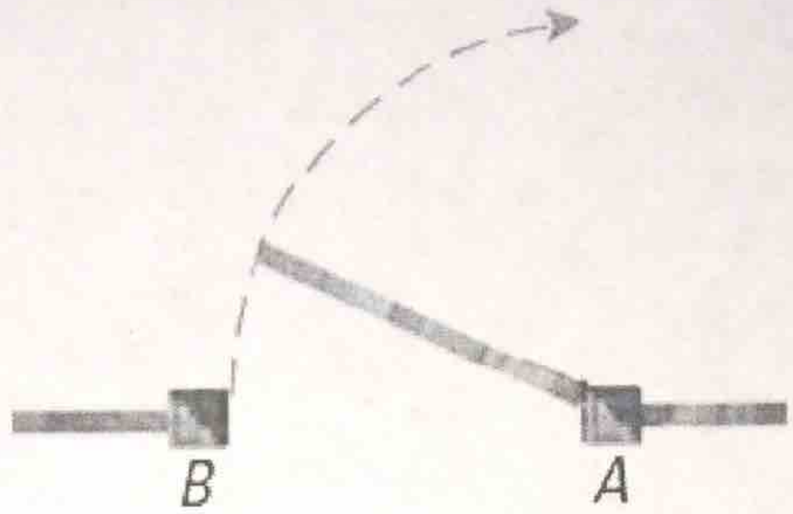
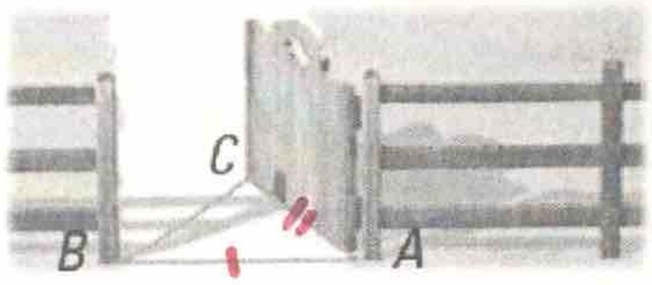
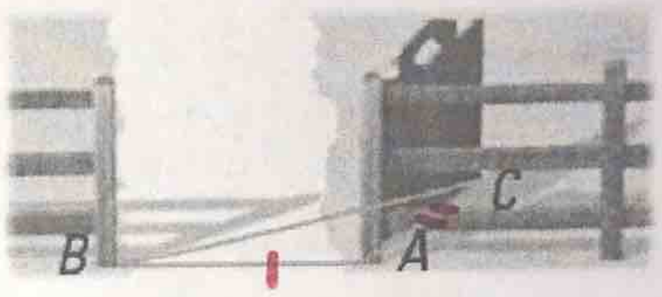
5.6 Inequalities in Two Triangles

Imagine a gate between fence posts A and B that has hinges at A and swings open at B.







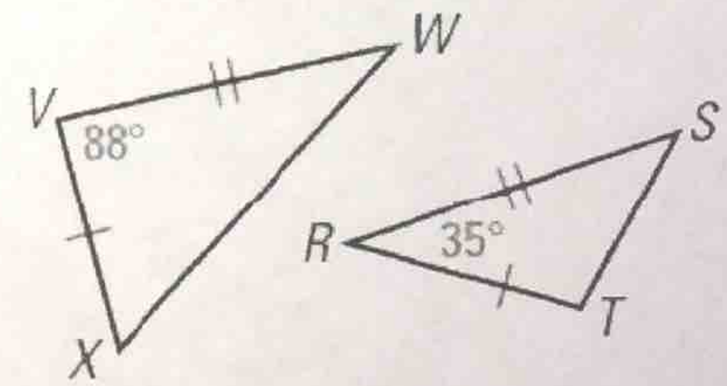
Notice that as the gate opens wider, both the measure of $\angle A$ and the distance CB increase. This suggests the **Hinge Theorem**.

THEOREMS *For Your Notebook*

THEOREM 5.13 Hinge Theorem

If two sides of one triangle are congruent to two sides of another triangle, and the included angle of the first is larger than the included angle of the second, then the third side of the first is longer than the third side of the second.

Proof: Ex. 28, p. 341

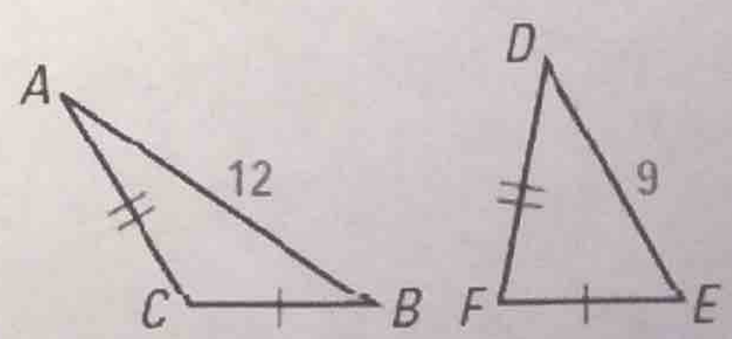


$WX > ST$

THEOREM 5.14 Converse of the Hinge Theorem

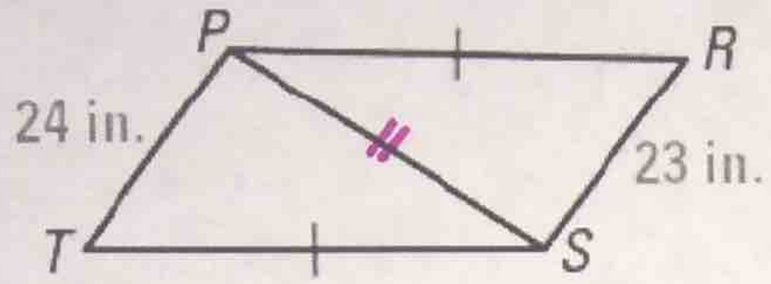
If two sides of one triangle are congruent to two sides of another triangle, and the third side of the first is longer than the third side of the second, then the included angle of the first is larger than the included angle of the second.

Proof: Example 4, p. 338



$m\angle C > m\angle F$

Ex 1: Given that $\overline{ST} \cong \overline{PR}$, how does $\angle PST$ compare to $\angle SPR$?



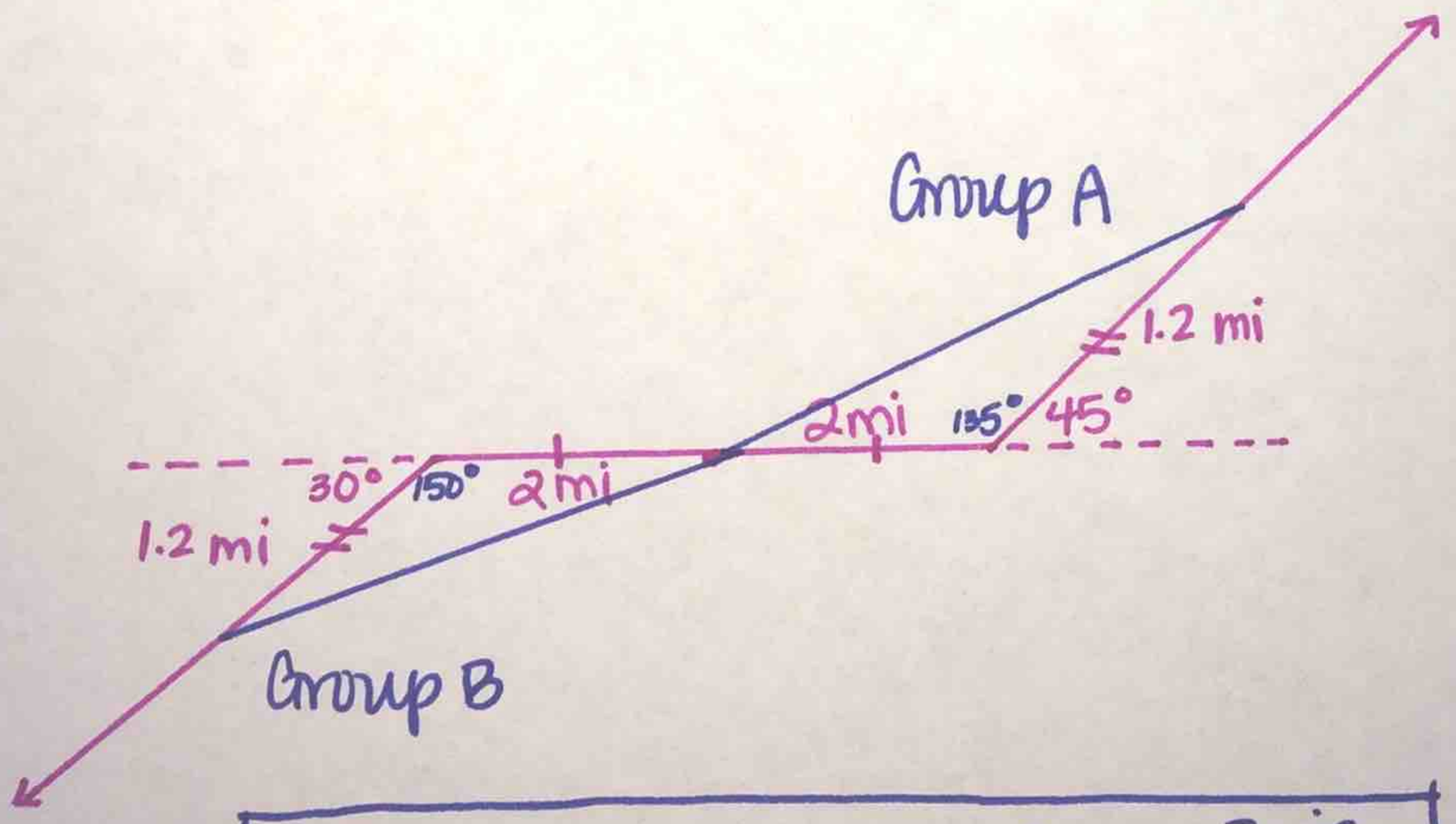
$\overline{ST} \cong \overline{PR}$ Given

$\overline{PS} \cong \overline{PS}$ Reflexive Property

24 in > 23 in so PT > RS

$m\angle PST > m\angle SPR$ by the Converse of the Hinge Theorem

Ex 2: Two groups of bikers leave the same camp heading in opposite directions. Each group goes 2 miles, then changes direction and goes 1.2 miles. Group A starts due east and then turns 45° toward north. Group B starts due west and then turns 30° toward south. Which group is farther from camp?



Because 150° > 135°, Group B is farther by the Hinge Theorem.