

## 4.3

# Prove Triangles Congruent by SSS

**Goal** • Use side lengths to prove triangles are congruent.

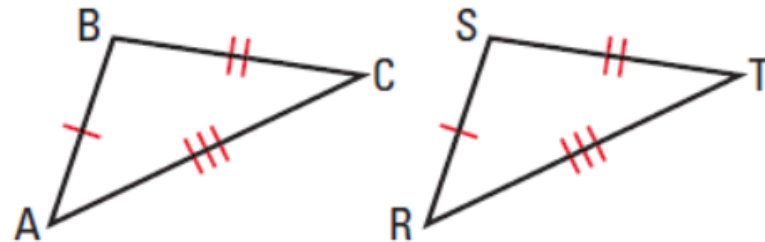
## POSTULATE

*For Your Notebook*

### POSTULATE 19 Side-Side-Side (SSS) Congruence Postulate

If three sides of one triangle are congruent to three sides of a second triangle, then the two triangles are congruent.

If Side  $\overline{AB} \cong \overline{RS}$ ,  
 Side  $\overline{BC} \cong \overline{ST}$ , and  
 Side  $\overline{CA} \cong \overline{TR}$ ,  
 then  $\triangle ABC \cong \triangle RST$ .

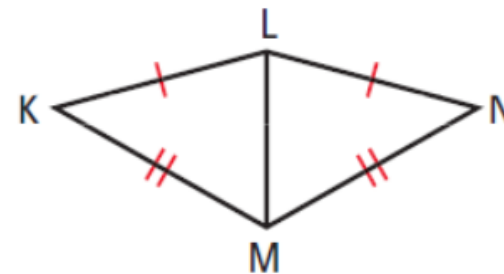


**EXAMPLE 1** Use the SSS Congruence Postulate

Write a proof.

**GIVEN** ▶  $\overline{KL} \cong \overline{NL}$ ,  $\overline{KM} \cong \overline{NM}$

**PROVE** ▶  $\triangle KLM \cong \triangle NLM$



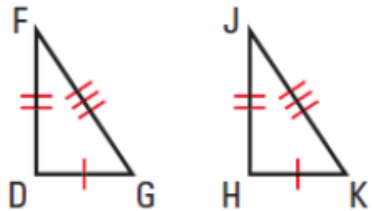
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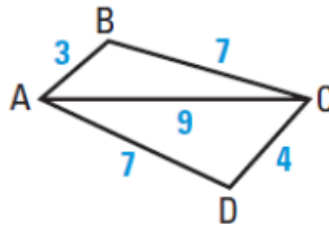

**GUIDED PRACTICE** for Example 1

Decide whether the congruence statement is true. *Explain* your reasoning.

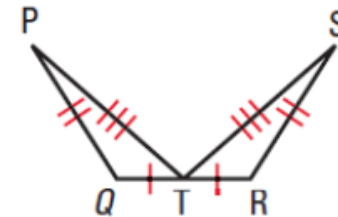
1.  $\triangle DFG \cong \triangle HJK$



2.  $\triangle ACB \cong \triangle CAD$



3.  $\triangle QPT \cong \triangle RST$

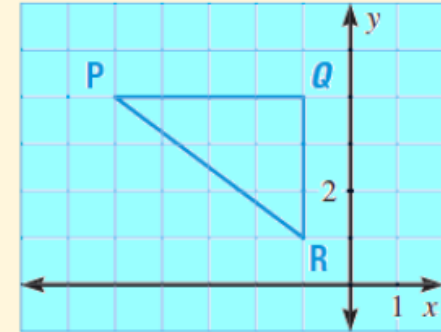




## EXAMPLE 2 Standardized Test Practice

Which are the coordinates of the vertices of a triangle congruent to  $\triangle PQR$ ?

- (A)  $(-1, 1), (-1, 5), (-4, 5)$
- (B)  $(-2, 4), (-7, 4), (-4, 6)$
- (C)  $(-3, 2), (-1, 3), (-3, 1)$
- (D)  $(-7, 7), (-7, 9), (-3, 7)$



### Solution

By counting,  $PQ = 3$  and  $QR = 4$ . Use the Distance Formula to find  $PR$ .

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$PR = \sqrt{(-1 - (-4))^2 + (1 - 5)^2} = \sqrt{3^2 + (-4)^2} = \sqrt{9 + 16} = \sqrt{25} = 5$$

By the SSS Congruence Postulate, any triangle with side lengths 3, 4, and 5 will be congruent to  $\triangle PQR$ . The distance from  $(-1, 1)$  to  $(-1, 5)$  is 4. The distance from  $(-1, 5)$  to  $(-4, 5)$  is 3. The distance from  $(-1, 1)$  to  $(-4, 5)$  is  $\sqrt{(5 - 1)^2 + ((-4) - (-1))^2} = \sqrt{4^2 + (-3)^2} = \sqrt{16 + 9} = \sqrt{25} = 5$ .

► The correct answer is A. (A) (B) (C) (D)

### ELIMINATE CHOICES

Once you know the side lengths of  $\triangle PQR$ , look for pairs of coordinates with the same x-coordinates or the same y-coordinates. In Choice C,  $(-3, 2)$  and  $(-3, 1)$  are only 1 unit apart. You can eliminate D in the same way.

### EXAMPLE 3 Solve a real-world problem

**STRUCTURAL SUPPORT** Explain why the bench with the diagonal support is stable, while the one without the support can collapse.



#### Solution

The bench with a diagonal support forms triangles with fixed side lengths. By the SSS Congruence Postulate, these triangles cannot change shape, so the bench is stable. The bench without a diagonal support is not stable because there are many possible quadrilaterals with the given side lengths.



#### GUIDED PRACTICE for Example 3

Determine whether the figure is stable. *Explain* your reasoning.

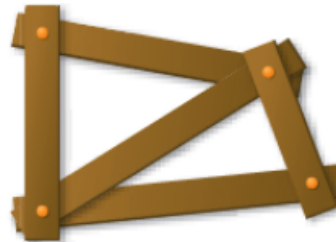
**GUIDED PRACTICE** for Example 3

Determine whether the figure is stable. *Explain* your reasoning.

5.



6.



7.



**Assignment:**

p. 236 (1-9, 13-20, 24-27 all, 32-36 even)