



## Investigation 1

### What Is the Shortest Path from A to B?

**You will need**

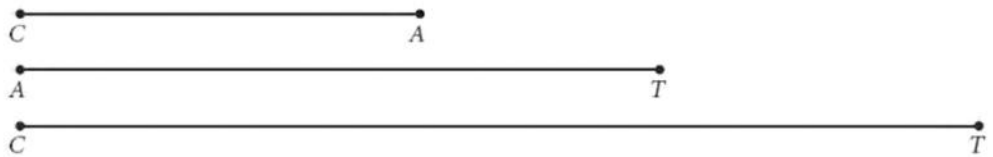
- a compass
- a straightedge

Each person in your group should do each construction. Compare results when you finish.

Step 1

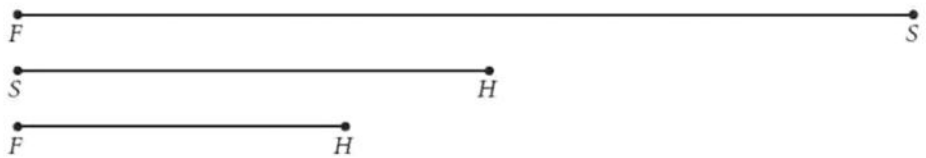
Construct a triangle with each set of segments as sides.

**Given:**



**Construct:**  $\triangle CAT$

**Given:**



**Construct:**  $\triangle FSH$

Step 2

You should have been able to construct  $\triangle CAT$ , but not  $\triangle FSH$ . Why? Discuss your results with others. State your observations as your next conjecture.

### Triangle Inequality Conjecture

C-20

The sum of the lengths of any two sides of a triangle is ? the length of the third side.



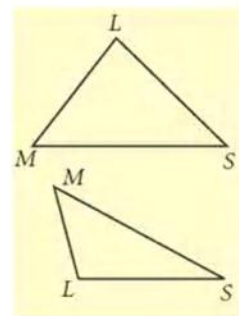
## Investigation 2

### Where Are the Largest and Smallest Angles?

**You will need**

- a ruler
- a protractor

- Step 1 | Measure the angles in your triangle. Label the angle with greatest measure  $\angle L$ , the angle with second greatest measure  $\angle M$ , and the smallest angle  $\angle S$ .
- Step 2 | Measure the three sides. Label the longest side  $l$ , the second longest side  $m$ , and the shortest side  $s$ .
- Step 3 | Which side is opposite  $\angle L$ ?  $\angle M$ ?  $\angle S$ ?



Discuss your results with others. Write a conjecture that states where the largest and smallest angles are in a triangle, in relation to the longest and shortest sides.

#### Side-Angle Inequality Conjecture

C-21

In a triangle, if one side is longer than another side, then the angle opposite the longer side is ?.



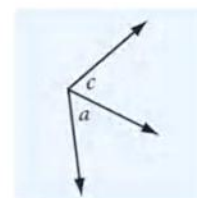
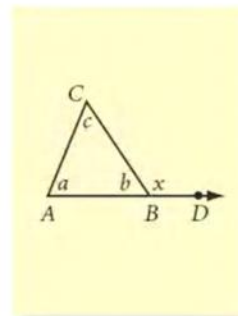
## Investigation 3

### Exterior Angles of a Triangle

**You will need**

- a straightedge
- patty paper

- Step 1 | On your paper, draw a scalene triangle,  $\triangle ABC$ . Extend  $\overline{AB}$  beyond point  $B$  and label a point  $D$  outside the triangle on  $\overline{AB}$ . Label the angles as shown.
- Step 2 | Copy the two remote interior angles,  $\angle A$  and  $\angle C$ , onto patty paper to show their sum.
- Step 3 | How does the sum of  $a$  and  $c$  compare with  $x$ ? Use your patty paper from Step 2 to compare.
- Step 4 | Discuss your results with your group. State your observations as a conjecture.



#### Triangle Exterior Angle Conjecture

C-22

The measure of an exterior angle of a triangle ?.