, G.GPE.4, G.GPE.7	In this unit students learn about polygon angle sums, parallelograms, proving a parallelogram, rhombuses, rectangles, and squares. They also learn about proving special parallelograms, trapezoids and kites, polygons and coordinates, and using coordinates in proofs.

Unit 7 – Similarity	G.SRT.4, G.SRT.5, G.GPE.5	In this unit students learn about ratios and proportions, similar polygons, and proving triangles similar. They also learn about similarity in right triangles, and proportions in similar triangles.
Unit 8 – Right Triangles and Trigonometry	G.SRT.4, G.SRT.7, G.SRT.8, G.SRT.10, G.SRT.11, G.MG.1	In this unit students learn about the Pythagorean Theorem, special right triangles, and trigonometry. They also learn about angles of elevation and depression, the law of sine, and the law of cosine.
Unit 9 – Transformations	G.CO.2, G.CO.3, G.CO.4, G.CO.5, G.CO.6, G.CO.7, G.CO.8, G.SRT.1, G.SRT.2, G.SRT.3	In this unit students learn about translations, reflections, rotations, and compositions. They also learn about congruence transformations, dilations, and similarity transformations.
Unit 10 – Area	G.CO.1, G.CO.13, G.SRT.9, G.C.1, G.C.2, G.C.5, G.GPE.7, G.GMD.3, G.MG.1, S.CP.1	In this unit students learn about areas of paralelograms, triangles, trapezoids, rhombuses, kites, regular polygons, circles, sectors, and perimeters and areas of similar figures. Students also learn about trigonometry and area, circles and arcs, area addition and subtraction, and geometric probability.
Unit 11 – Surface Area and Volume	G.GMD.1, G.GMD.2, G.GMD.3, G.GMD.4, G.MG.1, G.MG.2	In this unit students learn about polyhedra. They also learn about surface areas and volumes of prisms, cylinders, pyramids, cones, spheres, and similar solids.
Unit 12 – Circles	G.C.2, G.C.3, G.C.4, G.GPE.1, G.GMD.4	In this unit students learn about tangent lines, chords and arcs, inscribed angles, angle measures and segment lengths. They also learn about circles in the coordinate plane, and locus.
Unit 13 – Conic Sections		In this unit students learn about conic sections. Specifically, they learn about parabolas, completing the square, distance, midpoint, and circles.
Unit 14 – Probability	S.CP.1, S.CP.2, S.CP.3, S.CP.4, S.CP.5, S.CP.6, S.CP.7, S.CP.8, S.CP.9, S.MD.6, S.MD.7	In this unit students learn about experimental versus theoretical probability, probability distributions, permutations, combinations, and compound probabilities. They also learn about probability models, conditional probability, expected value, and two-way tables.