Name: _____ Date: _____

Unit 5 Lesson 6 Exploring Hinge Theorem

Essential Question:

● What are the relationships between the sides and angles in triangles?

Objectives:

● Determine the relationships between two triangles when they have two pairs of congruent sides.

● Determine the possible side lengths for the third side of two triangles when two pairs of sides are congruent.

● Solve problems using two triangles with two pairs of congruent sides.

Materials:

● iPad
● Internet
● partner
● Hinge Theorem Applet
● Partner

Pacing

● Parts I-III (50 minutes - teacher led classwork)
● 5 min break
● Part IV (30 minutes - independent classwork)

Part I: Specific Cases & Examples

Open the Hinge Theorem Applet. Move points *E*, *C*, *F*, and *D* so that angles *A* and *B* are different sizes. When a triangle is formed, the angle measurements will appear. Record the side and angle measurements in the table. Move the points to find another example. Include 3 examples.

Example 1					
Screenshot:					
△*CEA*			△*DFB*		
EA	*AC*	*EC*	*FB*	*DB*	*FD*
m∠A		<, >, =		*m∠B*	
EC		<, >, =		*FD*	

Example 2					
Screenshot:					
△CEA			△DFB		
EA	**AC**	**EC**	**FB**	**DB**	**FD**
m∠A		**<, >, =**		**m∠B**	
EC		**<, >, =**		**FD**	

Example 3					
Screenshot:					
△ CEA			△ DFB		
EA	**AC**	**EC**	**FB**	**DB**	**FD**
m∠A		**<, >, =**		**m∠B**	
EC		**<, >, =**		**FD**	

Part II: Patterns & Observations

1. Discuss your observations with your partner, including any patterns that you notice.

2. Without collaborating with your partner, write down any patterns you notice about the relationship between the <mark>sides</mark> in the two triangles that are <mark>different</mark> and the <mark>angles</mark> opposite those sides.

Part III: <mark style="background:#00ff00">R</mark>ule

1. Use your explanation from question 2 in part II to write a rule about the relationship between the sides and angles in the two triangles. The rule does not need to be in if, then form. This will be called <mark style="background:yellow">**The Hinge Theorem.**</mark>

2. Discuss your theorem with your partner. Then, we will share answers as a group. In the space below, write a revised theorem:
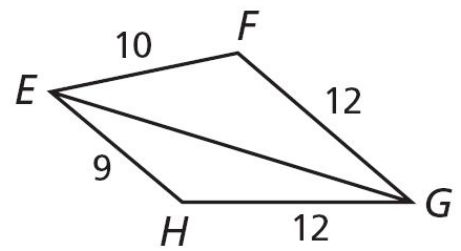
Part IV: <mark style="background:#00ff00">T</mark>est & Check
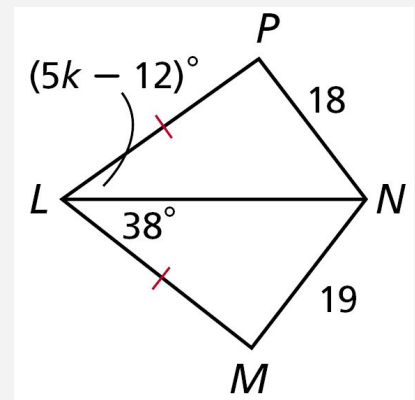
Use <, >, or = to compare each pair of segments or angles.

1. Compare *BC* and *AB* using <, >, or =.
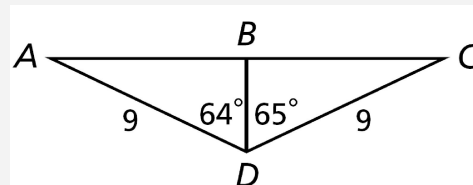
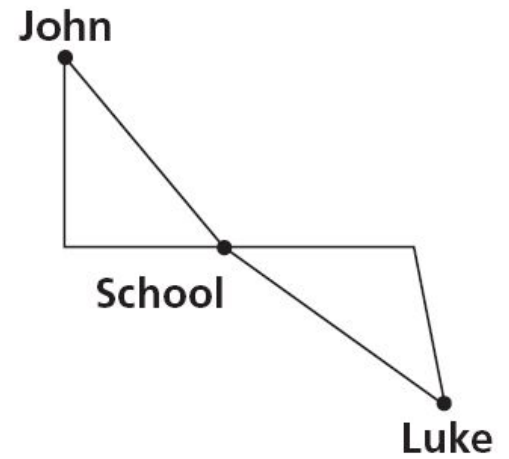2. Compare $m\angle EGH$ and $m\angle EGF$ using <, > or =.

3. Find the range of values for k in the figure below.

Problem Solving

John and Lucas leave school at the same time. John rides his bike 3 blocks west and then 4 blocks north. Lucas rides 4 blocks east and then 3 blocks at a bearing of N 10°E. Who is farther from school? (Remember that there are 90° between each cardinal direction).

John

School

Luke

Rubric

	Below Expectations	Approaching Expectations	Meeting Expectations	Exemplifying Expectations
Modes of Inquiry 16.9-10.MAT.MI.001 16.9-10.MAT.MI.002 16.9-10.MAT.MI.003 16.9-10.MAT.MI.004	Student cannot compare sides and angles of triangles using the Hinge Theorem and its converse. AND Student cannot solve problems using the Hinge Theorem	Student can compare sides and angles of triangles using the Hinge Theorem and its converse. OR Student can solve problems using the Hinge Theorem	Student can compare sides and angles of triangles using the Hinge Theorem and its converse. AND Student can solve problems using the Hinge Theorem	
Comments:				
Synthesis and Evaluation 16.9-10.MAT.SE.001 16.9-10.MAT.SE.002 16.9-10.MAT.SE.003 16.9-10.MAT.SE.004 16.9-10.MAT.SE.005	Student is unable to use results from tests to revise rules.	Student is able to use results from tests to revise rules.	Student is able to use results from tests to revise rules.	
Comments:				

16.9-10.MAT.MI.001 Student recognizes terms in patterns
16.9-10.MAT.MI.002 Student selects and applies general rules and mathematical problem-solving techniques to solve problems in familiar situations.
16.9-10.MAT.MI.003 Student uses appropriate mathematical concepts and skills to solve problems in unfamiliar situations.
16.9-10.MAT.MI.004 Student discovers patterns as relationships or general rules.
16.9-10.MAT.SE.001 Student draws conclusions consistent with findings.
16.9-10.MAT.SE.002 Student predicts and uses different forms of mathematical representations.
16.9-10.MAT.SE.003 Student recognizes reasonableness of results in the context of the problem.
16.9-10.MAT.SE.004 Student relates the importance of findings in connection to real life.
16.9-10.MAT.SE.005 Student suggests improvements and revisions to methods when necessary.