Randolph Township Schools
Randolph High School
Geometry Curriculum

"It is the glory of geometry that from so few principles, fetched from without, it is able to accomplish so much."

-Sir Isaac Newton

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Mission Statement

We commit to inspiring and empowering all students in Randolph schools to reach their full potential as unique, responsible and educated members of a global society.

Affirmative Action Statement
Equality and Equity in Curriculum

The Randolph Township School district ensures that the district's curriculum and instruction are aligned to the state's standards. The curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972

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EDUCATIONAL GOALS
VALUES IN EDUCATION

The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization, which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:

- The needs of the child come first
- Mutual respect and trust are the cornerstones of a learning community
- The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members
- A successful learning community communicates honestly and openly in a non-threatening environment
- Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways
- Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences
- Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth

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Introduction

This mathematics course provides the student an opportunity to study axiomatic systems and apply deductive reasoning to Euclidean geometry. The study of geometry includes academic experiences intended to help develop students' spatial sense, a recognition, visualization, and transformation of shapes, figures in two and three dimensions, as well as inductive and deductive reasoning. Implementing geometric properties to real-world problems and other areas of mathematics is integral as shapes and figures are explored both synthetically (without coordinates) and analytically (with coordinates). Students learn to persevere through analyzing situations, hypothesizing, testing and proving conjectures, thereby discovering and utilizing relationships to work toward developing clear, logical and valid thinking. Proficiency in geometry bridges the eternal and the ever-changing; this course seeks to root students in sound, timeless mathematical reasoning by way of today's technological tools thereby empowering students to tackle tomorrow's problems.

For the Honors level math class, skills should be excellent; students should be ready for independent self-motivated work. Emphasis is placed on application and problem solving. Abstract and visualization skills are important, and memorization is insufficient to be successful. Specific Honors-level knowledge and skill statements that pertain to each unit are indicated in the curriculum document with an (H).

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Curriculum Pacing Chart

SUGGESTED TIME ALLOTMENT	UNIT NUMBER	CONTENT - UNIT OF STUDY
1 week	**I**	Pre-Requisite Skills
2 weeks	**II**	The Language and Tools of Geometry
2 weeks	**III**	Transformations
5 weeks	**IV**	Proving Relationships Between Lines and Angles
6 weeks	**V**	Triangles
4 weeks	**VI**	Polygons with a Focus on Quadrilaterals
3 weeks	**VII**	Relationships of Similar Figures
5 weeks	**VIII**	Similar Right Triangles and Trigonometry
5 weeks	**IX**	Circles
3 weeks	**X**	Explore and Analyze Measurements in Two- & Three-Dimensional Figures

36 weeks is the average

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Unit I: Pre-Requisite Skills

TRANSFER: Students will fluidly apply prior algebraic understanding to model geometric relationships and properties.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. A-REI.B.4 Solve quadratic equations in one variable. A-REI.B.4b Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	Mathematical problem solving applies to a variety of strategies and methods.	• How do we select strategies or methods to solve problems? • How does prior knowledge apply to solve mathematical problems?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	Simplifying square roots is used in distance formula and right triangles. Systems of two variables and quadratic equations will be formed using geometric concepts.	Simplify radical expressions without variables. Multiply and simplify polynomials. Solve a system of two equations through substitution or elimination. Solve quadratic equations by factoring with a=1 and a>1.
	VOCABULARY: Expression, equation, radical, simplify, substitution, elimination, factor, AC method, solve, FOIL, quadratic formula, system of equations	

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Unit I: Pre-Requisite Skills

ASSESSMENT EVIDENCE: Students will show their learning by:

- Completing a summative assessment on the Algebra 1 skills required for success in Geometry.

KEY LEARNING EVENTS AND INSTRUCTION:

- Station Review Activity – Students will work in small groups rotating through stations of different algebra skills to prepare for the summer packet assessment.

SUGGESTED TIME ALLOTMENT	**1 week**
SUPPLEMENTAL UNIT RESOURCES	• Summer Packets • Khan Academy Links: Systems of Equations Radicals Factoring • Kuta Software worksheets: Elimination Substitution Radicals Factoring Quadratic Formula

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Unit II: The Language and Tools of Geometry

<table>
<tr><td colspan="3">TRANSFER: Students will communicate mathematical ideas, reasoning, and their implications using multiple representations.</td></tr>
<tr><td rowspan="6">STANDARDS / GOALS:
G-CO.A.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.D.12
Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

G-GPE.B.7
Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

G-MG-A.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).

A-CED.A.1
Create equations and inequalities in one variable and use them to solve problems.</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Geometry is a mathematical system built on accepted facts, basic terms, and definitions.</td><td>• To what extent does the learning of mathematical vocabulary help with communication?</td></tr>
<tr><td>Geometric tools are used to construct accurate diagrams without measuring.</td><td>• How can figures be constructed accurately without rulers and protractors?</td></tr>
<tr><td>Geometry is a field of study that analyzes spatial relationships which are developed by reasoning from the known to the unknown.</td><td>• What are the building blocks of geometry?</td></tr>
<tr><td><u>KNOWLEDGE</u>
Students will know:</td><td><u>SKILLS</u>
Students will be able to:</td></tr>
<tr><td>Constructing congruent angles, segments, and perpendicular lines can be performed using a compass and straightedge.</td><td>Perform basic geometric constructions.

Identify segment and angle bisectors.

Use given bisectors to write and solve algebraic equations.

Differentiate between parallel, perpendicular, and skew lines.</td></tr>
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Unit II: The Language and Tools of Geometry

A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. A-REI.B.4 Solve quadratic equations in one variable. A-REI.B.4b Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	There are multiple notations and terms that are important for the foundations of geometry. (H) There are specific properties associated with congruent segments and angles. (H) There are angles formed that are greater than 180^{o} and formed with the inclusion of bisectors and trisectors. The midpoints and lengths of segments are modeled on the Cartesian Plane and may be calculated using formulas.	Identify, name, and represent basic geometric figures. Understand the difference between equality and congruence. Classify angles as acute, obtuse, right, or straight. (H) Utilize the reflexive, symmetric, and transitive properties with congruent segments and angles. (H) Identify a reflex angle and demonstrate an understanding of rays or points that are trisectors. Calculate the midpoint of a line segment on the coordinate plane. Find the missing endpoint given one endpoint and a midpoint.

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Unit II: The Language and Tools of Geometry

	The distance formula is derived from the Pythagorean Theorem Constructing congruent angles, segments, and perpendicular lines can be performed using a compass and straightedge. (H) There exist relationships between segments and angles when combined. (H) Angle measures can be noted using base 10 decimals as well as base 60 numerical systems. **VOCABULARY:** Point, line, plane, distance, angle, congruent, equal, bisector, midpoint, circle, perpendicular, parallel, segment, skew, arc, ray, endpoint, vertex, equidistant, intersect, acute, obtuse, straight, right, theorem, reflex angle, symmetric, reflexive, transitive, trisector, Segment Addition Postulate, Angle Addition Postulate, construction	Determine the length of a line segment using the distance formula. Perform basic geometric constructions. (H) Recognize the union and intersection of segments and angles. (H) Convert an angle measure from degrees to degrees, minutes, and seconds. (H) Calculate the angle formed by the hands of a clock and given times.

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Unit II: The Language and Tools of Geometry

ASSESSMENT EVIDENCE: Students will show their learning by:

- Working through problem sets as formative assessments to reinforce algebraic and/or geometric concepts.
- Completing a summative exam at the conclusion of the unit/chapter.
- Responding to periodic exit problems to guide the teacher's knowledge of students' understanding.

KEY LEARNING EVENTS AND INSTRUCTION:

- Floor Tile Coordinate Plane – Using the tiles as a grid, students will create segments, measure the distance using a tape measure, and compare the length using the distance formula.
- The Math Train – Using the concept of "speed dating," students become masters of one problem and then teach/assist their classmates. The "stations" remain seated, while the "trains" move on to the next problem. During this activity, students should be able to progress through 15-20 different problems including midpoint, distance, angle bisector, and vertical angles, for example (See Appendix B for full explanation and diagram).

SUGGESTED TIME ALLOTMENT	**2 weeks**
SUPPLEMENTAL UNIT RESOURCES	• Big Ideas Chapter 1 • (H) Geometry for Enjoyment and Challenge Chapter 1 and Chapter 2 • Kuta Software worksheets: Angle Pairs Segment Addition Postulate Angle Addition Postulate Midpoints Distance Formula • Khan Academy: Geometry Terminology and Foundations Distance and Midpoint • Desmos Activity: Terminology and Diagrams • Geogebra • Constructions Packet

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Unit III: Transformations

TRANSFER: Students will investigate and find patterns in data and model them mathematically.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
G-CO.A.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.A.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. G-CO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. G-CO.A.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.	Proving and applying congruence provides a basis for modeling situations geometrically.	• Where does congruency appear in the real world?
	Rigid motions of a figure preserve shape and area but may change orientation.	• In what ways do the characteristics of a figure change when it is moved on the coordinate plane?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	Symmetry may or may not exist in polygons.	Identify lines of reflection and centers of rotation. Understand the use of line symmetry and rotational symmetry.
	There are four transformations: translations, rotations, reflections, and dilations.	Explain what makes a transformation a rigid or a non-rigid motion. Perform transformations and their compositions.
	Two figures are congruent through rigid transformations if one could be mapped on to the other.	Describe the compositions of rigid motions that map a pre-image to its image.

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Unit III: Transformations

G-CO.B.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-SRT.A.1a Verify experimentally the properties of dilations given by a center and a scale factor: 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. G-SRT.A.1b Verify experimentally the properties of dilations given by a center and a scale factor: The dilation of a line segment is longer or shorter in the ratio given by the scale factor. G-MG-A.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).	**VOCABULARY:** Rigid motion, reflections, rotations, translations, dilations, scale factor, symmetry, rotational symmetry, composition	

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Unit III: Transformations

ASSESSMENT EVIDENCE: Students will show their learning by:

- Completing problem sets as formative assessments to reinforce algebraic and/or geometric concepts.
- Successfully writing solutions for a summative exam at the conclusion of the unit/chapter.
- Creating a problem on their own and sharing with a classmate and assessing his/her knowledge.

KEY LEARNING EVENTS AND INSTRUCTION:

- Kaleidoscope – Students make their own kaleidoscope using a Pringles can and mirrored paper to create reflections, rotations, and translations.
- Tessellation – Using an index card to make a pattern, students complete their own translation or rotation tessellation. *Challenge* turn the shape into an image.
- Quizlets – Students create their own quizlet or find an existing one to practice and review the rules for transformations including reflections (y-axis, x-axis, y=x) and rotations (90, 180, 270 and 360 degrees counterclockwise) on the coordinate grid.

SUGGESTED TIME ALLOTMENT	2 weeks
SUPPLEMENTAL UNIT RESOURCES	• Big Ideas Chapter 4 • (H) Geometry for Enjoyment and Challenge Chapter 2 and Chapter 3 • Kuta Software worksheets: Translations Rotations Reflections Combined • Khan Academy: Transformations • Desmos Activity: Translations • Geogebra: Rotations • Rotation, Reflection, Translation Applet

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Unit IV: Proving Relationships Between Lines and Angles

TRANSFER: Students will express appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning of others, and attending to precision when making mathematical statements.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
G-CO.A.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.C.9 Prove theorems about lines and angles. G-GPE.B.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-MG-A.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). A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.	Specific angle relationships are formed when two or more lines are intersected by a transversal.	• What role do lines and angles play in modeling the world around us?
	Mathematical reasoning is evidenced by testing and evaluating statements and justifying steps in mathematical procedures.	• Why do we need to justify our steps in mathematical proofs?
	You can use given information, definitions, properties, postulates and previously proven theorems as a justification in a proof.	• What is proof?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	Segments and angles have basic properties that are used in proofs. Reasoning uses common sense and logic.	(A/B) Utilize the reflexive, symmetric, and transitive properties with congruent segments and angles. Complete algebraic proofs.

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Unit IV: Proving Relationships Between Lines and Angles

A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. A-REI.B.4 Solve quadratic equations in one variable. A-REI.B.4b Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	Properties of segments and angles are used in a variety of situations to complete proofs. Parallel lines and transversals form unique angle pairs.	Using addition and subtraction properties of equality to create larger and smaller segments/angles in basic proofs. (H) Using multiplication and division properties of equality to create larger and smaller segments/angles in proofs. (H) Prove theorems about complements and supplements and apply them appropriately in a proof. (H) Use congruent complements and congruent supplements theorems to write and solve algebraic equations. Prove and use the vertical angles theorem. Identify parallel lines and perpendicular lines. Distinguish between pairs of angles when parallel lines are intersected by a transversal and utilize their relationships to solve problems.

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Unit IV: Proving Relationships Between Lines and Angles

	Parallel and perpendicular angle relationships are used to logically complete proofs.	Prove theorems and their converse about parallel and perpendicular lines and use them appropriately in a proof including corresponding, alternate interior, alternate exterior, and consecutive interior angles.
	Parallel slopes are congruent whereas perpendicular slopes are opposite reciprocals.	Determine the slopes of parallel and perpendicular lines. Write equations of parallel and perpendicular lines in slope-intercept and/or point-slope form.
	A compass and straightedge can be used to construct parallel and perpendicular lines.	Construct parallel and perpendicular lines using a compass and straight edge.
	VOCABULARY: Parallel, perpendicular, slope, transversal, alternate interior, alternate exterior, same-side (consecutive) interior, corresponding, reflexive, symmetric, transitive, congruent complements theorem, congruent supplements theorem, law of detachment, law of syllogism, conditional statements, equivalent statements, proof	

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Unit IV: Proving Relationships Between Lines and Angles

ASSESSMENT EVIDENCE: Students will show their learning by:

- Completing problem sets as formative assessments to reinforce algebraic and/or geometric concepts.
- Completing a summative exam at the conclusion of the unit/chapter.
- My Own City Map – Students will create an imaginary city which is comprised of streets, angles, and other parallel/perpendicular line properties to demonstrate their understanding of line/angle relationships.

KEY LEARNING EVENTS AND INSTRUCTION:

- Masking Tape Parallel Lines – Using a set of parallel lines and a transversal taped onto the wall, students will identify different angle relationship pairs.
- Cereal Box – With one side of a box being blank and the other with the cereal box cover, students will take cut-up statements and reasons and put them in their proper placements to aid with the flow of proof reasoning. Students will check their accuracy by verifying if the cereal box cover is intact.
- Stations – Stations will be set up with a proof, a hint, and an answer key. Students will work in small groups rotating through the proofs, using the hints and answer keys as scaffolding when needed.

SUGGESTED TIME ALLOTMENT	5 weeks
SUPPLEMENTAL UNIT RESOURCES	• Big Ideas Chapters 2 & 3 • (H) Geometry for Enjoyment and Challenge Chapter 4 and Chapter 5 • Kuta Software worksheets: Parallel Angle Pairs Equations of Parallel Lines • Khan Academy: Equations of Parallel and Perpendicular Lines • Desmos Activity: Angle Relationships • Geogebra • Giant Proof Packet • Logic Puzzles

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Unit V: Triangles

TRANSFER: Students will apply sound mathematical reasoning to clarify and solve novel mathematical problems involving triangles.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
G-CO.C.10 Prove theorems about triangles. G-GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. G-CO.B.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.B.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. G-MG-A.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). A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.	Mathematical reasoning is evidenced by testing and evaluating statements and justifying steps in mathematical procedures.	• Why do we need to justify our steps in mathematical proofs?
	The properties of triangles create a basis for understanding and reasoning that extends to other geometric figures.	• How do the properties of triangles contribute to the geometric understanding of the world around us?
	Many relationships exist between the measures of the angles and the lengths of the sides of the triangle.	• What is the relationship between the angles and sides of the same triangle?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	There are three classifications of triangles by sides and by angles. Properties of triangles extend beyond the sides and angles.	Classify triangles by their angle measures and side lengths. Use triangle classification to find angle measures and side lengths. Apply the properties of a midsegment to find its length.

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Unit V: Triangles

A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. A-REI.B.4 Solve quadratic equations in one variable. A-REI.B.4 Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	The interior angles of a triangle add to 180°. The four points of concurrency are orthocenter, incenter, circumcenter, and centroid. (H) At times proofs require alternative methods for solving.	Understand the relationships between an exterior angle of a triangle and the two remote interior angles. Recognize the connection between the base angles and the vertex angle of an isosceles triangle. Understand the relationship between the legs and base angles of an isosceles triangle. (H) Identify all points of concurrency. (H) Use the properties and theorems for the specific points of concurrency. Identify the centroid and use it to calculate segment lengths. (H) Perform indirect proofs. (H) Use parallel lines to prove theorems about triangles.

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Unit V: Triangles

	Sides and angles in a triangle are directly related. Some properties in a diagram can be assumed, while others cannot. Triangles can be proved congruent by SAS, SSS, ASA, AAS, and HL. **VOCABULARY:** SAS, SSS, ASA, AAS, HL, CPCTC, obtuse, acute, right, equilateral, equiangular, isosceles, scalene, hypotenuse, median, centroid, angle bisector, incenter, perpendicular bisector, circumcenter, altitude, orthocenter, midsegment, interior and exterior angles, base angles	Use the triangle inequality theorem to determine whether three lengths can form a triangle. Compare the sizes of angles and side lengths within a triangle. Correctly interpret geometric diagrams. Prove triangles are congruent using the congruence statements. Identify corresponding congruent segments or angles of congruent triangles. (H) Prove overlapping triangles are congruent.

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Unit V: Triangles

ASSESSMENT EVIDENCE: Students will show their learning by:

- Completing problem sets as formative assessments to reinforce algebraic and/or geometric concepts.
- Completing a summative exam at the conclusion of the unit/chapter.
- Completing warm-up or exit proofs to demonstrate understanding of the topic for teachers to approach the next lesson.

KEY LEARNING EVENTS AND INSTRUCTION:

- CPCTC – Students will create their own mnemonic to aid their retention of "corresponding sides of congruent triangles are congruent." Mnemonic devices are helpful memory cues and when a student creates his/her own, they are more inclined to retain the information.
- Proof Week – Students will spend several days working through congruent triangle proofs through partner, group, and individual activities. At the end of the week, students earn a "Congratulations" certificate.

SUGGESTED TIME ALLOTMENT	6 weeks
SUPPLEMENTAL UNIT RESOURCES	• Big Ideas Chapters 5 & 6 • (H) Geometry for Enjoyment and Challenge Chapter 3 • Kuta Software worksheets: Congruent Triangles Isosceles and Equilateral Midsegment Angle Bisectors Medians Centroid Triangle Inequality Theorem Inequalities in One Triangle • Khan Academy: Congruence • Geogebra: Perpendicular Bisector Theorem Angle Bisector Theorem • Giant Proof Packet

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Unit VI: Polygons with a Focus on Quadrilaterals

TRANSFER: Students will extend their knowledge of triangles and coordinate systems to the study of quadrilaterals.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
G-CO.C.11 Prove theorems about parallelograms. G-CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. G-SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. G-GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. G-GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. G-MG-A.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).	There exist certain patterns in the angle measure of polygons.	• Is there a limit to the sum of interior and exterior angles of a polygon? Why or why not?
	Geometry and spatial sense offer ways to interpret and reflect on our physical environment.	• How do you use properties of quadrilaterals to solve real world problems?
	The properties of quadrilaterals are important for distinguishing the differences between the special quadrilaterals.	• How can you use coordinate geometry to find and verify relationships within triangles and quadrilaterals?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	Polygons are classified based on the number of sides and angles, as well as side lengths and angle measures.	Differentiate between polygons and non-polygons. Classify convex and concave polygons by the number of sides and angles. Identify equilateral, equiangular, and regular polygons.

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Unit VI: Polygons with a Focus on Quadrilaterals

A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. A-REI.B.4 Solve quadratic equations in one variable. A-REI.B.4a Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	Interior and exterior angle sums of a polygon are related to triangles and circles, respectively. Quadrilaterals and special quadrilaterals each have a set of unique properties. Properties of quadrilaterals can be verified algebraically on the coordinate plane.	Derive the formulas to find the sum of the interior angles of a polygon. Calculate the sum of the interior angles of a polygon. Given the sum of the interior angles, determine the number of sides of a polygon. Use polygon angle sum theorems to write and solve algebraic equations. Compare and contrast the properties of quadrilaterals. Classify a quadrilateral based on markings on a diagram. Use properties of diagonals and angles in quadrilaterals to write and solve algebraic equations. Use distance, slope, and midpoint formulas to classify a quadrilateral on a coordinate plane.

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Unit VI: Polygons with a Focus on Quadrilaterals

	(H) Polygon characteristics are used to calculate area and perimeter.	(H) Derive the formulas for area of all polygons based on the area of the parallelogram. (H) In a given problem, find all the dimensions to appropriately apply area formulas. (H) Decompose complex figures into component polygons to determine the area. (H) Use the apothem and perimeter to find the area of a regular polygon.
	Formal geometric constructions can be used to make special quadrilaterals and regular polygons. **VOCABULARY:** Regular polygon, interior angles, exterior angles, diagonal, parallelogram, quadrilateral, square, rectangle, rhombus, kite, trapezoid, isosceles trapezoid, trapezoid midsegment theorem, apothem, convex, concave	Construct all special quadrilaterals and regular polygons and those inscribed in circles.

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ASSESSMENT EVIDENCE: Students will show their learning by:

- Completing problem sets as formative assessments to reinforce algebraic and/or geometric concepts.
- Completing a summative exam at the conclusion of the unit/chapter.

KEY LEARNING EVENTS AND INSTRUCTION:

- Quadrilateral Family Tree Poster Project – Students work in groups to create one of the seven quadrilateral shapes and identifying key features. Students also create a review sheet for their quadrilateral, which in turn becomes a study guide for the entire class and is uploaded for sharing.
- Error Analysis – Students find the errors in coordinate geometry and problems using characteristics of quadrilaterals and make proper corrections.
- Quadrilateral Story Books – Students create children's books geared to 5th/6th graders where they demonstrate their knowledge of quadrilaterals in a fun manner such as graphic novel, romance, suspense, or comedy.
- Quadrilateral Detective – Students apply their understanding of coordinate geometry proofs to a crime scene setting.

SUGGESTED TIME ALLOTMENT	4 weeks
SUPPLEMENTAL UNIT RESOURCES	• Big Ideas Chapter 7 • (H) Geometry for Enjoyment and Challenge Chapter 7 and Chapter 11 • Kuta Software worksheets: Classifying Angles in Quadrilaterals Parallelograms Trapezoids Angles in Polygons • Desmos Activities: Basic Advanced • Geogebra: Area of Trapezoid

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Unit VII: Relationships of Similar Figures

TRANSFER: Students will apply proportional reasoning skills to analyze and model mathematical relationships in a given context to make decisions, draw conclusions, and solve problems.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
G-SRT.A.1a Verify experimentally the properties of dilations given by a center and a scale factor: 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. G-SRT.A.1b Verify experimentally the properties of dilations given by a center and a scale factor: The dilation of a line segment is longer or shorter in the ratio given by the scale factor. G-SRT.A.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.A.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	Diagrams can help see the relationships between two figures and help connect the properties of real objects with two-dimensional drawings of these objects.	• How does similarity in mathematics compare to similarity in everyday life?
	Geometric figures can change size and position while maintaining proportional attributes.	• How does an understanding of transformations lead to a better understanding of similarity?
	You can use ratios and proportions to decide whether two polygons are similar and to find unknown side lengths of similar figures.	• What does it mean to be similar?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	Similar polygons have equal angle measures and proportional side lengths. (H) Triangles are proven similar by AA, SAS, and SSS.	Identify similar polygons. Determine side lengths of similar figures using proportions. (H) Use the concept of similarity to establish the congruence of angles and proportionality of segments in proofs.

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Unit VII: Relationships of Similar Figures

G-SRT.B.4 Prove theorems about triangles. G-SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. G-MG-A.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). A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. A-REI.B.4 Solve quadratic equations in one variable. A-REI.B.4b Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation.	There are several proportionality theorems associated with similar triangles. The ratio of the perimeters of two similar polygons is equivalent to the similarity ratio whereas the ratio of the areas is equal to the square of the similarity ratio.	Apply the angle bisector theorem to write and solve proportions. Use the side-splitter theorem to write and solve proportions. Apply the triangle midsegment theorem to write and solve proportions. Use the similarity ratio of similar figures to find the ratios of perimeter and area. Find the area ratio given the similarity ratio and/or perimeter ratio. Find the similarity ratio given the area ratio. Calculate areas and perimeters of similar figures indirectly.

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Unit VII: Relationships of Similar Figures

A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	**VOCABULARY:** Ratio, proportion, scale factor, dilation, similar, AA, SAS, SSS, side-splitter, proportionality theorem, angle bisector theorem, means, extremes	

ASSESSMENT EVIDENCE: Students will show their learning by:

- Completing problem sets as formative assessments to reinforce algebraic and/or geometric concepts.
- Completing a summative exam at the conclusion of the unit/chapter.

KEY LEARNING EVENTS AND INSTRUCTION:

- Password Style Games – Partners sit facing opposite sides of the room. Project vocabulary words from the unit and have students facing the word, describe until the partner guesses the correct term. After half of the terms are used, the students switch rolls.
- Scale Factor Project – Given a clip art image, the students must enlarge the image by a scale factor of 3 using graph paper.

SUGGESTED TIME ALLOTMENT	3 weeks
SUPPLEMENTAL UNIT RESOURCES	• Big Ideas Chapter 8 • (H) Geometry for Enjoyment for Challenge Chapter 8 • Kuta Software Worksheets: Proportions Similar Polygons Similar Triangles Proportionality Theorems • Khan Academy: Similarity

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Unit VIII: Similar Right Triangles and Trigonometry

TRANSFER: Students will look for and make use of the structure of right triangles in the real world.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
G-SRT.B.4 Prove theorems about triangles. G-SRT.C.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.C.7 Explain and use the relationship between the sine and cosine of complementary angles. G-SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. G-SRT.D.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.D.10 Prove the Laws of Sines and Cosines and use them to solve problems.	Trigonometry offers ways to interpret and reflect on our physical environment.	• Why is trigonometry required to model some real-world situations?
	The Pythagorean Theorem establishes an essential relationship between the sides of a right triangle.	• Why is the Pythagorean Theorem one of the most used theorems in mathematics?
	Trigonometry can help one to find unknown information about triangles.	• How do you determine the best method to find a side length or angle measure in any triangle?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	The Pythagorean Theorem is used to find a missing side when given two sides of a right triangle. Special right triangle patterns are derived from the Pythagorean Theorem and, when applicable, provide more efficient means of finding side lengths of right triangles.	Classify a triangle using the Pythagorean Theorem. Determine the length of a missing side of a right triangle given the other two sides using the Pythagorean Theorem. Derive the ratios of special right triangles and use the relationships to find the missing sides.

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Unit VIII: Similar Right Triangles and Trigonometry

G-SRT.D.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-MG-A.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). A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. A-REI.B.4 Solve quadratic equations in one variable. A-REI.B.4b Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation.	A right triangle with an altitude drawn to the hypotenuse creates three similar right triangles. Sine, cosine, and tangent ratios are created from ratios of side lengths of a right triangle and are used to finding missing sides and angles of a right triangle. Trigonometry is useful as a means of indirect measurement. (H) Trigonometry can be applied to oblique triangles.	Use the geometric mean to find the missing sides of similar right triangles. Identify the trigonometric ratios. Use trigonometric ratios to find missing sides in a right triangle. Use inverse trigonometric functions to solve for angle measures in a right triangle. Draw an auxiliary line from the vertex of a triangle, perpendicular to the opposite side to assist in deriving the formula for area of an oblique triangle. (H) Use special right triangles and trigonometric ratios to calculate the length of an apothem in a regular polygon and find the area. Illustrate real world problems involving angles of elevation and depression. (H) Apply the Law of Sines and Law of Cosines to solve oblique triangles.

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Unit VIII: Similar Right Triangles and Trigonometry

A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	**VOCABULARY:** Sine, cosine, tangent, trigonometric ratio, angle of elevation and depression, geometric mean, altitude, Pythagorean theorem, Pythagorean triples, law of sines, law of cosines, oblique triangles, special right triangles, 45-45-90, 30-60-90, apothem, regular polygon	

ASSESSMENT EVIDENCE: Students will show their learning by:

- Completing problem sets as formative assessments to reinforce algebraic and/or geometric concepts.
- Completing a summative exam at the conclusion of the unit/chapter.
- SOHCAHTOA Mountain – Students solve for the lengths of a ski run based on given information for the mountain, the slopes, and the distance from the base.
- Quick Calc – Students practice using their calculators to solve trigonometric functions, both for sides and angles.

KEY LEARNING EVENTS AND INSTRUCTION:

- Trig in the Park – Students set up equations using trigonometry to solve for the height of a slide, length of a kite string, and distance from the base of a ladder.
- Trig Pile Up – Students take stacked triangles and use SOHCAHTOA to find sides and angles using previous calculations.
- (H) Google Map Project – Students will apply their knowledge of the law of sines and law of cosines to a real world problem involving their home, the local library, and the high school.

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Unit VIII: Similar Right Triangles and Trigonometry

SUGGESTED TIME ALLOTMENT	5 weeks
SUPPLEMENTAL UNIT RESOURCES	• Big Ideas Chapter 9 • (H) Geometry for Enjoyment and Challenge Chapter 8 and Chapter 9 • Kuta Software worksheets: Geometric Mean Pythagorean Theorem Special Right Triangles Multi-Step Special Right Triangles Ratios Inverse Trig Solving Right Triangles Multi-Step Trig • Khan Academy: Right Triangles • Geogebra: Proof of Pythagorean Theorem • Similar Right Triangle Applet • Trig Pile Up

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Unit IX: Circles

TRANSFER: Students will recognize and solve practical or theoretical problems involving mathematics, including those for which the solution approach is not obvious, using mathematical reasoning, tools, and strategic thinking.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
G-CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. G-C.A.1 Prove that all circles are similar. G-C.A.2 Identify and describe relationships among inscribed angles, radii, and chords. G-C.A.3 Construct the inscribed and circumscribed circles of a triangle and prove properties of angles for a quadrilateral inscribed in a circle. G-C.A.4 Construct a tangent line from a point outside a given circle to the circle. G-GPE.A.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.	The center and radius are required for writing the standard equation of a circle.	• How can circles be studied algebraically and geometrically?
	The properties of polygons, lines, and angles can be used to understand circles.	• How do the properties of polygons, lines, and angles contribute to the geometric understanding of circles?
	The properties of circles make them advantageous in certain situations to measure segments and angles.	• What role do circles play in modeling the world around us?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	Segments, arcs, and angles in circles have distinct features. In order for a polygon to be inscribed in a circle, or circumscribed about a circle, certain properties must be met.	Identify, name, and represent parts of a circle. Differentiate between all the angles that are formed by segments intersecting a circle. Compare and contrast the properties that develop when a polygon is inscribed in a circle. (H) Compare and contrast the properties that develop when a polygon is circumscribed about a circle.

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Unit IX: Circles

G-MG-A.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). A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. A-REI.B.4 Solve quadratic equations in one variable. A-REI.B.4b Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	Real world situations are represented by relationships with circles. (H) Circle properties can be used in a proof. (H) Arc length is a fraction of the circumference of a circle. Constructions are used to create segments and angles unique to a circle. The standard form of a circle is derived from the distance formula or the Pythagorean Theorem.	Use the appropriate formula for vertices of an angle that lie on, in, or outside of a circle. Use the appropriate formulas for segment lengths formed by tangents, chords, and secants. (H) Incorporate theorems appropriately in a logical proof about circles. (H) Calculate the length of an arc using the central angle and radius of a circle. Construct a tangent line to a circle from a point outside the circle. Find the center and radius of a circle using the standard form of a circle. Write the standard form of a circle given a radius and center or by completing the square. Graph a circle given specific coordinate information.

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Unit IX: Circles

A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	(H) Circles can be tangent to one another and can have common tangent lines. **VOCABULARY:** Circle, radius, center, diameter, chord, secant, tangent, point of tangency, common tangent, internal tangent, external tangent, intercepted arc, minor arc, major arc, semicircle, concentric circle, inscribed angle, central angle, chord-chord, secant-tangent, tangent-tangent, circumscribed angle, inscribed polygon, arc length, circumference, completing the square	(H) Illustrate a problem involving two circles and a common tangent. (H) Find the length of a segment tangent to two circles using trigonometry.

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Unit IX: Circles

ASSESSMENT EVIDENCE: Students will show their learning by:

- Completing problem sets as formative assessments to reinforce algebraic and/or geometric concepts.
- Completing a summative exam at the conclusion of the unit/chapter.
- Theater in the Round Performance Task – Using the concept of a circular theater and stage, students will use circle theorems and vocabulary to demonstrate their understanding.

KEY LEARNING EVENTS AND INSTRUCTION:

- The Big Circle Problem, The Bigger Circle Problem, The Biggest Circle Problem – Students apply their knowledge of circle segments and angles to complete a puzzle with increasing difficulty.
- Flashcards – Students will make flashcards to help memorize circle vocabulary and theorems important for the unit assessment.
- Theater in the Round Performance Task – Using the concept of a circular theater and stage, students will use circle theorems and vocabulary to demonstrate their understanding.

SUGGESTED TIME ALLOTMENT	5 weeks
SUPPLEMENTAL UNIT RESOURCES	• Big Ideas Chapter 10 • (H) Geometry for Enjoyment and Challenge Chapter 10 • Kuta Software Worksheets: Central Angles Inscribed Angles Tangents Secant Angles Angle Relationships Segment Relationships Equations of Circles • Khan Academy: Circles • Desmos Activity: Sectors • Geogebra: Circle Applets Area of Circle Inscribed Angles • Big Circle Example

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Unit X: Measuring Two- & Three-Dimensional Figures

TRANSFER: Students will interpret and persevere in solving complex mathematical problems using strategic thinking and expressing answers with a degree of precision appropriate for the problem context.

STANDARDS / GOALS:	**ENDURING UNDERSTANDINGS**	**ESSENTIAL QUESTIONS**
G-C.B.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-GMD.A.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. G-GMD.A.2 Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. G-GMD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. G-GMD.B.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.	You can analyze a three-dimensional figure by using the relationships among its vertices, edges, and faces.	• Why is visualization important when studying three dimensional figures?
	Every solid has a surface area and volume.	• How do the dimensions of a geometric solid affect its surface area and volume?
	Geometry and spatial sense offer ways to interpret and reflect on our physical environment.	• What role do surface area and volume play in modeling the world around us?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	Arc length is a fraction of the circumference of a circle, sector area a fraction of the area.	Calculate the length of an arc using the central angle and radius of the circle. Determine the area of a sector. Find the area of a segment in a circle.

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Unit X: Measuring Two- & Three-Dimensional Figures

G-MG-A.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). A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. A-REI.B.4 Solve quadratic equations in one variable. A-REI.B.4b Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	Polygons have unique area formulas that use different dimensions. Trigonometric functions are used to find missing sides and angles of right triangles. A solid is a three-dimensional figure. Nets of solids are helpful in deriving surface area and volume formulas.	In a given problem, find all the dimensions to appropriately apply area formulas. Use the apothem and perimeter to find the area of a regular polygon. Decompose complex figures into component polygons to determine the area. Use special right triangles and trig ratios to calculate the length of an apothem in a regular polygon and find the area. Classify geometric solids according to the number of faces, edges, and vertices. Use nets and cross-sections to analyze three-dimensional figures. Differentiate between the height and slant height of a cone and pyramid. Derive the formulas for surface area and volume of all solids.

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Unit X: Measuring Two- & Three-Dimensional Figures

A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	Geometry can be used to analyze the likelihood of an outcome.	Use geometry to measure the desired outcome, measure the sample space, and calculate the probability the desired outcome will occur.
	Solids are formed from the rotation of a two-dimensional figure about an axis.	Classify the three-dimensional solid that is formed when a two-dimensional figure is rotated about an axis of rotation. Calculate the volume and surface area of the three-dimensional solid formed when the two-dimensional figure is rotated about an axis of rotation.
	(H) There are multiple formulas to find areas of triangles and cyclic quadrilaterals.	(H) Derive the formula for the area of an equilateral triangle using the ratios of special right triangles. (H) Apply Heron's and Brahmagupta's formulas to find the area of triangles and cyclic quadrilaterals.
	Complex solids can be split into known solids.	Decompose complex solids into component polygons to determine their volume and surface area.

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Unit X: Measuring Two- & Three-Dimensional Figures

	(H) Cross sections of solids have varying characteristics based on the solid from which they are derived. (H) Solids displace liquid and the features of the solid can be calculated based on this displacement. **VOCABULARY:** Solid, sector, apothem, regular polygon, cross section, Heron's formula, Brahmagupta's theorem, prism, cylinder, cone, pyramid, sphere, lateral area, slant height, surface area, volume, right solid, oblique solid	(H) Solve problems involving the cross sections of pyramids and cones. (H) Understand the relationship of volume between solids with cross sections of equal area at every level with equal height. (H) Address real-world problems that require an understanding of the displacement of liquid in a solid as additional solids are added.

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Unit X: Measuring Two- & Three-Dimensional Figures

ASSESSMENT EVIDENCE: Students will show their learning by:

- Completing problem sets as formative assessments to reinforce algebraic and/or geometric concepts.
- Demonstrating on a summative exam the proficiencies learned at the conclusion of the unit/chapter.

KEY LEARNING EVENTS AND INSTRUCTION:

- Video instruction – Students create their own videos to teach a new concept to their classmates.
- Blueprint Activity – Students calculate surface area to estimate quantities of paint needed for walls of a home as well as estimating the number of floor tiles needed for a room or length/width for a rug.
- The Castle – Students calculate missing dimensions, areas, and volumes of the components of a castle in order to demonstrate their knowledge of surface area and volume.
- Playgound Performance Task – Students will use surface area and volume concepts to find playing areas, amount of sand needed, and amount of safety equipment.

SUGGESTED TIME ALLOTMENT	3 weeks
SUPPLEMENTAL UNIT RESOURCES	• Big Ideas Chapter 11 • (H) Geometry for Enjoyment and Challenge Chapter 11 and Chapter 12 • Kuta Software Worksheets: Volume of Prisms and Cylinders Surface Area of Prisms and Cylinders Volume of Pyramids and Cones Surface Area of Pyramids and Cones Spheres • Khan Academy • Castle

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APPENDIX A

Textbooks

Big Ideas Math Geometry, A Common Core Curriculum, Ron Larson & Laurie Boswell, Big Ideas Learning, LLC, Copyright 2015

(H) Geometry for Enjoyment and Challenge McDougal Littell/Houghton Mifflin, McDougal, Littell & Company, 2008 Impression, Copyright 1991

Pre-Requisites

Students should have successfully completed Algebra 1.

Kahoot

Students partake in the online game to practice solving specific geometry skills based on the unit (examples include proportions, finding scale factors, and working with triangle proportionality theorems).

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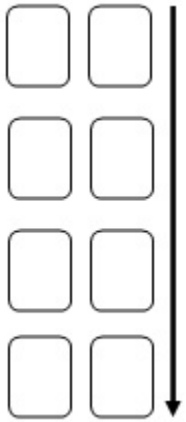
APPENDIX B

THE MATH TRAIN (think "speed dating")

Lesson: 5.6 graphing inequalities in 2 variables

Partner work/practice: math train, 12 problems, each student is assigned one problem, solves it, checks with the teacher and becomes the expert on that problem. After 3 minutes, trains move, stations stay, on to next problem, in this manner, the expert can help the new train (student) if he/she gets stuck AND the train (student) is also the expert on his/her problem! The goal is to get through as many as possible with the new expert ACROSS from you each time!

station train



station train