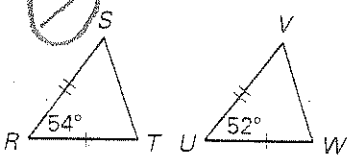
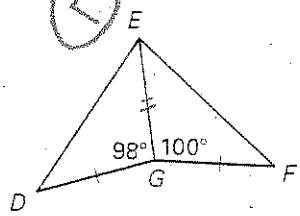
Adv. Geometry 5.6 - Hinge Theorem Key

Complete with <, >, or = .

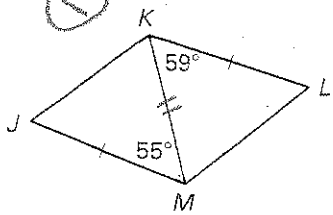
1. ST __>__ VW



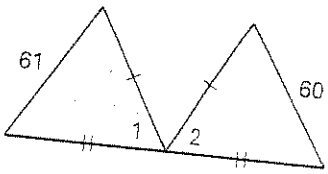
2. DE __<__ EF



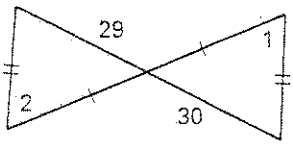
3. JK __<__ LM



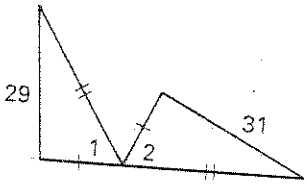
4. $m\angle 1$ __>__ $m\angle 2$



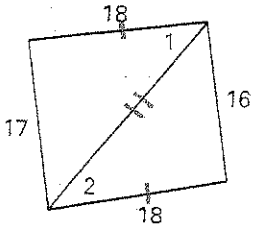
5. $m\angle 1$ __>__ $m\angle 2$



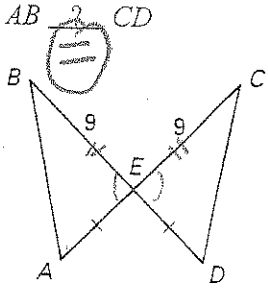
6. $m\angle 1$ __<__ $m\angle 2$



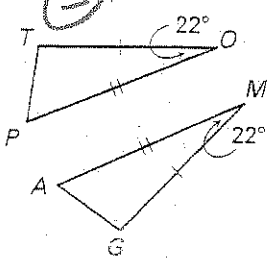
7. $m\angle 1$ __>__ $m\angle 2$



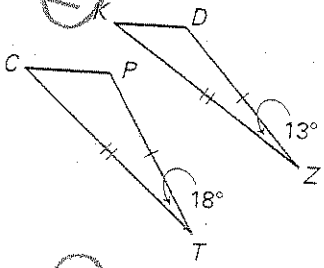
8. AB __=__ CD



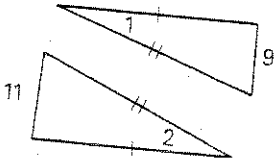
1. TP __=__ AG



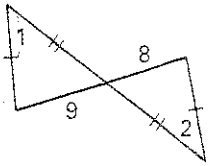
2. KD __<__ CP



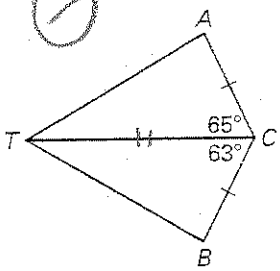
3. $m\angle 1$ __<__ $m\angle 2$



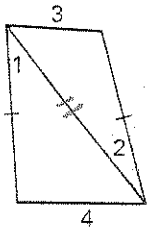
4. $m\angle 1$ __>__ $m\angle 2$



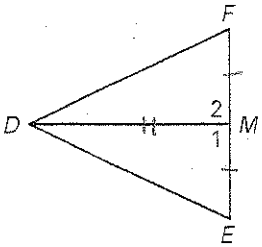
5. AT __>__ BT



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



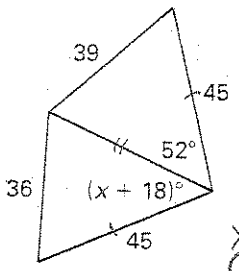
In $\triangle DEF$, DM is a median. Determine if each statement is *always*, *sometimes*, or *never* true.



7. If $m\angle 2 > m\angle 1$, then $ED > FD$. Never
8. If $m\angle E > m\angle F$, then $\angle 1$ is obtuse. Sometimes
9. If $\angle 2$ is acute, then $m\angle F > m\angle E$. Always
10. If $m\angle E < m\angle F$, then $m\angle 1 < m\angle 2$. Never
11. If $m\angle 2 > m\angle 1$, then $ED > FD$. Never
12. If $m\angle D = 90°$, then $FD > ED$. Sometimes

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.



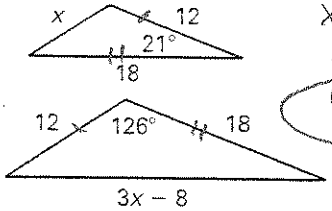
$x+18 < 52$

$x < 34$

$x+18 > 0$

$x > -18$

10.



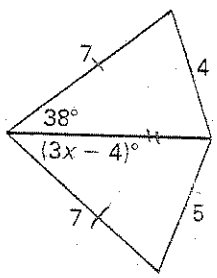
$x < 3x-8$

$8 < 2x$

$4 < x$

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.

13.

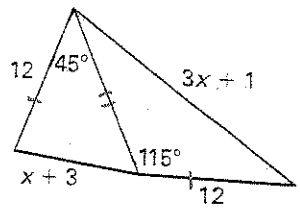


$3x - 4 > 38$

$3x > 42$

$x > 14$

14.



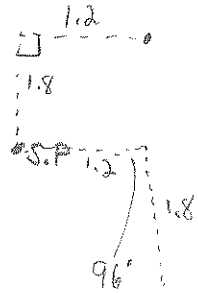
$x + 3 < 3x + 1$

$2 < 2x$

$1 < x$

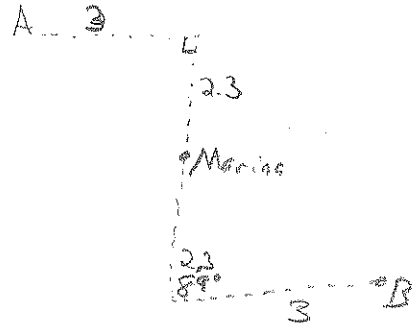
14. Fishing Contest One contestant in a catch-and-release fishing contest spends the morning at a location 1.8 miles due north of the starting point, then goes 1.2 miles due east for the rest of the day. A second contestant starts out 1.2 miles due east of the starting point, then goes another 1.8 miles 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.

Second Contestant



15. Sailing Two families are going sailing. Family A leaves the marina and sails 2.3 miles due north, then sails 3 miles due west. Family B leaves the marina and sails 2.3 miles due south, then sails 3 miles in a direction 1° north of due east. Which family is farther from the marina? *Explain* your reasoning.

Family A



In Exercises 16–18, write an indirect proof.

16. **GIVEN:** $\triangle JKL$ is a scalene triangle.

PROVE: No two angles of $\triangle JKL$ are congruent.

Assume two angles of $\triangle JKL$ are congruent. This means that two sides of $\triangle JKL$ are congruent. This is a contradiction because $\triangle JKL$ is a scalene $\triangle$

$\therefore$ Assumption is false, $\longrightarrow$ No two angles of $\triangle JKL$ are $\cong$.

1. Suppose x and y are odd. Prove xy is odd. (*Hint:* An odd number can be written as $2m + 1$, where m is an integer.)

Let $x = 2m + 1$ and $y = 2n + 1$ where m & n are integers

$$xy = (2m+1)(2n+1) = 4mn + 2n + 2m + 1$$
$$= 2(2mn + n + m) + 1$$

$2mn + n + m$ is an integer

$\therefore xy$ is odd