

# 5.2

## Congruent Polygons

For use with Exploration 5.2

**Essential Question** Given two congruent triangles, how can you use rigid motions to map one triangle to the other triangle?

### 1 EXPLORATION: Describing Rigid Motions

**Work with a partner.** Of the four transformations you studied in Chapter 4, which are rigid motions? Under a rigid motion, why is the image of a triangle always congruent to the original triangle? Explain your reasoning.



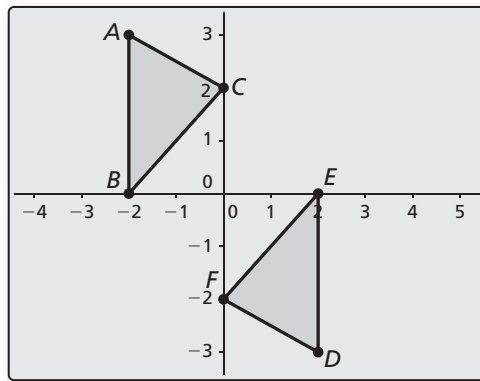
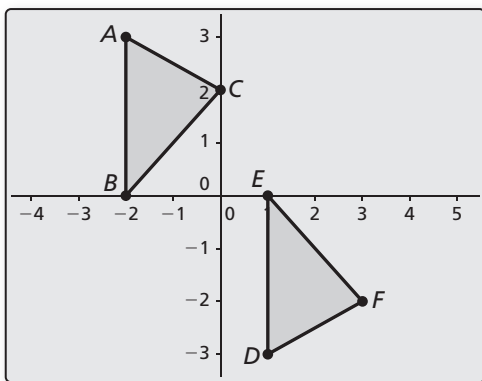
### 2 EXPLORATION: Finding a Composition of Rigid Motions

Go to [BigIdeasMath.com](http://BigIdeasMath.com) for an interactive tool to investigate this exploration.

**Work with a partner.** Describe a composition of rigid motions that maps  $\triangle ABC$  to  $\triangle DEF$ . Use dynamic geometry software to verify your answer.

a.  $\triangle ABC \cong \triangle DEF$

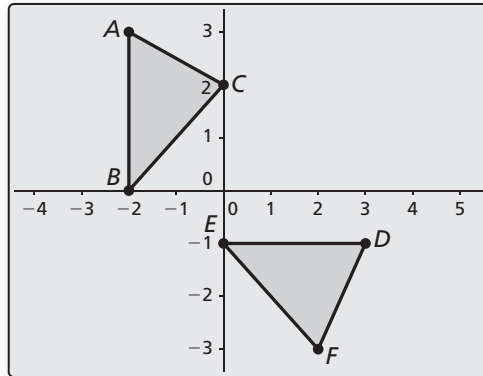
b.  $\triangle ABC \cong \triangle DEF$



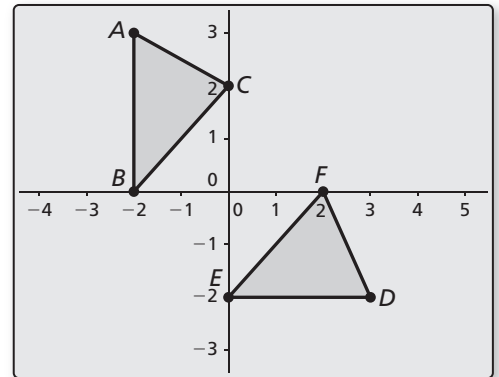
**5.2** Congruent Polygons (continued)

**2** **EXPLORATION:** Finding a Composition of Rigid Motions (continued)

c.  $\triangle ABC \cong \triangle DEF$



d.  $\triangle ABC \cong \triangle DEF$



**Communicate Your Answer**

3. Given two congruent triangles, how can you use rigid motions to map one triangle to the other triangle?
  
4. The vertices of  $\triangle ABC$  are  $A(1, 1)$ ,  $B(3, 2)$ , and  $C(4, 4)$ . The vertices of  $\triangle DEF$  are  $D(2, -1)$ ,  $E(0, 0)$ , and  $F(-1, 2)$ . Describe a composition of rigid motions that maps  $\triangle ABC$  to  $\triangle DEF$ .

**5.2****Notetaking with Vocabulary**

For use after Lesson 5.2

In your own words, write the meaning of each vocabulary term.

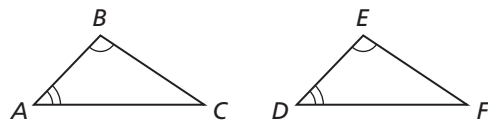
corresponding parts

**Theorems****Theorem 5.3 Properties of Triangle Congruence**

Triangle congruence is reflexive, symmetric, and transitive.

**Reflexive** For any triangle  $\triangle ABC$ ,  $\triangle ABC \cong \triangle ABC$ .**Symmetric** If  $\triangle ABC \cong \triangle DEF$ , then  $\triangle DEF \cong \triangle ABC$ .**Transitive** If  $\triangle ABC \cong \triangle DEF$  and  $\triangle DEF \cong \triangle JKL$ , then  $\triangle ABC \cong \triangle JKL$ .**Notes:****Theorem 5.4 Third Angles Theorem**

If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent.

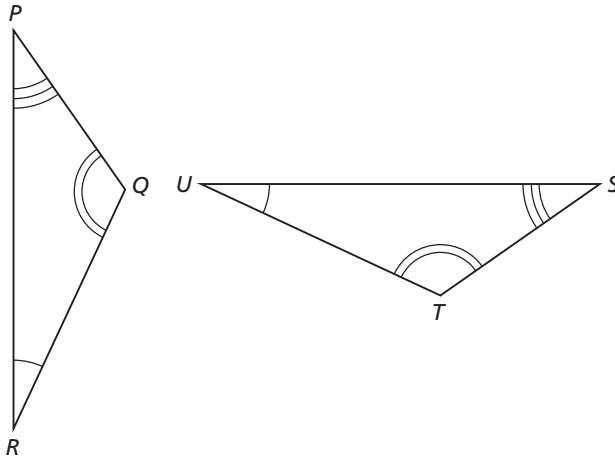
**Notes:**If  $\angle A \cong \angle D$  and  $\angle B \cong \angle E$ , then  $\angle C \cong \angle F$ .

## 5.2 Notetaking with Vocabulary (continued)

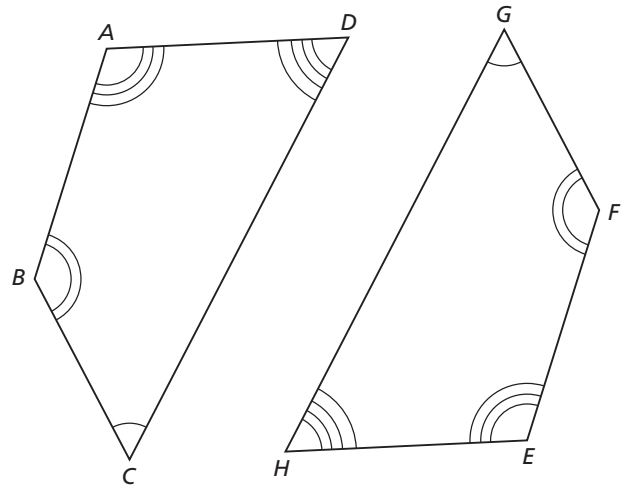
### Extra Practice

In Exercises 1 and 2, identify all pairs of congruent corresponding parts. Then write another congruence statement for the polygons.

1.  $\triangle PQR \cong \triangle STU$

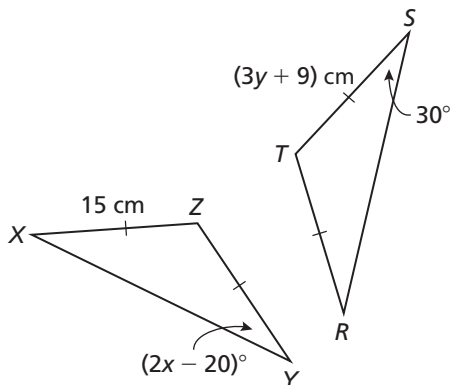


2.  $ABCD \cong EFGH$

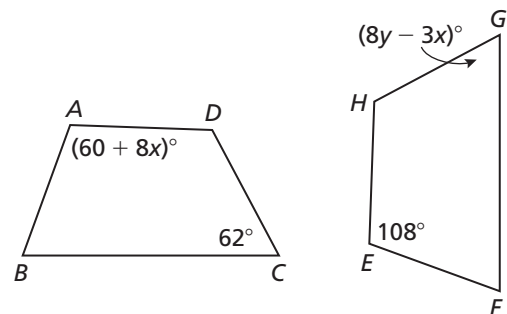


In Exercises 3 and 4, find the values of  $x$  and  $y$ .

3.  $\triangle XYZ \cong \triangle RST$

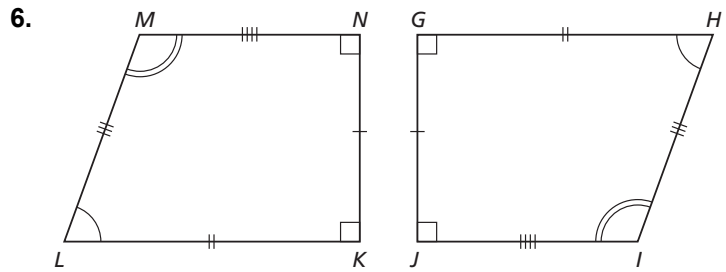
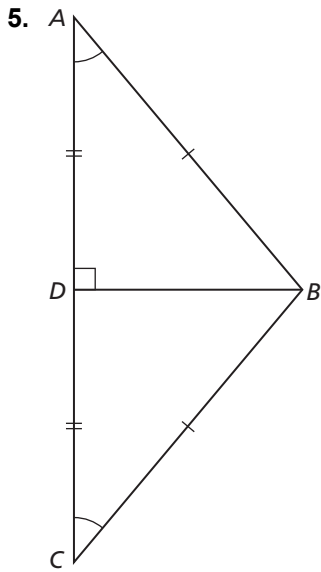


4.  $ABCD \cong EFGH$



**5.2** Notetaking with Vocabulary (continued)

In Exercises 5 and 6, show that the polygons are congruent. Explain your reasoning.



In Exercises 7 and 8, find  $m\angle 1$ .

