Name ______________________________ Date ______________

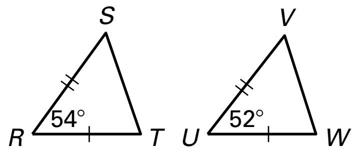
LESSON 5.6

Practice B

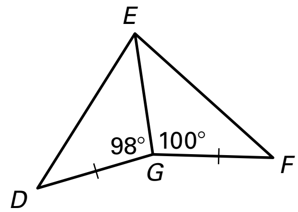
For use with pages 349–355

Complete with <, >, or = . *Explain.*

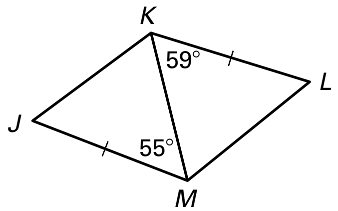
1. ST __?__ VW



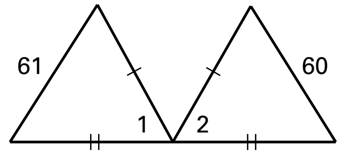
2. DE __?__ EF



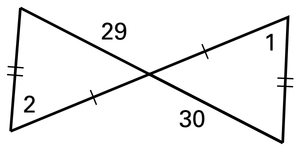
3. JK __?__ LM



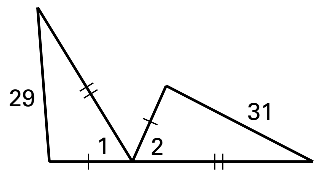
4. $m\angle 1$ __?__ $m\angle 2$



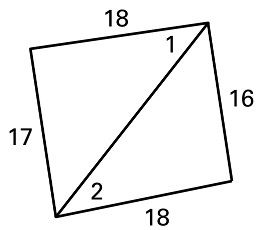
5. $m\angle 1$ __?__ $m\angle 2$



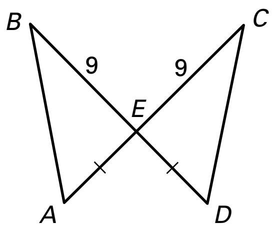
6. $m\angle 1$ __?__ $m\angle 2$



7. $m\angle 1$ __?__ $m\angle 2$

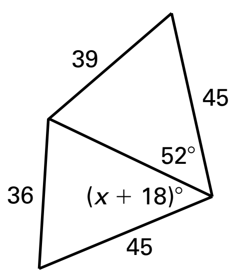


8. AB __?__ CD

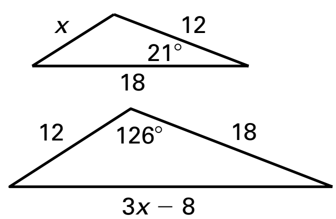


Use the Hinge Theorem or its converse and properties of triangles to write and solve an inequality to describe a restriction on the value of *x*.

9.



10.



LESSON 5.6

LESSON 5.6

Practice B *continued*

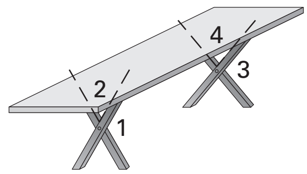
For use with pages 349–355

Write a temporary assumption you could make to prove the conclusion indirectly.

11. If two lines in a plane are parallel, then the two lines do not contain two sides of a triangle.

12. If two parallel lines are cut by a transversal so that a pair of consecutive interior angles is congruent, then the transversal is perpendicular to the parallel lines.

13. **Table Making** All four legs of the table shown have identical measurements, but they are attached to the table top so that the measure of $\angle 3$ is smaller than the measure of $\angle 1$.



a. Use the Hinge Theorem to *explain* why the table top is not level.

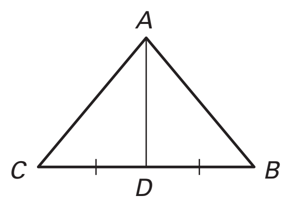
b. Use the Converse of the Hinge Theorem to *explain* how to use a length measure to determine when $\angle 4 \cong \angle 2$ in reattaching the rear pair of legs to make the table level.

14. **Fishing Contest** One contestant in a catch-and-release fishing contest spends the morning at a location 1.8 miles due north of the starting point, then goes 1.2 miles due east for the rest of the day. A second contestant starts out 1.2 miles due east of the starting point, then goes another 1.8 miles in a direction 84° south of due east to spend the rest of the day. Which angler is farther from the starting point at the end of the day? *Explain* how you know.

15. **Indirect Proof** Arrange statements A–F in order to write an indirect proof of Case 1.

GIVEN: $\overline{AD}$ is a median of $\triangle ABC$.
$\angle ADB \cong \angle ADC$

PROVE: $AB = AC$



Case 1:

A. Then $m\angle ADB < m\angle ADC$ by the converse of the Hinge Theorem.

B. Then $\overline{BD} \cong \overline{CD}$ by the definition of midpoint. Also, $\overline{AD} \cong \overline{AD}$ by the reflexive property.

C. This contradiction shows that the temporary assumption that $AB < AC$ is false.

D. But this contradicts the given statement that $\angle ADB \cong \angle ADC$.

E. Because $\overline{AD}$ is a median of $\triangle ABC$, D is the midpoint of $\overline{BC}$.

F. Temporarily assume that $AB < AC$.

16. **Indirect Proof** There are two cases to consider for the proof in Exercise 15. Write an indirect proof for Case 2.

LESSON 5.6

Review for Mastery

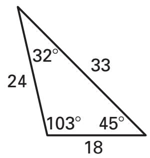
1. $m\angle A < m\angle C < m\angle B$; $BC < AB < AC$

2. $m\angle E < m\angle F < m\angle D$; $DF < DE < EF$

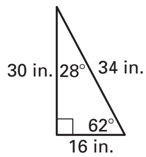
3. $m\angle H < m\angle I < m\angle G$; $GI < GH < HI$

4. $m\angle J < m\angle L < m\angle K$; $KL < JK < JL$

5.



6.



7. greater than 3 cm and less than 7 cm

8. greater than 5 in. and less than 19 in.

9. greater than 6 ft and less than 14 ft

10. greater than 1 m and less than 21 m

11. greater than 16 in. and less than 34 in.

12. greater than 7 mi and less than 9 mi

Challenge Practice

1. x is between 8 and 16. **2.** x is between 6.5 and 7. **3.** x is between $\frac{5}{3}$ and 8.
4. x is greater than 2.
5. Because $AC = BC$, $\triangle ABC$ is isosceles. By the Base Angles Theorem, you can conclude that $\angle CAB \cong \angle ABC$. In $\triangle ABE$, you know that $m\angle CAB < m\angle ABE$, because $m\angle ABE = m\angle ABC + m\angle CBE$ and $m\angle ABC = m\angle CAB$. So, $BE < AE$ because if one angle of a triangle is smaller than another angle, then the side opposite the smaller angle is shorter than the side opposite the larger angle.

6. $\overline{MJ} \perp \overleftrightarrow{JN}$, so $\triangle MJN$ is a right triangle. The largest angle in a right triangle is the right angle, so $m\angle MJN > m\angle MNJ$. Finally, you can conclude that $MN > MJ$ because if one angle of a triangle is larger than another angle, then the side opposite the larger angle is longer than the side opposite the smaller angle.

7. If a line segment is perpendicular to a plane, then it is perpendicular to every line segment in the plane, so $\overline{PC} \perp \overline{DC}$. You also know that $\triangle PCD$ is a right triangle. The largest angle in a right triangle is the right angle, so $m\angle PCD > m\angle PDC$. Finally, you can conclude that $PD > PC$ because if one angle of a triangle is larger than another angle, then the side opposite the larger angle is longer than the side opposite the smaller angle.

Lesson 5.6

Practice Level A

1. < **2.** = **3.** < **4.** = **5.** < **6.** > **7.** < **8.** <

9. In order to use the Hinge Theorem, the student must know the measure of the included angles $\angle ACB$ and $\angle CAD$. **10.** D **11.** A

12. B **13.** C **14.** $x > 7$ **15.** $x > 1$ **16.** Apply the Hinge Theorem to conclude that your friend is farthest from the school. **17.** Assume $\overline{MP}$ is not an altitude.

Practice Level B

1. >; Hinge Thm. with $m\angle R > m\angle U$

2. <; Hinge Thm. with $m\angle DGE < m\angle EGF$

3. <; Hinge Thm. with $m\angle JMK < m\angle LKM$

4. >; Converse of Hinge Thm. with the side opposite $\angle 1$ longer than the side opposite $\angle 2$.

5. >; Converse of Hinge Thm. with the side opposite $\angle 1$ longer than the side opposite $\angle 2$.

6. <; Converse of Hinge Thm. with the side opposite $\angle 1$ shorter than the side opposite $\angle 2$.

7. >; Converse of Hinge Thm. with the side opposite $\angle 1$ longer than the side opposite $\angle 2$.

8. =; The triangles are ≅ by SAS. **9.** $x < 34$

10. $x > 4$ **11.** Assume temporarily that the two parallel lines contain two sides of a triangle.

12. Assume temporarily that the transversal is not perpendicular to the parallel lines.

13. a. Because $m\angle 3 < m\angle 1$, by the Hinge Thm, the far side of the table is lower than the near side.
b. By the Converse of the Hinge Thm., $\angle 4$ will be larger than $\angle 2$ until the distance between the tops of each pair of legs is the same.
14. the second angler; The included $\angle$ for the second angler is 96° and for the first angler is 90°.

15. F, E, B, A, D, C **16.** Temporarily assume that $AB > AC$. The steps of the proof correspond to the steps of the proof in Ex. 15.

Practice Level C

1. = **2.** < **3.** < **4.** > **5.** > **6.** > **7.** never

8. never **9.** always **10.** never **11.** never

12. sometimes **13.** $x > 14$ **14.** $x > 1$

15. Family A; The included angle for Family A is 90° and for Family B is 89°.