Stage 2 – Evidence		
Code	**Evaluative Criteria**	**Assessment Evidence**
T,M,A	Scoring Rubric used to evaluate successful understanding of the criteria of a tessellation and completion of the tessellation.	PERFORMANCE TASK(S): **Goal**: To design a wallpaper pattern using tessellations **Role**: Interior Designer **Audience**: Hotel Manager **Situation**: The manager of a hotel wants to redesign the lobby and has hired an interior designer to make a new geometric wallpaper pattern. **Product**: A completed tessellation design **Standards for Success**: Scoring Rubric including focus on color, size and production of a tessellatable shape **Differentiation**: Scaffolding where students can create a design from a simple transformation and basic coloring pattern or a more complex transformation and more sophisticated coloring scheme.

		OTHER EVIDENCE:
M, A	Thorough understanding of vocabulary, function notation and ability to successfully complete a transformation.	● Monitoring class work through board work, group work, questioning, and walk-arounds ● Check for understanding via going over homework, whiteboard activities, and medium such as reflections and exit tickets
M, A	Thorough understanding of vocabulary, function notation and ability to successfully complete a transformation.	● Differentiate through purposeful or flexible grouping, use of diagrams and explanations to demonstrate understanding and active lessons involving discovery, scaffolding, jigsaw activities and use of hands-on manipulatives
M,T, A	Accurate application of content in completing transformations and domain specific vocabulary and function notation	● Alternative assessment projects such as posters, drawings, pictures and real world applications ● Review of standardized test questions to prep students for the challenge of the SAT and ACT exams
M, T, A	Accurate application of content in completing transformations and domain specific vocabulary and function notation	● Quizzes ● Unit Test - to include variety of DOK level of problems and may include SAT style problems.

Stage 3 – Learning Plan		
Code	***Pre-Assessment***	
M	● Teacher checks for prerequisite and prior knowledge via warm-up and questioning activities, such as basic problems on graphing vertical and horizontal lines and writing equations ● Prerequisite knowledge is reinforced through algebra review assignments ● Teacher will provide review and assessment on prerequisite geometric vocabulary knowledge to ensure all students are capable of communicating effectively	
	Summary of Key Learning Events and Instruction	Progress Monitoring
M	● Teacher introduces vocabulary and notation associated with translations, reflections, rotations and dilations.	● Warm up questions
T, M, A	● Teacher demonstrates a variety of methods on how to complete an actual transformation using translations, reflections, rotations and dilations.	● Class worksheets with direct teacher observation or self assessment
T, M, A	● Students use a variety of methods to complete transformations on worksheets, whiteboards and graph paper .	● Practice on whiteboard with direct teacher observation
M, A	● Students will observe patterns and develop definitions of reflections, rotations, translations and dilations	● Kahoot quiz with review questions
T, M, A	● Students will complete a project where they create an original shape and complete each of the 4 transformations on that shape	● Homework assignments with direct teacher observation or self assessment
M, A	● Teacher expands upon their understanding of transformations through compound transformations and the results they achieve.	● Projects/performance tasks original design tessellation
T, M, A	● Students practice working with compound transformations and sequences of transformations and identifying their results.	● Summative assessments quizzes

M, A T, M, A T, M, A	● Teacher introduces the concepts of symmetry and demonstrates with physical models. ● Students will identify the symmetry associated with a variety of figures ● Students will create a shape that tessellates and use it to make a tessellation picture on paper.	unit test

	Suggested resources/ tools ● Textbook: Bass, Laurie, et.al. . *Geometry Common Core.* 1st ed. Upper Saddle River, NJ: Pearson, Prentice Hall, 2012. Print. ● Textbook: Serra, Michael. *Discovering Geometry*. Emeryvillle, CA: Key Curriculum Press, 2008. Print. ● Resource materials provided by Pearson such as implementing the common core, differentiation and standardized test practice ● Resource from the Bureau of Education and Research: *Strengthening your geometry program: Ideas, strategies and hands-on activities* ● Supplies: Patty paper, white boards, straight edge, graph paper, colored pencils	

Subject/Course: Honors Geometry Unit: 2 Congruence, Proof and Construction
Grade:9/10
Time frame: approx. 5-6 weeks

Stage 1 Desired Results

ESTABLISHED GOALS

CCSS.Math.Content.HSG.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.
CCSS.Math.Content.HSG.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.
CCSS.Math.Content.HSG.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.

Transfer

Students will be able to independently use their learning to…

- communicate concepts through diagrams and written statements
- CCSS.Math.Practice.MP3: construct viable arguments and critique the reasoning of others.
- CCSS.Math.Practice.MP5 Use appropriate tools strategically.
- CCSS.Math.Practice.MP6 Attend to precision.

Meaning

UNDERSTANDINGS
Students will understand that…

- Congruent figures have the same size and shape.
- Orientation of a triangle is not necessary for congruence if the corresponding parts are congruent.
- Angle relationships exist when parallel lines are intersected by a transversal.
- A variety of tools including technology can be used to construct specific geometry configurations.
- Proof is the highest level of mathematical argument.
- There are theorems that prove triangle congruence

ESSENTIAL QUESTIONS

- How does one know if triangles are congruent?
- What effect do rotations have on the congruence criteria?
- How does one use criteria to prove congruence?
- How can one find the measure of special angle pairs given parallel lines?
- How does one perform a geometric construction?
- How does one formulate a proof?

Acquisition

Students will know…

Students will be skilled at…

	● *Vocabulary: triangle, acute, obtuse, right, isosceles, scalene, equilateral, equiangular, interior angle, exterior angle, median, altitude, angle bisector, perpendicular bisector, centroid.* ● *The four criteria used to prove triangles congruent.* ● *The sum of interior angles in a triangle is 180 degrees.* ● *The four special segments in triangles: median, altitude, angle bisector, perpendicular bisector.* ● *The triangle inequality theorem states that the sum of any two sides must be longer than the third.* ● *The longest side in a triangle is across from the largest angle and the shortest side is across from the smallest angle.* ● *Constructions can be made to identify a locus of points*	● Identifying which theorem can be used to prove or disprove triangles congruent. ● Creating basic constructions for bisectors and congruent figures ● Proving and applying theorems about angles ● Using and applying the vertical angles theorem ● Identifying special angle pairs and relationships given two lines and a transversal ● Constructing basic geometric figures including but not limited to : congruent angles, bisectors, parallel and perpendicular lines

Stage 2 – Evidence		
Code	**Evaluative Criteria**	**Assessment Evidence**
T, M, A	Scoring Rubric used to evaluate successful understanding of the criteria for a successful proof.	PERFORMANCE TASK(S): **Goal**: To demonstrate how to communicate clearly using the medium of mathematical proof by correcting student mistakes **Role**: Teacher **Audience**: Student **Situation**: Students will be given incorrect proofs. It will be their job to correct the mistakes and provide feedback. **Product**: A completed worksheet with corrections clearly labeled with explanation. **Standards for Success**: Rubric based on understanding of different styles of proof **Differentiation:** Students will be able to choose from a variety of styles and difficulty level of proofs.

		OTHER EVIDENCE:
M, A	Thorough understanding of vocabulary, format of proofs and construction steps	• Monitoring class work through board work, group work, questioning, and walk arounds
T, M, A	Thorough understanding of vocabulary, format of proofs and construction steps	• Check for understanding via going over homework, whiteboard and construction activities, and medium such as reflections and exit tickets • Differentiate through purposeful or flexible grouping, use of diagrams and explanations to demonstrate understanding and active lessons involving discovery, scaffolding, jigsaw activities and use of hands-on manipulatives
T, M, A	Accurate application of content and domain specific vocabulary	• Alternative assessment projects such as posters, drawings, pictures and real world applications
T, M, A	Accurate application of content and domain specific vocabulary	• Review of standardized test questions to prep students for the challenge of the SAT and ACT exams
		• Quizzes
		• Unit Test - to include variety of DOK level of problems and may include SAT style problems.

Stage 3 – Learning Plan		
Code	***Pre-Assessment***	
M	● Teacher checks for prerequisite and prior knowledge via warm-up and questioning activities, such as basic problems on graphing lines and writing equations of lines and properties of equality for equations ● Prerequisite knowledge is reinforced through algebra review assignments ● Teacher will provide review and assessment on prerequisite geometric vocabulary knowledge to ensure all students are capable of communicating effectively	
	Summary of Key Learning Events and Instruction	Progress Monitoring
M, A	● Teacher will introduce the methods of proof: statement/reason, flowchart and paragraph using prior knowledge on algebraic and geometric terms	● Warm up questions
M, A	● Teacher will introduce the methods that do and do not prove triangles congruent.	● Class worksheets with direct teacher observation or self assessment
T, M, A	● Students will complete proofs, using each method, to demonstrate their understanding of the logical sequence of steps and knowledge of vocabulary	● Homework assignments with direct teacher observation or self assessment
M, A	● Teacher reviews vocabulary and guides students in basic constructions of bisectors, perpendiculars, congruent figures.	● Projects/performance tasks Construction tasks Proof correction project
T, M, A	● Students will apply their knowledge of vocabulary and constructions to constructions of parallel lines, isosceles and equilateral triangles and rectangles.	● Summative assessments quizzes unit test

	Suggested resources/ tools ● Textbook: Bass, Laurie, et.al. . *Geometry Common Core.* 1st ed. Upper Saddle River, NJ: Pearson, Prentice Hall, 2012. Print. ● Textbook: Serra, Michael. *Discovering Geometry*. Emeryvillle, CA: Key Curriculum Press, 2008. Print. ● Resource materials provided by Pearson such as implementing the common core, differentiation and standardized test practice ● Resource from the Bureau of Education and Research: *Strengthening your geometry program: Ideas, strategies and hands-on activities* ● Supplies: Patty paper, compass, protractor, straight edge, graph paper, colored pencils	

Subject/Course: Honors Geometry Unit: 3 Triangles and Quadrilaterals
Grade:9/10
Time frame: approx. 5-6 weeks

Stage 1 Desired Results

ESTABLISHED GOALS

CCSS.Math.Content.HSG.CO.C.11
Prove theorems about parallelograms.
Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

CCSS.Math.Content.HSG.CO.C.10

Prove theorems about triangles.
Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

CCSS.Math.Content.HSG.SRT.B.4

Prove theorems about triangles.
Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.

CCSS.Math.Content.HSG.SRT.B.5

Transfer

Students will be able to independently use their learning to…

- CCSS.Math.Practice.MP1: Make sense of problems and persevere in solving them
- CCSS.Math.Practice.MP2: Reason abstractly and quantitatively.
- CCSS.Math.Practice.MP4 Model with mathematics.
- CCSS.Math.Practice.MP6 Attend to precision
- CCSS.Math.Practice.MP7: Look for and make use of structure.

Meaning

UNDERSTANDINGS
Students will understand that…

- Special properties apply to isosceles and equilateral triangles
- The special segments in triangles exhibit specific properties in the real world.
- The sum of any two sides of a triangle must be larger than the third.
- properties of parallelograms work from specific (square) to general (parallelogram).
- parallelograms use properties of parallel lines.
- we can determine the quadrilateral through the slope and distance formula.

ESSENTIAL QUESTIONS

- What distinguishes isosceles and equilateral triangles from other triangles?
- What are the special segments in triangles?
- What distinguishes the types of quadrilaterals?
- How does a square differ from a rectangle?
- How can we prove which quadrilateral we have?
- What are the properties of a trapezoid and kite, which separate it from a parallelogram?

Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	● a square is a rectangle, but a rectangle is not necessarily a square. ● trapezoids and kites are special quadrilaterals which do not have the properties of parallelograms.	
	Acquisition	
	Students will know… ● *Vocabulary: triangle, acute, obtuse, right, isosceles, scalene, equilateral, equiangular, interior angle, exterior angle, median, altitude, angle bisector, perpendicular bisector, centroid.* ● *The sum of interior angles in a triangle is 180 degrees.* ● *The four special segments in triangles: median, altitude, angle bisector, perpendicular bisector.* ● *The triangle inequality theorem states that the sum of any two sides must be longer than the third.* ● *The longest side in a triangle is across from the largest angle and the shortest side is across from the smallest angle.* ● *vocabulary: quadrilateral, parallelogram, rectangle, rhombus, square, trapezoid, kite, base, midsegment, isosceles trapezoid.* ● *quadrilaterals can be broken into the more specific classifications of:*	*Students will be skilled at…* ● Identifying congruent angles and sides in an isosceles or equilateral triangle. ● Applying properties of special segments in triangles to problems using algebraic thinking. ● Calculating the length of a midsegment in a triangle. ● Finding the missing angle measures in a triangle. ● Using and applying Polygon Angle Sum Theorem. ● Using and applying Exterior Angle Theorem ● Proving the type of quadrilateral given information about the angles and sides. ● Showing the type of parallelogram by calculating slope and distance. ● Identifying the classification of parallelograms given the angle and side measurements. ● Giving a specific quadrilateral and coordinates (as variables) identify

	parallelograms, rectangles, rhombus, square, trapezoid and kite. ● *in a parallelogram opposite angles and sides are congruent.* ● *in a rectangle all angles are right angles.* ● *in a rhombus all sides are congruent.* ● *in a square all angles and sides are congruent.* ● *in an isosceles trapezoid the legs are congruent.* ● *how to identify the legs and bases in a trapezoid.* ● *in a kite, there are two pairs of congruent adjacent sides.* ● *in a trapezoid, the midsegment connects the midpoints of the legs.*	any missing coordinates (as variables). ● Applying properties of quadrilaterals to real-world problems.

Stage 2 – Evidence		
Code	**Evaluative Criteria**	**Assessment Evidence**
T, M, A	Scoring Rubric used to evaluate successful understanding of the criteria for a successful construction for points of concurrency.	PERFORMANCE TASK(S): **Goal**: To use knowledge of points of concurrency to physically locate a gift shop in an amusement park, a power line to a building and a circular train track connecting 3 sections of the amusement park **Role**: Architect **Audience**: Owner of an amusement park **Situation**: The owner of an amusement park wants to move the gift shop to a location that is equidistant to the three main attractions at the park. He/she also wishes to construct a railroad connecting 3 outer sections of the park. He/she has hired the architect to help find this location. **Product**: A diagram showing the location of the gift shop and railroad **Standards for Success**: Rubric based on knowledge of points of concurrency and constructions. **Differentiation**: Students will have the option to choose which of the construction tasks they would like to complete.

M, A T, M, A T, M, A T, M, A	Thorough understanding of vocabulary, format of proofs and construction steps Thorough understanding of vocabulary, format of proofs and construction steps Accurate application of content and domain specific vocabulary Accurate application of content and domain specific vocabulary	OTHER EVIDENCE: ● Monitoring class work through board work, group work, questioning, and walk arounds ● Check for understanding via going over homework, whiteboard and construction activities, and medium such as reflections and exit tickets ● Differentiate through purposeful or flexible grouping, use of diagrams and explanations to demonstrate understanding and active lessons involving discovery, scaffolding, jigsaw activities and use of hands-on manipulatives ● Alternative assessment projects such as posters, drawings, pictures and real world applications ● Review of standardized test questions to prep students for the challenge of the SAT and ACT exams ● Quizzes ● Unit Test - to include variety of DOK level of problems and may include SAT style problems.

Stage 3 – Learning Plan		
Code	***Pre-Assessment***	
M	● Teacher checks for prerequisite and prior knowledge via warm-up and questioning activities, such as basic problems on solving equations,order of operations and substitution ● Prerequisite knowledge is reinforced through algebra review assignments ● Teacher will provide review and assessment on prerequisite geometric vocabulary knowledge to ensure all students are capable of communicating effectively	
	Summary of Key Learning Events and Instruction	Progress Monitoring
M, A	● Teacher will guide students through a review of prior knowledge on triangles including median, altitude, perpendicular bisector and angle bisector	● Warm up questions ● Class worksheets with direct teacher observation or self assessment ● Construction practice in class with direct teacher observation or self assessment ● Homework assignments with direct teacher observation or self assessment ● Projects/performance tasks Construction tasks Applications of points of concurrency ● Summative assessments
M, A	● Teacher will introduce properties of triangles: sum of interior angles, exterior angle theorem, isosceles triangles, triangle inequality theorem, and longest/shortest side relationship to smallest/largest angle	
T, M, A	● Student knowledge will be reinforced through a discovery lesson using linguini and measuring activities	
T, M, A	● Students will apply knowledge of vocabulary and properties of triangles on class practice with direct monitoring from the teacher	
M, A	● Teacher will introduce the vocabulary associated with points of concurrency	
T, M, A	● Students will demonstrate their understanding of points of concurrency through a construction project requiring application of content to specific scenarios.	

		quizzes unit test
M, A	● Teacher will guide students through a review of prior knowledge on quadrilaterals	
M, A	● Teacher will introduce the family tree of quadrilaterals.	
T, M, A	● Students will apply knowledge of properties of triangles and quadrilaterals to coordinate geometry proofs using midpoint, distance and slope to identify specific triangles and quadrilaterals	
T, M, A	● Students will apply knowledge of vocabulary and properties of quadrilaterals on class practice with direct monitoring from the teacher	
T, M, A	● Students will demonstrate understanding of vocabulary and properties of triangles and quadrilaterals through construction activities involving equilateral and isosceles triangles, squares, rectangles, rhombus, parallelograms and hexagons.	
M, A	● Students will use a discovery lesson to determine the polygon angle sum theorem	
T, M, A	● Students will apply their knowledge of interior and exterior angles to application problems with direct monitoring from the teacher	

	Suggested resources/ tools ● Textbook: Bass, Laurie, et.al. . *Geometry Common Core.* 1st ed. Upper Saddle River, NJ: Pearson, Prentice Hall, 2012. Print. ● Textbook: Serra, Michael. *Discovering Geometry*. Emeryvillle, CA: Key Curriculum Press, 2008. Print. ● Resource materials provided by Pearson such as implementing the common core, differentiation and standardized test practice ● Resource from the Bureau of Education and Research: *Strengthening your geometry program: Ideas, strategies and hands-on activities* ● Supplies: Patty paper, straight edge, compass, protractor, graph paper, colored pencils and calculator	

Subject/Course: Honors Geometry Unit: 4 Similarity, Right triangles and Trigonometry
Grade:9/10
Time frame: approx 5-6 weeks

Stage 1 Desired Results

ESTABLISHED GOALS

CCSS.Math.Content.HSG.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.
CCSS.Math.Content.HSG.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.

CCSS.Math.Content.HSG.SRT.C.8

Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

CCSS.Math.Content.HSG.GPE.A.1

Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find

Transfer

Students will be able to independently use their learning to…

- CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them.
- CCSS.Math.Practice.MP4 Model with mathematics.
- CCSS.Math.Practice.MP5 Use appropriate tools strategically.
- CCSS.Math.Practice.MP6 Attend to precision.
- CCSS.Math.Practice.MP7 Look for and make use of structure.
    -

Meaning

UNDERSTANDINGS
Students will understand that…

- similarity refers to any objects which have the same shape.
- ratio and proportion can be used often to find missing sides in similar figures.
- special right triangles have formulas to identify exact values for side lengths.
- ratios are used in all right triangles using the sine, cosine or tangent of an angle.
- sine and cosine of complementary angles are congruent.

ESSENTIAL QUESTIONS

- How can we show two triangles are similar?
- How can we identify corresponding parts of similar triangles?
- How can we find the length of the side in a right triangle without Pythagorean theorem?
- How can we find the missing parts of a right triangle?
- How can we use ratios to find missing parts of triangles?
- How do we apply the shortcuts for special right triangles?
- What is the Golden Ratio?

the center and radius of a circle given by an equation. CCSS.MATH.CONTENT.HSG.SRT.A.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar	● the Golden Ratio is a naturally occurring ratio known for its aesthetic beauty. ● angles of elevation and depression are angles formed above and below a horizontal plane.	● How do trigonometric ratios relate to similar right triangles? ● What is the difference between an angle of elevation and an angle of depression?
	Acquisition	
	Students will know… ● *Vocabulary: Right Triangle, Hypotenuse, Adjacent Leg, Opposite Leg.* ● *Ratios are used to find missing parts of similar figures.* ● *Similar figures are the same shape but not necessarily the same size.* ● *Similar figures may be congruent, but congruent figures are always similar.* ● *The shortcuts for similarity are AA, SAS, SSS* ● *30-60-90 and 45-45-90 are the most common configurations of right triangles.* ● *Using the Pythagorean Theorem we can prove shortcuts to find exact*	*Students will be skilled at…* ● Using SOHCAHTOA, student will be able to find a missing side or missing angle in a right triangle. ● Using special right triangles, find the exact value of a side in a right triangle ● Applying similarity to find the length of real-world objects like the height of an outdoor flagpole. ● Proving similarity in triangles with the AA similarity criterion. ● Identifying three natural locations where the Golden Ratio appears. ● Applying the Pythagorean Theorem and its converse to triangles

	lengths of sides for special right triangles. ● *Sine and Cosine of complementary angles are congruent .*	● Applying the sine, cosine and tangent ratios to real-world application problems. ● Classifying and solving problems involving angles of elevation and depression

Stage 2 – Evidence		
Code	**Evaluative Criteria**	**Assessment Evidence**
T, M. A	Scoring Rubric used to evaluate a correct method of calculation, accurate collection of data and calculation of solution.	PERFORMANCE TASK(S): **Goal**: Calculate the height of the flagpole outside the high school **Role**: Engineer **Audience**: Board of Education **Situation**: The Board of Education would like to purchase a new flagpole and would like to know the height of the current flagpole. **Product**: Work shown with diagram and written summary about which size pole to purchase **Standards for Success**: Rubric based on the method of calculation and accuracy of solution **Differentiation:** Students will be able to choose which mathematical method they would like to use to complete the task.

		OTHER EVIDENCE:
M, A	Thorough understanding of vocabulary, format of proofs and construction steps	● Monitoring class work through board work, group work, questioning, and walk arounds
T, M, A	Thorough understanding of vocabulary, format of proofs and construction steps	● Check for understanding via going over homework, whiteboard and construction activities, and medium such as reflections and exit tickets
T, M, A	Accurate application of content and domain specific vocabulary	● Differentiate through purposeful or flexible grouping, use of diagrams and explanations to demonstrate understanding and active lessons involving discovery, scaffolding, jigsaw activities and use of hands-on manipulatives
T, M, A	Accurate application of content and domain specific vocabulary	● Alternative assessment projects such as posters, drawings, pictures and real world applications
		● Review of standardized test questions to prep students for the challenge of the SAT and ACT exams
		● Quizzes
		● Unit Test - to include variety of DOK level of problems and may include SAT style problems.

Stage 3 – Learning Plan		
Code	***Pre-Assessment***	
M	● Teacher checks for prerequisite and prior knowledge via warm-up and questioning activities, such as basic problems on cross multiplication, simplifying radicals and solving equations ● Prerequisite knowledge is reinforced through algebra review assignments ● Teacher will provide review and assessment on prerequisite geometric vocabulary knowledge to ensure all students are capable of communicating effectively	
	Summary of Key Learning Events and Instruction	Progress Monitoring
M, A	● Teacher will guide students through a review of prior knowledge on Corresponding Angles, Corresponding Sides, Congruence Statements,and Scale Factor (Similarity Ratio)	● Warm up questions
M, A	● Teacher will introduce new vocabulary: Right Triangle, Hypotenuse, Adjacent Leg, Opposite Leg, Trigonometric Ratios, Angle of Elevation, Angle of Depression	● Class worksheets with direct teacher observation or self assessment
T, M, A	● Students will demonstrate their understanding of the vocabulary on class practice with direct monitoring from the teacher	● Application practice in class with direct teacher observation or self assessment
M, A	● Teacher will introduce triangle similarity using AA, SAS, and SSS similarity criterion.	● Homework assignments with direct teacher observation or self assessment
T, M, A	● Teacher will guide students through a review of prior knowledge of the pythagorean theorem and its applications	● Projects/performance tasks Applications of all methods for finding missing parts in right triangles
M, A		

T, M, A T, M, A	● Teacher will introduce trigonometric ratios and SOHCAHTOA to find a missing side or missing angle in a right triangle. ● Students will apply knowledge of similarity, pythagorean theorem and trigonometry to real applications with direct monitoring from the teacher and peer and self assessment ● Students will apply their knowledge from this unit to choose an appropriate method to find the height of the flagpole in front of the school. Suggested resources/ tools ● Textbook: Bass, Laurie, et.al. . *Geometry Common Core.* 1st ed. Upper Saddle River, NJ: Pearson, Prentice Hall, 2012. Print. ● Textbook: Serra, Michael. *Discovering Geometry*. Emeryvillle, CA: Key Curriculum Press, 2008. Print. ● Resource materials provided by Pearson such as implementing the common core, differentiation and standardized test practice ● Resource from the Bureau of Education and Research: *Strengthening your geometry program: Ideas, strategies and hands-on activities* ● Supplies: calculator, straight edge, graph paper, colored pencils	flagpole project ● Summative assessments quizzes unit test

Subject/Course: Honors Geometry Unit: 5 Area, Surface Area and Volume
Grade:9/10
Time frame: approx 5-6 weeks

Stage 1 Desired Results

ESTABLISHED GOALS

CCSS.Math.Content.HSG.GMD.A.3
Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*

CCSS.Math.Content.HSG.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.

CCSS.Math.Content.HSG.MG.A.2

Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).*

Transfer

Students will be able to independently use their learning to…

- CCSS.Math.Practice.MP1: Make sense of problems and persevere in solving them.
- CCSS.Math.Practice.MP2 Reason abstractly and quantitatively.
- CCSS.Math.Practice.MP4 Model with mathematics.
- CCSS.Math.Practice.MP5 Use appropriate tools strategically.
- CCSS.Math.Practice.MP6 Attend to precision.
- CCSS.Math.Practice.MP7 Look for and make use of structure.

Meaning

UNDERSTANDINGS
Students will understand that…

- solids can be named by the shape of their base and the shape of their lateral faces.
- surface area is used to determine how much material is needed to cover a figure and the result is given in square units.
- volume is used to determine how much material will fill an object and the result is given in cubic units.
- lowercase “b” refers to base height, whereas uppercase “B” refers to height of the solid. Lowercase “h” refers to the height of the base

ESSENTIAL QUESTIONS

- How do we identify a solid?
- How can we locate the base or height of a solid?
- How can we calculate the surface area and volume of a solid?
- When do we use surface area and when do we use volume?
- How can we derive the formulas for volume from the area formulas?
- How do the surface areas and volumes of similar solids compare?

	whereas uppercase “H” refers to the height of the solid. ● the bases of a prism can be found by identifying the non-rectangular parallel faces of the solid (with the exception of a rectangular prism). ● the base of a pyramid can be found by identifying the non triangular face of the solid (with the exception of a triangular pyramid) ● the units which are reported in an answer are critical to the accuracy of an answer. ● a cross section is the intersection of a solid and a plane. ● many careers will utilize scales and design with measurement, area and volume. ● similar solids have the same shape and all their corresponding dimensions are proportional. If the scale factor of two similar solids is a:b, then the ratio of their corresponding surface areas is a^2:b^2, and the ratio of their volumes is a^3:b^3.	

	Acquisition	
	Students will know… ● *formulas for area of two-dimensional figures.* ● *Vocabulary: Polyhedron, prism, pyramid, cylinder, cone, sphere, hemisphere, height, base, apothem, slant height, lateral area, surface area, volume, face, lateral face, edge, vertex, side, cross section, oblique, great circle.* ● *The relationship between volume of pyramids and prisms as well as cylinders and cones.* ● *Cavalieri's Principle (If two solids have the same height and the same cross-sectional area at every level, then they have the same volume.)* ● *The difference between slant height and the height of a solid.* ● *The relationship between the dimensions of similar solids and their area and volumes.*	*Students will be skilled at…* ● Apply the formulas for surface area and volume to prisms, pyramids, cylinders, and spheres. ● Apply the formulas for area of two-dimensional figures including quadrilaterals, triangles, polygons, etc. ● Find missing measures including, but not limited to, slant height, height of the solid, lateral edges, radius, etc. ● Transform an expression from one unit to another (ex. ft per sec to yds per hr) ● Use and apply the formulas for perimeter and area of rectangles, squares and triangles. ● Use and apply the formulas for circumference and area of a circle.. ● Write proportions to solve for area and volume of similar solids using the ratio of the lengths of the edges of the solids. ● Apply concepts of density based on area and volume in modeling situations.

Stage 2 – Evidence		
Code	**Evaluative Criteria**	**Assessment Evidence**
M, T, A	Scoring Rubric used to evaluate a correct method of calculation, accurate collection of data and calculation of solution.	PERFORMANCE TASK(S): **Goal**: Find the surface area and volume of various solids that are used in the manufacturing industry **Role**: Employee at a Manufacturing Company **Audience**: Client **Situation**: Manufacturer must calculate the surface area and volume of various three-dimensional objects for packaging purposes **Product**: Work/Calculations and conclusion about which solid to choose for shipping specific items. Many justifiable answers. **Standards for Success**: Rubric based on accurate data collection and presentation of conclusions. **Differentiation:** Students will work hands-on with 3-dimensional shapes that require the use of basic and familiar area and volume formulas as well as the option to work with shapes that require the use of more complex formulas and calculations.

		OTHER EVIDENCE:
M, A	Thorough understanding of vocabulary, format of proofs and construction steps	• Monitoring class work through board work, group work, questioning, and walk arounds
T, M, A	Thorough understanding of vocabulary, format of proofs and construction steps	• Check for understanding via going over homework, whiteboard and construction activities, and medium such as reflections and exit tickets
T, M, A	Accurate application of content and domain specific vocabulary	• Differentiate through purposeful or flexible grouping, use of diagrams and explanations to demonstrate understanding and active lessons involving discovery, scaffolding, jigsaw activities and use of hands-on manipulatives
T, M, A	Accurate application of content and domain specific vocabulary	• Alternative assessment projects such as posters, drawings, pictures and real world applications
		• Review of standardized test questions to prep students for the challenge of the SAT and ACT exams
		• Quizzes
		• Unit Test - to include variety of DOK level of problems and may include SAT style problems.

Stage 3 – Learning Plan		
Code	***Pre-Assessment***	
M	● Teacher checks for prerequisite and prior knowledge via warm-up and questioning activities, such as basic problems on substitution, order of operations, solving equations and identification of basic shapes ● Prerequisite knowledge is reinforced through algebra review assignments ● Teacher will provide review and assessment on prerequisite geometric vocabulary knowledge to ensure all students are capable of communicating effectively	
	Summary of Key Learning Events and Instruction	Progress Monitoring
M, A	● Teacher will guide students through a review of prior knowledge on area formulas	● Warm up questions
M, A	● Teacher will introduce and demonstrate the concepts of cross sections and solids of revolutions	● Class worksheets with direct teacher observation or self assessment
M, A	● Teacher will guide students through a review of prior knowledge on surface area, both by formula and the sum of individual sides	● Application practice in class with direct teacher observation or self assessment
M, A	● Teacher will guide the students through a demonstration of the volume of pyramids and cones as they relate to prisms and cylinders and will acknowledge the formulas for each shape	● Homework assignments with direct teacher observation or self assessment
T, M, A	● Students will practice measuring skills by calculating the surface area and volume for a wide range of three-dimensional solids. This will be in a laboratory format.	● Projects/performance tasks lab - calculating surface

		areas and volumes for real object lab - real applications of surface area and volumes
T, M, A	● Teacher will brainstorm with students how to determine if a problem is asking for area, surface area and volume.	
T, M, A	● Teacher will have students work in groups to create and solve their own application problems for surface area and volume	
T, M, A	● Students will apply area formulas to solve both single and compound areas. The compound area problems will appear in a real-world application type format	● Summative assessments quizzes unit test
T, M, A	● Students will explore various occupations that use these formulas and perform some of the calculations.	
T, M, A	● Teacher will model how to determine an object's composition based on its density.	
T, M, A	● Students will work individually to calculate density of an irregular shaped solid to determine its volume and composition.	
M, A	● Teacher will introduce the concept of scale factors for areas and volumes through a group discovery activity and subsequent class analysis of the results	
T, M, A	● Students will work in groups to "think, pair, and share" results about the relationship between scale factors, areas, and volumes of similar solids.	

	Suggested resources/ tools ● Textbook: Bass, Laurie, et.al. . *Geometry Common Core.* 1st ed. Upper Saddle River, NJ: Pearson, Prentice Hall, 2012. Print. ● Textbook: Serra, Michael. *Discovering Geometry*. Emeryvillle, CA: Key Curriculum Press, 2008. Print. ● Resource materials provided by Pearson such as implementing the common core, differentiation and standardized test practice ● Resource from the Bureau of Education and Research: *Strengthening your geometry program: Ideas, strategies and hands-on activities* ● Supplies: calculator, ruler, graph paper, colored pencils	

Time frame: approx 5-6 weeks

Stage 1 Desired Results		
ESTABLISHED GOALS CCSS.Math.Content.HSG.C.A.2 Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.* CCSS.MATH.CONTENT.HSG.C.A.1 Prove that all circles are similar CCSS.MATH.CONTENT.HSG.C.A.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	***Transfer***	
	Students will be able to independently use their learning to… ● CCSS.Math.Practice.MP1: Make sense of problems and persevere in solving them. ● CCSS.Math.Practice.MP2: Reason abstractly and quantitatively. ● CCSS.Math.Practice.MP4 Model with mathematics	
	Meaning	
	UNDERSTANDINGS *Students will understand that...* ● *A circle is the set of all points equidistant from the center.* ● *Arcs and angles are closely related but the notation is different.* ● *Area of a sector is a fractional piece of the area of the entire circle.* ● *Central angles and inscribed angles will have different sized arcs.* ● *Arc length is a fractional piece of the circumference.*	ESSENTIAL QUESTIONS ● How does one use the equation of a circle? ● What are the key terms for a circle? ● How are arc measure and angle measure related? ● How does one measure arc length? ● How does the Pythagorean Theorem relate to a unit circle
	Acquisition	
	Students will know…	*Students will be skilled at…*

	● Vocabulary: Circle, Radius, Diameter, Chord, Arc, Sector, Angle, Intercepted Arc, Inscribed Angle, Central Angle, tangent, secant. ● Inscribed Angle measures are half the measure of the arc. ● Central Angle measures are equal to the measure of the arc.	● Calculating measure of an arc. ● Calculating measure of an interior angle. ● Calculating measure of an inscribed angle. ● Calculating the arc length. ● Calculating the area of a sector. ● Apply calculations to real-world problems

Stage 2 – Evidence		
Code	**Evaluative Criteria**	**Assessment Evidence**
T, M, A	Scoring Rubric used to evaluate a correct method of calculation, accurate collection of data and calculation of solution	**Goal**: To calculate the measures of lines, sectors and angles on a standard oval track. **Role**: Surveyor **Audience**: Manager of a development company **Situation**: Use the properties of circles, tangents and chords to calculate **Product**: Calculated distances with solutions shown **Standards for Success**: Rubric based on accurate data collection and presentation of conclusions. **Differentiation**: Students will be able to choose from a variety of different methods to solve the problems.
M, A T, M, A T, M, A	Thorough understanding of vocabulary, format of proofs and construction steps Thorough understanding of vocabulary, format of proofs and construction steps Accurate application of content and domain specific vocabulary	OTHER EVIDENCE: ● Monitoring class work through board work, group work, questioning, and walk arounds ● Check for understanding via going over homework, whiteboard and construction activities, and medium such as reflections and exit tickets ● Differentiate through purposeful or flexible grouping, use of diagrams and explanations to demonstrate understanding and active lessons involving discovery, scaffolding, jigsaw activities and use of hands-on manipulatives

T, M, A	Accurate application of content and domain specific vocabulary	• Alternative assessment projects such as posters, drawings, pictures and real world applications • Review of standardized test questions to prep students for the challenge of the SAT and ACT exams • Quizzes • Unit Test - to include variety of DOK level of problems and may include SAT style problems.

Stage 3 – Learning Plan		
Code M	***Pre-Assessment*** ● Teacher checks for prerequisite and prior knowledge via warm-up and questioning activities, such as basic problems on substitution, solving equations, order of operations and identification of basic parts of a circle ● Prerequisite knowledge is reinforced through algebra review assignments ● Teacher will provide review and assessment on prerequisite geometric vocabulary knowledge to ensure all students are capable of communicating effectively	
	Summary of Key Learning Events and Instruction ● Teacher will guide students in the definition of key terms. ● Teacher will confirm with students the measure of angles using a protractor. ● Students will explore the measure of arc and angles using an activity to measure angles. ● Teacher will describe how tangents, secants and line segments are related to circles ● Students will demonstrate their understanding of tangents, secants, angles and arcs through class practice on whiteboards and worksheets ● Teacher will describe the various situations where segments are divided on tangents and secants ● Teacher will model how to write the equation of a circle given its radius and center and how to use the equation to graph the circle	Progress Monitoring ● Warm up questions ● Class worksheets with direct teacher observation or self assessment ● Practice on whiteboard with direct teacher observation ● Application practice in class with direct teacher observation or self assessment ● Homework assignments with direct teacher observation or self assessment ● Projects/performance tasks project- track and field activity lesson activities measuring

	● Students will complete a hands-on activity to measure the lines, sectors and angles involved in Track & Field. ● Students will identify the relationship between central, inscribed interior and exterior angles and apply them to real applications Suggested resources/ tools ● Textbook: Bass, Laurie, et.al. . *Geometry Common Core.* 1st ed. Upper Saddle River, NJ: Pearson, Prentice Hall, 2012. Print. ● Textbook: Serra, Michael. *Discovering Geometry*. Emeryvillle, CA: Key Curriculum Press, 2008. Print. ● Resource materials provided by Pearson such as implementing the common core, differentiation and standardized test practice ● Resource from the Bureau of Education and Research: *Strengthening your geometry program: Ideas, strategies and hands-on activities* ● Supplies: calculator, straight edge, graph paper, colored pencils 3-d shapes	angles and arcs ● Summative assessments quizzes unit test

Subject/Course: Honors Geometry Unit: 7 Probability
Grade:9/10
Time frame: approx. 2-4

Stage 1 Desired Results

ESTABLISHED GOALS

- CCSS.Math.Content.HSS.CP.A.1: Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or", "and," "not").
- CCSS.Math.Content.HSS.CP.A.3 Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.
- CCSS.Math.Content.HSS.CP.A.2 Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent
- CCSS.Math.Content.HSS.CP.A.4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the

Transfer

Students will be able to independently use their learning to…

CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them.

CCSS.Math.Practice.MP2 Reason abstractly and quantitatively.

CCSS.Math.Practice.MP4 Model with mathematics.

CCSS.Math.Practice.MP5 Use appropriate tools strategically.

CCSS.Math.Practice.MP6 Attend to precision.

CCSS.Math.Practice.MP7 Look for and make use of structure.

Meaning

UNDERSTANDINGS
Students will understand that…

Probability is a measure of the likelihood that an event will occur.

Data can be organized in tables that show frequencies to find probabilities.

Counting techniques can be used to find all of the possible ways to complete different tasks or choose items from a list.

ESSENTIAL QUESTIONS

What is the difference between experimental probability and theoretical probability?

What is a frequency table?

What does it mean for an event to be random?

two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results. ● CCSS.Math.Content.HSS.CP.A.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer. ● CCSS.Math.Content.HSS.CP.B.6 Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. ● CCSS.Math.Content.HSS.CP.B.7 Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model	The probability of compound events can be found by using the probability of each part of the compound event. Two-way frequency tables are used to organize data and identify sample spaces.	
	Acquisition	
	Students will know: Key Terms: central tendency, data set, mean, median, mode, frequency table, combination, permutation, probability, single event, compound event, factorial, union, intersection. How to find the central tendency of a data set by calculating mean, median, and mode. Combinations, permutations, and factorials are extensions of multiplication. The processes of calculating mean, median, and mode, and differentiate between these three central tendencies.	*Students will be skilled at…* Organizing data in tables, graphs, and plots. Writing experimental and theoretical probability as ratios, percents, and decimals. Calculating combinations, permutations, and factorials. Calculating the mean, median, and mode of a data set. Reading information from tables and graphs.

	Tables and graphs are visual representations of data.	

Stage 2 – Evidence		
Code	**Evaluative Criteria**	**Assessment Evidence**
		PERFORMANCE TASK(S): **Goal**: To find the probability of actual carnival style gaming events in order to determine the likelihood of the carnival making money on the game. **Role**: Carnival manager **Audience**: Carnival board of directors **Situation**: The carnival operators would like to add more games to their boardwalk and would like to ensure that the games will bring in revenue **Product**: Work shown with written summary of the success of the game **Standards for Success**: Rubric based on the method of calculation and accuracy of solution **Differentiation:** Students will be able to choose which of the games they would like to review

		OTHER EVIDENCE: ● Monitoring class work through board work, group work, questioning, and walk arounds ● Differentiate through purposeful or flexible grouping, use of diagrams and explanations to demonstrate understanding and active lessons involving discovery, scaffolding, jigsaw activities and use of hands-on manipulatives ● Alternative assessment projects such as posters, drawings, pictures and real world applications ● Review of standardized test questions to prep students for the challenge of the SAT and ACT exams ● Quizzes . ● Unit Test - to include variety of DOK level of problems and may include SAT style problems.

Stage 3 – Learning Plan		
Code	***Pre-Assessment***	
M, A	● Teacher checks for prerequisite and prior knowledge via warm-up and questioning activities, such as basic problems on reading tables and operations on fractions ● Prerequisite knowledge is reinforced through algebra review assignments ● Teacher will provide review and assessment on prerequisite geometric vocabulary knowledge to ensure all students are capable of communicating effectively	
	Summary of Key Learning Events and Instruction	Progress Monitoring
		● Warm up questions
T, M, A	● Teacher will model and explain how to organize data into tables and graphs.	● Class worksheets with direct teacher observation or self assessment
T, M, A	● Teacher will model how to construct and interpret two-way frequency tables.	● Practice on whiteboard with direct teacher observation
T, M, A	● Students will construct a table and a graph of a given data set.	● Application practice in class with direct teacher observation or self assessment
T, M, A	● Teacher leads class in an activity that distinguishes between the three measures of central tendency	● Homework assignments with direct teacher observation or self assessment
T, M, A	● Students will find the mean, median, and mode of a data set, and conduct an analysis of the data.	● Projects/performance tasks
T, M, A	● Teacher will use real world situations to guide students in an understanding of independent and dependent events.	● Summative assessments quizzes unit test
T, M, A	● Students will identify independent and dependent events when given real world graphs and data.	

T, M, A T, M, A	● Teacher will instruct students on the addition and multiplication rules of probability ● Students will apply the rules of addition and multiplication to 'real problems' Suggested resources/ tools ● Textbook: Bass, Laurie, et.al. . *Geometry Common Core.* 1st ed. Upper Saddle River, NJ: Pearson, Prentice Hall, 2012. Print. ● Textbook: Serra, Michael. *Discovering Geometry*. Emeryvillle, CA: Key Curriculum Press, 2008. Print. ● Resource materials provided by Pearson such as implementing the common core, differentiation and standardized test practice ● Resource from the Bureau of Education and Research: *Strengthening your geometry program: Ideas, strategies and hands-on activities* ● Supplies: calculator	