Geometry - High School Math
Curriculum Resources

Curriculum Overview

The Alabama Course of Study: Mathematics (2019) provides the framework for the K-12 study of Mathematics in Alabama's public schools. Content standards in this document are minimum and required, fundamental and specific, but not exhaustive. The standards set high expectations for student learning in all grades.

Here are definitions to help understand this curriculum guide:

- **Units of Study:** A series of lessons, experiences, and assessments aligned to standards that may last two to six weeks.
- **Priority Standards:** These are the standards students must know and be able to do to be prepared for the next grade level or course.
- **Supporting Standards:** These standards support, connect to, or enhance priority standards.
- **Knowledge:** What students should know related to the standard.
- **Skills:** What students should be able to do related to the standard.
- **Bloom's Taxonomy:** This hierarchy helps describe the complexity and requirements of a standard.
- **Quad:** This framework has four parts that help determine the rigor and relevance of a standard: Acquisition, Application, Assimilation, Adaptation.
- **ACT:** This refers to ACT standards alignment.
- **Key Understandings:** Essential ideas students need to understand about the standard.
- **Key Vocabulary:** Keywords that should be taught to ensure understanding of the standard.
- **Formative Assessment:** Frequent and ongoing checks for understanding teachers can use throughout the unit.
- **Summative Assessment:** How students will be assessed at the end of a unit to demonstrate their level of mastery of the standards.
- **Activities & Resources:** Specific examples, lessons, and/or resources that may be used to support implementation of the standard.
- **RTI:** Response to Intervention - additional supports/resources teachers can use for students who need them.
- **Extensions:** Additional activities and resources to extend the learning experience, especially for accelerated students.

Geometry - Curriculum At A Glance - Pacing Calendar

Quarter	# Weeks	Unit Name	Priority Standards	Supporting Standards
	1	Launch Week	**Pre-Assessment**	
	2	UNIT 1: Algebra and Geometry	**1**	**2b, 3, 4, 5, 7, 12, 12a, 13, 14, 15, 15a, 15b**
	4	UNIT 2: Foundations of Geometry	**1, 6a, 6b, 30**	**2, 2a, 2d, 29, 29a, 31, 31a, 36, 38**
	2	UNIT 3: Parallel and Perpendicular Lines	**30**	**29, 29a, 31, 31a, 31b, 33, 36, 38**
	3	UNIT 4: Transformations	**21a, 21b, 22a, 22b**	**21, 22, 22c, 23**
	3	UNIT 5: Triangle Congruence	**22b, 24, 25a, 25b, 34**	**2d, 25, 29, 29a, 29b, 31b**
	3	UNIT 6: Relationships in Triangles	**34**	**2c, 29, 29a, 31a, 31b, 36, 38**
	3	UNIT 7: Quadrilaterals and Other Polygons	**34**	**29, 29a, 29b, 31c**
	3	UNIT 8: Similarity	**19, 21a, 27, 28a, 28b, 34**	**2, 2a, 2c, 21, 26, 26a, 26b, 31b, 35**
	3	UNIT 9: Right Triangles and Trigonometry	**35a, 35b, 35c**	**2, 2a, 2c, 31b, 35, 35d, 35e, 36, A2.38**
	2	UNIT 10: Coordinate Geometry	**6a, 30**	**2, 2a, 6, 18, 31, 32, PC.31, PC.31a, PC.31b**
	3	UNIT 11: Circles	**30**	**2, 2a, 20, 29, 29a, 37**
	2	UNIT 12: Two and Three - Dimensional Models		**2, 2a, 16, 17, 17a, 17b, 36, 38**
	3	UNIT 13: Data Analysis (AL-2)	**10b**	**8, 9, 10, 10a, 11**

UNIT 1: Algebra and Geometry	DURATION: 2 weeks
CONTENT STANDARDS	
PRIORITY STANDARDS ● **1. Extend understanding of irrational and rational numbers by rewriting expressions involving radicals, including addition, subtraction, multiplication, and division, in order to recognize geometric patterns.**	**SUPPORTING STANDARDS** ● 2b. Choose and interpret the scale and the origin in graphs and data displays. ● 3. Find the coordinates of the vertices of a polygon determined by a set of lines, given their equations, by setting their function rules equal and solving, or by using their graphs. ● 4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. Example: Rearrange the formula for the area of a trapezoid to highlight one of the bases. ● 5. Verify that the graph of a linear equation in two variables is the set of all its solutions plotted in the coordinate plane, which forms a line. ● 7. Use mathematical and statistical reasoning with quantitative data, both univariate data (set of values) and bivariate data (set of pairs of values) that suggest a linear association, in order to draw conclusions and assess risk. Example: Estimate the typical age at which a lung cancer patient is diagnosed, and estimate how the typical age differs depending on the number of cigarettes smoked per day ● 12. Represent data of two quantitative variables on a scatter plot, and describe how the variables are related. ○ a. Find a linear function for a scatter plot that suggests a linear association and informally assess its fit by plotting and analyzing residuals, including the squares of the residuals, in order to improve its fit. ● 13. Compute (using technology) and interpret the correlation coefficient of a linear relationship. ● 14. Distinguish between correlation and causation. ● 15. Evaluate possible solutions to real-life problems by developing linear models of contextual situations and using them to predict unknown values. ○ a. Use the linear model to solve problems in the context of the given data. ○ b. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the given data.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
	Rearrange formulas and equations to highlight a quantity of interest by isolating the variable and using the same reasoning used to solve equations.	Applying	B - Application	A 601
	Use formulas and equations to solve problems.	Applying	B - Application	A 601
Relate solutions of linear equations and systems of linear equations to their graphs in the coordinate plane		Analyzing	C - Assimilation	A 604
	Fit a function to linear data shown in a scatter plot and use fitted functions to solve problems in the context of the data.	Analyzing	C - Assimilation	S 506, S 705
Interpret the slope of a trend line within the context of data.		Evaluating	C - Assimilation	S 506, A 514, F 601
	Compute and interpret the correlation coefficient for linear data	Evaluating	C - Assimilation	None
	Plot and analyze residuals to assess the fit of a function	Analyzing	C - Assimilation	F 701, S 506, S 705
Distinguish between correlation and causation		Analyzing	C - Assimilation	None

KEY COMPONENTS

LEARNING TARGETS (incremental learning target by week)

Week 2

- Day 1 - AL-1-1: Rewrite and use literal equations to solve problems.
- Day 2 - AL-1-2: Relate solutions of linear equations and systems of linear equations to their graphs in the coordinate plane
- Day 3 - Review and Quiz

Week 3

- Day 4 - AL-1-3: Use a scatter plot to describe the relationship between two data sets.

KEY VOCABULARY

- Formula
- Literal equation
- Negative association
- Negative correlation
- No association
- Positive association
- Positive correlation
- Trend line
- Causation
- Correlation coefficient
- Extrapolation
- Interpolation
- Line of best fit
- Linear regression
- Residual

• Day 5 - AL-1-4: Find the line of best fit for a data set and evaluate its goodness of fit. • Day 6 - Review and Quiz Week 4 • Day 7 - AL-1-5: Add, subtract, multiply, divide, and simplify radical expressions. • Day 8 - Review • Day 9 - Test		
ESSENTIAL QUESTION(S) • AL-1-1: How is rewriting literal equations useful when solving problems? • AL-1-2: • AL-1-3: How can you use a scatter plot to describe the relationship between two data sets? • AL-1-4: How can you evaluate the goodness of fit of a line of best fit for a paired data set? • AL-1-5: How are radical expressions simplified?	PRIOR KNOWLEDGE AL-1-1 • Solve linear equations with one variable using the properties of equality. AL-1-2 • Plot coordinate points • Substitute values into a linear equation to verify the solution is true • Create a table for a linear equation AL-1-3 • Interpret the key features of the graph of a linear function • Use key features of the graph to write the function it represents. AL-1-4 • Fit a function to data presented in scatter plots that suggested a linear association. AL-1-5 • Perform operations on irrational and rational numbers	

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 15 Proficiency Scale: Standard 1	
RTI	EXTENSION OPPORTUNITIES

UNIT 2: Foundations of Geometry	DURATION: 4 weeks

CONTENT STANDARDS

PRIORITY STANDARDS

- **1. Extend understanding of irrational and rational numbers by rewriting expressions involving radicals, including addition, subtraction, multiplication, and division, in order to recognize geometric patterns.**
- **6a. Given the endpoints of the diameter of a circle, use the midpoint formula to find its center and then use the Pythagorean Theorem to find its equation.**
- **6b. Derive the distance formula from the Pythagorean Theorem.**
- **30. Develop and use precise definitions of figures such as angle, circle, perpendicular lines, parallel lines, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.**

SUPPORTING STANDARDS

- 2. Use units as a way to understand problems and to guide the solution of multi-step problems.
  - a. Choose and interpret units consistently in formulas
  - d. Choose a level of accuracy appropriate to limitations of measurements when reporting quantities.
- 29. Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools.
  - a. Construct figures, using technology and other tools, in order to make and test conjectures about their properties.
- 31. Justify whether conjectures are true or false in order to prove theorems and then apply those theorems in solving problems, communicating proofs in a variety of ways, including flow chart, two-column, and paragraph formats.
  - a. Investigate, prove, and apply theorems about lines and angles, including but not limited to: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; the points on the perpendicular bisector of a line segment are those equidistant from the segment's endpoints.
- 36. Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems.
- 38. Use the mathematical modeling cycle involving geometric methods to solve design problems. Examples: Design an object or structure to satisfy physical constraints or minimize cost; work with typographic grid systems based on ratios; apply concepts of density based on area and volume.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
Communicate precise definitions of angle and segment using the undefined terms: point, line, and plane.		**Remembering**	**A - Acquisition**	**G 606**

	Use the Ruler and the Segment Addition Postulates	Applying	B - Application	G 203
	Use the Protractor and the Angle Addition Postulates	Applying	B - Application	G 203
Identify congruent segments and congruent angles		Remembering	A - Acquisition	G 203
	Construct copies of segments and angles, perpendicular bisectors of segments, and bisectors of angles.	Creating	C - Assimilation	None
	Apply construction to solve problems	Applying	C - Assimilation	None
	Use the midpoint formula to find the midpoint of a segment drawn on a coordinate plane.	Applying	B - Application	G 602, G 504
	Use the distance formula to find the length of a segment drawn on the coordinate plane.	Applying	B - Application	G 602. G 605, G 504
	Use inductive reasoning to identify patterns and make predictions based on data.	Evaluating	C - Assimilation	None
	Use inductive reasoning to provide evidence that conjectures are true or provide counterexamples to disprove them.	Evaluating	C - Assimilation	None
	Write conditional and biconditional statements.	Creating	B - Application	None
	Test and verify the appropriateness of their math models.	Evaluating	C - Assimilation	None
Find the contrapositive, converse, and inverse of a conditional statement.		Understanding	A - Acquisition	None
	Find truth values for conditional statements and complete truth tables.	Applying	B - Application	None

	Use deductive reasoning to draw a valid conclusion based on a set of given facts.	Evaluating	C - Assimilation	None
	Use deductive reasoning to prove geometric theorems about lines and angles.	Evaluating	C - Assimilation	G 501, G 402, G 401, G 301
Understand and use indirect reasoning to prove geometric theorems about lines and angles.		Evaluating	C - Assimilation	G 501, G 402, G 401, G 301
	Write indirect proofs.	Creating	C - Assimilation	G 501, G 402, G 401, G 301

KEY COMPONENTS

LEARNING TARGETS (incremental learning target by week)

Week 5
- Day 1 - 1 - 1: Use properties of segments and angles to find their measures.
- Day 2 - 1 - 2: Use a straightedge and compass to construct basic figures.
- Day 3 - Review and Quiz

Week 6
- Day 4 - 1 - 3: Use the midpoint and distance formulas to solve problems.
- Day 5 - 1 - 4: Use inductive reasoning to make conjectures about mathematical relationships.
- Day 6 - Review and Quiz

Week 7
- Day 7 - 1 - 5: Write conditionals and biconditionals and find their truth values
- Day 8 - 1 - 6: Use deductive reasoning to draw conclusions.
- Day 9 - Review and Quiz

Week 8
- Day 10 - 1 - 7: Use deductive reasoning to prove theorems.
- Day 11 - 1 - 8: Use indirect reasoning to write a proof.
- Day 12 - Review

Week 9
- Day 13 - Test

KEY VOCABULARY
- Collinear points
- Line
- Plane
- Point
- Postulate
- Angle bisector
- Construction
- Perpendicular bisector
- Midpoint
- Conjecture
- Counterexample
- Inductive reasoning
- Biconditional
- Conditional
- Contrapositive
- Converse
- Inverse
- Negation
- Truth table
- Truth value
- Deductive reasoning
- Law of Detachment
- Law of Syllogism
- Proof
- Theorem
- Indirect proof

ESSENTIAL QUESTION(S)	PRIOR KNOWLEDGE
• 1 - 1: How are the properties of segments and angles used to determine their measures? • 1 - 2: How are a straightedge and compass used to make basic constructions? • 1 - 3: How are the midpoint and length of a segment on the coordinate plane determined? • 1 - 4: How is inductive reasoning used to recognize mathematical relationships? • 1 - 5: How do “if - then” statements describe mathematical relationships? • 1 - 6: How is deductive reasoning different from inductive reasoning? • 1 - 7: How is deductive reasoning used to prove a theorem? • 1 - 8: What can you conclude when valid reasoning leads to a contradiction?	1-1 • Absolute value of a number is the distance from 0 on a number line. • Classify angles by their measures. 1-2 • Basic vocabulary for lines, rays, segments, and angles. 1-3 • Copy segments using a straightedge and a compass • Find lengths of segments using perpendicular bisectors to find segment midpoints 1-4 • Use deductive reasoning to prove theorems 1-5 • Use inductive reasoning to recognize patterns, make conjectures, and make predictions 1-6 • Use inductive reasoning to make logical conjectures based on patterns of examples or past events • Use truth tables to study the values of conditional statements and their related statements. 1-7 • Use inductive reasoning to reach conclusions based on patterns of examples or past events • Use deductive reasoning to reason logically from a set of facts to a conclusion 1-8 • Use inductive reasoning to identify patterns and make predictions • Use deductive reasoning to solve problems and prove theorems.

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES
Proficiency Scale: Standard 30 Proficiency Scale: Standard 6

Proficiency Scale: Standard 1	
RTI	**EXTENSION OPPORTUNITIES**

UNIT 3: Parallel and Perpendicular Lines	DURATION: 2 weeks
CONTENT STANDARDS	
PRIORITY STANDARDS ● **30. Develop and use precise definitions of figures such as angle, circle, perpendicular lines, parallel lines, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.**	**SUPPORTING STANDARDS** ● 29. Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools. ○ a. Construct figures, using technology and other tools, in order to make and test conjectures about their properties. ● 31. Justify whether conjectures are true or false in order to prove theorems and then apply those theorems in solving problems, communicating proofs in a variety of ways, including flow chart, two-column, and paragraph formats. ○ a. Investigate, prove, and apply theorems about lines and angles, including but not limited to: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; the points on the perpendicular bisector of a line segment are those equidistant from the segment's endpoints. ○ b. Investigate, prove, and apply theorems about triangles, including but not limited to: the sum of the measures of the interior angles of a triangle is 180°; the base angles of isosceles triangles are congruent; the segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length; a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem using triangle similarity. ● 33. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems. Example: Find the equation of a line parallel or perpendicular to a given line that passes through a given point. ● 36. Use geometric shapes, their measures, and their properties to

	model objects and use those models to solve problems. • 38. Use the mathematical modeling cycle involving geometric methods to solve design problems. Examples: Design an object or structure to satisfy physical constraints or minimize cost; work with typographic grid systems based on ratios; apply concepts of density based on area and volume.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
Define parallel lines using the undefined terms point and line.		**Remembering**	**A - Acquisition**	**G 301, G 401, G 606**
	Prove theorems about lines and angles	**Evaluating**	**C - Assimilation**	**G 301, G 401, G 402, G 501, G 606**
	Use theorems to find the measures of angles formed by parallel lines and a transversal.	**Applying**	**B - Application**	**G 301, G 401, G 402, G 501, G 606**
	Prove that two lines cut by a transversal are parallel using the converses of parallel line angle relationships theorems.	**Evaluating**	**C - Assimilation**	**G 301, G 401, G 402, G 606**
	Use properties of parallel lines and transversals to solve real-world and mathematical problems.	**Evaluating**	**D - Adaptation**	**G 301, G 401, G 402, G 501, G 606**
	Write and use flow proofs.	**Creating**	**C - Assimilation**	**None**
	Use lines constructed parallel to another line to solve problems and prove theorems	**Applying**	**B - Application**	**G 501**
	Use the sum of the angle measures in a triangle to solve problems	**Applying**	**B - Application**	**G 501, G 503, G 603**
	Show that two lines in the coordinate plane are parallel by comparing their slopes, and solve problems	**Understanding**	**B - Application**	**None**

	Show that two lines in the coordinate plane are perpendicular by comparing their slopes, and use that information to solve problems	Understanding	B - Application	None

KEY COMPONENTS

LEARNING TARGETS (incremental learning target by week)

Week 9

- Day 1 - 2 - 1: Determine the measures of the angles formed when parallel lines are intersected by a transversal.
- Day 2 - 2 - 2: Use angle relationships to prove that lines are parallel.

Week 10

- Day 3: Review and Quiz
- Day 4 - 2 - 3: Solve problems using the measure of interior and exterior angles of triangles.
- Day 5 - 2 - 4: Use slope to solve problems about parallel and perpendicular lines.

Week 11

- Day 6 - Review
- Day 7 - Test

KEY VOCABULARY

- Flow proof
- Adjacent angles
- Linear pair
- Supplementary angles
- Vertical angles
- Alternate exterior angles
- Alternate interior angles
- Corresponding angles
- Same - side interior (Consecutive interior) angles
- Same - side exterior angles
- Transversal
- Slope of a line

ESSENTIAL QUESTION(S)

- 2 - 1: What angle relationships are created when parallel lines are intersected by a transversal?
- 2 - 2: What angle relationships can be used to prove that two lines intersected by a transversal are parallel?
- 2 - 3: What is true about the interior and exterior angle measures of a triangle?
- 2 - 4: How do the slopes of lines that are parallel to each other compare? How do the slopes of lines that are perpendicular to each other compare?

PRIOR KNOWLEDGE

2-1

- Special angle pairs, including adjacent, supplementary, and vertical angles and linear pairs.

2-2

- Formal understanding of parallel lines and segments.
- Angle relationships for parallel lines and a transversal.

2-3

- Theorems about angles formed when parallel lines are cut by a transversal

2-4

- Theorems to show that lines are perpendicular or parallel
- Solve problems involving parallel and perpendicular lines

FORMATIVE ASSESSMENT

SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 30	
RTI	EXTENSION OPPORTUNITIES

UNIT 4: Transformations	DURATION: 3 weeks
CONTENT STANDARDS	
PRIORITY STANDARDS • **21a. Describe transformations and compositions of transformations as functions that take points in the plane as inputs and give other points as outputs, using informal and formal notation.** • **21b. Compare transformations which preserve distance and angle measure to those that do not.** • **22a. Given a geometric figure and a rotation, reflection, or translation, draw the image of the transformed figure using graph paper, tracing paper, or geometry software.** • **22b. Specify a sequence of rotations, reflections, or translations that will carry a given figure onto another.**	**SUPPORTING STANDARDS** • 21. Represent transformations and compositions of transformations in the plane (coordinate and otherwise) using tools such as tracing paper and geometry software. • 22. Explore rotations, reflections, and translations using graph paper, tracing paper, and geometry software. • 22c. Draw figures with different types of symmetries and describe their attributes. • 23. Develop definitions of rotation, reflection, and translation in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
	Find a reflected image and write a rule for a reflection.	**Applying**	**B - Application**	**G 407, G 607**
Define reflection as a transformation across a line of reflection with given properties and perform reflections on and off a coordinate grid.		**Remembering**	**A - Acquisition**	**G 407, G 607**
	Translate a figure and write a rule for a translation.	**Applying**	**B - Application**	**G 407, G 607**
	Find the image of a figure after a composition of rigid motions.	**Applying**	**B - Application**	**G 407, G 607**
	Prove that a translation is a composition of two reflections.	**Evaluating**	**C - Assimilation**	**G 407, G 607, G 608**

	Rotate a figure and write a rule for a rotation.	Applying	B - Application	G 407, G 607, G 608
	Prove that a rotation can be written as the composition of two reflections.	Evaluating	C - Assimilation	G 407, G 607, G 608
	Describe the rotations and/or reflections that carry a polygon onto itself.	Understanding	B - Application	G 407, G 502 G 607, G 608
	Predict the effect of a given rigid motion	Evaluating	C - Assimilation	G 407, G 502 G 607, G 608
Identify types of symmetry in a figure.		Remembering	A - Acquisition	G 407, G 502 G 607, G 608

KEY COMPONENTS

LEARNING TARGETS (incremental learning target by week)

Week 11

- Day 1 - 3 - 1: Draw and describe the reflection of a figure across a line of reflection.

Week 12

- Day 2 - 3 - 2: Describe the properties of a figure before and after translation.
- Day 3 - Review and Quiz
- Day 4 - 3 - 3: Draw and describe the rotation of a figure about a point of rotation for a given angle of rotation

Week 13

- Day 5 - 3 - 4: Identify different rigid motions used to transform two - dimensional shapes.
- Day 6 - 3 - 5: Identify different types of symmetry in two - dimensional figures.
- Day 7 - Review

KEY VOCABULARY

- Rigid motion
- Composition of rigid motion
- Glide reflection
- Point symmetry
- Reflectional symmetry
- Rotational symmetry

ESSENTIAL QUESTION(S)

- 3 - 1: How are the properties of reflection used to transform a figure?
- 3 - 2: What are the properties of a translation?
- 3 - 3: What are the properties that identify a rotation?
- 3 - 4: How can rigid motions be classified?
- 3 - 5: How can you tell whether a figure is symmetric?

PRIOR KNOWLEDGE

3 - 1

- Use a preimage and an image to identify transformations
- Investigate whether transformations preserve angle and length.

3 - 2

- Reflect figures, write rules for reflections, and find the images of reflections.

3 - 3

	• Reflect and translate figures. 3 - 4 • Translate, reflect, and rotate figures 3 - 5 • Describe rotations and reflections • Find images of rotated and reflected figures.

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 22 Proficiency Scale: Standard 21	
RTI	EXTENSION OPPORTUNITIES

UNIT 5: Triangle Congruence	DURATION: 3 weeks

CONTENT STANDARDS

PRIORITY STANDARDS

- **22b. Specify a sequence of rotations, reflections, or translations that will carry a given figure onto another.**
- **24. Define congruence of two figures in terms of rigid motions (a sequence of translations, rotations, and reflections); show that two figures are congruent by finding a sequence of rigid motions that maps one figure to the other. Example: △ABC is congruent to △XYZ since a reflection followed by a translation maps △ABC onto △XYZ.**
- **25a. Verify that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.**
- **25b. Verify that two triangles are congruent if (but not only if) the following groups of corresponding parts are congruent: angle-side-angle (ASA), side-angle-side (SAS), side-side-side (SSS), and angle-angle-side (AAS). Example: Given two triangles with two pairs of congruent corresponding sides and a pair of congruent included angles, show that there must be a sequence of rigid motions that will map one onto the other.**
- **34. Use congruence and similarity criteria for triangles to solve problems in real-world contexts.**

SUPPORTING STANDARDS

- 2d. Choose a level of accuracy appropriate to limitations of measurements when reporting quantities.
- 25. Verify criteria for showing triangles are congruent using a sequence of rigid motions that map one triangle to another.
- 29. Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools.
    - a. Construct figures, using technology and other tools, in order to make and test conjectures about their properties.
    - b. Identify different sets of properties necessary to define and construct figures.
- 31b. Investigate, prove, and apply theorems about triangles, including but not limited to: the sum of the measures of the interior angles of a triangle is 180°; the base angles of isosceles triangles are congruent; the segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length; a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem using triangle similarity.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
Relate congruence to rigid motions		**Analyzing**	**C - Assimilation**	**G 407**
	Demonstrate that two figures are congruent by using one of more rigid motions to map one onto the other.	**Applying**	**B - Application**	**G 407**
	Use properties of and theorems about isosceles and equilateral triangles to solve problems.	**Applying**	**B - Applying**	**G 402, G 501, G 503, G 504, G 603**

Identify congruent triangles using properties of isosceles and equilateral triangles.		Remembering	A - Acquisition	G 402, G 501, G 503, G 504, G 603
	Prove triangle congruence by SAS and SSS criteria and use triangle congruence to solve problems.	Evaluating	C - Assimilation	G 407
Understand that corresponding parts of congruent triangles are congruent and use CPCTC to prove theorems and solve problems.		Understanding	B - Application	G 407
	Prove that two triangles are congruent using ASA and AAS criteria and apply ASA to solve problems.	Evaluating	C - Assimilation	G 407
	Prove that when all corresponding sides and angles of two polygons are congruent, the polygons are congruent.	Evaluating	C - Assimilation	G 407
	Prove and use the Hypotenuse - Leg Theorem	Evaluating	C - Assimilation	G 402, G 501, G 503, G 603
	Use congruence criteria for triangles to solve problems and to prove relationships in geometric figures.	Applying	B - Application	G 402, G 501, G 503, G 603
	Apply congruence criteria to increasingly difficult problems involving overlapping triangles and multiple triangles.	Applying	B - Application	None
	Prove triangles are congruent by identifying corresponding parts and using theorems.	Evaluating	C - Assimilation	None

KEY COMPONENTS

LEARNING TARGETS (incremental learning target by week)
Week 14

- Day 8 - Test
- Day 1 - 4 - 1: Use a composition of rigid motions to show that two

KEY VOCABULARY

- Congruence transformation
- Congruent

objects are congruent. ● Day 2 - 4 - 2: Apply theorems about isosceles and equilateral triangles to solve problems. Week 15 ● Day 3 - Review and Quiz ● Day 4 - 4 - 3: Use SAS and SSS to determine whether triangles are congruent. ● Day 5 - 4 - 4: Determine congruent triangles by comparing two angles and one side. Week 16 ● Day 6 - Review and Quiz ● Day 7 - 4 - 5: Identify congruent right triangles ● Day 8 - 4 - 6: Use triangle congruence to solve problems with overlapping triangles Week 17 ● Day 9 - Review ● Day 10 - Test	
ESSENTIAL QUESTION(S) ● 4 - 1: What is the relationship between rigid motions and congruence? ● 4 - 2: How are the side lengths and angle measures related in isosceles triangles and in equilateral triangles? ● 4 - 3: How are SAS and SSS used to show that two triangles are congruent? ● 4 - 4: How are ASA and AAS used to show that triangles are congruent? ● 4 - 5: What minimum criteria are needed to show that right triangles are congruent? ● 4 - 6: Which theorems can be used to prove that two overlapping triangles are congruent?	PRIOR KNOWLEDGE 4 - 1 ● Rigid motions in the coordinate plane ● Solve problems using rigid motions ● Compose two or more rigid motions ● Describe rigid motions as compositions of reflections 4 - 2 ● Relate congruence to rigid motions in the coordinate plane ● Use rigid motion to show congruency 4 - 3 ● Use rigid motions to define congruence of figures. ● Use theorems for isosceles and equilateral triangles. 4 - 4 ● Use rigid motions to define congruence. ● Apply SSS and SAS triangle congruency criteria 4 - 5 ● Use rigid motion to define congruence. ● Prove and use SSS, SAS, ASA, and AAS Triangle Congruence Theorems 4 - 6 ● Define congruence in terms of congruence transformations ● Apply SSS, SAS, ASA, HL and AAS Triangle Congruence Theorems

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 34 Proficiency Scale: Standard 25 Proficiency Scale: Standard 24 Proficiency Scale: Standard 22	
RTI	EXTENSION OPPORTUNITIES

UNIT 6: Relationships in Triangles	DURATION: 3 weeks
CONTENT STANDARDS	
PRIORITY STANDARDS ● **34. Use congruence and similarity criteria for triangles to solve problems in real-world contexts.**	**SUPPORTING STANDARDS** ● 2c. Define appropriate quantities for the purpose of descriptive modeling. ● 29. Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools. ○ a. Construct figures, using technology and other tools, in order to make and test conjectures about their properties. ● 31a. Investigate, prove, and apply theorems about lines and angles, including but not limited to: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; the points on the perpendicular bisector of a line segment are those equidistant from the segment's endpoints. ● 31b. Investigate, prove, and apply theorems about triangles, including but not limited to: the sum of the measures of the interior angles of a triangle is 180°; the base angles of isosceles triangles are congruent; the segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length; a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem using triangle similarity. ● 36. Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems. ● 38. Use the mathematical modeling cycle involving geometric methods to solve design problems. Examples: Design an object or structure to satisfy physical constraints or minimize cost; work with typographic grid systems based on ratios; apply concepts of density based on area and volume.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
	Prove the Perpendicular Bisector Theorem, the Angle Bisector Theorem, and their converses.	**Evaluating**	**C - Assimilation**	**G 301, G 401, G 402, G 501**

	Use the Perpendicular Bisector Theorem to solve problems.	Applying	B - Application	G 301, G 401, G 402, G 501
	Use the Angle Bisector Theorem to solve problems.	Applying	B - Application	G 301, G 401, G 402, G 501
	Prove that the point of concurrency of the perpendicular bisectors of a triangle, called the circumcenter, is equidistant from the vertices.	Evaluating	C - Assimilation	G 402, G 501, G 503, G 603
	Prove that the point of concurrency of the angle bisectors of a triangle, called the incenter, is equidistant from the sides.	Evaluating	C - Assimilation	G 402, G 501, G 503, G 603
Identify special segments in triangles and understand theorems about them.		Remembering	B - Application	G 503, G 603
	Find and use the point of concurrency of the medians of a triangle to solve problems and prove relationships in triangles.	Applying	B - Application	G 503, G 603
	Find the point of concurrency of the altitudes of a triangle.	Applying	B - Application	G 503, G 603
	Prove that the side lengths of a triangle are related to the angle measures of the triangle.	Evaluating	C - Assimilation	G 402, G 501, G 503, G 603
	Use the angle measures of a triangle to compare the side lengths of the triangle.	Applying	B - Application	G 402, G 501, G 503, G 603
	Use the Triangle Inequality Theorem to determine if three given side lengths will form a triangle and to find a range of possible side lengths for a third side given two side lengths.	Applying	B - Application	G 402, G 501, G 503, G 603
	Prove the Hinge Theorem and use the Hinge Theorem to compare side lengths.	Evaluating	C - Assimilation	G 402, G 501, G 503, G 603
	Prove the Converse of the Hinge Theorem and use the Converse of the Hinge	Evaluating	C - Assimilation	G 402, G 501, G 503, G 603

	Theorem to compare angle measures.			

KEY COMPONENTS	
LEARNING TARGETS (incremental learning target by week) Week 17 ● Day 1 - 5 - 1: Use perpendicular and angle bisectors to solve problems. Week 18 ● Day 2 - 5 - 2: Use triangle bisectors to solve problems. ● Day 3 - Review and Quiz ● Day 4 - 5 - 3: Find the points of concurrency for the medians of a triangle and the altitudes of a triangle. Week 19 ● Day 5 - 5 - 4: Use theorems to compare the sides and angles of a triangle. ● Day 6 - 5 - 5: Compare a pair of sides of two triangles when the remaining pairs of sides are congruent. ● Day 7 - Review Week 20 ● Day 8 - Test	KEY VOCABULARY ● Equidistant ● Circumcenter of a triangle ● Circumscribed ● Concurrent lines ● Incenter of a triangle ● Inscribed ● Point of concurrency ● Altitude of a triangle ● Centroid of a triangle ● Median of a triangle ● Orthocenter of a triangle
ESSENTIAL QUESTION(S) ● 5 - 1: What is the relationship between a segment and the points on its perpendicular bisector? Between an angle and the points on its bisector? ● 5 - 2: What are the properties of the perpendicular bisectors in a triangle? What are the properties of the angle bisectors in a triangle? ● 5 - 3: What are the properties of the medians in a triangle? What are the properties of the altitudes in a triangle? ● 5 - 4: What are some relationships between the sides and angles of any triangle? ● 5 - 5: When two triangles have two pairs of congruent sides, how are the third pair of sides and the pair of angles opposite the third pair of sides related?	PRIOR KNOWLEDGE 5 - 1 ● Identify congruent triangles and use CPCTC to solve problems. 5 - 2 ● Solve problems using the Perpendicular Bisector Theorem and the Angle Bisector Theorem 5 - 3 ● Solve problems using Bisector Theorems ● Use the circumcenter and incenter of triangles to solve problems. 5 - 4 ● Determine whether given side lengths will form a triangle. 5 - 5 ● Determine the relationship between the largest angle and the longest side of a triangle.

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 34	
RTI	EXTENSION OPPORTUNITIES

UNIT 7: Quadrilaterals and Other Polygons	DURATION: 3 weeks
CONTENT STANDARDS	
PRIORITY STANDARDS ● **34. Use congruence and similarity criteria for triangles to solve problems in real-world contexts.**	**SUPPORTING STANDARDS** ● 29. Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools. ○ a. Construct figures, using technology and other tools, in order to make and test conjectures about their properties. ○ b. Identify different sets of properties necessary to define and construct figures. ● 31c. Investigate, prove, and apply theorems about parallelograms and other quadrilaterals, including but not limited to both necessary and sufficient conditions for parallelograms and other quadrilaterals, as well as relationships among kinds of quadrilaterals. Example: Prove that rectangles are parallelograms with congruent diagonals.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
	Show that the sum of the exterior angles of a polygon is 360° and use that to solve problems.	**Evaluating**	**C - Assimilation**	**None**
	Show that the sum of the interior angles of a polygon is the product of 180° and two less than the number of sides, and use that to solve problems.	**Evaluating**	**C - Assimilation**	**None**
	Use properties of the diagonals of a kite to solve problems and prove relationships.	**Applying**	**B - Application**	**None**
	Use properties of isosceles trapezoids to solve problems and prove relationships.	**Applying**	**B - Application**	**None**
	Use the relationship between the lengths of the bases and midsegment	**Applying**	**B - Application**	**None**

	Show that the consecutive angles of a parallelogram are supplementary and opposite angles are congruent.	Evaluating	C - Assimilation	None
	Show that opposite sides of a parallelogram are congruent.	Evaluating	C - Assimilation	None
	Show that diagonals of a parallelogram bisect each other.	Evaluating	C - Assimilation	
	Demonstrate that a quadrilateral is a parallelogram based on its sides and diagonals.	Evaluating	C - Assimilation	
	Demonstrate that a quadrilateral is a parallelogram based on its angles.	Evaluating	C - Assimilation	None
	Prove that the diagonals of rhombi are perpendicular bisectors of each other and angle bisectors of the angles of the rhombus.	Evaluating	C - Assimilation	None None None
	Prove that the diagonals of a rectangle are congruent.	Evaluation	C - Assimilation	None
	Use properties of rhombi, rectangles, and squares to solve problems.	Applying	B - Application	None
Identify rhombi, rectangles, and squares by the characteristics of diagonals and parallelograms		Remembering	A - Acquisition	None

KEY COMPONENTS	
LEARNING TARGETS (incremental learning target by week) Week 20 ● Day 1 - 6 - 1: Find the sums of the measures of the exterior angles and interior angles of polygons. ● Day 2 - 6 - 2: Use triangle congruence to understand kites and	KEY VOCABULARY ● Midsegment of a trapezoid

trapezoids **Week 21** ● Day 3 - Review and Quiz ● Day 4 - 6 - 3: Use the properties of parallel lines, diagonals, and triangles to investigate parallelograms. ● Day 5 - 6 - 4: Use properties of sides, angles, and diagonals to identify a parallelogram. **Week 22** ● Day 6 - Review and Quiz ● Day 7 - 6 - 5: Use the properties of rhombi, rectangles, and squares to solve problems. ● Day 8 - 6 - 6: Identify rhombi, rectangles, and squares by the characteristics of their diagonals. **Week 23** ● Day 9 - Review ● Day 10 - Test	
ESSENTIAL QUESTION(S) ● 6 - 1: How does the number of sides in convex polygons relate to the sums of the measures of the exterior and interior angles? ● 6 - 2: How are diagonals and angle measures related in kites and trapezoids? ● 6 - 3: What are the relationships of the sides, the angles, and the diagonals of a parallelogram? ● 6 - 4: Which properties determine whether a quadrilateral is a parallelogram? ● 6 - 5: What properties of rhombi, rectangles, and squares differentiate them from other parallelograms? ● 6 - 6: Which properties of the diagonals of a parallelogram help you to classify a parallelogram?	**PRIOR KNOWLEDGE** **6 - 1** ● Define and use interior and exterior angles of triangles ● Prove and use the Triangle Angle - Sum Theorem **6 - 2** ● Apply SSS, SAS, ASA, AAS, and HL triangle congruency criteria. **6 - 3** ● Use polygon angle - sum theorems. ● Use theorems about kites and trapezoids. **6 - 4** ● Prove properties of the sides, diagonals, and angles of parallelograms. **6 - 5** ● Apply properties of parallelograms ● Determine whether a figure is a parallelogram based on its characteristics. **6 - 6** ● Prove properties of the sides and diagonals of parallelograms. ● Prove properties of rhombi, squares, and rectangles.

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 34	Quadrilateral Venn Diagram
RTI	EXTENSION OPPORTUNITIES

UNIT 8: Similarity	DURATION: 3 weeks
CONTENT STANDARDS	

PRIORITY STANDARDS
• **19 - Derive and apply the relationships between the lengths, perimeters, areas, and volumes of similar figures in relation to their scale factor.**
• **21a - Describe transformations and compositions of transformations as functions that take points in the plane as inputs and give other points as outputs, using informal and formal notation.**
• **27 - Given two figures, determine whether they are similar by identifying a similarity transformation (sequence of rigid motions and dilations) that maps one figure to the other.**
• **28a - Verify that two triangles are similar if and only if corresponding pairs of sides are proportional and corresponding pairs of angles are congruent.**
• **28b - Verify that two triangles are similar if (but not only if) two pairs of corresponding angles are congruent (AA), the corresponding sides are proportional (SSS), or two pairs of corresponding sides are proportional and the pair of included angles is congruent (SAS).**
• **34 - Use congruence and similarity criteria for triangles to solve problems in real-world contexts.**
	SUPPORTING STANDARDS
	• 2 - Use units as a way to understand problems and to guide the solution of multi-step problems.
	  ○ a. Choose and interpret units consistently in formulas.
	  ○ c. Define appropriate quantities for the purpose of descriptive modeling.
	• 21 - Represent transformations and compositions of transformations in the plane (coordinate and otherwise) using tools such as tracing paper and geometry software.
	• 26 - Verify experimentally the properties of dilations given by a center and a scale factor.
	  ○ a. Verify that 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.
	  ○ b. Verify that the dilation of a line segment is longer or shorter in the ratio given by the scale factor.
	• 31b - Investigate, prove, and apply theorems about triangles, including but not limited to: the sum of the measures of the interior angles of a triangle is 180°; the base angles of isosceles triangles are congruent; the segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length; a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem using triangle similarity.
	• 35 - Discover and apply relationships in similar right triangles.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
	Dilate figures on and off the coordinate plane.	Applying	B-Application	G 703
Understand how distances and lengths in a dilation are related to the scale factor and center of dilation.		Understanding	A-Acquisition	G 506, G 703
	Understand that two figures are similar if there is a similarity transformation that maps one figure to the other.	Understanding	A-Acquisition	G 703
Identify a combination of rigid motions and dilation that maps one figure to a similar figure.		Remembering	B-Application	G 703
Identify the coordinates of an image under a similarity transformation.		Remembering	B-Application	G 703
	Use dilations and rigid motions to prove triangles are similar.	Applying	B-Application	None
	Prove and use the AA~, SSS~, and SAS~ theorems to prove triangles are similar.	Evaluation	C-Assimilation	None
	Use similarity of right triangles to solve problems.	Applying	B-Application	G 402, G 503, G 508, G 603
	Use length relationships of the sides of the right triangles and an altitude drawn to the hypotenuse to solve problems.	Applying	B-Application	G 501, G 503, G 508, G 602
	Use the Side-Splitter Theorem and the Triangle Midsegment Theorem to find lengths of side segments of triangles.	Applying	B-Application	None
	Use the Triangle-Angle-Bisector Theorem to find lengths of sides and segments of a triangle.	Applying	B-Application	None

KEY COMPONENTS	
LEARNING TARGETS (incremental learning target by week) **Week 23** ● Day 1 - 8-1: Dilate figures and identify characteristics of dilations. **Week 24** ● Day 2 - 8-2: Determine whether figures are similar. ● Day 3 - Review and Quiz ● Day 4 - 8-3: Use dilation and rigid motion to establish triangle similarity theorems. **Week 25** ● Day 5 - 8-4: Use similarity and the geometric mean to solve problems involving right triangles. ● Day 6 - Review and Quiz ● Day 7 - 8-5: Find the lengths of segments using proportional relationships in triangles resulting from parallel lines. **Week 26** ● Day 8 - Review ● Day 9 - Test	**KEY VOCABULARY** ● Center of Dilations ● Dilation ● Scale Factor ● Similarity Transformation ● Geometric Mean
ESSENTIAL QUESTION(S) ● 8-1: How does dilation affect the side lengths and angle measures of a figure? ● 8-2: What makes a transformation a similarity transformation? What is the relationship between a preimage and the image resulting from a similarity transformation? ● 8-3: How can you use the angles and sides of two triangles to determine whether they are similar? ● 8-4: In a right triangle, what is the relationship between the altitude to the hypotenuse, and the geometric mean? ● 8-5: When parallel lines intersect two transversals, what are the relationships among the lengths of the segments formed?	**PRIOR KNOWLEDGE** **8-1:** ● Rotated, translated, and reflected figures on and off the coordinate plane. **8-2:** ● Dilated figures both on and off the coordinate plane. **8-3:** ● Defined similarity in terms of a composition of rigid motions and a dilation. **8-4:** ● Used similarity transformations to show similarity between triangles. **8-5:** ● Use triangle similarity to prove theorems and find lengths and angle measures.

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 34 Proficiency Scale: Standard 28 Proficiency Scale: Standard 27 Proficiency Scale: Standard 21 Proficiency Scale: Standard 19	
RTI	**EXTENSION OPPORTUNITIES**

UNIT 9: Right Triangles and Trigonometry	DURATION: 3 weeks
CONTENT STANDARDS	
PRIORITY STANDARDS ● **35a. Derive and apply the constant ratios of the sides in special right triangles (45°-45°-90° and 30°-60°-90°).** ● **35b. Use similarity to explore and define basic trigonometric ratios, including sine ratio, cosine ratio, and tangent ratio.** ● **35c. Explain and use the relationship between the sine and cosine of complementary angles.**	**SUPPORTING STANDARDS** ● 2. Use units as a way to understand problems and to guide the solution of multi-step problems. ○ a. Choose and interpret units consistently in formulas. ○ c. Define appropriate quantities for the purpose of descriptive modeling. ● 31b. Investigate, prove, and apply theorems about triangles, including but not limited to: the sum of the measures of the interior angles of a triangle is 180°; the base angles of isosceles triangles are congruent; the segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length; a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem using triangle similarity. ● 35. Discover and apply relationships in similar right triangles. ○ d. Demonstrate the converse of the Pythagorean Theorem. ○ e. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems, including finding areas of regular polygons. ● 36. Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
	Prove the Pythagorean Theorem using similar right triangles.	Evaluation	C-Assimilation	G 602, G 604
	Understand and apply the relationships between side lengths in 45^o-45^o-90^o and 30^o-60^o-90^o triangles.	Understanding	B-Application	G 602, G 603, G 509, G 604, F 706
Define and calculate sine, cosine, and tangent ratios.		Remembering	A-Acquisition	G 509, G 604, F 706
	Use trigonometric ratios to solve problems	Applying	A-Acquisition	G 604, F 706
Understand why the Law of Sine applies to any triangle.		Understanding	A-Acquisition	G 509
Understand the Law of Sines to solve problems.		Understanding	A-Acquisition	G 509
	Develop an understanding of the Law of Cosines.	Remembering	B-Application	G 509
	Use the Law of Cosines to solve problems.	Applying	B-Application	G 509
	DIstinguish between angles of elevation and depression.	Understanding	C-Assimilation	G 509, G 604, F 706
	Use trigonometric ratios and the Laws of Sines and Cosines to solve problems.	Applying	B-Application	G 509, G 604, F 706

KEY COMPONENTS

LEARNING TARGETS (incremental learning target by week)

Week 26

- Day 1 - 9-1: Prove the Pythagorean Theorem using similarity and establish the relationships in special right triangles.

Week 27

- Day 2 - 9-2: Use trigonometric ratios to find lengths and angle measures of right triangles.

KEY VOCABULARY

- Pythagorean Triple
- Cosine
- Sine
- Tangent
- Trigonometric ratios
- Inverse Functions

• Day 3 - Review and Quiz • Day 4 - 9-3: Use the Law of Sines to solve problems. Week 28 • Day 5 - 9-4: Use the Law of Cosines to solve problems. • Day 6 - 9-5: Use trigonometry to solve problems. • Day 7 - Review Week 29 • Day 8 - Test	• Law of Sine • Law of Cosine • Angle of depression • Angle of Elevation
ESSENTIAL QUESTION(S) • 9-1: How are similarity in right triangles and the Pythagorean Theorem related? • 9-2:How do trigonometric ratios relate angle measures to side lengths of right triangles? • 9-3: How can the Law of SInes be used to determine side lengths and angle measures of acute and obtuse triangles? • 9-4:How can the Law of Cosines be used to determine side lengths and angle measures of acute and obtuse triangles? • 9-5: How can trigonometry be used to solve real-world and mathematical problems?	PRIOR KNOWLEDGE • Examined the relationships between the similar triangles that are formed by the altitude to the hypotenuse in a right triangle.

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 35abe	
RTI	EXTENSION OPPORTUNITIES

UNIT 10: Coordinate Geometry	DURATION: 2 weeks

CONTENT STANDARDS

PRIORITY STANDARDS

- **6a. Given the endpoints of the diameter of a circle, use the midpoint formula to find its center and then use the Pythagorean Theorem to find its equation.**
- **30. Develop and use precise definitions of figures such as angle, circle, perpendicular lines, parallel lines, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.**

SUPPORTING STANDARDS

- 2. Use units as a way to understand problems and to guide the solution of multi-step problems.
  - a. Choose and interpret units consistently in formulas.
- 6. Derive the equation of a circle of given center and radius using the Pythagorean Theorem.
- 18. Given the coordinates of the vertices of a polygon, compute its perimeter and area using a variety of methods, including the distance formula and dynamic geometry software, and evaluate the accuracy of the results.
- 31. Justify whether conjectures are true or false in order to prove theorems and then apply those theorems in solving problems, communicating proofs in a variety of ways, including flow chart, two-column, and paragraph formats.
- 32. Use coordinates to prove simple geometric theorems algebraically.
- PC31. Graph conic sections from second-degree equations, extending from circles and parabolas to ellipses and hyperbolas, using technology to discover patterns.
  - a. Graph conic sections given their standard form.
    - Example: The graph of $\frac{x^2}{9} + \frac{(y-3)^2}{4} = 1$ will be an ellipse centered at (0,3) with major axis 6 and minor axis 4, while the graph of $\frac{x^2}{9} - \frac{(y-3)^2}{4} = 1$ will be a hyperbola centered at (0,3) with asymptotes with slope $\pm\frac{3}{2}$.
  - b. Identify the conic section that will be formed, given its equation in general form.
    - Example: $5y^2 - 25x^2 = -25$ will be a hyperbola.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
Use coordinate geometry to classify triangles and quadrilaterals on the		**Remembering**	**A-Acquisition**	**G 505,**

coordinate plane.				
	Solve problems involving triangles and polygons on the coordinate plane.	Applying	B-Application	G 505, G 203
Plan a method of proof using coordinate geometry.		Remembering	A-Acquisition	G 702
	Prove theorems using algebra and the coordinate plane.	Evaluation	C-Assimilation	
	Write the equation for a circle given the graph of the circle and radius of the circle.	Applying	B-Application	G 507
	Graph a circle from its equation.	Applying	B-Application	G 507
	Explain the relationship between a focus and directrix and the corresponding parabola.	Understanding	A-Acquisition	G 609
	Write equations for parabolas given the focus and directrix.	Applying	B-Application	G 609

KEY COMPONENTS

LEARNING TARGETS (incremental learning target by week)

Week 29

- Day 1 - 10-1: Use the coordinate plane to analyze geometric figures.
- Day 2 - 10-2: Prove geometric theorems using algebra and the coordinate plane.

Week 30

- Day 3 - Review and Quiz
- Day 4 - 10-3: Use the equations and graphs of circles to solve problems.
- Day 5 - 10-4: Use the equations and graphs of parabolas to solve problems.

Week 31

- Day 6 - Review

KEY VOCABULARY

- Directrix
- Focus
- Parabola

ESSENTIAL QUESTION(S)

PRIOR KNOWLEDGE

• 10-1: How are properties of geometric figures represented in the coordinate plane? • 10-2: How can geometric relationships be proven algebraically in the coordinate plane. • 10-3: How is the equation of a circle determined in the coordinate plane? • 10-4: How does the geometric description of a parabola relate to the equation?	• Learned and used the Midpoint and Distance Formulas to find lengths and midpoints of segments on coordinate planes. • Used slopes to show segments are parallel or perpendicular.

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 30 Proficiency Scale: Standard 6	
RTI	EXTENSION OPPORTUNITIES

UNIT 11: Circles	DURATION: 3 weeks
CONTENT STANDARDS	
PRIORITY STANDARDS ● **30. Develop and use precise definitions of figures such as angle, circle, perpendicular lines, parallel lines, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.**	**SUPPORTING STANDARDS** ● 2. Use units as a way to understand problems and to guide the solution of multi-step problems. ○ a. Choose and interpret units consistently in formulas. ● 20. Derive and apply the formula for the length of an arc and the formula for the area of a sector. ● 29. Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools. ○ a. Construct figures, using technology and other tools, in order to make and test conjectures about their properties. ● 37. Investigate and apply relationships among inscribed angles, radii, and chords, including but not limited to: 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.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
	Calculate the length of an arc when the central angle is given in degrees or radians.	**Applying**	**B-Application**	**G 507, G 606**
	Calculate the area of sectors and segments of circles.	**Applying**	**B-Application**	**G 507, G 606**
Identify lines that are tangent to a circle using angle measures and segment lengths.		**Remembering**	**B-Application**	**G 609, G 701**
	Solve problems involving tangent lines.	**Applying**	**B-Application**	**G 609, G 701**

	Prove and apply relationships between chords, arcs, and central angles.	Evaluation	C-Assimilation	G 609, G 701
	FInd lengths of chords given the distance from the center of the circle and use this information to solve problems.	Applying	B-Application	G 609, G 701
Identify and apply relationships between the measures of inscribed angles, arcs, and central angles.		Remembering	A-Acquisition	G 609, G 701
Identify and apply the relationships between an angle formed by a chord and a tangent to its intercepted arc.		Remembering	A-Acquisition	G 609, G 701
	Recognize and apply angle relationships formed by secant and tangents intersecting inside and outside a circle.	Applying	B-Application	G 609, G 701
	Recognize and apply segment length relationships formed by secants and tangents intersecting inside and outside a circle.	Applying	B-Application	G 609, G 701

KEY COMPONENTS

LEARNING TARGETS (incremental learning target by week)

Week 31

- Day 1 - Test
- Day 2 - 11-1: Find arc length and sector area of a circle and use them to solve problems.

Week 33

- Day 3 - 11-2: Use properties of tangent lines to solve problems.
- Day 4 - Review and Quiz
- Day 5 - 11-3: Relate the length of a chord to its central angle and the arc it intercepts.

Week 34

- Day 6 - 11-4: Use the relationships between angles and arcs in circles to find their measures.
- Day 7 - Review and Quiz
- Day 8 - 11-5: Use angle measures and segment lengths formed by intersecting lines and circles to solve problems.

KEY VOCABULARY

- Arc Length
- Central Angle
- Intercepted Arc
- Major Arc
- Minor Arc
- Radian
- Sector of a circle
- Segment of circle
- Point of Tangency
- Tangent to a circle
- Chord
- Inscribed angle
- Secant

Week 35 ● **Day 9 - Review** ● **Day 10 - Test**	
ESSENTIAL QUESTION(S) ● **11-1: How are arc length and sector area related to circumference and area of a circle?** ● **11-2: How is a tangent line related to the radius of a circle at the point of tangency?** ● **11-3: How are chords related to their central angles and intercepted arcs?** ● **11-4: How is the measure of an inscribed angle related to its intercepted arc?** ● **11-5: How are the measures of angles, arcs, and segments formed by intersecting secant lines related?**	**PRIOR KNOWLEDGE** ● **Learned how to calculate the circumference and area of circles.** ● **Learned that angle measure can be expressed in degrees, and there are 360 in a circle.**

FORMATIVE ASSESSMENT	**SUMMATIVE ASSESSMENT**

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 30	
RTI	**EXTENSION OPPORTUNITIES**

UNIT 12: Two and Three - Dimensional Models	DURATION: 2 weeks
CONTENT STANDARDS	
PRIORITY STANDARDS ●	**SUPPORTING STANDARDS** ● 2. Use units as a way to understand problems and to guide the solution of multi-step problems. ○ a. Choose and interpret units consistently in formulas. ● 16. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. ● 17. Model and solve problems using surface area and volume of solids, including composite solids and solids with portions removed. ○ a. Give an informal argument for the formulas for the surface area and volume of a sphere, cylinder, pyramid, and cone using dissection arguments, Cavalieri's Principle, and informal limit arguments. ○ b. Apply geometric concepts to find missing dimensions to solve surface area or volume problems. ● 36. Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems. ● 38. Use the mathematical modeling cycle involving geometric methods to solve design problems. ○ Examples: Design an object or structure to satisfy physical constraints or minimize cost; work with typographic grid systems based on ratios; apply concepts of density based on area and volume.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
	Use Euler's Formula to calculate the number of vertices, faces, and edges in polyhedrons.	**Applying**	**B-Application**	**None**
	Describe cross sections of polyhedrons.	**Remembering**	**A-Acquisition**	**None**

	Describe rotations of polygons about an axis.	Remembering	A-Acquisition	None
Understand how the volume formulas for prisms and cylinders apply to oblique prisms and cylinders.		Understanding	Application	G 203, G 405, G 601, G 702
	Model three-dimensional figures as cylinders and prisms to solve problems.	Evaluating	C-Assimilation	G 203, G 302, G 405, G 601, G 702
Understand how the volume formulas for pyramids and cones apply to oblique pyramids and cones.		Understanding	Application	G 203, G 302, G 405, G 601, G 702,
	Model three-dimensional figures as pyramids and cones to solve problems.	Evaluating	C-Assimilation	G 203, G 302, G 405, G 601, G 702
	Use Cavalieri's Principle to show how the volume of a hemisphere is related to the volume of a cone and a cylinder.	Applying	B-Application	G 302, G 405, G 601, G 702
	Calculate volumes and surface area of spheres and composite figures.	Applying	B-Application	G 302, G 505 G 601, G 702

KEY COMPONENTS

LEARNING TARGETS (incremental learning target by week)

Week 35

- Day 1 - 12-:1 Identify three-dimensional figures and their relationships with polygons to solve problems.

Week 36

- Day 2 - 12-2:Use the properties of prisms and cylinders to calculate their volumes.
- Day 3 - Review and Quiz
- Day 4 - 12-3: Use the volume of right and oblique pyramids and cones to solve problems.

Week 37

- Day 5 - Review
- Day 6 - Test

KEY VOCABULARY

- Cavalieri's Principle
- Oblique Cylinder
- Oblique Prism
- Hemisphere

ESSENTIAL QUESTION(S)	PRIOR KNOWLEDGE
• **12-1: How are three-dimensional figures and polygons related?** • **12-2: How does the volume of a prism or cylinder relate to a cross section parallel to its base?** • **12-3: How are the formulas for volume of a pyramid and volume of a cone alike?**	• **Learned criteria for classifying polygons.** • **Worked with polygons in the coordinate plane.**

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
RTI	**EXTENSION OPPORTUNITIES**

UNIT 13: Data Analysis (AL-2)	DURATION: 3 weeks
CONTENT STANDARDS	
PRIORITY STANDARDS • **10b. Calculate the standard deviation for a data set, using technology where appropriate.**	**SUPPORTING STANDARDS** • 8. Use technology to organize data, including very large data sets, into a useful and manageable structure. • 9. Represent the distribution of univariate quantitative data with plots on the real number line, choosing a format (dot plot, histogram, or box plot) most appropriate to the data set, and represent the distribution of bivariate quantitative data with a scatter plot. Extend from simple cases by hand to more complex cases involving large data sets using technology. • 10. Use statistics appropriate to the shape of the data distribution to compare and contrast two or more data sets, utilizing the mean and median for center and the interquartile range and standard deviation for variability.

	○ a. Explain how standard deviation develops from mean absolute deviation. ● 11. Interpret differences in shape, center, and spread in the context of data sets, accounting for possible effects of extreme data points (outliers) on mean and standard deviation.

KNOWLEDGE (students need to know):	SKILLS (students need to be able to do):	BLOOM'S TAXONOMY	QUAD	ACT
	Represent data using dot plots, box plots, and histograms			**None**
Interpret the data displayed in dot plots, box plots, and histograms within the context it represents.		**Applying**	**B - Application**	**None**
	Use the measures of center to interpret and compare data sets displayed in dot plots, box plots, and histograms.	**Applying**	**B - Application**	**S 701**
	Use measures of variability, such as MAD and IQR, to interpret and compare data sets.	**Applying**	**B - Application**	**None**
Interpret and compare differences in the shape, center, and spread of different data sets.				**S 701**
	Determine the relationship between the mean and median of a data set when the shape of the data display is evenly spread, skewed right, or skewed left.			**S 701**
Explain how standard deviation develops from mean absolute deviation.				**None**

KEY COMPONENTS	
LEARNING TARGETS (incremental learning target by week) **Week 37** ● **Day 1 - AL-2-1: Organize and understand data using dot plots,**	**KEY VOCABULARY** ● **Interquartile range** ● **Mean**

histograms, and box plots. Week 38 • Day 2 - AL-2-2: Use measures of center and spread to compare data sets • Day 3 - Review and Quiz • Day 4 - AL-2-3: Interpret shapes of data displays representing different types of data distributions. Week 39 • Day 5 - AL-2-4: Quantify and analyze the spread of data. • Day 6 - Review and Quiz • Day 7 - A:-2-5: Find and compare the standard deviation and mean absolute deviation of data sets. Week 40 • Day 8 - AL-2-6: Use technology to organize data sets into usable structures. • Day 9 - Review • Day 10 - Test	• Mean absolute deviation • Median • Variability • Bar graph • Box plot • Cluster • Dot plot • Histogram • Outlier • Skewed
ESSENTIAL QUESTION(S) • AL-2-1: What information about data sets can you get from different data displays? • AL-2-2: How can you use measures of center and spread to compare data sets? • AL-2-3: How does the shape of a data set help you understand the data? • AL-2-4: Why does the way in which data are spread out matter?	PRIOR KNOWLEDGE •

FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT

ACTIVITIES & RESOURCES	
Proficiency Scale: Standard 10	
RTI	EXTENSION OPPORTUNITIES