

# Adair County High School

2020-2021

## 9-12 MATH STANDARDS - Conceptual Category-Geometry / PACING GUIDE

### 5 Key Skills

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#### Geometry-Congruence

#### Cluster: Experiment with transformations in the plane

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.1</b> Know and apply precise definitions of the language of Geometry. (MP.3, MP.6)					
a. Understand properties of line segments, angles and circle	<b>Understand properties of line segments.</b> <b>Understand properties of angles.</b> <b>Understand properties of circles.</b>	<b>Unit - Geometry Basics</b>  <b>Unit - Circles</b>	<b>Line Segment</b> <b>Angle</b> <b>Circle</b> <b>Postulate</b> <b>Theorem</b> <b>Distance</b> <b>Arc Length</b>	<b>All Things Algebra - Unit Geometry Basic</b> <b>Unit Circles</b> <b>Kuta Software</b>	<b>Geometry</b>
b. Understand properties of and differences between perpendicular and parallel lines	<b>Understand properties of perpendicular and parallel lines.</b>	<b>Unit - Parallel &amp; Perpendicular Lines</b>	<b>Perpendicular lines</b> <b>Parallel Lines</b> <b>Slope</b> <b>Negative Reciprocal</b>	<b>All Things Algebra I - Linear Equations</b> <b>Kuta Software</b>  <b>All Things Algebra - Unit Parallel &amp; Perpendicular Lines</b> <b>Kuta Software</b>  <b>All Things Algebra II - Unit - Introduction to Functions</b> <b>Kuta Software</b>	<b>Algebra I</b>  <b>Geometry</b>  <b>Algebra II</b>
<b>KY.HS.G.2</b> Representing transformations in the plane (MP.5, MP.7)					

a. Describe transformations as functions that take points in the plane as inputs and give other points as outputs	<b>Describe transformations as functions.</b>	<b>Unit - Transformations</b>	<b>Input Output Transformation Rules Prime Notation</b>	<b>All Things Algebra - Unit Transformations  Kuta Software</b>	<b>Geometry</b>
b. Compare transformations that preserve distance and angle measures to those that do not	<b>Compare rigid and non-rigid transformation.</b>	<b>Unit - Transformations</b>	<b>Rigid Motion Isometry</b>	<b>All Things Algebra - Unit Transformations  Kuta Software</b>	<b>Geometry</b>
c. Given a rectangle, parallelogram, trapezoid, or regular polygon, formally describe the rotations and reflections that carry it onto itself, using properties of these figures.	<b>Use rotations and reflections .</b>	<b>Unit - Transformations</b>	<b>Composition of transformations</b>	<b>All Things Algebra - Unit Transformations  Kuta Software</b>	<b>Geometry</b>
<b>KY.HS.G.3 (+)</b> (MP.6, MP.7) Develop formal definitions of rotations, reflections and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments.	<b>Use angles, circles, lines, and segments to formulate definitions of transformations.</b>				<b>N/A</b>
<b>KY.HS.G.4</b> Understand the effects of transformations of geometric figures (MP.2, MP.8)					
a. Given a geometric figure and a rotation, reflection or translation, draw the transformed figure.	<b>Transform a geometric figure by rotation, reflection, or translation.</b>	<b>Unit - Transformations</b>	<b>Pre-image Congruence Image Congruence transformations</b>	<b>All Things Algebra - Unit Transformations  Kuta Software</b>	<b>Geometry</b>
b. Specify a sequence of transformations that will carry a given figure onto another.	<b>Use composition of transformation to map one figure onto another.</b>	<b>Unit - Transformations</b>	<b>Pre-image Image Congruence transformations</b>	<b>All Things Algebra - Unit - Transformation  Kuta Software</b>	<b>Geometry</b>
c. 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.	<b>Use rigid motions to prove congruence between two figures.</b>	<b>Unit - Transformations</b>	<b>Pre-image Image Congruence transformations</b>	<b>All Things Algebra - Unit - Transformations  Kuta Software</b>	<b>Geometry</b>

**Geometry - Congruence**

Cluster: Understand congruence in terms of rigid motions

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.5</b> Know and apply the concepts of triangle congruence: (MP.3, MP.6)					
a. 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.	<b>Show triangles congruent by proving corresponding sides and angle are congruent.</b>	Unit - Congruent Triangles	Congruence Similarity Equality Distance Formula SSS SAS ASA	All Things Algebra - Unit - Congruent Triangles  Kuta Software	Geometry
b. Explain how the criteria for triangle congruence (ASA, SAS and SSS) follow from the definition of congruence in terms of rigid motions.	<b>Prove triangles congruent by ASA, SAS, and SSS from the definition of congruence in terms of rigid motions.</b>	Unit - Congruent Triangles	Congruence Similarity Equality Distance Formula SSS SAS ASA	All Things Algebra - Unit - Congruent Triangles  Kuta Software	Geometry

**Geometry - Congruence**

Cluster: Prove geometric theorems

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.6</b> Apply theorems for lines, angles, triangles, parallelograms (MP.2,MP.3)	<b>Use theorems dealing with lines, angles, triangles, and parallelograms.</b>	Unit - Geometry Basics  Unit - Congruent Triangles  Unit - Quadrilaterals	Vertical Angles Transversals Alternate Interior Angles Corresponding Angles Alternate Exterior Angles Perpendicular Bisector Supplementary Complementary Interior Angle Sum Theorem	All Things Algebra - Unit - Geometry Basics  Unit Congruent Triangles  Unit - Quadrilaterals  Kuta Software	Geometry

			<b>Exterior Angle Theorem</b> <b>Isosceles Triangles</b> <b>Triangle Midsegment</b> <b>Centers of Triangles (Median)</b> <b>Properties of Parallelograms</b>		
<b>KY.HS.G.7</b> Prove theorems about geometric figures (MP.6, MP.7)					
a. Construct formal proofs to justify theorems for lines, angles and triangles.	<b>Construct formal proofs to justify theorems for lines, angles, and triangles.</b>	<b>Unit - Congruent Triangles</b>	<b>Two-column proofs</b>	<b>All Things Algebra - Unit - Congruent Triangles</b>  Kuta Software	<b>Geometry</b>
b. (+) Construct formal proofs to justify theorems for parallelograms.	<b>Construct formal proofs to justify theorems for parallelograms.</b>				<b>N/A</b>

**Geometry-Congruence**

**Cluster: Make geometric constructions**

<b>Standard</b>	<b>Learning Target We are learning to.....</b>	<b>Windows of instruction (weeks)</b>	<b>Essential Vocabulary</b>	<b>Resources</b>	<b>Course Name</b>
<b>KY.HS.G.8</b> Create and apply geometric constructions (MP.5, MP.6)					
a. Make formal geometric constructions with a variety of tools and methods.	<b>Make geometric constructions using appropriate tools and methods.</b>	<b>Unit - Geometry Basics</b>	<b>Compass</b> <b>Straight edge</b> <b>Protractor</b> <b>Reflective devices</b>	<b>All Things Algebra - Unit - Geometry Basics</b>  Kuta Software	<b>Geometry</b>
b. Apply basic construction procedures to construct more complex figures.	<b>Make geometric constructions using appropriate tools and methods to construct complex figures.</b>	<b>Unit - Geometry Basics</b>	<b>Compass</b> <b>Straight edge</b> <b>Protractor</b> <b>Reflective devices</b>	<b>All Things Algebra - Unit - Geometry Basics</b>  Kuta Software	<b>Geometry</b>

**Geometry-Similarity, Right Triangles and Trigonometry**  
**Cluster: Understand similarity in terms of similarity transformations**

Standard	Learning Target We are learning to.....	Windows of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.9</b> Understand properties of dilations (MP.5, MP.7)					
a. Verify the properties that result from that dilations given by a center and a scale factor.	<b>Perform dilations and use the figures to prove properties of similarity.</b>	Unit - Transformations	Center Scale Factor	All Things Algebra - Unit - Transformatons  Kuta Software	Geometry
b. Verify that a dilation produces an image that is similar to the pre-image.	<b>Perform dilations and use the figures to prove properties of similarity.</b>	Unit - Transformations	Center Scale Factor Similarity Proportionality Corresponding	All Things Algebra - Unit - Transformatons  Kuta Software	Geometry
<b>KY.HS.G.10</b> (MP.3, MP.6) Apply the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	<b>Apply the properties of similarity to establish AA similarity between two triangles.</b>	Unit - Similar Triangles	AA Similarity Theorem Triangle Angle Sum Theorem	All Things Algebra - Unit - Similar Triangles  Kuta Software	Geometry

**Geometry - Similarity, Right Triangles and Trigonometry**  
**Cluster: Prove theorems involving similarity**

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.11</b> Understand theorems about triangles (MP.1, MP.3)					
a. Apply theorems about triangles	<b>Apply theorems about triangles.</b>	Unit - Geometry Basics Unit - Congruent Triangles  Unit - Relationships	Pythagorean Theorem Proportional Parts Similarity Theorems	All Things Algebra - Unit - Geometry Basics All Things Algebra - Unit - Congruent Triangles  All Things Algebra - Unit - Relationships in Triangles  All Things Algebra - Similar Triangles  All Things Algebra - Trigonometry	Geometry

		in Triangles Unit - Similar Triangles Unit - Trigonometry		Kuta Software	
b. (+) Prove theorems about triangles.	Prove theorems about triangles.				N/A
c. Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	Use similarity theorems to prove relationship in geometric figures.	Unit - Similar Triangles	Similarity Theorems	All Things Algebra - Unit - Similar Triangles Kuta Software	Geometry

### Geometry - Similarity, Right Triangles and Trigonometry

#### Cluster: [Define trigonometric ratios and solve problems involving right triangles](#)

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
a. 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 (sine, cosine and tangent).	Use similarity ratios to lead to the proof of definitions of trigonometric ratios.	Unit - Trigonometry	Trigonometric Ratios Similarity AA Similarity SAS Similarity	All Things Algebra - Unit - Trigonometry Kuta Software	Geometry
b. Explain and use the relationship between the sine and cosine of complementary angles.	Explain the relationship between the sine and cosine of complementary angles.	Unit - Trigonometry	Complementary Trigonometric Functions	All Things Algebra - Unit - Trigonometry Kuta Software	Geometry
c. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★	Use the trigonometric ratios along with the Pythagorean Theorem to solve right triangles in applied problems.	Unit - Trigonometry	Right Triangle Trigonometric Ratios Pythagorean Theorem Special Right Triangles	All Things Algebra - Unit - Trigonometry Kuta Software	Geometry

## Geometry - Similarity, Right Triangles and Trigonometry

### Cluster: Apply trigonometry to general triangles

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.13 (+)</b> (MP.6, MP.7) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxillary line from a vertex perpendicular to the opposite side.	<b>Derive the formula <math>A = \frac{1}{2} ab \sin(C)</math> for the area of a triangle</b>				N/A
<b>KY.HS.G.14 (+)</b> Understand and apply the Law of Sines and the Law of Cosines (MP.1, MP.3)					
<b>a.</b> Use the Law of Sines and Cosines to find unknown measurements in right and non-right triangles.	<b>Use the Law of Sines and Cosines to find unknown measurements in right and non-right triangles.</b>				N/A
<b>b.</b> Prove the Laws of Sines and Cosines and use them to solve problems.	<b>prove the Laws of Sines and Cosines.</b>				N/A

## Geometry - Circles

### Cluster: Understand and apply theorems about circles

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.15</b> (MP.5, MP.8) Verify using dilations that all circles are similar.	<b>Verify, using dilations, that all circles are similar.</b>	<b>Unit - Circles</b>	<b>Similarity Dilations Circle Scale Factor Radii</b>	<b>All Things Algebra - Unit - Circles  Kuta Software</b>	<b>Geometry</b>
<b>KY.HS.G.16</b> Identify and describe relationships among angles and segments within the context of circles involving: (MP.3, MP.5, MP.7)					
<b>a.</b> Recognize differences between and properties of inscribed, central and circumscribed angles.	<b>differences between and properties of inscribed, central and circumscribed angles.</b>	<b>Unit - Circles</b>	<b>Central Angles Inscribed Angles Circumscribed Angles Opposite Angles Overlapping Arcs</b>	<b>All Things Algebra - Unit - Circles  Kuta Software</b>	<b>Geometry</b>

			<b>Right Angles Diameter</b>		
<b>b.</b> Understand relationships between inscribed angles and the diameter of a circle.	<b>Understand relationships between inscribed angles and the diameter of a circle.</b>	<b>Unit - Circles</b>	<b>Right Angle Diameter</b>	<b>All Things Algebra - Unit - Circles</b>  Kuta Software	<b>Geometry</b>
<b>c.</b> Understand the relationship between the radius of a circle and the line drawn through the point of tangency on that radius.	<b>Understand the relationship between the radius of a circle and the line drawn through the point of tangency on that radius.</b>	<b>Unit - Circles</b>	<b>Perpendicular Pythagorean Theorem</b>	<b>All Things Algebra - Unit - Circles</b>  Kuta Software	<b>Geometry</b>

### Geometry - Circles

#### Cluster: Find arc lengths and areas of sectors of circles

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.18</b> (+) Understand the relationship between an intercepted arc length within a circle and the radius of the circle (MP.2, MP.3)					
<b>a.</b> Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius. Derive the formula for the area of a sector.	<b>the length of the arc intercepted by an angle is proportional to the radius.</b>				<b>N/A</b>
<b>b.</b> Define the radian measure of the angle as the measure of a central angle that intercepts an arc equal in length to the radius of the circle.	<b>Define the radian measure of the angle</b>				<b>N/A</b>

### Geometry - Expressing Geometric Properties with Equations

#### Cluster: Translate between the geometric description and the equation for a conic section

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.19</b> Understand the relationship between the algebraic form and the geometric representation of a circle (MP.6, MP.8)					



a. Write the equation of a circle of given center and radius using the Pythagorean Theorem.	write the equation of a circle of given center and radius using the Pythagorean Theorem.	Unit - Circles	Equation of a Circle Pythagorean Theorem Center Radius	All Things Algebra - Unit - Circles  Kuta Software	Geometry
b. (+) Derive and write the equation of a circle of given center and radius using the Pythagorean Theorem.	derive and write the equation of a circle of given center and radius using the Pythagorean Theorem.				N/A
c. (+) Complete the square to find the center and radius of a circle given by an equation.	complete the square to find the center and radius of a circle given by an equation.				N/A
<b>KY.HS.G.20</b> (+) Derive the equation of conic sections (MP.2, MP.7)					
a. Derive the equation of a parabola given a focus and directrix.	derive the equation of a parabola given a focus and directrix.				N/A
b. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.	derive the equations of ellipses and hyperbolas				N/A

### Geometry - Expressing Geometric Properties with Equations

**Cluster:** [Use coordinates to prove simple geometric theorems algebraically](#)

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.21</b> (MP.2, MP.6) Use coordinates to justify and prove simple geometric theorems algebraically.	use coordinates to justify and prove simple geometric theorems	Unit - Geometry Basics  Unit - Parallel and Perpendicular Lines	Slope Formula Distance Formula Parallel Slopes Perpendicular Slopes Midpoint Formula	All Things Algebra - Unit - Geometry Basics  All Things Algebra - Unit Parallel and Perpendicular Lines  Kuta Software	Geometry
<b>KY.HS.G.22</b> (MP.3, MP.7)	Use slope criteria for	Unit - Parallel	Slope Formula	All Things Algebra - Unit - Parallel and Perpendicular Lines	Geometry

Justify and apply the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.	<b>parallel and perpendicular lines.</b>	<b>and Perpendicular Lines</b>	<b>Parallel Lines Perpendicular Lines Forms of Linear Equations</b>	<b>Kuta Software</b>	
<b>KY.HS.G.23</b> Find measurements among points within the coordinate plane. (MP.2, MP.8)					
<b>a.</b> Use points from the coordinate plane to find the coordinates of a midpoint of a line segment and the distance between the endpoints of a line segment.	<b>Find the distance and midpoint of line segments.</b>	<b>Unit - Geometry Basics</b>	<b>Distance Formula Midpoint Formula</b>	<b>All Things Algebra - Unit - Geometry Basics  Kuta Software</b>	<b>Geometry</b>
<b>b.</b> Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	<b>Create given ratios by partitioning segments into certain lengths.</b>	<b>Unit - Geometry Basics</b>	<b>Distance Formula Midpoint Formula Partitioning Segments</b>	<b>All Things Algebra - Unit - Geometry  Kuta Software</b>	<b>Geometry</b>
<b>KY.HS.G.24</b> Use coordinates within the coordinate plane to calculate measurements of two dimensional figures. (MP.2, MP.4)					
<b>a.</b> Compute the perimeters of various polygons.	<b>Compute the perimeters of various polygons.</b>	<b>Unit - Quadrilaterals</b>	<b>Perimeter Polygon Distance Formula</b>	<b>All Things Algebra - Unit - Quadrilaterals  Kuta Software</b>	<b>Geometry</b>
<b>b.</b> Compute the areas of triangles, rectangles and other quadrilaterals. ★	<b>Compute the areas of triangles, rectangles and other quadrilaterals.</b>	<b>Unit - Volume &amp; Surface Area</b>	<b>Area Formulas</b>	<b>All Things Algebra - Unit - Volume &amp; Surface Area  Kuta Software</b>	<b>Geometry</b>

### Geometry -Geometric Measurement and Dimensions

#### Cluster: [Explain volume formulas and use them to solve problems](#)

<b>Standard</b>	<b>Learning Target We are learning to.....</b>	<b>Window of Instruction (weeks)</b>	<b>Essential Vocabulary</b>	<b>Resources</b>	<b>Course Name</b>
<b>KY.HS.G.25</b> Analyze and determine the validity of arguments for the formulas for the various figures and shapes (MP.3, MP.7)					
<b>a.</b> Finding the circumference and area of a circle.	<b>Find the circumference and area of a circle.</b>	<b>Unit - Circles</b>	<b>Circle Area Circumference Radius Diameter Pi Distance Formula</b>	<b>All Things Algebra - Unit - Circles  Kuta Software</b>	<b>Geometry</b>

b. Finding the volume of a sphere, prism, cylinder, pyramid and cone.	Find the volume of a sphere, prism, cylinder, pyramid and cone.	Unit - Volume & Surface Area	Pi Radius Diameter Height Base Base Area	All Things Algebra - Unit - Volume & Surface Area  Kuta Software	Geometry
<b>KY.HS.G.26 (+)</b> (MP.2, MP.5) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	Use Cavalieri's principle to argue formulas for solid figures.				N/A
<b>KY.HS.G.27</b> (MP.4, MP.6) Use volume formulas to solve problems for cylinders, pyramids, cones, spheres, prisms ★	Use volume formulas to solve problems for cylinders, pyramids, cones, spheres, prisms	Unit - Volume & Surface Area	Pi Radius Diameter Height Base Base Area Applications	All Things Algebra - Unit - Volume & Surface Area  Kuta Software	Geometry

### Geometry - Geometric Measurement and Dimensions

#### Cluster: Visualize relationships between two-dimensional and three-dimensional objects

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
<b>KY.HS.G.28</b> (MP.5, MP.7) Identify the shapes of two-dimensional cross-sections of three-dimensional objects and identify three-dimensional objects generated by rotations of two-dimensional objects.	identify the shapes of two-dimensional cross-sections of three-dimensional objects.  identify three-dimensional objects generated by rotations of two-dimensional objects.	Unit - Volume & Surface Area	Cavalieri's Principle Compare Contrast	All Things Algebra - Unit - Volume & Surface Area  Kuta Software	Geometry

### Geometry - Modeling with Geometry

#### Cluster: Apply geometric concepts in modeling situations

Standard	Learning Target We are learning to.....	Window of Instruction	Essential Vocabulary	Resources	Course Name
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		(weeks)			
<b>KY.HS.G.29</b> (MP.1, MP.4) Use geometric shapes, their measures and their properties to describe objects in real world settings.	<b>use geometric shapes, their measures and their properties to describe objects in real world settings.</b>	<b>Unit - Volume &amp; Surface Area</b>	<b>Modeling</b>	<b>All Things Algebra - Unit - Volume &amp; Surface Area</b>  <b>Kuta Software</b>	<b>Geometry</b>
<b>KY.HS.G.30</b> (MP.4, MP.6) Apply concepts of density based on area and volume in modeling situations, using appropriate units of measurement.	<b>Apply concepts of density based on area and volume in modeling situations, using appropriate units of measurement.</b>	<b>Unit - Volume &amp; Surface Area</b>	<b>Density Area Volume Units of Measurement</b>	<b>All Things Algebra - Unit - Volume &amp; Surface Area</b>  <b>Kuta Software</b>	<b>Geometry</b>
<b>KY.HS.G.31</b> (MP.1, MP.4) Apply geometric methods to solve design problems.★	<b>Apply geometric methods to solve design problems.</b>	<b>Unit - Geometry Basics</b>  <b>Unit - Volume &amp; Surface Area</b>	<b>Modeling Constraints Ratios</b>	<b>All Things Algebra - Unit - Geometry Basics</b>  <b>All Things Algebra - Unit - Volume &amp; Surface Area</b>  <b>Kuta Software</b>	<b>Geometry</b>