# 5-6 Inequalities In Two Triangles

~Master E~

The relationship of the sides and the angle between them illustrates the following theorem.

Hinge Theorem (SAS Inequality):

If two sides of a triangle are ___congruent___ to two sides of another triangle, and the included angle of the first is ___greater/less___ than the included angle of the second triangle, then the third side of the first triangle is ___greater/less___ than the third side of the second triangle.


Example: If $\overline{AB} \cong \overline{FG}$, and $\overline{AC} \cong \overline{FH}$, and

$m\angle A > m\angle F$, then ___BC___ $>$ ___GH___.
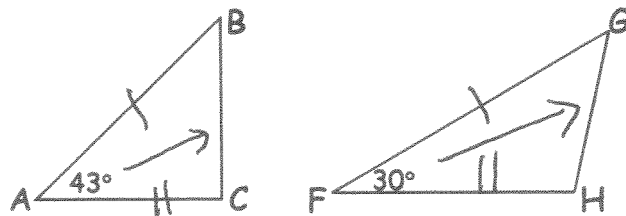
**Converse of the Hinge Theorem (SSS Inequality):**

If two sides of a triangle are ___congruent___ to two sides of another triangle, and the third side in the first triangle is ___greater/less___ than the third side in the second triangle, then the included angle measure of the first triangle is ___greater/less___ than the included angle measure in the second triangle.

Example: If $\overline{AC} \cong \overline{FH}$, and $\overline{BC} \cong \overline{GH}$, and
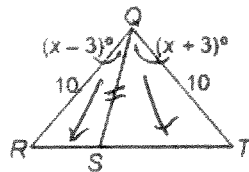
$FG > AB$, then m ___$\angle H$___ $> m$ ___$\angle C$___.
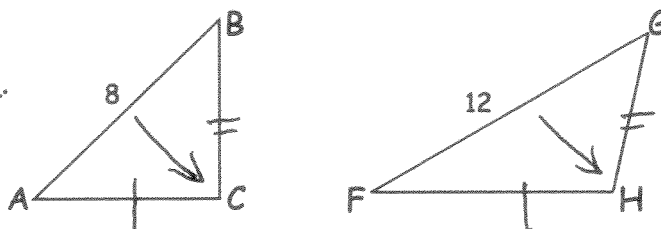
Compare the given measures.

1. *AB* and *BK*
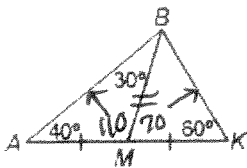
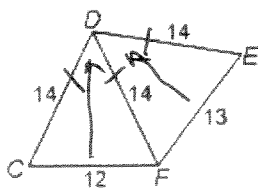AB $\boxed{\geq}$ BK
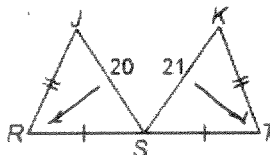
2. *ST* and *SR*

ST $\boxed{\geq}$ SR

$x - 3$ is less than $x+3$

3. $m\angle CDF$ and $m\angle EDF$

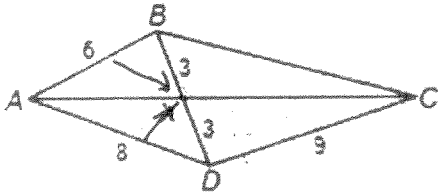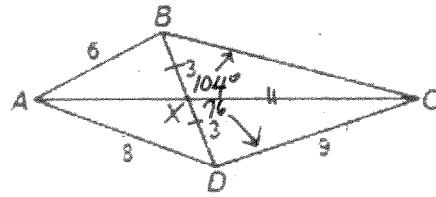$m\angle CDF$ $\boxed{\leq}$ $m\angle EDF$

4. $m\angle R$ and $m\angle T$

$m\angle R$ $\boxed{\leq}$ $m\angle T$

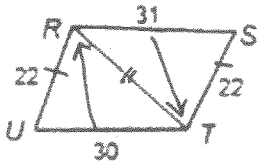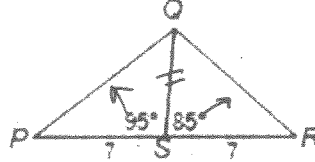Complete the statement with an inequality that compares each side or angle measure.

17. m∠BXA _____<_____ m∠DXA
6   8

18. BC _____>_____ DC
104   76

19. m∠STR _____>_____ m∠TRU SSS ≠
31   30

20. PQ _____>_____ RQ
95   85

21. MR _____>_____ RP
21   19
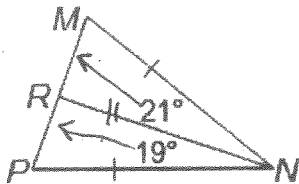
22. m∠XYW _____<_____ m∠WYZ
28   42
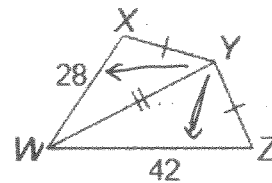
Find the range of possible values for x using the Hinge Theorem.

23.
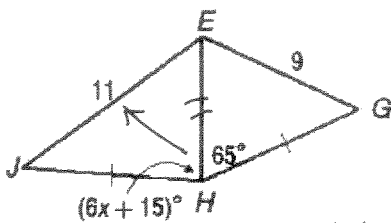
$6x+15 > 65$
$6x > 50$
$\boxed{x > 8.\overline{3}}$

*but the > must be less than 180, so
$6x + 15 < 180$
$6x < 165$
$\boxed{x < 27.5}$

Final Answer: $\boxed{8.\overline{3} < x < 27.5}$

24.
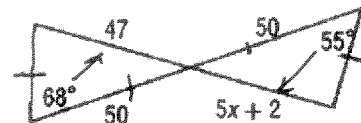
$5x + 2 < 47$
$5x < 45$
$\boxed{x < 9}$

but a side can't be negative, so
$5x + 2 > 0$
$5x > -2$
$\boxed{x > -\frac{2}{5}}$

$\left\{ -\frac{2}{5} < x < 9 \right\}$ Final Answer