

Geometry emphasizes the development of logical thinking as it relates to geometric problems. Topics include using the correct language and notations of geometry, developing inductive and deductive reasoning, applying geometric properties of lines, triangles, polygons and circles, writing geometric proofs, working with basic geometric solids, and finding perimeter, area, surface area and volume. Students will continue to use and master algebraic skills and apply them to various geometric applications including coordinate geometry and trigonometry.

Credits: 1.0

Prerequisite: Algebra 1 and Algebra 2 CP (75% or higher)

Unit 1: Introduction to the Basic Elements of Geometry**Unit Outcomes:**

In this unit students will begin to work with the language of geometry, using correct notations, and identifying geometric figures. Students will use postulates to identify congruent segments, find the lengths of segments in the coordinate plane, and find the midpoint of a segment. Students will also name, measure, and classify angles, identify complementary and supplementary angles and classify polygons. Algebraic skills include solving linear and quadratic equations, simplifying fractions, and simplifying radicals.

Eligible Content:

G.2.1.2.1 Calculate the distance and/or midpoint between two points on a number line or on a coordinate plane.

G.2.2.1.1 Use properties of angles formed by intersecting lines to find the measures of missing angles.

G.1.2.1 Recognize and/or apply properties of angles, polygons, and polyhedral.

PA Core Standards:

CC.2.3.8.A.3 Understand and apply the Pythagorean theorem to solve problems.

CC.2.3.HS.A.11 Apply coordinate geometry to prove simple geometric theorems algebraically

CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools.

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

Essential Outcomes:

- A. Identify and model points, lines and planes, including intersection.
- B. Measure segments and calculate measurements using distance and midpoint formulas. Express answers as simplified fractions and/or radicals.
- C. Measure and classify angles.
- D. Find missing segments and angles. Bisect angles and segments.
- E. Identify and measure vertical angles, linear pairs, complementary and supplementary angles.
- F. Solve linear and quadratic equations to find angle measurements.
- G. Classify polygons based on sides and angles.
- H. Use the Pythagorean Theorem to solve right triangles

Key Vocabulary:

Acute Angle	Distance between two points	Obtuse Angle
Angle		Pythagorean Theorem
Angle Bisector	Exterior Angles of a Polygon	Plane
Bisect	Interior Angles of a polygon	Polygon
Collinear	Intersecting Lines	Ray
Congruent figures	Line	Regular Polygon
Coplanar	Line Segment	Straight Angle
	Midpoint	Vertex

Content and Instructional Strategies:

Lecture
Discovery and application activities
Geogebra
Visual Aids/Powerpoint
Worksheets
Text-based questions
Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
Websites

Assessment Criteria:

Homework – e-book and/or worksheets
Teacher created quizzes, tests, and open-ended questions
Application based assessments

Resources and Materials:

E-book
Computer or Chromebook
Interwrite Board or Smart Board
Worksheets

Unit 2: Reasoning and Developing Proofs

Unit Outcomes:

In this unit, students will use inductive reasoning to make and test conjectures. They will use deductive reasoning to make logical conclusions. While developing skills in understanding geometric relationships in diagrams, students will be introduced to the idea of a mathematical proof. Finally, students will use properties of equality and the laws of logic to prove statements about segments and angles. Algebraic skills include solving linear and quadratic equations.

Eligible Content:

G.1.3.2.1 Write, analyze, complete, or identify formal proofs (e.g., direct and/or indirect proofs/proofs by contradiction).

PA Core Standards:

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

CC.2.3.HS.A.6 Verify and apply theorems involving similarity as they relate to plane figures.

Essential Outcomes:

- A. Make conjectures based on inductive reasoning and find counter examples.
- B. Recognize and analyze conditional statements and write their inverses, converses, and contra-positives.
- C. Recognize, use, and rewrite definitions in biconditional statements.
- D. Use deductive reasoning to analyze the truth of a statement and form logical arguments.
- E. Use postulates and diagrams involving points, lines, planes and angles
- F. Use algebraic properties in proofs and reasoning.
- G. Justify statements about congruent segments and angle relationships, and write steps in a proof.

Key Vocabulary

Point	Counterexample
Logic Statement	Inductive Reasoning
Direct Proof	Deductive Reasoning
Indirect Proof	Perpendicular Lines
Conjecture	Biconditional Statement

Content and Instructional Strategies:

Lecture

Discovery and application activities

Geogebra

Visual Aids/Powerpoint

Worksheets

Text-based questions

Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

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Websites

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Resources and Materials:

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Interwrite Board or Smart Board
Worksheets

Unit 3: Perpendicular and Parallel Lines

Unit Outcomes:

In this unit, students will classify angle pairs formed by three intersecting lines, study angle pairs formed by a line that intersects two parallel lines and use angle relationships to prove lines parallel. Students will investigate slopes of lines and study the relationship between the slopes of parallel and perpendicular lines. Students will find equations of lines. Finally, they will prove theorems about perpendicular lines and find the distance between parallel lines in the coordinate plane. Algebraic skills include writing equations of lines and graphing lines.

Eligible Content:

G.1.3.2.1 Write, analyze, complete, or identify formal proofs (e.g., direct and/or indirect proofs/proofs by contradiction).

G.2.1.2.2 Relate slope to perpendicularity and/or parallelism (limit to linear algebraic equations).

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.

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.

PA Core Standards:

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

CC.2.3.HS.A.6 Verify and apply theorems involving similarity as they relate to plane figures.

CC.2.3.HS.A.11 Apply coordinate geometry to prove simple geometric theorems algebraically

CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools.

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

Essential Outcomes:

- A. Identify relationships between pairs of lines and angles.
- B. Use angles formed by parallel lines intersected by a transversal.
- C. Prove and use results about parallel lines and transversals.
- D. Prove that lines are parallel, prove that lines are perpendicular
- E. Find and use slopes of lines and relate to parallel or perpendicular.
- F. Write equations of lines including lines parallel or perpendicular to another line.
- G. Graph lines in the coordinate plane using points and slope (include positive, negative, zero and undefined slope).
- H. Find distance between a point and a line.

Key Vocabulary:

Parallel Lines	Corresponding Angles
Perpendicular Lines	Coordinate Plane
Skew Lines	Coordinates
Transversal	

Content and Instructional Strategies:

Lecture
Discovery and application activities
Geogebra
Visual Aids/Powerpoint
Worksheets
Text-based questions
Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
Websites

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Application based assessments

Resources and Materials:

E-book
Computer or Chromebook
Interwrite Board or Smart Board
Worksheets

Unit 4: Congruent Triangles

Unit Outcomes:

In this unit, the students will classify triangles, find measures of angles in triangles, identify congruent figures, and prove triangles congruent. They will also use theorems about isosceles and equilateral triangles. Students will use coordinate geometry to investigate triangle relationships. Algebraic skills include solving linear and quadratic equations.

Eligible Content:

G.1.2.1.1 Identify and/or use properties of triangles.

G.1.2.1.3 Identify and/or use properties of isosceles and equilateral triangles.

G.1.3.1.1 Identify and/or use properties of congruent and similar polygons or solids.

G.1.3.2.1 Write, analyze, complete, or identify formal proofs (e.g., direct and/or indirect proofs/proofs by contradiction).

PA Core Standards:

CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools.

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

CC.2.3.HS.A.13 Analyze relationships between two-dimensional and three-dimensional objects.

CC.2.3.HS.A.6 Verify and apply theorems involving similarity as they relate to plane figures.

Essential Outcomes:

- A. Classify triangles by their sides and angles.
- B. Find measurements of angles in triangles.
- C. Identify congruent figures and corresponding parts.
- D. Prove triangles congruent using definitions, postulates and theorems, including Side-Side-Side (SSS), Side-Angle-Side (SAS), Angle-Side-Angle (ASA), and Angle-Angle-Side (AAS).
- E. Use congruent triangles to prove statements about corresponding parts.
- F. Use coordinate geometry to investigate triangle relationships and properties of congruence.
- G. Use properties of isosceles, equilateral, and right triangles.

Key Vocabulary:

Acute triangle	Obtuse triangle
Corresponding parts	Right triangle
Equilateral triangle	-Legs
Isosceles triangle	-Hypotenuse
-Base	Scalene triangle
-Vertex	Triangle
- Legs	

Content and Instructional Strategies:

Lecture
Discovery and application activities
Geogebra
Visual Aids/Powerpoint
Worksheets
Text-based questions
Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
Websites

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Application based assessments

Resources and Materials:

E-book
Computer or Chromebook
Interwrite Board or Smart Board
Worksheets

Unit 5: Relationships in Triangles

Unit Outcomes:

In this unit, students use properties of special segments in triangles. They explore perpendicular bisectors, angle bisectors, medians, and altitudes along with the concurrency of these segments. Concepts are related to real life problems about distance and center of mass. Students relate side lengths and angle measures of a triangle to determine which triangles are possible. Finally, students extend methods for justifying and proving relationships. Algebraic skills include proportions, linear equations and fractions.

Eligible Content:

G.1.2.1.1 Identify and/or 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 (e.g., direct and/or indirect proofs/proofs by contradiction).

Pa Core Standards:

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

CC.2.3.HS.A.13 Analyze relationships between two-dimensional and three-dimensional objects

Essential Outcomes:

- A. Using properties of perpendicular bisectors and angle bisectors of triangles.
- B. Using properties of medians and altitudes of a triangle.
- C. Recognize and apply properties of inequalities to the angles and sides of a triangle.
- D. Use the triangle inequality theorem to identify possible triangles.

Key Vocabulary:

Altitude of a triangle	Indirect Proof
Centroid	Median of a triangle
Circumcenter	Orthocenter
Incenter	Perpendicular Bisector

Content and Instructional Strategies:

Lecture

Discovery and application activities

Geogebra

Visual Aids/Powerpoint

Worksheets

Text-based questions

Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
Websites

Assessment Criteria:

Homework – e-book and/or worksheets
Teacher created quizzes, tests, and open-ended questions
Application based assessments

Resources and Materials:

E-book
Computer or Chromebook
Interwrite Board or Smart Board
Worksheets

Unit 6: Quadrilaterals

Unit Outcomes:

In this unit, students will find angle measures in polygons. They will investigate properties of parallelograms and use properties to conclude whether or not a quadrilateral is a parallelogram. Students will also study special quadrilaterals such as rhombi, rectangles, squares, trapezoids, and kites. Algebraic skills include solving linear and quadratic equations.

Eligible Content:

G.1.2.1.2 Identify and/or use properties of quadrilaterals.

G.1.2.1.4 Identify and/or use properties of regular polygons.

G.1.3.2.1 Write, analyze, complete, or identify formal proofs (e.g., direct and/or indirect proofs/proofs by contradiction).

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.

Pa Core Standards:

CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools.

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

CC.2.3.HS.A.6 Verify and apply theorems involving similarity as they relate to plane figures.

Essential Outcomes:

- A. Find the measurements of interior and exterior angles of polygons.
- B. Recognize and apply properties of the sides and angles of parallelograms and diagonals.
- C. Prove that a quadrilateral is a parallelogram.
- D. Recognize and apply properties of rectangles, rhombi, and squares.
- E. Apply and use properties of trapezoids and kites.
- F. Identify special quadrilaterals using properties and theorems.
- G. Use coordinate geometry to prove special quadrilaterals.

Key Vocabulary:

Diagonal	Rhombus
Kite	Square
Parallelogram	Trapezoid
Quadrilateral	- Bases of Trapezoid
Rectangle	- Legs of Trapezoid

Content and Instructional Strategies:

Lecture
Discovery and application activities
Geogebra
Visual Aids/Powerpoint
Worksheets
Text-based questions
Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
Websites

Assessment Criteria:

Homework – e-book and/or worksheets
Teacher created quizzes, tests, and open-ended questions
Application based assessments

Resources and Materials:

E-book
Computer or Chromebook
Interwrite Board or Smart Board
Worksheets

Unit 7: Proportions and Similarity

Unit Outcomes:

In this unit, students use ratios and proportions to solve geometric and real-life problems. Students will identify similar polygons, find the scale factor between two polygons, and use the scale factor to find measurements and solve problems, including scale models. Students will learn the postulates and theorems to prove triangles are similar and continue developing skills in formal proof. Also, students use proportions and the Triangle Proportionality Theorem or its converse to find the lengths of segments related to triangles or parallel lines. Algebraic skills include fractions, proportions and solving linear equations.

Eligible content:

G.1.2.1.1 Identify and/or use properties of triangles.

G.1.3.1.1 Identify and/or use properties of congruent and similar polygons or solids.

G.1.3.1.2 Identify and/or use proportional relationships in similar figures.

G.1.3.2.1 Write, analyze, complete, or identify formal proofs (e.g., direct and/or indirect proofs/proofs by contradiction).

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.

PA Core Standards:

CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools.

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

CC.2.3.HS.A.13 Analyze relationships between two-dimensional and three-dimensional objects.

Essential Outcomes:

- A. Write and simplify ratios and proportions.
- B. Use proportions to solve problems.
- C. Identify similar polygons and use their properties.
- D. Identify similar triangles.
- E. Prove two triangles are similar.
- F. Using proportionality theorems to solve problems.
- G. Interpret scale models and use scale factors to solve problems.

Key Vocabulary:

Conversion

Proportional relationship

Scale Factor

Similar Figures

Content and Instructional Strategies:

Lecture
Discovery and application activities
Geogebra
Visual Aids/Powerpoint
Worksheets
Text-based questions
Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
Websites

Assessment Criteria:

Homework – e-book and/or worksheets
Teacher created quizzes, tests, and open-ended questions
Application based assessments

Resources and Materials:

E-book
Computer or Chromebook
Interwrite Board or Smart Board
Worksheets

Unit 8: Right Triangles and Trigonometry

Unit Outcomes:

In this unit, students investigate side lengths and angles in triangles. They start by using the Pythagorean Theorem to find the length of the third side in a right triangle, and then use the Converse of the Pythagorean Theorem to classify triangles by angles. Students explore ratios of lengths of sides in special right triangles and use the results to find side measurements. Finally, students apply trigonometric ratios to find side lengths and angle measures in triangles and apply to real-life problems. Algebraic skills include simplifying radicals and solving proportions.

Eligible Content:

G.1.2.1.1 Identify and/or use properties of triangles.

G.2.1.1.1 Use the Pythagorean Theorem to write and/or solve problems involving right triangles.

G.2.1.1.2 Use trigonometric ratios to write and/or solve problems involving right triangles.

PA Core Standards:

CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools.

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

CC.2.3.HS.A.13 Analyze relationships between two-dimensional and three-dimensional objects

Essential Outcomes:

- A. Use the Pythagorean Theorem to find side lengths in right triangles. Express answers as simplified radicals.
- B. Use the converse of the Pythagorean Theorem to classify a triangle as right, obtuse, or acute.
- C. Use the properties of $45^\circ - 45^\circ - 90^\circ$ and $30^\circ - 60^\circ - 90^\circ$ triangles.
- D. Find trigonometric ratios (sine, cosine, and tangent) of an acute angle in a right triangle.
- E. Apply trigonometric ratios to solve right triangles and apply to real life problems.

Key Vocabulary:

Cosine (of an angle)

Pythagorean Theorem

Sine (of an angle)

Tangent (of an acute angle)

Trigonometric Ratio

Content and Instructional Strategies:

Lecture
Discovery and application activities
Geogebra
Visual Aids/Powerpoint
Worksheets
Text-based questions
Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
Websites

Assessment Criteria:

Homework – e-book and/or worksheets
Teacher created quizzes, tests, and open-ended questions
Application based assessments

Resources and Materials:

E-book
Computer or Chromebook
Interwrite Board or Smart Board
Worksheets
Tape Measures and Clinometers

Unit 9: Circles**Unit Outcomes:**

In this unit, students investigate aspects of circles. They start by drawing tangents to circles and seeing how a tangent to a circle is related to the radius at the point of tangency. They use intercepted arcs of circles to measure angles formed by chords in a circle and to measure angles formed by secants and tangents to a circle. They explore relationships between segment lengths of chords that intersect in a circle, and they investigate relationships between segment lengths of secants and tangents to a circle. Finally, they use the standard equation of a circle to graph and describe circles in a coordinate plane. Algebraic skills include solving linear and quadratic equations and completing the square.

Eligible Content:

- G.1.1.1.1 Identify, determine, and/or use the radius, diameter, segment, and/or tangent of a circle.
- G.1.1.1.2 Identify, determine, and/or use the arcs, semicircles, sectors, and/or angles of a circle.
- G.1.1.1.3 Use chords, tangents, and secants to find missing arc measures or missing segment measures.

PA Core Standards:

- CC.2.3.HS.A.8 Apply geometric theorems to verify properties of circles.
- CC.2.3.HS.A.9 Extend the concept of similarity to determine arc lengths and areas of sectors of circles.
- CC.2.3.HS.A.13 Analyze relationships between two-dimensional and three-dimensional objects.
- CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.

Essential Outcomes:

- A. Identify segments and lines related to circles – radius, diameter, chord, secant, and tangent.
- B. Identify central angles, major arcs, minor arcs, and semicircles and find their measures.
- C. Recognize and use relationships between arcs and chords.
- D. Find measures of inscribed angles of circles.
- E. Use angles formed by tangents, chords, and secant lines that intersect a circle.
- F. Find segment lengths in circles.
- G. Identify the center and radius from an equation and write the equation of a circle in standard form.
- H. Use completing the square to find center and radius from the equation of a circle not written in standard form.
- I. Completing the square with $a = 0$
- J. Completing the square with $a \neq 0$

Content and Instructional Strategies:

Lecture
Discovery and application activities
Geogebra
Visual Aids/Powerpoint
Worksheets
Text-based questions
Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
Websites

Assessment Criteria:

Homework – e-book and/or worksheets
Teacher created quizzes, tests, and open-ended questions
Application based assessments

Resources and Materials:

E-book
Computer or Chromebook
Interwrite Board or Smart Board
Worksheets

Unit 10: Areas of Polygons and Circles**Unit Outcomes:**

In this unit, students will find measurements of perimeter, circumference, and area for plane figures. Beginning with circles, students will find circumference and arc length measurements around a circle and area of both the whole circle and sectors of circles. Students will then find perimeter and area of triangles and quadrilaterals, including parallelograms and trapezoids. Lastly, students will find area of regular polygons. Students will find areas of shaded regions of overlapping shapes. Algebraic skills include fractions, solving linear equations, rewriting formulas, and applying trigonometry.

Eligible Content:

G.2.2.2.1 Estimate area, perimeter, or circumference of an irregular figure.

G.2.2.2.2 Find the measurement of a missing length, given the perimeter, circumference, or area.

G.2.2.2.3 Find the side lengths of a polygon with a given perimeter to maximize the area of the polygon.

G.2.2.2.4 Develop and/or use strategies to estimate the area of a compound/composite figure.

G.2.2.2.5 Find the area of the sector of a circle.

G.2.2.3.1 Describe how a change in the linear dimension of a figure affects its perimeter, circumference, and area.

PA Core Standard

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

CC.2.3.HS.A.8 Apply geometric theorems to verify properties of circles.

CC.2.3.HS.A.9 Extend the concept of similarity to determine arc lengths and areas of sectors of circles.

CC.2.3.HS.A.13 Analyze relationships between two-dimensional and three-dimensional objects.

Essential Outcomes:

- A. Find circumference and arc lengths of circles.
- B. Find areas of circles and sectors of circles.
- C. Find the area of triangles, parallelograms, and trapezoids.
- D. Understand perimeter as distance around a figure.
- E. Apply perimeter and area to real-life applications.
- F. Find areas of regular polygons, including problems that use trig to calculate angles.
- G. Find the area of the shaded regions of composite figures including inscribed and circumscribed polygons.

Key Vocabulary:

Arc length of a Circle	Inscribed
Area	Perimeter
Circumference	Sector of a Circle
Circumscribed	

Content and Instructional Strategies:

Lecture
Discovery and application activities
Geogebra
Visual Aids/Powerpoint
Worksheets
Text-based questions
Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
Websites

Assessment Criteria:

Homework – e-book and/or worksheets
Teacher created quizzes, tests, and open-ended questions
Application based assessments

Resources and Materials:

E-book
Computer or Chromebook
Interwrite Board or Smart Board
Worksheets

Unit 11: Solids, Surface Area and Volume**Unit Outcomes:**

In this unit, students identify and name solids and describe cross sections of solids. Students will explore and understand surface area of solids and calculate surface area of prisms, cones, cylinders, pyramids, and spheres. Students will explore and understand the concept of volume of solids and find the volume of prisms, cones, cylinders, pyramids, cones, and spheres. Students will be permitted to use the state formula sheet and emphasis will be placed on understanding concepts and comparing measurements. Algebraic skills include solving linear equations and rewriting formulas.

Eligible Content:

G.1.1.1.1 Identify, determine, and/or use the radius, diameter, segment, and/or tangent of a circle.

G.1.2.1.5 Identify and/or use properties of pyramids and prisms

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.

G.2.3.1.3 Find the measurement of a missing length, given the surface area or volume.

G.2.3.2.1 Describe how a change in the linear dimension of a figure affects its surface area or volume (e.g., How does changing the length of the edge of a cube affect the volume of the cube?).

PA Core Standards:

CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.

CC.2.3.HS.A.12 Explain volume formulas and use them to solve problems.

CC.2.3.HS.A.13 Analyze relationships between two-dimensional and three-dimensional objects.

CC.2.3.HS.A.14 Apply geometric concepts to model and solve real- world problems.

Essential Outcomes and Related Standards:

- A. Identify and name three dimensional figures
- B. Find the surface area of prisms and cylinders.
- C. Find the surface area of pyramids and cones.
- D. Find the volume of prisms and cylinders.
- E. Find the volume of pyramids and cones.
- F. Find the volume and surface area of spheres.

Key Vocabulary:

Altitude of a solid	Cylinder	Prism
Base of a solid	- altitude	- lateral faces
Cone	- right vs. oblique	Pyramid
- base	Edge	- base, lateral face, altitude, vertex
- vertex	Face	Rectangular Prism
- altitude	Lateral face	Sphere
Cube	Polyhedron	Surface Area
		Volume

Content and Instructional Strategies:

Lecture
 Discovery and application activities
 Geogebra
 Visual Aids/Powerpoint
 Worksheets
 Text-based questions
 Real life problems/connections

Remediation:

Websites
 Re-teaching Activities
 Extra worksheets
 Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
 Websites

Assessment Criteria:

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Resources and Materials:

E-book
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 Interwrite Board or Smart Board
 Worksheets

Unit Algebra Review

Unit Outcomes:

In this unit students will review algebra topics from previous years and applying them to geometric concepts. Topics include simplifying rational expressions, factoring algebraic expressions, adding, subtracting, multiplying, and dividing rational expressions, factoring and solving quadratic equations.

Eligible Content:

A2.1.2.2.1 Factor algebraic expressions, including difference of squares and trinomials.

A2.1.3.1.1 Write and/or solve quadratic equations (including factoring and using the Quadratic Formula).

A2.1.2.2.1 Factor algebraic expressions, including difference of squares and trinomials.

A2.1.2.2.2 Simplify rational algebraic expressions.

PA Core Standards:

CC.2.2.HS.D.9 Use reasoning to solve equations, and justify the solution method.

CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.

CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.

CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.

CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.

CC.2.2.HS.D.5 Use polynomial identities to solve problems.

Essential Outcomes and Related Standards:

- A. Completing the square with $a = 0$
- B. Completing the square with $a \neq 0$
- C. Solving and simplifying Quadratic equations by factoring
- D. Adding and subtracting rational expressions
- E. Using the discriminant to determine the number of solutions

Content and Instructional Strategies:

Lecture

Discovery and application activities

Geogebra

Visual Aids/Powerpoint

Worksheets

Text-based questions

Real life problems/connections

Remediation:

Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:

Enrichment/challenge worksheets
Websites

Assessment Criteria:

Homework – e-book and/or worksheets
Teacher created quizzes, tests, and open-ended questions
Application based assessments

Resources and Materials:

E-book
Computer or Chromebook
Interwrite Board or Smart Board
Worksheets