Geometry

CURRICULUM

CARLISLE AREA SCHOOL DISTRICT

DATE OF BOARD APPROVAL: **February 16, 2023**

COURSE OVERVIEW

Title:	Geometry
Grade Level:	Grades 9-10
Level:	High School – Option II
Length:	Full Year
Duration:	85 Minute Periods
Frequency:	90 Days
Pre-Requisites:	Algebra I, or Algebra 1A and Algebra 1B
Credit:	1 credit
Description:	Geometry is similar to the Honors Geometry course but with a more applied approach. The emphasis is on the study of geometric facts and their applications. It is recommended that students with an interest in eventually studying calculus take the Honors Geometry course. This course may not be selected if Honors Geometry has been successfully completed.

COURSE TIMELINE

UNIT	TITLE	KEY CONCEPTS	DURATION (DAYS)
1	Essentials of Geometry	• Introduction to inductive and deductive reasoning (Why do we study geometry?) • The language of geometry (geometric notation) • Properties of segments (segment addition postulate, congruent segments, midpoint/distance in coordinate plane) • Properties of angles (angle addition postulate, congruent angles, angle bisector) • Classifying polygons	9 Days
2	Angle Pair Relationships	• Angle pairs with intersecting lines (vertical angles, linear pair, perpendicular lines) • Parallel and perpendicular lines in coordinate geometry • Angle pairs with parallel lines cut by a transversal	4 Days
3	Congruent Triangles	• Finding missing measures in triangles (classify triangles, triangle sum thm, exterior angle thm, isosceles/equilateral) • Triangle congruence (definition of congruent triangles, congruence shortcuts, CPCTC) • Proof writing/proving triangles congruent	9 Days
4	Similar Triangles	• Finding missing measures in similar polygons • Similarity shortcuts • Proportionality theorems	6 Days
5	Relationships within Triangles	• Relationships between sides and angles in triangles • Segments within triangles (midsegment, perp bisector, angle bisector, median, altitude) • Points of concurrency (circumcenter, incenter, centroid, orthocenter)	8 Days
6	Right Triangles	• Simplifying radical expressions • Pythagorean thm and its converse • Special right triangles • Right triangle trigonometry • Solving right triangles	13 Days

7	Quadrilaterals	• Measures in polygons (interior sum, exterior sum, area of regular polygon) • Properties of quadrilaterals • Using properties of quadrilaterals • Area of polygons	11 Days
8	Circles	• Circle vocabulary and tangent properties • Arcs and arc measure • Angle relationships • Segment relationships • Composite and shaded area • Arc length and area of sector	10 Days
9	Surface Area and Volume	• Classifying solids • Surface area and volume of cylinders • Surface area and volume of cones • Surface area and volume of spheres • Surface area and volume of prisms and pyramids	9 Days

DISCIPLINARY SKILLS and PRACTICES

DISCIPLINARY PRACTICE	DESCRIPTION
Make sense of problems and persevere in solving them.	Make conjectures about how real-world application problems may be solved, monitor progress toward a solution, and adjust the problem-solving plan if necessary.
Reason abstractly and quantitatively.	Estimate and check answers to problems and determine the reasonableness of results.
Construct viable arguments and critique the reasoning of others.	Justify and communicate conclusions effectively and respond to arguments logically.
Model with mathematics.	Use mathematics to model real world problems, interpreting the mathematical results in the context of the situation.
Use appropriate tools strategically.	Consider the tools available in solving problems and understand the insights gained by using the tool as well as the limitation of the tool.
Attend to precision.	Calculate accurately and efficiently within the context of problems and communicate results precisely.
Look for and make use of structure.	Examine problems to discern a pattern or structure and utilize this finding in similar problems.
Look for and express regularity in repeated reasoning.	Notice repeated calculations or processes and generalize from those insights in order to solve problems.

UNIT 1

Unit Title	Essentials of Geometry
Unit Description	Basic geometric terms are defined. Ways to communicate through words, pictures, and symbols are introduced. Properties of segments and angles will begin to be explored along with classification of polygons. Inductive and deductive thinking will also be discussed as they relate to drawing conclusions in Geometry.
Unit Assessment	Unit assessment

Essential Question	**Learning Goals**	**Content and Vocabulary**	**Standards**
How do you reason in geometry? **1 Day**	☐ Classify a given situation as inductive and deductive reasoning. ☐ Develop a conjecture based on a pattern.	**Content:** -Inductive reasoning is looking for a pattern to write a conjecture. -Deductive reasoning is drawing a conclusion based on fact.	CC.2.3.HS.A.14 Apply geometric concepts to model and solve real-world problems.
How do you represent basic geometric figures using geometric notation? **1 Day**	☐ Identify geometric figures from a diagram and name them using correct notation.	**Vocabulary:** point, line, plane, line segment, ray, opposite rays, collinear, coplanar	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

How do you find the length of line segments? **3 Days**	☐ Find missing lengths of line segments. ☐ Use formulas to find the midpoint and length of a segment in the coordinate plane.	**Content:** -Segment addition can be used to find missing lengths of line segments. -Segment bisector passes through the midpoint of a segment creating congruent segments. -The distance and midpoint formulas can be used to find the length and midpoint of segments in the coordinate plane.	CC.2.3.8.A.3 Understand and apply the Pythagorean theorem to solve problems. G.2.1.2.3 Use slope, distance, and/or midpoint between two points on a coordinate plane to establish properties of a two-dimensional shape.
How do you name, measure, and classify angles? **2 Days**	☐ Name and classify angles. ☐ Find missing measures in an angle.	**Content:** -Angles can be named and classified using the terms acute, right, obtuse, straight, adjacent, complementary, and supplementary. -Angle addition can be used to find missing measures in an angle. -Angle bisector creates two congruent angles.	CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools. G.2.2.1 Use and/or compare measurements of angles.
How are polygons classified? **2 Days**	☐ Name and classify polygons. ☐ Find missing measures in a regular polygon.	**Vocabulary:** polygon, concave, convex, equilateral, equiangular, regular	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures. G.1.2.1.4 Identify and/or use properties of regular polygons.

UNIT 2

Unit Title	Angle Pair Relationships
Unit Description	Parallel lines and skew lines alone do not create any angle pairs. Pairs of angles formed by intersecting lines are defined and the relationships between those angles are used to find missing angle measures.
Unit Assessment	Unit assessment

Essential Question	**Learning Goals**	**Content and Vocabulary**	**Standards**
How do you identify angle pairs created by two intersecting lines? **1 Day**	☐ Identify and name geometric figures given a diagram. ☐ Find angle measures using the relationships between pairs of angles.	**Vocabulary:** parallel lines, parallel planes, skew lines, perpendicular lines, perpendicular planes, linear pairs, vertical angles **Content:** -Linear pair postulate states angles that form a linear pair are supplementary. -Vertical angles theorem states that vertical angles are congruent.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures. G.2.2.1.1 Use properties of angles formed by intersecting lines to find the measures of missing angles.

How do you use angle relationships to solve problems involving intersecting lines? **3 Days**	☐ Identify angle pairs created by two lines and a transversal. ☐ Use angle relationships to solve for missing angle measures.	**Vocabulary:** transversal, corresponding angles, alternate interior angles, alternate exterior angles, consecutive interior angles, consecutive exterior angles **Content:** -Corresponding angles, alternate interior angles, and alternate exterior angles are congruent. -Consecutive interior and consecutive exterior angles are supplementary.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures. G.2.2.1.2 Use properties of angles formed when two parallel lines are cut by a transversal to find the measures of missing angles.

UNIT 3

Unit Title	Congruent Triangles
Unit Description	Triangles can be classified by their sides and angles. Properties of triangles can be used to find missing measures. Triangle congruence shortcuts can be used to prove triangles are congruent.
Unit Assessment	Unit 3 Assessment

Essential Question	**Learning Goals**	**Content and Vocabulary**	**Standards**
How do you use properties of triangles to find missing measures in triangles? **4 Days**	☐ Classify triangles by their sides and by their angles. ☐ Use the Triangle Sum Theorem and its corollary to find missing angle measures in a triangle. ☐ Use the Exterior Angle Theorem to find missing angle measures in a triangle. ☐ Use properties of isosceles and equilateral triangles to find missing angle measures and side lengths in isosceles and equilateral triangles.	**Vocabulary:** acute, right, obtuse, scalene, isosceles, equilateral, exterior angle **Content:** -Triangle Sum Theorem states that the sum of the interior angles of a triangle is 180°. -Corollary to the Triangle Sum Theorem states that the acute angles of a right triangle are complementary. -Exterior Angle Theorem states that the measure of the exterior angle is equal to the sum of the measures of the nonadjacent interior angles. -Base angles are congruent in an isosceles triangle. -An equilateral triangle is equiangular.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures. G.1.2.1.1 Identify and use properties of triangles. G.1.2.1.3 Identify and/or use properties of isosceles and equilateral triangles. G.1.3.2.1 Write, analyze, complete or identify formal proofs.

How do you show two triangles are congruent? **3 Days**	☐ Read and write a congruence statement for two congruent figures. ☐ Recognize if a pair of triangles are congruent and identify the triangle congruence shortcut. ☐ Show corresponding parts of triangles are congruent.	**Content:** -Two triangles are congruent if their corresponding parts are congruent. -A congruence statement is a statement that tells us two triangles are congruent. -The order of the letters when naming two triangles in a congruence statement gives us the corresponding angles of the triangles.	CC.2.3.HS.A.2 Apply rigid transformations to determine and explain congruence. G.1.3.1.1 Identify and/or use properties of congruent and similar polygons or solids.
How do you prove two triangles are congruent? **2 Days**	☐ Write proofs to prove two triangles are congruent.	**Content:** -Identify the missing piece of information needed for two triangles to be congruent using a given triangle congruence shortcut. -Triangles can be proven congruent using congruence shortcuts (SSS, SAS, HL, ASA, and AAS).	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures. G.1.3.2.1 Write, analyze, complete, or identify formal proofs (e.g. direct and/or indirect proofs/proofs by contradiction).

UNIT 4

Unit Title	Similar Triangles
Unit Description	Similar figures are defined and ratio and proportion are used to find missing measures in similar figures. Ways to show two triangles are similar (AA, SSS, and SAS) are defined and indirect measurement is used as an application of similar triangles because of the AA Similarity Postulate to solve real-world problems. Other proportional relationships among triangles and parallel lines are defined and applied.
Unit Assessment	Unit assessment

Unit Assessment

Essential Question	**Learning Goals**	**Content and Vocabulary**	**Standards**
How do you find missing lengths in similar polygons? **3 Days**	☐ Determine if two polygons are similar. ☐ Identify the scale factor of two similar polygons. ☐ Write and solve a proportion to find missing side lengths of similar polygons. ☐ Write and solve a proportion to find missing medians, altitudes, diagonals, and perimeters of similar polygons.	**Vocabulary:** proportion, similar, scale factor **Content:** -Two polygons are similar if their corresponding angles are congruent and their corresponding sides are proportional. -The scale factor is the ratio of any two corresponding lengths in two similar polygons. -Recall solving a proportion by cross multiplying. -In similar polygons, any two corresponding lengths are proportional. This includes sides, altitudes, medians, and perimeters.	CC.2.3.HS.A.6 Verify and apply theorems involving similarity as they relate to plane figures. G.1.3.1.2 Identify and/or use proportional relationships in similar figures.

How do you show two triangles are similar? **1 Day**	☐ Verify the triangle similarity shortcuts. ☐ Determine if a pair of triangles are similar and identify the triangle similarity shortcut that shows the triangles are similar.	**Content:** angle-angle (AA), side-side-side (SSS), and side-angle-side (SAS) are shortcuts for showing two triangles are similar.	CC.2.3.HS.A.5 Create justifications based on transformations to establish similarity of plane figures. G.1.3.1.1 Identify and/or use properties of congruent and similar polygons or solids.
What proportional relationships exist among triangles and parallel lines? **2 Days**	☐ Use the Triangle Proportionality Theorem and its Converse to either find missing parts of triangles or determine if a segment passing through a triangle is a parallel to the third side. ☐ Determine when to apply the Triangle Proportionality Theorem versus the definition of similar polygons to find missing measures in triangles. ☐ Extend the idea of Triangle Proportionality Theorem to apply to parallel lines intersecting two transversals. ☐ Use the idea that the angle bisector divides the sides proportionally to find missing parts of triangles.	**Content:** -Triangle Proportionality Theorem states if a line parallel to one side of a triangle intersects the other two sides, then it divides the two sides proportionally. -Converse to Triangle Proportionality Theorem states if a line divides two sides of a triangle proportionality, then it is parallel to the third side. -If three parallel lines intersect two transversals, then they divide the transversals proportionally. -If a ray bisects an angle of a triangle, then it divides the opposite side into segments whose lengths are proportional to the lengths of the other two sides.	CC.2.3.HS.A.6 Verify and apply theorems involving similarity as they relate to plane figures. G.1.3.1.2 Identify and/or use proportional relationships in similar figures.

UNIT 5

Unit Title	Relationships within Triangles
Unit Description	Relationships between the sides and angles of a triangle are applied. Properties of points of concurrency will be discovered by constructing segments in a triangle and their properties will be compared.
Unit Assessment	Unit assessment

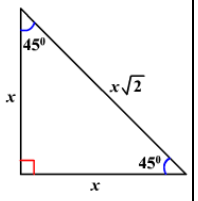
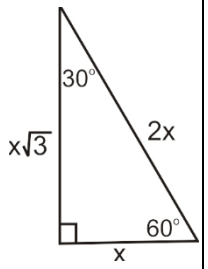
Essential Question	**Learning Goals**	**Content and Vocabulary**	**Standards**
What are the relationships between sides and angles in a triangle? **2 Days**	☐ List sides and angles of a triangle in ascending/descending order. ☐ Determine if three lengths make a triangle. ☐ Describe the possible length of the third side of a triangle given the length of the other two sides. ☐ Compare a pair of sides or angles in a triangle.	**Content:** -The longest side is opposite the largest angle. -The sum of the lengths of any two sides is greater than the third side. -Given two congruent sides, the larger the included angle the longer the opposite side.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

What are the segments of a triangle and how can you use them? **3 Days**	☐ Construct and use the properties of an angle bisector. ☐ Construct and use the properties of a median. ☐ Construct and use the properties of a perpendicular bisector. ☐ Construct and use the properties of an altitude. ☐ Construct and use the properties of a midsegment.	**Vocabulary:** angle bisector, perpendicular bisector, median, altitude and midsegment **Content:** -An angle bisector bisects each angle. -A perpendicular bisector is perpendicular to the side and divides it into two congruent pieces. -A median connects the midpoint of the side to the opposite vertex. -An altitude is perpendicular to the side and goes through the opposite vertex. -A midsegment connects the midpoints of two sides.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.
What are the points of concurrency of a triangle and what are their properties? **3 Days**	☐ Construct and use the properties of a circumcenter. ☐ Construct and use the properties of an incenter. ☐ Construct and use the properties of a centroid. ☐ Construct an orthocenter. ☐ Construct three midsegments.	**Content:** -A circumcenter is the intersection of the three (3) perpendicular bisectors and is equal distance from angles. -An incenter is the intersection of the three angle bisectors and is equal distance from the sides. -A centroid is the intersection of the three medians and is the center of gravity of the triangle. -An orthocenter is the intersection of the three altitudes. -The three midsegments divide the triangle into four congruent triangles.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

UNIT 6

Unit Title	Right Triangles
Unit Description	Techniques will be developed for finding missing sides and angles in right triangles. Pythagorean Theorem and its converse will be used to find missing sides and classify triangles. The special right triangle relationships will be used to find missing sides. Trigonometric ratios will be used to find missing sides and angles in right triangles. Students will apply these techniques to solve right triangles (find all missing sides and angles).
Unit Assessment	Unit assessment

Essential Question	**Learning Goals**	**Content and Vocabulary**	**Standards**
How do you simplify radical expressions? **2 Days**	☐ Simplify radicals. ☐ Multiply and divide radical expressions. ☐ Rationalize the denominator.	**Content:** -Given an un-simplified radicand, factor trees can be used to simplify the radicand. -Given two radical expressions to be multiplied or evenly divided, the product property or quotient property of radicals can be used to perform the given operation. -Given a radical expression with a radical in the denominator, rationalizing must be used to eliminate the radical from the denominator.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

How can Pythagorean Theorem and its converse be applied to right triangles? **3 Days**	☐ Use Pythagorean Theorem to find missing sides lengths of right triangles. ☐ Use Pythagorean Theorem to classify triangles as acute, obtuse or right. ☐ Find the area of an isosceles triangle using Pythagorean Theorem to find the altitude.	**Content:** -Given a right triangle and two side lengths, Pythagorean Theorem can be used to find the third side. -Given three side lengths of a triangle, Pythagorean Theorem can be used to classify the triangle as acute, obtuse or right. -Pythagorean Theorem can be used to solve real world applications. -Pythagorean Theorem can be used to solve real world applications. -Given three sides of an isosceles triangle, Pythagorean Theorem can be used to find the height which can then be used to find the area of the triangle.	CC.2.3.8.A.3 Understand and apply the Pythagorean Theorem to solve problems. G.2.1.1.1 Use the Pythagorean Theorem or trigonometric ratios to write and/or solve problems involving right triangles.
How can special right triangle relationships be used to find missing side lengths? **3 Days**	☐ Apply the relationship between the sides of a 45°-45°-90° right triangle to find missing side lengths. ☐ Apply the relationship between the sides of a 30°-60°-90° right triangle to find missing side lengths. ☐ Find the area of a square or the area of an equilateral triangle using the special right triangle relationships to find a missing dimension needed to calculate the area.	**Content:** -Given one side of a 45°-45°-90° triangle, special right triangle relationships can be used to find the other sides.  -Given one side of a 30°-60°-90° triangle, special right triangle relationships can be used to find the other sides.  -Given a square or an equilateral triangle, the appropriate right triangle relationship can be applied to find a missing dimension needed to calculate the area.	CC.2.3.8.A.3 Understand and apply the Pythagorean Theorem to solve problems. G.2.1.1 Solve problems involving right triangles.

How can trigonometric ratios be used to find missing side lengths? **3 Days**	☐ Identify which trigonometric ratio should be used to find a missing side length. ☐ Use trigonometric ratios to solve for a missing side length. ☐ Find the area by using trigonometric ratios to solve for a missing dimension needed to calculate area.	**Content:** -The trigonometric ratios for sine $= \frac{opp}{hyp}$ cosine $= \frac{adj}{hyp}$, and tangent $= \frac{opp}{adj}$. -Given an acute angle and a side length in a right triangle, the appropriate trigonometric ratio will be applied to solve for a specified missing side length. -Given an acute angle and a side length in a right triangle, trigonometric ratios can be used to find the height or base which can then be used to find the area of the triangle. -Trigonometric ratios can be used to solve real world applications.	CC.2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles. G.2.1.1.2 Use trigonometric ratios to write and/or solve problems involving right triangles.
How can inverse trigonometric ratios be used to find missing angle measures? **2 Days**	☐ Identify which inverse trigonometric ratio should be used to find a missing angle. ☐ Use inverse trigonometric ratios to solve for a missing angle measure. ☐ Solve a right triangle to find all of its missing sides and angles.	**Content:** -Given two side lengths in a right triangle, the appropriate inverse trigonometric ratio will be applied to solve for a specified missing angle measure. -Given a right triangle, find the missing measures by applying the tools of Pythagorean Theorem, special right triangles, trigonometric ratios, and/or inverse trigonometric ratios.	CC.2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles. G.2.1.1.2 Use trigonometric ratios to write and/or solve problems involving right triangles.

UNIT 7

Unit Title	Quadrilaterals
Unit Description	Properties of interior/exterior angles of polygon, area of a regular polygon, and properties of quadrilaterals are explored. Properties are used to classify quadrilaterals, find missing sides, angles and diagonals. Strategies are developed to find the area of complex figures and partial areas.
Unit Assessment	Unit assessment

Essential Question	**Learning Goals**	**Content and Vocabulary**	**Standards**
How can you use the relationship between the sides and angles to solve problems in regular polygons? **4 Days**	☐ Use the Polygon Interior Angle Theorem to find the number of sides or the sum of the interior angles. ☐ Use the Polygon Interior/Exterior Angle Theorems to find the measure of one interior or one exterior angle of a regular polygon. ☐ Calculate the area of a regular polygon.	**Content:** -The Polygon Interior Angle Theorem states that the sum of the measures of the interior angles of a convex n-gon is 180(n-2). -Given a polygon, the sum of the interior angles can be calculated using Polygon Interior Angle Theorem. -Given a polygon, the number of the sides can be calculated using Polygon Interior Angle Theorem. -The Polygon Exterior Angle Theorem states that the sum of the exterior angles of a polygon is 360°. -The measure of the exterior angle of a regular polygon is equal to 360°/n where n is the number of sides. -The area of a regular polygon is equal to $\frac{1}{2}ans$ where a is the apothem, n is the number of sides and s is the side length.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures. G.1.2.1.4 Identify and/or use properties of regular polygons.

How do you identify a quadrilateral using its properties? **1 Day**	☐ Investigate properties of a quadrilateral (parallelogram, square, rectangle, rhombus, trapezoid, isosceles trapezoid or kite). ☐ Identify a quadrilateral (parallelogram, square, rectangle, rhombus, trapezoid, isosceles trapezoid, or kite) by its properties.	**Vocabulary:** parallelogram, rhombus, rectangle, square**,** kite, trapezoid, isosceles trapezoid **Content:** -Given an unknown quadrilateral, it can be classified based on its defining characteristics.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures. G.1.2.1.2 Identify and/or use properties of quadrilaterals.
How do you use the properties of quadrilaterals to find missing measures? **3 Days**	☐ Use the properties of a quadrilateral to find missing measures.	**Content:** -Given a quadrilateral, classify the quadrilateral and use its properties to find missing values for sides, angles and diagonals. -Pythagorean Theorem, Special Right Triangles and trigonometry can be used to find missing measures.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures. G.1.2.1.2 Identify and/or use properties of quadrilaterals.
What procedures can be developed to solve complex area problems? **3 Days**	☐ Locate and use the area formula of quadrilaterals to calculate area using Pythagorean Theorem, Special Right Triangles and Trigonometry to find missing dimensions. ☐ Use the area of a quadrilateral to solve for missing lengths. ☐ Develop and/or use strategies to calculate the area of a compound figure and shaded regions.	**Content:** -Given a quadrilateral, area can be calculated using the appropriate area formula. Problems should require the use of Pythagorean Theorem, Special Right Triangles, and trigonometry to find missing dimensions needed to calculate area. -Given the area of a quadrilateral, use the appropriate formula to find a missing length. -Given compound/composite figure, calculate its area.	CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures. G.2.2.2.2 Find the measurement of a missing length given the area. G.2.2.2.4 Develop and/or use strategies to estimate the area of a compound/composite figure.

UNIT 8

Unit Title	Circles
Unit Description	Parts of a circle are defined and properties of each of the parts are applied. Tangent, secant, and chord properties are used to find segment lengths and angle/arc measures in a circle. Arc length and area of a sector are calculated using proportional relationships with circumference and area of a circle.
Unit Assessment	Unit assessment

Essential Question	**Learning Goals**	**Content and Vocabulary**	**Standards**
How do you use the tangent of a circle to find missing lengths? **2 Days**	☐ Identify a radius, diameter, chord, secant, and tangent in a circle. ☐ Use properties of tangents to find missing lengths in a circle.	**Vocabulary:** center, diameter, radius, chord, secant, tangent **Content:** -Two tangent segments from a common external point are congruent. -A tangent is perpendicular to the radius at its point of tangency. -Given a circle with a tangent line, the properties of tangents can be used to find missing measures.	CC.2.3.HS.A.8 Apply geometric theorems to verify properties of circles. G.1.1.1.1 Identify, determine and/or use the radius, diameter, segment and/or tangent of a circle.

What are the relationships between arcs and angles in a circle? **2 Days**	☐ Identify a minor arc, major arc, semicircle, central angle, and an inscribed angle in a circle. ☐ Determine the measure of an arc in a circle using properties of central angles, semicircles, chords, inscribed angles, and inscribed polygons.	**Vocabulary:** minor arc, major arc, semicircle, central angle, inscribed angle, intercepted arc **Content:** -The measure of a minor arc is equal to its central angle. -The measure of a major arc is the difference between 360° and its corresponding minor arc measure. -The measure of an inscribed angle is equal to half its intercepted arc. -An inscribed angle that intercepts a semicircle is a right angle. -In an inscribed quadrilateral, opposite angles are supplementary. -Congruent chords intercept congruent arcs.	CC.2.3.HS.A.8 Apply geometric theorems to verify properties of circles. G.1.1.1.2 Identify, determine and/or use the arcs, semicircles, and/or angles of a circle.
What angle/arc relationships are created by intersecting segments in a circle? **2 Days**	☐ Determine the measure of an angle or an arc in a circle given two intersecting chords. ☐ Determine the measure of an angle or an arc in a circle given intersecting secants and/or tangents.	**Content:** -If the intersection of the segments is inside the circle, then the angle is equal to half the sum of the measure of the intercepted arcs. -If the intersection of the segments is outside the circle, then the angle is equal to half the difference of the measure of the intercepted arcs.	CC.2.3.HS.A.8 Apply geometric theorems to verify properties of circles.

What segment relationships are created by segments intersecting in a circle? **2 Days**	☐ Determine the length of a segment in a circle given two intersecting chords. ☐ Determine the length of a segment in a circle given intersecting secants and/or tangents.	**Vocabulary:** external segment, secant segment **Content:** -If the intersection of the segments is inside the circle, then the product of the parts of one chord is equal to the product of the parts of the other chord. -If two secants intersect outside the circle, then the product of the lengths of one secant segment and its external segment equals the product of the lengths of the other secant segment and its external segment. -If a tangent and a secant intersect outside the circle, then the product of the lengths of the secant segment and its external segment equals the square of the length of the tangent segment.	CC.2.3.HS.A.8 Apply geometric theorems to verify properties of circles.

How can you find the area and arc length of a sector? **2 Days**	☐ Determine the circumference and area of a circle. ☐ Determine the arc length and area of a sector of a circle. ☒ Determine the area of compound/composite figures involving circles.	**Vocabulary:** circumference, arc length, sector **Content:** -The length of an arc is proportional to the circumference of a circle and can be found by using the proportion: $\frac{arc\ length}{circumference} = \frac{arc\ measure}{360°}$ - The area of a sector is proportional to the area of a circle and can be found using the proportion: $\frac{area\ of\ sector}{area\ of\ circle} = \frac{arc\ measure}{360°}$	CC.2.3.HS.A.9 Extend the concept of similarity to determine arc lengths and areas of sectors of circles. G.1.1.1.2 Identify, determine, and/or use the arcs, semicircles, sectors, and/or angles of a circle. G.2.2.2.2 Find the measurement of a missing length given the perimeter, circumference, or area. G.2.2.2.5 Find the area of a sector of a circle.

UNIT 9

Unit Title	Surface Area and Volume
Unit Description	Polyhedron are named using the shape of their base. Formulas will be used to calculate the surface area and volume of three-dimensional figures. Missing dimensions of three-dimensional figures will be calculated given the surface area or volume of the figure.
Unit Assessment	Unit assessment

Essential Question	**Learning Goals**	**Content and Vocabulary**	**Standards**
How do you classify solids? **1 Day**	☐ Identify three-dimensional figures.	**Content:** -The name of a polyhedron is based on the shape of the base and the number of bases. -The name of a non-polyhedron is based on its shape.	G.1.2.1.5 Identify and/or use properties of pyramids and prisms.
How do you find the surface area of solids? **3 Days**	☐ Use a formula to find the surface area of cylinder, cone, prism, pyramid, sphere, and hemisphere.	**Content:** -Each solid has a formula that can be used to find its surface area. It is important to identify the solid so that the correct formula is used.	CC.2.3.HS.A.12 Explain surface area formulas and use them to solve problems. G.2.3.1.1 Calculate the surface area of prisms, cylinders, cones, pyramids, and/or spheres. Formulas are provided on a reference sheet.

How do you find the volume of solids? **3 Days**	☐ Use a formula to find the volume of a cylinder, cone, prism, pyramid, sphere, and hemisphere.	**Content:** - Each solid has a formula that can be used to find its volume. It is important to identify the solid so that the correct formula is used.	CC.2.3.HS.A.12 Explain volume formulas and use them to solve problems. G.2.3.1.2 Calculate the volume of prisms, cylinders, cones, pyramids, and/or spheres. Formulas are provided on a reference sheet. G.2.3.1.3 Find the measurement of a missing length given the surface area or volume.
How do you find the volume of a composite solid? **2 Days**	☐ Develop and/or use strategies to calculate the volume of a composite solid.	**Content:** -A composite figure is made up of many solids. Identifying each solid within the composite figure is critical to finding the volume of the entire figure.	CC.2.3.HS.A.12 Explain volume formulas and use them to solve problems. G.2.3.1.1 Calculate the surface area of prisms, cylinders, cones, pyramids, and/or spheres. Formulas are provided on a reference sheet. G.2.3.1.2 Calculate the volume of prisms, cylinders, cones, pyramids, and/or spheres. Formulas are provided on a reference sheet.

ACCOMMODATIONS AND MODIFICATIONS

Adaptations or modifications to this planned course will allow exceptional students to earn credits toward graduation or develop skills necessary to make a transition from the school environment to community life and employment. The I.E.P. team has determined that modifications to this planned course will meet the student's I.E.P. needs.

Adaptations/Modifications may include but are not limited to:

INSTRUCTION CONTENT

- Modification of instructional content and/or instructional approaches
- Modification or deletion of some of the essential elements

SETTING

- Preferential seating

METHODS

- Additional clarification of content
- Occasional need for one to one instruction
- Minor adjustments or pacing according to the student's rate of mastery
- Written work is difficult, use verbal/oral approaches
- Modifications of assignments/testing
- Reasonable extensions of time for task/project completion
- Assignment sheet/notebook
- Modified/adjusted mastery rates
- Modified/adjusted grading criteria
- Retesting opportunities

MATERIALS

- Supplemental texts and materials
- Large print materials for visually impaired students
- Outlines and/or study sheets
- Carbonless notebook paper
- Manipulative learning materials
- Alternatives to writing (tape recorder/calculator)