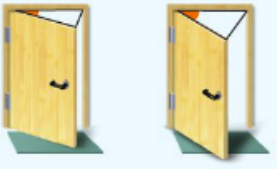
5-7 Inequalities in Two Triangles

Content Standard
Extends G.CO.10 Prove theorems about triangles. . . .

Objective To apply inequalities in two triangles

Essential Understanding In triangles that have two pairs of congruent sides, there is a relationship between the included angles and the third pair of sides.

When you close a door, the angle between the door and the frame (at the hinge) gets smaller. The relationship between the measure of the hinge angle and the length of the opposite side is the basis for the SAS Inequality Theorem, also known as the Hinge Theorem.

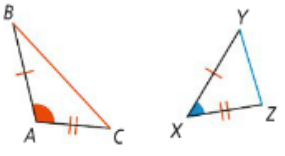


take note

Theorem 5-13 The Hinge Theorem (SAS Inequality Theorem)

Theorem
If two sides of one triangle are congruent to two sides of another triangle, and the included angles are not congruent, then the longer third side is opposite the larger included angle.

If . . .
$m\angle A > m\angle X$



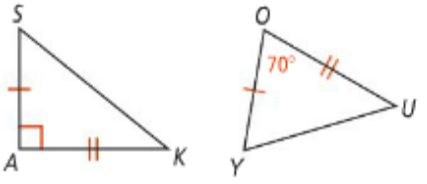
Then . . .
$BC > YZ$

You will prove Theorem 5-13 in Exercise 25.

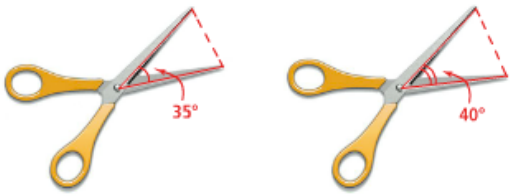
Problem 1 Using the Hinge Theorem

Multiple Choice Which of the following statements must be true?

(A) $AS < YU$
(B) $SK > YU$
(C) $SK < YU$
(D) $AK = YU$



Got It? **2.** The diagram below shows a pair of scissors in two different positions. In which position is the distance between the tips of the two blades greater? Use the Hinge Theorem to justify your answer.

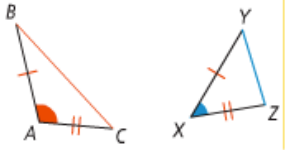


take note

Theorem 5-14 Converse of the Hinge Theorem (SSS Inequality)

Theorem
If two sides of one triangle are congruent to two sides of another triangle, and the third sides are not congruent, then the larger included angle is opposite the longer third side.

If . . .
$BC > YZ$



Then . . .
$m\angle A > m\angle X$

Got It? **3.** What is the range of possible values for x in the figure at the right?