9-12 Honors Geometry Curriculum

July 6, 2017
St. Charles R6 School District

The City of Saint Charles School District
HONORS GEOMETRY CURRICULUM

CONTENT AREA: Mathematics	UNIT TITLE: Unit 1-Basics of Geometry
COURSE: Honors Geometry	UNIT DURATION: 10 Days

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
- Textbook - Calculator - Chrome book - Geogebra - Ruler/Straightedge - Protractor - Compass - Supplemental Handouts	- Model and interpret images of points, lines, planes, etc. using key terms and symbols. - Write and solve algebraic equations using betweenness of points, congruent segments, and segment bisectors. - Apply the length and midpoint formulas for segments on the coordinate plane. - Write and solve algebraic equations using angle addition, congruent angles, and angle bisectors. - Apply the concepts of adjacent angles, vertical angles, a linear pair, complementary angles, supplementary angles, and perpendicular lines. - Make formal geometric constructions with a variety of tools and methods to copy a segment, copy an angle, bisect a segment, bisect an angle, construct perpendicular lines, including the perpendicular bisector of a line segment, and constructing a line parallel to a given line through a point not on the line. - Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
ENDURING UNDERSTANDINGS:	**ESSENTIAL QUESTIONS:**
- Understand and use vocabulary, symbols, and figures involving the undefined terms, segments, and angles. - Find the length and midpoint of a segment on the coordinate plane. - Write and solve algebraic equations involving segments and angles. - Identify and find the perimeters and areas of rectangles, triangles, and circles.	- What are the undefined terms and can you draw them and represent them with symbols? - What are collinear and coplanar points? - Can you draw, name, and find the lengths of segments? - Can you find the length and midpoint of a segment on the coordinate plane? - Can you measure and classify angles? - Can you identify and use congruent angles and angle bisectors? - Can you identify and use angle pairs?

	• Can you identify and use perpendicular lines?
	• Can you identify and name polygons?
	• Can you find the perimeter and areas of rectangles, triangles, and circles?

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	**STANDARDS: Content specific standards that will be addressed in this unit.**	**MAJOR STANDARD**	**SUPPORTING STANDARD**
G.CO.A.1	Define angle, circle, perpendicular line, parallel line, line segment and ray based on the undefined notions of point, line, distance along a line and distance around a circular arc.	X	
G.CO.B.1	Develop the definition of congruence in terms of rigid motions		X
G.CO.D.1	Construct geometric figures using various tools and methods.	X	
G.GPE.B.4	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles		X
G.MG.A.3	Apply geometric methods to solve design mathematical modeling problems		X

OBJECTIVE # 1	**Geometric Essentials**
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• G.CO.A.1 Define angle, circle, perpendicular line, parallel line, line segment and ray based on the undefined notions of point, line, distance along a line and distance around a circular arc. • G.MG.A.3 Apply geometric methods to solve design mathematical modeling problems

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*

• How to identify and model points, lines, and planes. • How to identify collinear and coplanar points and intersecting lines and planes in space. • How to apply undefined terms to real world situations.	• Undefined terms • Collinear • Coplanar • Intersect	• Identify and model points, lines, and planes. • Identify collinear and coplanar points and intersecting lines and planes in space. • Apply undefined terms to real world situations.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	• Cooperative learning • Discovery learning • Goal setting • Graphic organizers • Hands-on learning • Homework and practice • Peer teaching • Self-assessment • Summarizing and note taking	• 1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Art - Perspective Drawing	• Plot points on the coordinate plane • Model points and lines	• How can we use points, lines, and planes to model real world situations?
HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)

• Daily Homework check	Formative	1 - 4
• Frequent Quizzes	Formative	2 - 3
• Comprehensive Test	Summative	1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	• Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables • Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Hands-on learning • Peer teaching	• Peer teach • Present applications of the undefined terms. • Model undefined terms using Geogebra	3 - 4

STANDARD 1: Geometric Essentials		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• Peer teach • Present applications of the undefined terms. • Model undefined terms using Geogebra
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	The student: • **Model and interpret images of points, lines, planes, etc. using key terms and symbols.** The student exhibits no major errors or omissions.	• Draw and label a figure that shows line l and plane N intersecting at point..
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	

2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:**
	  • Recognizes or recalls specific terminology, such as:
	    • *point, line, plane, collinear, coplanar, intersect*
	  Performs basic processes, such as:
	    • *applying some basic terminology and symbols*
	
	However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
		• **Refer to the figure at the right.**
		  1. Name a line that contains point .
		  2. Name a point contained in line h.
		  3. Give two names for the plane containing lines *h* and
		
		  g.

1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

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OBJECTIVE # 2	Linear Measure
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• G.CO.A.1 Define angle, circle, perpendicular line, parallel line, line segment and ray based on the undefined notions of point, line, distance along a line and distance around a circular arc. • G.CO.B.1 Develop the definition of congruence in terms of rigid motions • G.GPE.B.4 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• What are segments, congruent segments, and segment bisectors. • Know the distance and midpoint formulas for segments on the coordinate plane.	• Line segment • Betweenness of points • Congruent segments • Distance • Midpoint • Segment bisector	• Write and solve algebraic equations using betweenness of points, congruent segments, and segment bisectors. • Apply the length and midpoint formulas for segments on the coordinate plane.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	• Cooperative learning • Discovery learning • Goal setting • Graphic organizers • Hands-on learning • Homework and practice • Peer teaching • Self-assessment • Summarizing and note taking	1 - 4

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INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
• Art • Architecture	• Plot points on the coordinate plane • Solve a linear equation • Measure with a ruler • Add & subtract fractions	• How can we apply the distance and midpoint formulas for segments on the coordinate plane?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	FORMATIVE OR SUMMATIVE?	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	• Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables • Additional practice	2 - 3

HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Hands-on learning • Peer teaching	• Scavenger hunt to measure various object around the room with a ruler to practice precise measurement. • Measure and model segments using Geogebra • Peer teaching • String art project to create curves with segments and angles.	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

STANDARD 2: Linear Measure		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• Measure and model segments using Geogebra • String art project to create curves with segments and angles.
3.0	**The student:** • **Write and solve algebraic equations using betweenness of points, congruent segments, and segment bisectors.** • **Find the length and midpoint of a segment on the coordinate plane.** **The student exhibits no major errors or omissions.**	• LIne LN bisects segment NO at P . If NO=x+11 and PO=2x-8 , find x and NP.
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	

2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:**
	• Recognizes or recalls specific terminology, such as:
	   • *line segment, betweenness of points, congruent segments, distance, midpoint, segment bisector*
	Performs basic processes, such as:
	   • *finding the length and midpoint of a segment on a number line, finding the length and midpoint of a segment on the coordinate plane with some errors, writing and solving algebraic equations using betweenness of points, congruent segments, and segment bisectors with some errors*
	
	However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
		• Suppose Y is between X and Z . If YZ=1 5/8 in and XZ=3 in. Find XY .

1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

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OBJECTIVE # 3	Angle Measure
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• G.CO.A.1 Define angle, circle, perpendicular line, parallel line, line segment and ray based on the undefined notions of point, line, distance along a line and distance around a circular arc. • G.CO.B.1 Develop the definition of congruence in terms of rigid motions

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* ACADEMIC VOCABULARY	**BE ABLE TO DO?** *Skills; Products*
• Angle addition, congruent angles, and angle bisectors. • The concepts of adjacent angles, vertical angles, a linear pair, complementary angles, supplementary angles, and perpendicular lines.	• *Ray, opposite ray, angle, sides, vertex, interior, exterior, degree, right, acute, obtuse, straight, angle bisector, adjacent angles, vertical angles, linear pair, complementary, supplementary, and perpendicular*	• Write and solve algebraic equations using angle addition, congruent angles, and angle bisectors. • Apply the concepts of adjacent angles, vertical angles, a linear pair, complementary angles, supplementary angles, and perpendicular lines.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	• Cooperative learning • Discovery learning • Goal setting • Graphic organizers • Hands-on learning • Homework and practice • Peer teaching • Self-assessment • Summarizing and note taking	1 - 4

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INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
• Art	• Define and draw an angle. • Measure an angle with a protractor. • Classify an angle. • Solve a linear equation.	• How can we apply angle pairs to real world situations.

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	FORMATIVE OR SUMMATIVE?	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	• Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables • Additional practice	2 - 3

HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Hands-on learning • Peer teaching	• String art project to create curves with segments and angles. • Measure and model angles using Geogebra	3 - 4

PROFICIENCY SCALES FOR THIS STANDARD

STANDARD 3: Angle Measure		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• String art project to create curves with segments and angles. • Measure and model angles using Geogebra
3.0	**The student:** • **Write and solve algebraic equations using angle addition, congruent angles, and angle bisectors.** • **Apply the concepts of adjacent angles, vertical angles, a linear pair, complementary angles, supplementary angles, and perpendicular lines.** **The student exhibits no major errors or omissions.**	• Find the measures of two complementary angles if the measure of the larger angle is 12 more than twice the measure of the smaller angle.
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	

2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:**
	• Recognizes or recalls specific terminology, such as:
	    • *ray, opposite ray, angle, sides, vertex, interior, exterior, degree, right, acute, obtuse, straight, angle bisector, adjacent angles, vertical angles, linear pair, complementary, supplementary, and perpendicular*
	Performs basic processes, such as:
	    • *writing and solving algebraic equations using angle addition, congruent angles, and angle bisectors with some errors, applying the concepts of adjacent angles, vertical angles, a linear pair, complementary angles, supplementary angles, and perpendicular lines with some errors, measure angles with a protractor.*
	However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
		• Draw and label a pair of vertical angles. Identify the vertical angles.
		• Draw a pair of adjacent, supplementary angles. What is another name for this pair of angles?

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1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 4	Constructions
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• G.CO.D.1 Construct geometric figures using various tools and methods.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to construct basic geometric figures with a compass and straightedge and Geogebra.	• *Construction* • *Straightedge* • *Compass straightedge*	• Make formal geometric constructions with a variety of tools and methods to copy a segment, copy an angle, bisect a segment, bisect an angle, construct perpendicular lines, including the perpendicular bisector of a line segment, and constructing a line parallel to a given line through a point not on the line. • Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	• Cooperative learning • Discovery learning • Goal setting • Graphic organizers • Hands-on learning • Homework and practice • Peer teaching • Self-assessment	1 - 4

	• Summarizing and note taking	
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Art	• Use vocabulary, symbols, and figures involving segments and angles	• Can you trisect a segment or angle using formal constructions?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	• Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables • Additional practice	2 - 3

HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Hands-on learning • Peer teaching	• Peer teach • Present applications of constructions. • Construct more complex geometric figures using a compass and straightedge and Geogebra.	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

STANDARD4: Constructions		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• Present applications of constructions. • Construct more complex geometric figures using a compass and straightedge and Geogebra.
3.0	**The student:** • **Make formal geometric constructions with a variety of tools and methods to copy a segment, copy an angle, bisect a segment, bisect an angle, construct perpendicular lines, including the perpendicular bisector of a line segment, and constructing a line parallel to a given line through a point not on the line.** • **Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.** **The student exhibits no major errors or omissions.**	• Construct a regular hexagon DEFGHI inscribed in circle C.
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	

2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:**
	• Recognizes or recalls specific terminology, such as:
	  • *construction*
	Performs basic processes, such as:
	  • *Making some simple constructions (copy segment or angle)*
	However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
		• Construct line AB so that it is the perpendicular bisector of segment HG .

1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

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CONTENT AREA: Mathematics	UNIT TITLE: Reasoning and Proof
COURSE TITLE: Honors Geometry	UNIT DURATION: 7 Days

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
- Textbook - Supplemental Handouts - Chrome book	- Make conjectures using inductive reasoning and find counterexamples. - Write and determine truth values of conditionals, biconditionals, and converses. - Write proofs involving segment and angle congruence and addition.
ENDURING UNDERSTANDINGS:	ESSENTIAL QUESTIONS:
- A counterexample shows a conjecture is false. - A proof shows a conjecture is true. - Understand and use the properties of equality and postulates and theorems involving segment and angle congruence and addition. - Know how to write a proof.	How do you write conjectures and prove that they are true or false?

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
G.CO.C.1	Prove theorems about lines and angles.	X	
OBJECTIVE # 5	**Reasoning & Conjecture**		
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	G.CO.C.1 Prove theorems about lines and angles.		

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WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• A counterexample shows a conjecture is false. • A proof shows a conjecture is true.	• Inductive reasoning • Conjecture • Counterexample • Conditional • Biconditional • Converse	▢ Make conjectures using inductive reasoning and find counterexamples. ▢ Write and determine truth values of conditionals, biconditionals, and converses.
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	• Cooperative learning • Discovery learning • Goal setting • Graphic organizers • Homework and practice • Peer teaching • Self-assessment • Summarizing and note taking	• 1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Computer Science • English	• Use vocabulary, symbols, and figures involving segments and angles. • Write a grammatically correct sentence. • Understand basic mathematical concepts such as even, odd, prime, greater than, less than, etc.	• How are inductive reasoning and conjectures applied in the real world?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	▪ Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ▪ Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Peer teaching	• Peer teach • Present applications of inductive reasoning and conjectures.	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

STANDARD 5: Reasoning & Conjecture		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• Peer teach • Present applications of inductive reasoning and conjectures.
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	• **Make conjectures using inductive reasoning and find counterexamples.** • **Write and determine truth values of conditionals, biconditionals, and converses .**	• **Given the following biconditional statement, write both the conditional and its converse. Determine the truth value of the biconditional.** Two angles are congruent iff they have the same measure.
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	

2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:**
	• Recognizes or recalls specific terminology, such as:
	   • *Inductive reasoning, conjecture, counterexample, negation, conditional, biconditional, converse*
	Performs basic processes, such as:
	   • *Determining the hypothesis and conclusion for a conditional statement, writing a statement but not correctly determining the truth value.*
	
	However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
		• Write a conjecture that describes the pattern in the sequence. Then use your conjecture to find the next item in the sequence.
		      1, 4, 9, 16, 25 . . .
		• **Make a conjecture about each value or geometric relationship. List or draw some examples that support your conjecture.**
		      the sum of two odd numbers
		• **Write each statement in if-then form. Identify the hypothesis and conclusion.**
		      The intersection of two planes is a line.

1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes**	

	and some of the more complex ideas and processes.	
LND	Even with help, no understanding or skill demonstrated.	

OBJECTIVE # 6	Proving Geometric Relationships
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• G.CO.C.1 Prove theorems about lines and angles.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• The properties of equality and postulates and theorems involving segment and angle congruence and addition. • How to write a proof.	• Proof • Theorem • Postulate • Properties of Equality	▢ Write proofs involving segment and angle congruence and addition.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	• Cooperative learning • Discovery learning • Goal setting • Graphic organizers • Homework and practice • Peer teaching • Self-assessment • Summarizing and note taking	1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Computer Science	• Use vocabulary, symbols, and figures involving segments and angles.	• How can proofs be applied?

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HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Daily Homework check - Frequent Quizzes - Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Emphasize vocabulary and symbols - Additional modeling	- Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables - Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Discovery learning - Peer teaching	- Peer teach - Present applications of proofs. - Write your own conjecture and prove it.	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

STANDARD 6: Proving Geometric Relationships		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• Peer teach • Present applications of proofs. • Write your own conjecture and prove it.

3.0	**The student:**
	   • **Write proofs involving segment and angle congruence and addition.**
	
	The student exhibits no major errors or omissions.
		• **Given:** Q is the midpoint of segment PR .
		      R is the midpoint of segment QS .
		Prove: PR=QS
		• **Given:** angle 1 and angle 3 are
		      supplementary angles
		Prove: angle 1 is congruent to angle 4

2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	

2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:**
	   • Recognizes or recalls specific terminology, such as:
	      • *Proof, theorem, postulate, properties of equality*
	   Performs basic processes, such as:
	      • *Justifying basic definitions and properties, but not recognizing theorems or postulates, prove algebraic relationships*
	
	However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
		• **Name the property of equality or congruence that justifies each statement.**
		If 2(x+3)=14, then 2x+6=14
		If AB+BC=BC+CD, then AB=CD

1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

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CONTENT AREA: Mathematics COURSE: Honors Geometry	UNIT TITLE: Unit 3- Parallel and Perpendicular Lines UNIT DURATION: 7 Days

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT: • Textbook • Supplemental Handouts • Calculator • Geogebra • Chrome book	**BIG IDEA(S):** • Use properties of special angle pairs formed by parallel lines and transversals to find angle measures. • Prove theorems involving parallel lines and special angle pairs. • Construct new lines with direct relationships to given parallel/perpendicular lines or coordinates of points on a graph. • Determine slopes of parallel/perpendicular lines given coordinates of points on lines or graphs of lines.
ENDURING UNDERSTANDINGS: • Use properties of special angle pairs formed by parallel lines. • Know that the slopes of parallel lines are the same and perpendicular lines are opposite reciprocals.	**ESSENTIAL QUESTIONS:** • What are parallel and perpendicular lines? • What are the properties of special angles pairs formed by parallel lines and transversals? • How do you prove lines are parallel? • What is the relationship between the slopes of parallel lines and perpendicular lines? • What segment represents the distance between a point and a line?

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
G.CO.A.1	Define angle, circle, perpendicular line, parallel line, line segment and ray based on the undefined notions of point, line, distance along a line and	X	

	distance around a circular arc.		
G.CO.C.1	Prove theorems about lines and angles.	X	
G.GPE.B.2	Prove the slope criteria for parallel and perpendicular lines and use them to solve problems.	X	

OBJECTIVE # 7	Lines & Transversals
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	• G.CO.A.1 Define angle, circle, perpendicular line, parallel line, line segment and ray based on the undefined notions of point, line, distance along a line and distance around a circular arc. • G.CO.C.1 Prove theorems about lines and angles.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• The properties of special angle pairs formed by parallel lines and transversals to find angle measures. • How to prove lines are parallel.	⬚ Parallel ⬚ Skew ⬚ Perpendicular ⬚ Transversal ⬚ Equidistant	⬚ Use properties of special angle pairs formed by parallel lines and transversals to find angle measures. ⬚ Prove theorems involving parallel lines and special angle pairs. ⬚ Apply properties of special angle pairs.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations	⬚ Cooperative learning ⬚ Discovery learning ⬚ Goal setting ⬚ Graphic organizers ⬚ Hands-on learning ⬚ Homework and practice ⬚ Peer teaching	1 - 4

• Targeted feedback	☐ Self-assessment ☐ Summarizing and note taking	

INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS

• Architecture	☐ Identify and draw parallel and perpendicular lines.
	☐ Solve linear equations.
	     • Use vocabulary, symbols, and figures involving lines, segments, and angles.
	     • Write a proof.
	     • Solving linear equations.
		• How can we apply special angles pairs to real world situations?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	☐ Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ☐ Additional practice	2 – 3

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HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Hands-on learning • Peer teaching	▢ Peer teach ▢ Present applications of special angle pairs. ▢ Model parallel lines and transversals using Geogebra	3 - 4

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CONTENT AREA: Mathematics	UNIT TITLE: Unit 4 – Triangles
COURSE: Honors Geometry	UNIT DURATION: 9-10 days

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:

- Textbook
- Pencil/paper
- Calculator
- Geogebra
- Compass/straightedge

BIG IDEA(S):

- Prove fundamental properties of triangles.
- Prove congruence of triangles using multiple methods
- Use the idea of bisector, median, and altitude in setting up and solving triangle problems.
- Use inequalities to set up and solve triangle problems.

ENDURING UNDERSTANDINGS:

- The Angle Sum Theorem, Exterior Angle Theorem, and Isosceles Triangle Theorem properties.
- Triangles can be proven congruent both directly and indirectly using SSS, SAS, ASA, AAS, and CPCTC.
- Properties of perpendicular bisectors, angle bisectors, medians, and altitudes in triangles.
- Exterior Angle and Triangle Inequality Theorems can be used to find unknown values in triangles.

ESSENTIAL QUESTIONS:

- How can we relate triangles to one another using multiple methods of comparison?
- What information can be ascertained from key pieces of any triangle?
- How do inequalities in triangles allow for opportunities to solve for unknown components?

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WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
G.CO.B.2	Prove theorems about triangles.	X	
G.SRT.B.1	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	X	

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OBJECTIVE # 9	Properties of Triangles
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	● G.CO.B.2 Prove theorems about triangles.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
● The angles of a triangle sum to 180°. ● An exterior angle of a triangle is equivalent to the sum of the two remote interior angles. ● If a triangle is isosceles then the base angles are congruent.	● Sum ● Isosceles triangle ● Exterior Angle ● Remote Interior Angle ● Base Angle	● Reproduce at least one of multiple proofs of all 3 theorems. ● Be able to identify and use the key property of each theorem.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Academic vocabulary/language ● Cooperative learning ● Discovery learning ● Effective questioning ● Modeling ● Nonlinguistic representations	● Cooperative learning ● Discovery learning ● Goal setting ● Graphic organizers ● Homework and practice ● Peer teaching	● 1 - 4

● Targeted feedback	● Self-assessment ● Summarizing and note taking	

INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
● Computer Science ● English	● Use vocabulary, symbols, and figures involving angles and triangles. ● Write a grammatically correct sentence. ● Understand basic mathematical concepts such as even, odd, prime, greater than, less than, etc.	● How do these properties fit in to construction, engineering, and architecture/design?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Daily Homework check ● Frequent Quizzes ● Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Emphasize vocabulary and symbols	● Practice vocabulary and symbols using	2 - 3

● Additional modeling	flashcards, matching, graphic organizers, foldables ● Additional practice	
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Discovery learning ● Peer teaching	● Peer teach ● Present applications of inductive reasoning and conjectures.	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

Strand 4: TRIANGLES

Standard 9: *Properties of Triangles*

Level: Geometry

Score 4.0   **In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**

3.5   In addition to score 3.0 performance, in-depth inferences and applications with partial success.

Score 3.0   **The student will:**

   a.   **Apply and prove the Angle Sum Theorem, Exterior Angle Theorem, and Isosceles Triangle Theorem.**

The student exhibits no major errors or omissions.

2.5   No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.

Score 2.0   **There are no major errors or omissions regarding the simpler details and processes as the student:**

recognizes or recalls specific terminology such as:

acute, equiangular, obtuse, right, equilateral, isosceles, and scalene triangles, exterior angles, remote interior angles, hypotenuse, vertex angle, base angles

performs basic processes, such as:

classifying triangles according to the angles and sides, finding the third angle value given two angles in a triangle, using properties of equiangular, right, equilateral, and isosceles triangles to find missing values of angles and sides.

However, the student exhibits major errors or omissions regarding the more complex ideas and processes.

1.5   Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.

Score 1.0   **With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**

0.5   With help, a partial understanding of the 2.0 content, but not the 3.0 content.

Score 0.0   **Even with help, no understanding or skill demonstrated.**

OBJECTIVE # 10	Proving Triangle Congruence
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	● G.SRT.B.1 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
● How to prove triangles congruent. ● How to prove Corresponding parts of congruent triangles are congruent. ● How to write an indirect proof.	● Indirect Proof. ● CPCTC acronym ● SSS, SAS, AAS, ASA acronyms	● Write proofs involving congruent triangles both directly and indirectly.
FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)

- Academic vocabulary/language - Cooperative learning - Discovery learning - Effective questioning - Modeling - Nonlinguistic representations - Targeted feedback	- Cooperative learning - Discovery learning - Goal setting - Graphic organizers - Homework and practice - Peer teaching - Self-assessment - Summarizing and note taking	1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
Computer Science	Use vocabulary, symbols, and figures involving segments and angles.	How can proofs be applied?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Daily Homework check - Frequent Quizzes - Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

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HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Emphasize vocabulary and symbols - Additional modeling	- Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables - Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Discovery learning - Peer teaching	- Peer teach - Present applications of proofs. - Develop a new approach to a proof.	3 - 4

Strand 4: TRIANGLES

***Standard 10**: Proving Triangle Congruence*

Level: Geometry

Score 4.0	In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.

3.5   In addition to score 3.0 performance, in-depth inferences and applications with partial success.

Score 3.0	The student will:

a.   **Prove triangles are congruent using SSS, SAS, ASA, AAS.**
b.   **Prove congruent parts using CPCTC.**
c.   **Write indirect geometry proofs.**

The student exhibits no major errors or omissions.

2.5   No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.

Score 2.0	There are no major errors or omissions regarding the simpler details and processes as the student:

recognizes or recalls specific terminology such as:

included angle, included side, corresponding parts, CPCTC, indirect reasoning

performs basic processes, such as:

identifying corresponding parts of congruent triangles, naming congruent triangles and identifying the postulate or theorem used to prove they are congruent, recognizing AAA and SSA cannot be used to prove triangle congruence, identifying assumptions and partially completing an indirect proof

However, the student exhibits major errors or omissions regarding the more complex ideas and processes.

1.5   Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.

Score 1.0   **With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**

0.5   With help, a partial understanding of the 2.0 content, but not the 3.0 content.

Score 0.0   **Even with help, no understanding or skill demonstrated.**

Strand 4: TRIANGLES

Standard 10: _Proving Triangle Congruence_

SAMPLE TASKS

LEVEL 2	**LEVEL 3**
1. What does CPCTC stand for? **2.** If Δ▢▢▢ ≅ Δ▢▢▢, list all of the parts of the two triangles that are congruent to each other. **Use the information given to complete the congruence statements for each pair of triangles. Then tell which postulate or theorem could be used to prove the triangles are congruent.** **3.** ▢ bisects ▢▢, ▢▢ ⊥ ▢▢ **4.** ▢▢ ∥ ▢▢, ∠▢ ≅ ∠▢	**1.** If Δ▢▢▢ ≅ Δ▢▢▢ and ▢∠▢ = 75°, ▢∠▢ = 25°, and ▢∠▢ = 4▢ − 12, find ▢. **2.** Find ▢ and ▢ if Δ▢▢▢ ≅ Δ▢▢▢.
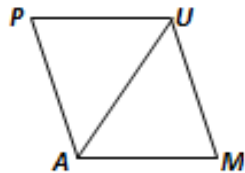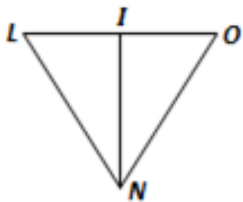
Δ▢▢▢ ≅ Δ_____ by _____   Δ▢▢▢ ≅ Δ_____ by _____
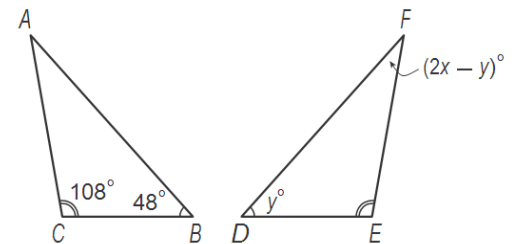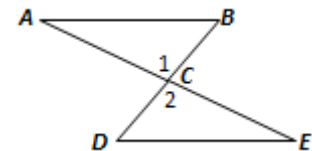
State the assumption you would make to start an indirect proof of each statement.

5. If *3▢ < 12*, then *▢ < 4*.

6. If ∠*1* ≅ ∠*2* and ▢▢ ≇ ▢▢, then ▢▢ ≇ ▢▢.

▢▢ ∥ ▢▢

Prove: Δ▢▢▢ ≅ Δ▢▢▢

4. Given: ▢▢ ⊥ ▢▢, ▢▢ ⊥ ▢▢

▢ is the midpoint of ▢▢
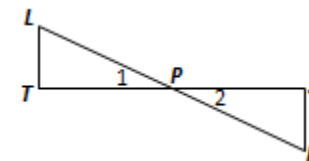
Prove: ∠▢ ≅ ∠▢

5. Given: Δ▢▢▢ is isosceles with vertex ▢

▢▢ bisects ▢▢

Prove: ∠1 ≅ ∠2
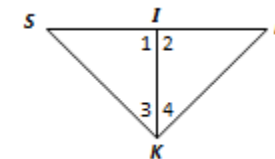
Prove the following using indirect reasoning.

6. Given: ∠B ≅ ∠D, $\overline{BA}$ ≇ $\overline{DA}$

Prove: $\overline{AC}$ does not bisect ∠BCD

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OBJECTIVE # 11	Bisectors, Medians, and Altitudes
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	● G.SRT.B.1 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
● The bisectors, medians, and altitudes of a triangle have special properties. ● The points of concurrency of triangles are formed by the bisector, medians, and altitudes, and have special properties themselves.	● bisector ● altitude ● median ● orthocenter ● centroid ● incenter	● Define any special triangle line or point of concurrency and state its property ● Apply the properties of special lines and points of concurrency to set up and solve triangle problems.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Academic vocabulary/language ● Cooperative learning	● Cooperative learning ● Discovery learning	● 1 - 4

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- Discovery learning - Effective questioning - Modeling - Nonlinguistic representations - Targeted feedback	- Goal setting - Graphic organizers - Homework and practice - Peer teaching - Self-assessment - Summarizing and note taking

INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
- Computer Science - English	Use vocabulary, symbols, and figures involving angles and triangles.	- What is the balancing point of a triangle? - How can these fundamental properties be applied to design of structures?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Daily Homework check - Frequent Quizzes - Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

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HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	• Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables • Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Peer teaching	• Peer teach • Construct models of points of concurrency	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

Strand 4: TRIANGLES

Standard 11: *Bisectors, Medians, and Altitudes*

Level: Geometry

Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.

Score 3.0	**The student will:** a. **Use properties of perpendicular bisectors, angle bisectors, medians, and altitudes in triangles to find unknown values.** b. **Use properties of points of concurrency to solve for unknowns.** **The student exhibits no major errors or omissions.**

2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.
Score 2.0	There are no major errors or omissions regarding the simpler details and processes as the student: recognizes or recalls specific terminology such as: *perpendicular bisector, incenter, concurrent lines, circumcenter, median, centroid, altitude, orthocenter*

performs basic processes, such as:

identifying and using properties of perpendicular bisectors, angle bisectors, medians, and altitudes in triangles to find some unknown values.

However, the student exhibits major errors or omissions regarding the more complex ideas and processes.

1.5   Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.

Score 1.0   **With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**

0.5   With help, a partial understanding of the 2.0 content, but not the 3.0 content.

Score 0.0   **Even with help, no understanding or skill demonstrated.**

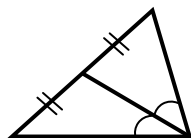**The City of Saint Charles School District**
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Strand 4: TRIANGLES

Standard 11: _Bisectors, Medians, and Altitudes_

SAMPLE TASKS

LEVEL 2	LEVEL 3
Tell whether the line segment is a *median, altitude, angle bisector*, and/or *perpendicular bisector*. **(You can have more than one answer.)** **1.** **2.** **3.**	**Draw and label a figure to illustrate each situation.** **1.** $\overline{AD}$ an altitude of $\triangle ABC$ and C is between B and D.
	2. $\triangle NRW$ is a right triangle with right angle at N. $\overline{NX}$ is a median of $\triangle NRW$ and $\overline{YX}$ is a perpendicular bisector of $\overline{NW}$.
4. Find each segment in the picture at the right: altitude angle bisector median perpendicular bisector	**3.** Find $m\angle ACQ$ if $\overline{CQ}$ is an angle bisector. $m\angle ACB = (123 - x)°$ $(42 + x)°$
5. Identify each as an *altitude, angle bisector, median,* or *perpendicular bisector.* $\overline{PQ}$ $\overline{TR}$ $\overline{QS}$ $\overline{SU}$	**4.** Find x and y if $\overline{PO}$ is the $\perp$ bisector of $\triangle MNL$. $(4y + 10)°$ $2x + 8$ O $4x - 4$
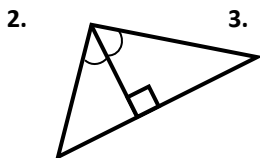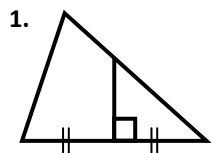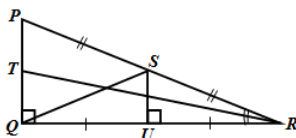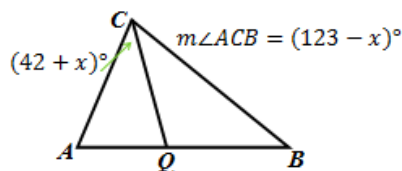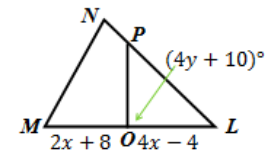
Find each measure.

6. KN

H

3x

B

x + 10

K

N

7. QA

7x   3x + 16

R   Q   A

E

8. $m\angle MFP$

M

(x + 9)°

F   Z

(2x − 1)°
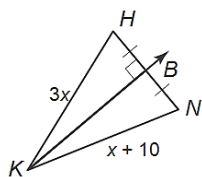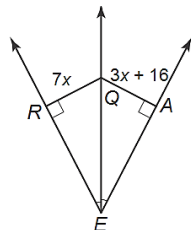
P
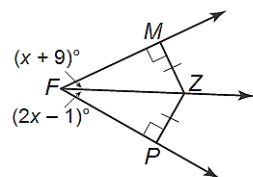
5. Point P is the circumcenter of ΔABC. List any segment(s) congruent to each segment.

A

R   S

P

B   T   C

a. $\overline{BT}$ **b.** $\overline{BP}$
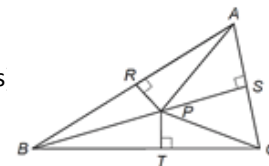
6. Find each measure if Q is the incenter of ΔJKL.

L

26°

P   M

20   Q   29°

25

J   N   K

a. $\angle QJK$ **b.** MQ
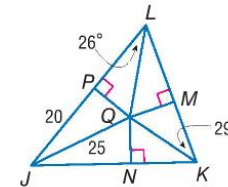
7. T is the centroid of ΔDEF.

F

S   R

T

E   Q   D

a. If $FT = 12$, find QT.

b. If $ER = 21$, find ET.

c. If $FD = 14$, find FR.

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OBJECTIVE # 12	Inequalities in Triangles
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	● G.SRT.B.1 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
● The relationship of the sides of a triangle to its angles. ● The relationship of an exterior angle to the remote interior angles of a triangle. ● Identify possible range of values to determine a triangle.	● Exterior Angle ● Remote Interior Angle ● How to solve 2 sides inequalities	● Use the exterior angle to determine a remote interior angle and vice versa. ● Calculate the possible range of values for an unknown side of a triangle. ● Order sides and angles of triangles given specific parameters.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Academic vocabulary/language ● Cooperative learning ● Discovery learning ● Effective questioning	● Cooperative learning ● Discovery learning ● Goal setting ● Graphic organizers	● 1 - 4

● Modeling ● Nonlinguistic representations ● Targeted feedback	● Homework and practice ● Peer teaching ● Self-assessment ● Summarizing and note taking	
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
● Computer Science ● English	● Solving compound inequalities ● Basic vocabulary of angles and triangles.	● What happens when we apply the parameters to multiple triangles at one time? ● What are other methods for obtaining these solutions other than the given methods? Why does this work?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Daily Homework check ● Frequent Quizzes ● Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

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HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Emphasize vocabulary and symbols ● Additional modeling	● Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ● Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Discovery learning ● Peer teaching	● Peer teach ● Prove some of these properties.	3 - 4

Strand 4: TRIANGLES

Standard 12: *Inequalities in Triangles*

Level: Geometry

Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.

Score 3.0	**The student will:** a. **Apply the Exterior Angle Inequality Theorem.** b. **Apply properties of inequalities to the relationships between the angles and sides of triangles** c. **Use the Triangle Inequality Theorem to identify possible range for the unknown values.** **The student exhibits no major errors or omissions.**

2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.

Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** performs basic processes, such as: *applying properties of inequalities to the relationships between the angles and sides of triangles in one triangle, determining if three side lengths form a triangle, finding the range of values for the third side of a triangle*

However, the student exhibits major errors or omissions regarding the more complex ideas and processes.

1.5   Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.

Score **With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**
1.0

0.5   With help, a partial understanding of the 2.0 content, but not the 3.0 content.

Score **Even with help, no understanding or skill demonstrated.**
0.0

Strand 4: TRIANGLES

Standard 12: _Inequalities in Triangles_

SAMPLE TASKS

LEVEL 2	**LEVEL 3**

Use the Exterior Angle Inequality to list all angles that satisfy the conditions stated in each problem.

1. all angles whose measures are less than $m\angle 1$

2. all angles whose measures are greater than $m\angle 1$

3. all angles whose measures are less than $m\angle 4$
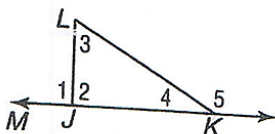
List the sides in order form shortest to longest.

4.

5.

1. List the sides of $\triangle ABC$ in order from shortest to longest if $m\angle A = 5x + 31, m\angle B = 74 - 3x$, and $m\angle C = 4x + 9$.

2. Find the range of possible values of x in $\triangle ABC$ where $AB = 4x + 2, BC = 5x + 1$, and $AC = 12x - 1$.

List the angles in order from least to greatest measure.

6.

7.
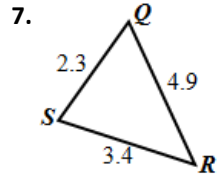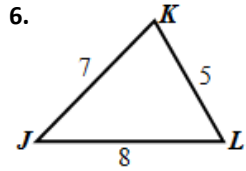
Circle the angle that has the greatest measure.

8. $\angle QRW, \angle RWQ$

9. $\angle RTW, \angle TWR$
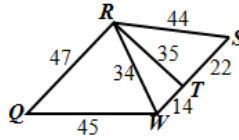
10. $\angle RST, \angle TRS$

11. $\angle WQR, \angle QRW$

Circle the side that is longer.

12. $\overline{DH}, \overline{GH}$

13. $\overline{DE}, \overline{DG}$
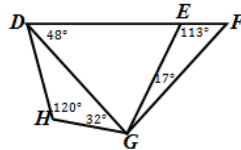
14. $\overline{EG}, \overline{FG}$

15. $\overline{DE}, \overline{EG}$

Determine whether the given measures can be the lengths of the sides of a triangle. Write *yes* or *no*. Explain.

16. 13, 13, 26

17. 9, 10, 20

Find the range for the measure of the third side of a triangle given the measures of two sides.

18. 5 and 9

19. 8 and 13

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CONTENT AREA: Mathematics	UNIT TITLE: Unit 5 – Quadrilaterals
COURSE: Honors Geometry	UNIT DURATION: 9-10 days

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
- Textbook - Calculator - Chrome book - Geogebra - Ruler/Straightedge - Protractor - Compass - Supplemental Handouts	- Solve problems involving the sum of the measures of the interior and exterior angles of a polygon. - Apply properties of quadrilaterals. - Prove theorems about parallelograms.
ENDURING UNDERSTANDINGS: - Understand and use vocabulary, formulas, and processes pertaining to polygons. - Define and interpret the properties of quadrilaterals to solve for unknown values. - Use multiple properties of quadrilaterals to verify shapes are parallelograms.	**ESSENTIAL QUESTIONS:** - What is the formula to determine the sum of the interior angles of a polygon? - How do you utilize this formula to solve for interior and exterior angle values? - What are the properties of a parallelogram, rectangle, square, kite, rhombus, and trapezoid? - What methods exist to verify a figure is a parallelogram.

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WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD i.e. GLE/CLE/MLS/NGSS	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
G.CO.C.3	Prove theorems about polygons.	X	
G.GPE.B.1	Use coordinates to prove geometric theorems algebraically.		X

OBJECTIVE # 13	Angles of Polygons
REFERENCES/STANDARDS i.e.GLE/CLE/MLS/NGSS	● G.GPE.B.1 Use coordinates to prove geometric theorems algebraically.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* ACADEMIC VOCABULARY	**BE ABLE TO DO?** *Skills; Products*
● How to determine the sum of the interior and exterior angles of polygons. ● How to determine the value of individual interior and exterior angles of regular polygons	● Interior Angle ● Exterior Angle ● Diagonal ● Linear Pair ● S = 180(n-2) ● Names of key polygons (triangle, quadrilateral, pentagon, hexagon, etc…)	● Calculate values of interior and exterior angles of polygons ● Apply these values to various models and applications. ● Identify a polygon by name and number of sides.

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FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Academic vocabulary/language - Cooperative learning - Discovery learning - Effective questioning - Modeling - Nonlinguistic representations - Targeted feedback	- Cooperative learning - Discovery learning - Goal setting - Graphic organizers - Hands-on learning - Homework and practice - Peer teaching - Self-assessment - Summarizing and note taking	1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
Art-symmetric drawings.	- Basic shape recognition (filling a polygon with simple triangles to derive a formula). - Basic vocabulary.	How can we use interior and exterior angles of polygons to model real world situations?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Daily Homework check - Frequent Quizzes - Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

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HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Emphasize vocabulary and symbols ● Additional modeling	● Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ● Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Discovery learning ● Hands-on learning ● Peer teaching	● Peer teach ● Create and design a flower box of polygonal shape. ● How would you cut a pie for 7 people?	3 - 4

		Strand 5: QUADRILATERALS
		Standard 13: _Angles of Polygons_
		Level: Geometry
Score 4.0		In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.
Score 3.0		**The student will:** **a. Solve problems involving the sum of the measures of the interior and exterior angles of a polygon.** **The student exhibits no major errors or omissions.**
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.

Score 2.0		**There are no major errors or omissions regarding the simpler details and processes as the student:**
		
		   • recognizes or recalls specific terminology such as:
		    diagonals of a polygon
		
		   • performs basic processes, such as:
		    find the sum of the measures of the interior and exterior angles of a polygon.
		
		However, the student exhibits major errors or omissions regarding the more complex ideas and processes.

	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.
Score 1.0		**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.
Score 0.0		**Even with help, no understanding or skill demonstrated.**

Strand 5: QUADRILATERALS

Standard 13: <u>Angles of Polygons</u>

SAMPLE TASKS

LEVEL 2	LEVEL 3
1. Find the sum of the measures of the interior angles of a convex 60-gon. **2.** Find the sum of the exterior angles of a convex 33-gon.	**1.** A convex pentagon has interior angles with measures $(5x - 12)°, (2x + 100)°, (4x + 16)°, (6x + 15)°,$ and $(3x + 41)°.$ Find x. **2.** If the measure of each interior angle of a regular polygon is 171, find the number of sides of the polygon. **3.** Find the measure of an interior angle and an exterior angle of a regular convex 12-gon. **4.** The sum of the measures of the interior angles of a convex polygon is 1260. How many sides does the polygon have?

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OBJECTIVE # 14	Linear Measure
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	● G.CO.C.3 Prove theorems about polygons. ● G.GPE.B.1 Use coordinates to prove geometric theorems algebraically.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
● What the properties of each type of quadrilateral are. ● Derive and implement methods for proving specific types of quadrilaterals. ● Use coordinate points to prove types of quadrilaterals.	● Parallelogram ● Rhombus ● Trapezoid ● Kite ● Consecutive Angle ● Opposite Angles	● Apply the properties of quadrilaterals to specific figures to determine values and types. ● Plot vertices and midpoints and connect segments to construct and describe quadrilaterals.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Academic vocabulary/language ● Cooperative learning ● Discovery learning ● Effective questioning ● Modeling ● Nonlinguistic representations ● Targeted feedback	● Cooperative learning ● Discovery learning ● Goal setting ● Graphic organizers ● Hands-on learning ● Homework and practice ● Peer teaching	1 - 4

	● Self-assessment	
	● Summarizing and note taking	
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
● Science- a coordinate grid models many real world situations. ● PE- use properties of quadrilaterals to verify accuracy of field dimensions. ● Architecture	● Plot points on the coordinate plane ● Identify rectangles, squares, and triangles and their fundamental properties.	● How do the properties of quadrilaterals extend to larger geometric and mathematical questions/problems.

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		

ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Daily Homework check ● Frequent Quizzes ● Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Emphasize vocabulary and symbols ● Additional modeling	● Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ● Additional practice	2 – 3

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HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Discovery learning - Hands-on learning - Peer teaching	- Identify quadrilaterals at the root of more intricate designs. - Measure and model quadrilaterals using Geogebra - Peer teaching	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

	Strand 5: QUADRILATERALS	
	Standard 14: *Quadrilaterals*	
	Level: Geometry	
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**	
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.

Score 3.0	**The student will:**
	
	    a. **Apply properties of quadrilaterals.**
	    b. **Prove theorems about parallelograms.**
	
	The student exhibits no major errors or omissions.	

	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.

Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:**
	
	   • recognizes or recalls specific terminology such as:
	     parallelogram, rectangle, square, rhombus, trapezoid, midsegment, isosceles trapezoid, kites
	
	   • performs basic processes, such as:
	     identify quadrilaterals and their properties
	
	However, the student exhibits major errors or omissions regarding the more complex ideas and processes.	

	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.
Score 0.0	**Even with help, no understanding or skill demonstrated.**	

Strand 5: QUADRILATERALS

Standard 14: Quadrilaterals

SAMPLE TASKS

LEVEL 2	LEVEL 3

LEVEL 2

1. Name the five properties of a parallelogram.

Explain why it is impossible for each figure to be a parallelogram.

2.

18
22

3.

125°   43°
43°   31°
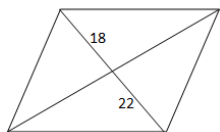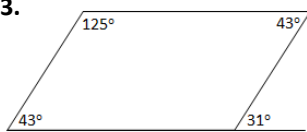
What values must x and y have in order for each quadrilateral to be a parallelogram? Justify your answers.

4.

55°
5x + 40°
5y°

4.

(y − 60)°
32°
$\frac{1}{3}y°$ (x − 10)°
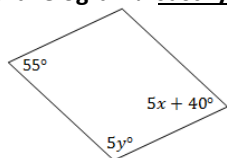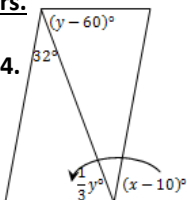
LEVEL 3

1. Determine the coordinates of the intersection of the diagonals of $\square HJKL$ with vertices $H(1, 1), J(2, 3), K(6, 3),$ and $L(5, 1)$. Explain your reasoning.

2. Determine whether $ABCD$ is a parallelogram if $A(0, 0), B(1, 3),$

$C(5, 3),$ and $D(4, 0)$. Justify your answer using both the Distance and Slope Formulas.

3. Write a two-column proof.

Given: $\square FGHJ$

Prove: $\angle F \cong \angle H$

$\angle J \cong \angle G$

F   G
J   H
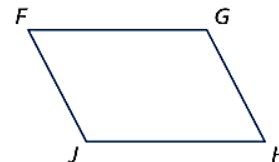
4. Determine whether $\square ABCD$ with vertices $A(0, 2), B(2, 4), C(4, 2),$ and $D(2, 0)$ is a *rhombus*, a *rectangle*, or a *square*. List all that apply. Explain.

Use rectangle $WXYZ$ and the given information to solve each problem. <u>Give the property or properties of a rectangle that you used to find your answer.</u>
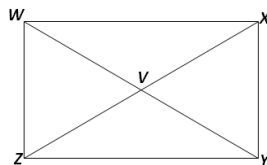
5. If $WV = 6y + 2$ and $VX = 4y + 6$, find y.

6. If $m\angle XZY = 2x + 4$ and $m\angle WZX = 3x + 1$, find x.

Use rhombus ABCD and the given information to solve each problem. <u>Give the property or properties of a rectangle that you used to find your answer.</u>

7. If m∠DAC = 60°, find m∠CBD.

8. Find m∠AEB.

Use square $QRST$ and the given information to solve each problem. <u>Give the property or properties of a rectangle that you used to find your answer.</u>

9. If $m\angle QUR = 5x$, find x.

10. If $TU = 4x - 6$ and $US = x + 3$, find x.
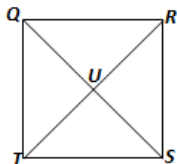
EFGH is a quadrilateral with vertices E(1, 3), F(5, 0), G(8, –5), H(–4, 4).

5. Verify that *EFGH* is a trapezoid.

6. Determine whether *EFGH* is an isosceles trapezoid. Explain.

Use rectangle $WXYZ$ and the given information to solve each problem. <u>Give the property or properties of a rectangle that you used to find your answer.</u>
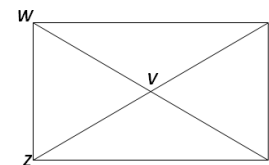
7. If $WV = 3x + 3$ and $WY = 10x - 30$, find VY.

Use rhombus ABCD and the given information to solve each problem. <u>Give the property or properties of a rectangle that you used to find your answer.</u>

8. If AB = 26 and AC = 20, find BE.
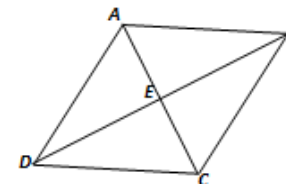
9. If $HG = 3x + 16$, $JK = 4x + 3$, and $EF = 40$, find x.

$EFGH$ is an isosceles trapezoid with bases $\overline{EF}$ and $\overline{GH}$. Use the figure and the given information to solve each problem.
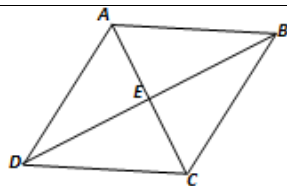
11. If $EF = 17$ and $HG = 35$, find JK.
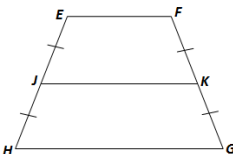
12. Find $m\angle E$ and $m\angle FKJ$ if $m\angle H = 72°$.

13. Given that $AB = 2x - 8$, $AD = x + 7$, and $\angle B \cong \angle D$, find x so that $ABCD$ is a kite.

Decide if each statement is true or false.

14. The diagonals of a rectangle are perpendicular.

15. All squares are rectangles.

16. If a parallelogram is a rhombus, then the diagonals are congruent.

17. Every parallelogram is a quadrilateral.

18. Each diagonal of a rectangle bisects a pair of opposite angles.

19. Both pairs of base angles in a trapezoid are congruent.

10. $LMNO$ is an isosceles trapezoid. Find $m\angle 1, m\angle 2,$ and $m\angle 3$.
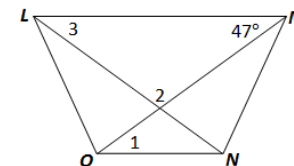
11. If $ABCD$ is a kite, find RC.
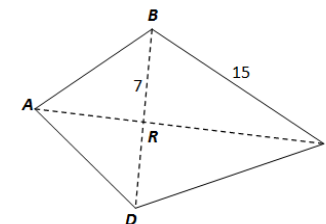
12. If $ABCD$ is a kite and $\angle B = 112°$ and $\angle C = 53°$, find $m\angle A$.

The City of Saint Charles School District
HONORS GEOMETRY CURRICULUM

CONTENT AREA: Mathematics	UNIT TITLE: Unit 6 – Similarity
COURSE: Honors Geometry	UNIT DURATION: 21 days

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
- Textbook - Calculator - Chrome book - Geogebra - Ruler/Straightedge - Protractor - Compass - Supplemental Handouts	- Write and solve proportions using properties of similar polygons. - Prove two polygons are similar. - Use the Pythagorean Theorem and special right triangles to solve problems involving right triangles. - Use and apply the properties of trigonometric ratios including problems involving angles of elevation and depression. - Draw reflections, translations, rotations, dilations, or compositions of transformations, including transformations on the coordinate plane. - Describe transformations as functions that take points in the plane as inputs and give other points as outputs. - Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
ENDURING UNDERSTANDINGS:	**ESSENTIAL QUESTIONS:**
- Similar polygons maintain a proportionality that can be proven and used to calculate various values within the figures. - Right triangles can be solved using special rules for 45-45-90 and 30-60-90 as well as universally with the Pythagorean Theorem. - Sides and angles of right triangles are relatable using basic trigonometric functions known as Sine, Cosine, and Tangent. - These trigonometric relationships can be used to solve for various parts of any right triangle.	- What is a proportion and how does it relate geometric figures. - How can we justify the proportionality of figures. - What is the Pythagorean Theorem and how does it enable solutions to right triangles. - What is Trigonometry. - How does trigonometry allow for solutions to missing components of right triangles. - Is it possible to maneuver fixed figures in 2 and potentially 3-

● Figures can be reflected, rotated, translated, and dilated using various geometric operations.	dimensional space. How?

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?

Standards, Concepts, Content, Skills, Products, Vocabulary

REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
G.CO.A.2	Represent transformations in the plane, and describe them as functions that take points in the plane as inputs and give other points as outputs.	X	
G.CO.A.3	Describe the rotational symmetry and lines of symmetry of two-dimensional figures.		X
G.CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.		X
G.CO.A.5	Demonstrate the ability to rotate, reflect or translate a figure, and determine a possible sequence of transformations between two congruent figures.	X	
G.SRT.A.1	Construct and analyze scale changes of geometric figures.	X	
G.SRT.A.2	Use the definition of similarity to decide if figures are similar and to solve problems involving similar figures.	X	
G.SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.		X
G.SRT.B.1	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	X	

G.SRT.C.1	Understand that side ratios in right triangles define the trigonometric ratios for acute angles.	X	
G.SRT.C.2	Explain and use the relationship between the sine and cosine of complementary angles.		X
G.SRT.C.3	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles.	X	
G.SRT.C.4	Derive the formula A = ½ ab sin(C) for the area of a triangle.		X
G.GPE.B.3	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.		X

OBJECTIVE # 15	Proportions and Similarity
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	● G.SRT.A.1 Construct and analyze scale changes of geometric figures. ● G.SRT.A.2 Use the definition of similarity to decide if figures are similar and to solve problems involving similar figures. ● G.SRT.A.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. ● G.SRT.B.1 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. ● G.GPE.B.3 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information,* *ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
● How to identify and setup similarity relationships. ● How to use AA, SAS, and ASA similarity methods to prove figures similar. ● Use the similarity of triangles to extend beyond	● Ratio ● Proportion ● Similar polygons ● Scale factor ● Midsegment	● Set two similar figure in a proportion. ● Use the proportion to solve for unknown values of figures. ● Verify that 2 figures are similar by appropriate methods.

triangular forms to multiple intersections while maintaining the proportionality.		● Utilize key components of triangles to establish a justification for similarity. ● Write similarity statements.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Academic vocabulary/language ● Cooperative learning ● Discovery learning ● Effective questioning ● Modeling ● Nonlinguistic representations ● Targeted feedback	● Cooperative learning ● Discovery learning ● Goal setting ● Graphic organizers ● Hands-on learning ● Homework and practice ● Peer teaching ● Self-assessment ● Summarizing and note taking	● 1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
● Art-Perspective drawing, photographic enlargements and reductions. ● Computer Science- resizing of items	● Solving a proportion. ● Setting up ratios ● Simplifying fractions	● How does the similarity of figures come in to play in our daily lives?

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HONORS GEOMETRY CURRICULUM

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Daily Homework check ● Frequent Quizzes ● Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Emphasize vocabulary and symbols ● Additional modeling	● Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ● Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Discovery learning ● Hands-on learning ● Peer teaching	● Peer teach ● Explain how scale modeling is just a similarity relationship. Create or design a project based on these concepts.	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

	Strand: SIMILARITY	
	Standard 15: Proportions & Similarity	
	Level: Geometry	
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**	
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.

Score 3.0	**The student will:**
	
	      a. Write and solve proportions using properties of similar polygons.
	      b. Prove two polygons are similar.
	      c. Prove the Triangle Proportionality Theorem.
	
	 The student exhibits no major errors or omissions.	

	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • recognizes or recalls specific terminology such as: *ratio, proportion, similarity, scale factor, scale model* • performs basic processes, such as: *write ratios, solve simple proportions, identify similar figures, and find scale factors.* **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.
Score 0.0	**Even with help, no understanding or skill demonstrated.**	

The City of Saint Charles School District
HONORS GEOMETRY CURRICULUM

OBJECTIVE # 16	Right Triangles
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	● G.SRT.C.3 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
● What is the Pythagorean Theorem. ● How do we apply the theorem to directly solve for components of right triangle. ● How does the theorem extend to provide faster, alternative methods for solutions in specific situations.	● a^2 + b^2 = c^2 ● hypotenuse ● complementary angles ● 45-45-90 triangle ● 30-60-90 triangle	● Apply the Pythagorean Theorem to solve for missing sides of triangles. ● Prove shortcut formulas for 45-45-90 and 30-60-90 triangles using the theorem and effectively utilize the short-cut formulas. ● Apply the rules of the theorem to real world situations.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Academic vocabulary/language ● Cooperative learning ● Discovery learning ● Effective questioning ● Modeling ● Nonlinguistic representations ● Targeted feedback	● Cooperative learning ● Discovery learning ● Goal setting ● Graphic organizers ● Hands-on learning ● Homework and practice ● Peer teaching ● Self-assessment ● Summarizing and note taking	1 - 4

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INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
- Physics-utilizes the theorem for multiple applications - Architecture, engineering, and design.	- Solving equations. - Recall vocabulary.	How has this integral theorem allowed for the progression of mathematics over the course of history.

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		

ASSESSMENT DESCRIPTION	FORMATIVE OR SUMMATIVE?	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
Daily Homework check	Formative	1 - 4
Frequent Quizzes	Formative	2 - 3
Comprehensive Test	Summative	1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		

TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Emphasize vocabulary and symbols - Additional modeling	- Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables - Additional practice	2 - 3

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HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Discovery learning ● Hands-on learning ● Peer teaching	● Identify right triangles at the root of more intricate designs. ● Measure and model right triangles using Geogebra ● Peer teaching ● Formulate alternate proof of the Pythagorean Theorem.	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

Strand: SIMILARITY		
Standard 16: _Right Triangles_		
Level: Geometry		
Score 4.0	**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**	
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.
Score 3.0	**The student will:** a. **Use the Pythagorean Theorem and special right triangles to solve problems involving right triangles.** **The student exhibits no major errors or omissions.**	
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.

Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:**
	
	   • recognizes or recalls specific terminology such as:
	   Pythagorean Theorem, Pythagorean triples, Pythagorean Inequality Theorems, special right triangles, rationalize
	
	   • performs basic processes, such as:
	   solving simple problems involving right triangles, Pythagorean Theorem, and special right triangles
	
	However, the student exhibits major errors or omissions regarding the more complex ideas and processes.	

	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.
Score 0.0	**Even with help, no understanding or skill demonstrated.**	

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OBJECTIVE # 17	Trigonometry
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	● G.SRT.C.1 Understand that side ratios in right triangles define the trigonometric ratios for acute angles. ● G.SRT.C.2 Explain and use the relationship between the sine and cosine of complementary angles. ● G.SRT.C.3 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles. ● G.SRT.C.4 Derive the formula A = ½ ab sin(C) for the area of a triangle.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
● How are the trigonometric ratios related to the right triangle and each other (ie., between acute angles within the same triangle). ● What is the relationship between a trigonometric function and it's inverse.	● Trigonometric Ratios (Sine, Cosine, and Tangent) ● Inverse Trigonometric ratios ● Angle of elevation/depression	● Use the trigonometric ratios to calculate unknown sides of right triangles. ● Use the inverse trigonometric ratios to calculate unknown angles of right triangles. ● Apply trigonometric ratios to real world situations utilizing angles of elevation and angles of depression.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Academic vocabulary/language ● Cooperative learning ● Discovery learning ● Effective questioning ● Modeling ● Nonlinguistic representations ● Targeted feedback	● Cooperative learning ● Discovery learning ● Goal setting ● Graphic organizers ● Hands-on learning ● Homework and practice ● Peer teaching ● Self-assessment ● Summarizing and note taking	1 - 4

INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
● Physics-Changes in position and motion are essentially modeled using trigonometry. As well, harmonic motions utilize trigonometric functions as models.	● Writing and solving equations. ● Solving proportions. ● Recall vocabulary	● What is a further extension of the basic trigonometric ratios, looking forward to Pre-Calculus? As in, how can this fundamental concept be extended to develop more advanced mathematical studies?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		

ASSESSMENT DESCRIPTION	FORMATIVE OR SUMMATIVE?	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Daily Homework check ● Frequent Quizzes ● Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED?		
Possible Interventions		

TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Emphasize vocabulary and symbols ● Additional modeling	● Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ● Additional practice	2 - 3

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HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Discovery learning ● Hands-on learning ● Peer teaching	● Peer teaching ● Inscribe a right triangle in a unit circle by construction (perhaps with Geogebra) and explore the relationships.	3 - 4

Strand: SIMILARITY		
Standard 17: *Trigonometry*		
Level: Geometry		
Score 4.0		**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.
Score 3.0	**The student will:** **a.** Use and apply the properties of trigonometric ratios including problems involving angles of elevation and depression. **The student exhibits no major errors or omissions.**	
	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.
Score 2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • recognizes or recalls specific terminology such as: *trigonometric ratios, inverse trig functions, angle of elevation, angle of depression* • performs basic processes, such as: *finding approximate values of trig ratios, solving simple problems involving trig ratios* **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.
Score 1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.
Score 0.0	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 18	Transformations and Symmetry
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	● G.CO.A.2 Represent transformations in the plane, and describe them as functions that take points in the plane as inputs and give other points as outputs. ● G.CO.A.3 Describe the rotational symmetry and lines of symmetry of two-dimensional figures. ● G.CO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. ● G.CO.A.5 Demonstrate the ability to rotate, reflect or translate a figure, and determine a possible sequence of transformations between two congruent figures.

WHAT SHOULD STUDENTS…

UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	KNOW? *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	BE ABLE TO DO? *Skills; Products*
● What a reflection, rotation, translation, and dilation is and how to construct it. ● How do we describe multiple transformations performed in sequence. ● What are the transformations that carry various figures onto themselves.	● Dilation ● Rotation ● Translation ● Reflection ● Transformation ● Vector ● Line-Symmetry ● Rotational Symmetry ● Magnitude	● Identify and construct the 4 key transformations (dilation, rotation, translation, reflection) with a compass and straightedge. ● Identify and construct the 4 key transformations (dilation, rotation, translation, reflection) on a 2-dimensional x,y-plane.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING

TEACHER INSTRUCTIONAL ACTIVITY	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)

- Academic vocabulary/language - Cooperative learning - Discovery learning - Effective questioning - Modeling - Nonlinguistic representations - Targeted feedback	- Cooperative learning - Discovery learning - Goal setting - Graphic organizers - Hands-on learning - Homework and practice - Peer teaching - Self-assessment - Summarizing and note taking	1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
- Art-Recreating images in different positions and varying sizes. - Physics-vectors modeling motion are essentially transformations or combinations of transformations.	- Recall basic construction skills. - Recall basic concepts of line-symmetry, axis symmetry, and reflections. - Recall key vocabulary.	How would we utilize these basic geometric skills in various fields, particularly computer science applications?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Daily Homework check - Frequent Quizzes - Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

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HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Emphasize vocabulary and symbols ● Additional modeling ● Computer constructing (utilize Geogebra).	● Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ● Additional practice ● Geogebra and internet apps	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
● Discovery learning ● Hands-on learning ● Peer teaching	● Peer teaching ● Write a basic program on a computer or calculator to perform transformations. ● Resize an image using coordinate grid system and transformations.	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

Strand: SIMILARITY	
Standard 18: *Transformations* **& Symmetry**	
Level: Geometry	
Score 4.0		**In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.**
	3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.

Score 3.0		**The student will:**
		
		   a. Draw reflections, translations, rotations, dilations, or compositions of transformations, including transformations on the coordinate plane.
		   b. Describe transformations as functions that take points in the plane as inputs and give other points as outputs.
		   c. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
		
		 The student exhibits no major errors or omissions.

	2.5	No major errors or omissions regarding 2.0 content and partial knowledge of the 3.0 content.
Score 2.0		**There are no major errors or omissions regarding the simpler details and processes as the student:** • recognizes or recalls specific terminology such as: *reflection, line of reflection, translation, translation vector, rotation, center of rotation, angle of rotation, composition of transformations, glide reflection, dilation, symmetry, line symmetry, line of symmetry, rotational symmetry, center of symmetry, order of symmetry, magnitude of symmetry, plane symmetry, axis symmetry* • performs basic processes, such as: *Drawing simple transformations, identifying a transformation, Identifying line and rotational symmetries in two-dimensional figures, identifying plane and axis symmetries in three-dimensional figures.* **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**
	1.5	Partial knowledge of the 2.0 content, but major errors or omissions regarding the 3.0 content.
Score 1.0		**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**
	0.5	With help, a partial understanding of the 2.0 content, but not the 3.0 content.
Score 0.0		**Even with help, no understanding or skill demonstrated.**

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CONTENT AREA: Mathematics	UNIT TITLE: Unit 7-Measurement
COURSE TITLE: Honors Geometry	UNIT DURATION: 16 Days

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
- Textbook - Calculator - Chrome book - Supplemental Handouts	- Apply properties of segments, lines, and angles of a circle. - Solve problems involving circumference, arcs, inscribed angles, and circumscribed polygons. - Find the area and perimeter of two dimensional shapes and similar figures. - Find the surface area of three dimensional shapes. - Find volumes of three dimensional shapes.

ENDURING UNDERSTANDINGS:	ESSENTIAL QUESTIONS:
- Circles have properties that can be applied to find missing angles, lines, or segments of a circle. - Circumference is the distance around a circle. - Area is the amount of space inside a boundary of a two-dimensional shape. - Area of polygons can be found by applying area formulas. - Volume is the amount of space inside a boundary of a three-dimensional shape. - Volume of polygons can be found by applying volume formulas. - Surface area the total area of the surface a three-dimensional figure. - Surface area can be found by applying surface area formulas.	- What are the properties of a circle? - What is the circumference of a circle? - What is area and how can I find the area of a two-dimensional shape? - What is volume and how can I find the volume of three-dimensional shape? - What is surface area and how can I find the surface area of the three-dimensional shape?

WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?

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HONORS GEOMETRY CURRICULUM

Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
G.C.A.1	Prove that all circles are similar using similarity transformations.		X
G.C.A.2	Identify and describe relationships among inscribed angles, radii, and chords of circles.	X	
G.C.A.3	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.		X
G.C.B.4	Derive the formula for the length of an arc of a circle.	X	
G.C.B.5	Derive the formula for the area of a sector of a circle.	X	
G.GPE.A.1	Derive the equation of a circle.	X	
G.GPE.A.2	Derive the equation of a parabola given a focus and directrix.	X	
G.GPE.B.6	Use coordinates to compute perimeters and areas of polygons.		X
G.GMD.A.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid and cone.	X	
G.GMD.A.2	Use volume formulas for cylinders, pyramids, cones, spheres, and composite figures to solve problems.	X	
G.GMD.B.3	Identify shapes of two-dimensional cross-sections of three-dimensional objects.	X	
G.GMD.B.4	Identify three dimensional objects generated by transformations of two-dimensional objects.	X	
G.MG.A.1	Use geometric shapes, their measures and their properties to describe objects.	X	
G.MG.A.2	Apply concepts of density based on area and volume in modeling situations.	X	

OBJECTIVE # 1	Circles
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	G.C.A.1 Prove that all circles are similar using similarity transformations. G.C.A.2 Identify and describe relationships among inscribed angles, radii, and chords of circles. G.C.A.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. G.C.B.4 Derive the formula for the length of an arc of a circle. G.C.B.5 Derive the formula for the area of a sector of a circle. G.GPE.A.1 Derive the equation of a circle. G.GPE.A.2 Derive the equation of a parabola given a focus and directrix. G.GMD.A.1 Given an informal argument for the formula for the circumference of a circle.

WHAT SHOULD STUDENTS...		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*

• How to apply properties of segments, lines and angles of circles. • How to solve problems involving circumference, arc, inscribed and circumscribed polygons. • How to construct the inscribed and circumscribed circles of a triangle.	• Circle • Circumference • Arc • Inscribed • Circumscribed • Radius • Diameter • ⬜ Semicircle	• Apply properties of segments, lines and angles of circles. • Solve problems involving circumference, arc, inscribed and circumscribed polygons. • ⬜ Construct the inscribed and circumscribed circles of a triangle.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	• Cooperative learning • Discovery learning • Goal setting • Hands-on learning • Homework and practice • Peer teaching • Self-assessment • ⬜ Summarizing and note taking	• 1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Art - (Architecture) • Science/Geography (Maps)	• Solving linear equations. • Special Angle Pairs	• ⬜ How can circles be applied to a real-life situation?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

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HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	▢ Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ▢ Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Hands-on learning • Peer teaching	• Peer teach • Present applications for similarity • Model similarity terms using Geogebra	3 - 4

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PROFICIENCY SCALES FOR THIS STANDARD

STANDARD 19: Circles		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• Peer teach • Present applications of the undefined terms. • Model similarity using Geogebra
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Apply properties of segments, lines, and angles of circles. • Solve problems involving circumference, arcs, inscribed, and circumscribed polygons. • Construct the inscribed and circumscribed circles of a triangle. **The student exhibits no major errors or omissions.**	Circles Assessment Questions **See linked document**
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • recognizes or recalls specific terminology such as: *circle, center, radius, chord, diameter, concentric circles, circumference, pi, inscribed, circumscribed, central angle, arc, minor arc, major arc, semicircle, congruent arcs, adjacent arcs, arc length, inscribed angle, intercepted arc, tangent, point of tangency, common tangent* **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

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OBJECTIVE # 2	Area of 2D Figures
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	G.GPE.B.6 Use coordinates to compute perimeters and areas of polygons.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to find the perimeter of 2D shapes. • How to find the area of 2D shapes.	• Triangle • Parallelogram • Circle • Kite • Rhombus • Trapezoid • Sector • Polygon • Apothem • Height • ▱ Area	• Find the perimeter of 2D shapes • ▱ Find the area of 2D shapes

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)

• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	• Cooperative learning • Discovery learning • Goal setting • Hands-on learning • Homework and practice • Peer teaching • Self-assessment • ⬚ Summarizing and note taking	• 1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Construction • Science	• Special Right Triangles • Pythagorean Theorem • Trigonometric Ratios	• How can area be applied to a real life situation?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

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HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	⬚ Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ⬚ Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Hands-on learning • Peer teaching	• Peer teach • Present applications for similarity • Model similarity terms using Geogebra	3 - 4

STANDARD 20: Area of 2D Figures		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• Peer teach • Present applications of the undefined terms. • Model similarity using Geogebra
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Find the area and perimeter of two-dimensional shapes and similar figures. **The student exhibits no major errors or omissions.**	Area of 2D Figures Assessment **See linked document**
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • recognizes or recalls specific terminology such as: *area, perimeter, composite figures* • performs basic processes, such as: *finding the area and perimeter of figures where no work is necessary to find the parts needed to calculate surface area and volume.* **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

OBJECTIVE # 3	Representations of 3D Figures
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	G.GMD.B.3 Identify shapes of two-dimensional cross-sections of three-dimensional objects. G.GMD.B.4 Identify three dimensional objects generated by transformations of two-dimensional objects.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to use cross sections and two-dimensional models of three-dimensional figures. • How to identify three-dimensional objects generated by rotations of two-dimensional objects.	▫ Polyhedron ▫ Prism ▫ Pyramid, ▫ Platonic solids ▫ Net ▫ Cross section	• Use cross sections and two-dimensional models of three-dimensional figures. • Identify three-dimensional objects generated by rotations of two-dimensional objects.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	▫ Cooperative learning ▫ Discovery learning ▫ Goal setting ▫ Hands-on learning ▫ Homework and practice ▫ Peer teaching ▫ Self-assessment ▫ Summarizing and note taking	• 1 – 4

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INTERDISCIPLINARY CONNECTION	PRIOR KNOWLEDGE CONNECTIONS	INQUIRY CONNECTIONS
• Construction • Science	▫ 2D Figures	• How can 2D cross sections of 3D shapes be applied in real life?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	▫ Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ▫ Additional practice	2 - 3

HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Hands-on learning • Peer teaching	• Peer teach • Present applications for similarity • Model similarity terms using Geogebra	3 - 4

STANDARD 21: Representations of 3D Figures		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• Peer teach • Present applications of the undefined terms. • Model similarity using Geogebra
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Investigate and use cross sections and two-dimensional models of three-dimensional figures, including identifying three-dimensional objects generated by rotations of two-dimensional objects. **The student exhibits no major errors or omissions.**	
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • recognizes or recalls specific terminology such as: *Polyhedron, prism, pyramid, platonic solids, net, cross section* • performs basic processes, such as: *Identify solids and name the bases, faces, edges, and vertices of solids.* **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

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OBJECTIVE # 4	Surface Area and Volume
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	G.GMD.A.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid and cone. G.GMD.A.2 Use volume formulas for cylinders, pyramids, cones, spheres, and composite figures to solve problems. G.MG.A.1 Use geometric shapes, their measures and their properties to describe objects. G.MG.A.2 Apply concepts of density based on area and volume in modeling situations.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*
• How to find surface area and volume of three-dimensional figures (prisms, cylinders, pyramids, cones, spheres) and similar figures.	• surface area, • volume • Right figures • oblique figures • slant height • similar solids • congruent solids	• Find surface area and volume of three-dimensional figures (prisms, cylinders, pyramids, cones, spheres) and similar figures.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)

• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	⬜ Cooperative learning ⬜ Discovery learning ⬜ Goal setting ⬜ Hands-on learning ⬜ Homework and practice ⬜ Peer teaching ⬜ Self-assessment ⬜ Summarizing and note taking	• 1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Architecture • Construction • Science	⬜ Area of 2D figures	⬜ How can surface area and volume be applied to a real-life situation?

HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4

HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	⬜ Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ⬜ Additional practice	2 – 3

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HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED?		
Possible Extensions/Enrichments		
INSTRUCTIONAL ACTIVITY/METHOD	STUDENT LEARNING TASK	DOK TARGET (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
- Discovery learning - Hands-on learning - Peer teaching	- Peer teach - Present applications for similarity - Model similarity terms using Geogebra	3 - 4

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STANDARD 22: Volume and Surface Area		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• Peer teach • Present applications of the undefined terms. • Model similarity using Geogebra
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • Find surface area and volume of three-dimensional figures (prisms, cylinders, pyramids, cones, spheres) and similar figures. **The student exhibits no major errors or omissions.**	
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • recognizes or recalls specific terminology such as: *surface area, volume, right and oblique figures, slant height, similar solids, congruent solids* • performs basic processes, such as: *finding surface area and volume of figures where no work is necessary to find the parts needed to calculate surface area and volume.* **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	

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CONTENT AREA: Mathematics	UNIT TITLE: Probability and Statistics
COURSE TITLE: Honors Geometry	UNIT DURATION: 10 Days

MATERIALS / INSTRUCTIONAL RESOURCES FOR THIS UNIT:	BIG IDEA(S):
- Textbook - Calculator - Chrome book - Supplemental Handouts	- 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"). - 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. - 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. - Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. - Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. - 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 models.
ENDURING UNDERSTANDINGS:	ESSENTIAL QUESTIONS:
- Understand how to describe the subsets of a sample space. - Understand independent probability - Understand conditional probability. - Use frequency tables to analyze data.	- What are subsets of sample space? - What is independent probability? - What is conditional probability? - How can a frequency table be applied to analyze statistical data?

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WHAT SHOULD STUDENTS KNOW, UNDERSTAND, AND BE ABLE TO DO AT THE END OF THIS UNIT?			
Standards, Concepts, Content, Skills, Products, Vocabulary			
REFERENCE/STANDARD *i.e. GLE/CLE/MLS/NGSS*	STANDARDS: Content specific standards that will be addressed in this unit.	MAJOR STANDARD	SUPPORTING STANDARD
G.CP.A.1	Describe events as subsets of a sample space using characteristics of the outcomes, or as unions, intersections or complements of other events.		X
G.CP.A.2	Understand the definition of independent events and use it to solve problems.	X	
G.CP.A.3	Calculate conditional probabilities of events.	X	
G.CP.A.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table independent and to approximate conditional probabilities.	X	
G.CP.A.5	Recognize and explain the concepts of conditional probability and independence in a context.	X	
G.CP.A.6	Apply and interpret the Addition Rule for calculating probabilities.	X	
G.CP.A.7	Apply and interpret the general Multiplication Rule in a uniform probability model.	X	
G.CP.A.8	Use permutations and combinations to solve problems.	X	
G.CO.A.5	Demonstrate the ability to rotate, reflect or translate a figure and determine the possible sequence of transformations between two congruent figures.	X	
OBJECTIVE # 1	Probability and Statistics		
REFERENCES/STANDARDS *i.e. GLE/CLE/MLS/NGSS*	G.CP.A.1 Describe events as subsets of a sample space using characteristics of the outcomes, or as unions, intersections or complements of other events. G.CP.A.2 Understand the definition of independent events and use it to solve problems.		

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	G.CP.A.3 Calculate conditional probabilities of events.
	G.CP.A.4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table independent and to approximate conditional probabilities.
	G.CP.A.5 Recognize and explain the concepts of conditional probability and independence in a context.
	G.CP.A.6 Apply and interpret the Addition Rule for calculating probabilities.
	G.CP.A.7 Apply and interpret the general Multiplication Rule in a uniform probability model.
	G.CP.A.8 Use permutations and combinations to solve problems.
	G.CO.A.5 Demonstrate the ability to rotate, reflect or translate a figure and determine the possible sequence of transformations between two congruent figures.

WHAT SHOULD STUDENTS…		
UNDERSTAND? *Concepts; essential truths that give meaning to the topic; ideas that transfer across situations.*	**KNOW?** *Facts, Names, Dates, Places, Information, ACADEMIC VOCABULARY*	**BE ABLE TO DO?** *Skills; Products*

• Understand how to describe the subsets of a sample space. • Understand independent probability • Understand conditional probability. • Use frequency tables to analyze data.	• subset, • sample space • probability • conditional probability • frequency table • independent events • union • intersection • complement	• Describe subsets of a sample space. • Apply independent probability • Apply conditional probability • Use frequency tables to analyze data.

FACILITATING ACTIVITIES – STRATEGIES AND METHODS FOR TEACHING AND LEARNING		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Academic vocabulary/language • Cooperative learning • Discovery learning • Effective questioning • Modeling • Nonlinguistic representations • Targeted feedback	• Cooperative learning • Discovery learning • Goal setting • Hands-on learning • Homework and practice • Peer teaching • Self-assessment • Summarizing and note taking	• 1 - 4
INTERDISCIPLINARY CONNECTION	**PRIOR KNOWLEDGE CONNECTIONS**	**INQUIRY CONNECTIONS**
• Science • Business		• How can we use statistics in a real-life situation?

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HOW DO WE KNOW WHAT STUDENTS HAVE LEARNED?		
ASSESSMENT DESCRIPTION	**FORMATIVE OR SUMMATIVE?**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Daily Homework check • Frequent Quizzes • Comprehensive Test	Formative Formative Summative	1 - 4 2 - 3 1 - 4
HOW WILL WE RESPOND IF STUDENTS HAVE NOT LEARNED? *Possible Interventions*		
TEACHER INSTRUCTIONAL ACTIVITY	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Emphasize vocabulary and symbols • Additional modeling	▢ Practice vocabulary and symbols using flashcards, matching, graphic organizers, foldables ▢ Additional practice	2 - 3
HOW WILL WE RESPOND IF STUDENTS HAVE ALREADY LEARNED? *Possible Extensions/Enrichments*		
INSTRUCTIONAL ACTIVITY/METHOD	**STUDENT LEARNING TASK**	**DOK TARGET** (1=Recall, 2=Skill/Concept, 3=Strategic Thinking, 4=Extended Thinking)
• Discovery learning • Hands-on learning • Peer teaching	• Peer teach • Present applications for similarity • Model similarity terms using Geogebra	3 - 4

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STANDARD 23: Probability and Statistics		
SCORE	**DESCRIPTION**	**SAMPLE TASKS**
4.0	**In addition to score 3.0, in-depth inferences and applications that go beyond what was taught.**	• Peer teach • Present applications of the undefined terms. • Model similarity using Geogebra
3.5	In addition to score 3.0 performance, in-depth inferences and applications with partial success.	
3.0	**The student:** • 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"). • 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. • 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. • Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. • Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. • 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. • 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 student exhibits no major errors or omissions.**	
2.5	No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content	
2.0	**There are no major errors or omissions regarding the simpler details and processes as the student:** • recognizes or recalls specific terminology such as: *subset, sample space, probability, conditional probability, frequency table, independent events, union, intersection, complement* • performs basic processes, such as: *finding simple probability,*	

	However, the student exhibits major errors or omissions regarding the more complex ideas and processes.	
1.5	Partial knowledge of the 2.0 content but major errors or omissions regarding the 3.0 content	
1.0	**With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.**	
LND	**Even with help, no understanding or skill demonstrated.**	