Essential Question How does a sequence of translations, reflections, and rotations result in congruent figures?

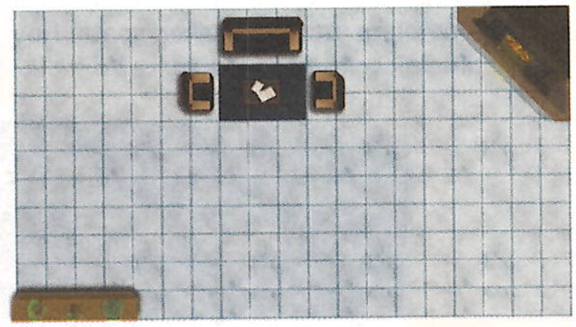
VISUAL LEARNING ASSESS

EXAMPLE 1 Understand Congruence

Scan for Multimedia

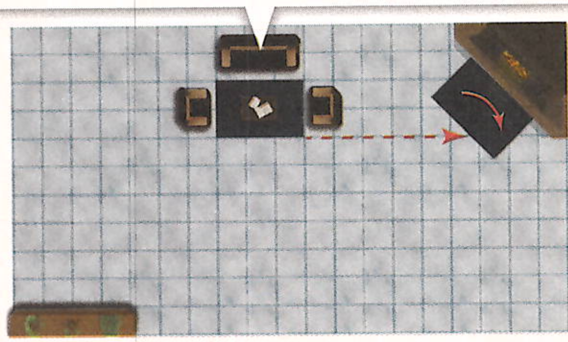
Ava wants to place a flame-resistant hearth rug in front of the fireplace that is the same size and shape as the rug in front of the sofa. How can she determine whether the rugs are the same size and shape?

Reasoning How does translating, reflecting, and rotating a figure change its shape and size?

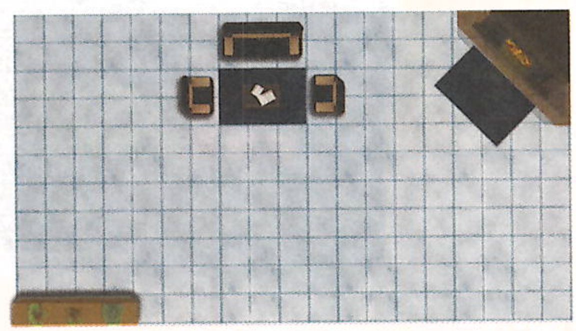


If a sequence of translations, reflections, and rotations maps one rug onto the other then the rugs are the same size and shape.

Congruent figures have the same size and shape. Two-dimensional figure are **congruent** ($\cong$) if the second figure can be obtained from the first by a sequence of rotations, reflections, and translations.



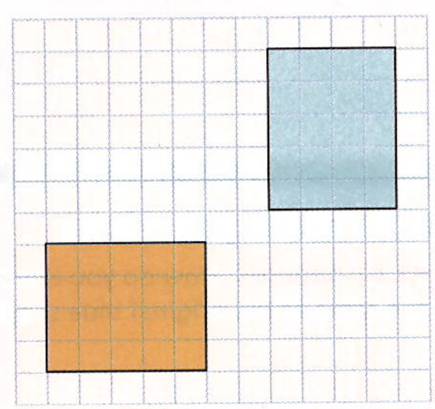
Ava uses a translation followed by a rotation to map the living room rug onto the hearth rug.



Since the two rugs are the same size and the same shape, they are congruent figures.

Try It!

How can you determine whether the orange and blue rectangles are congruent?



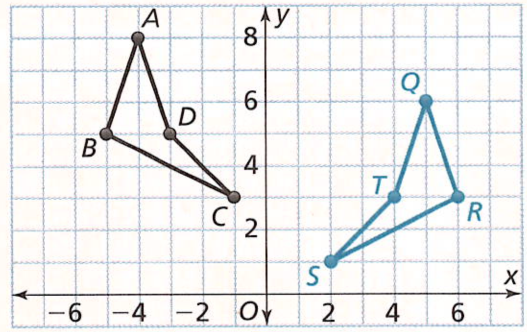
Convince Me! Quadrilateral *PQRS* is congruent to quadrilateral *P′Q′R′S′*. What do you know about how these figures relate?

EXAMPLE 2 Identify Congruent Figures

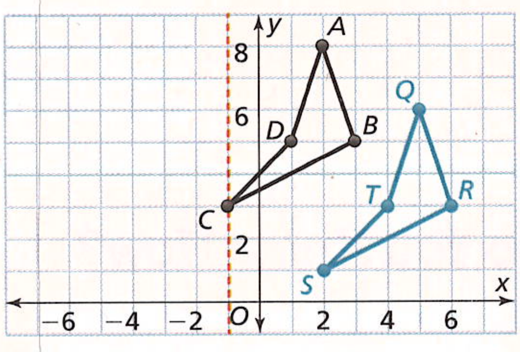
ACTIVITY ASSESS

A. Is quadrilateral *ABCD* congruent to quadrilateral *QRST*?

Look for Relationships Is there a sequence of transformations that will map one of the figures onto the other?

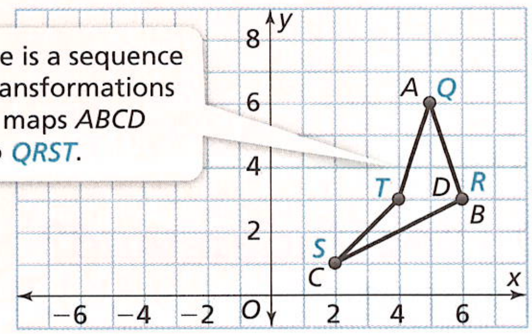


STEP 1 Reflect quadrilateral *ABCD* across the line $x = -1$.



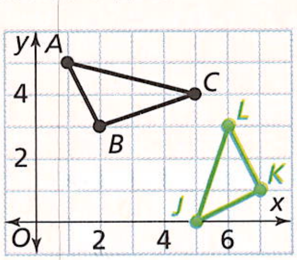
STEP 2 Translate quadrilateral *ABCD* 3 units right and 2 units down.

There is a sequence of transformations that maps *ABCD* onto *QRST*.

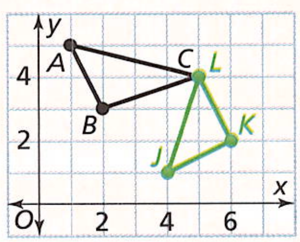


Since quadrilateral *ABCD* maps onto quadrilateral *QRST*, quadrilateral *ABCD* ≅ quadrilateral *QRST*.

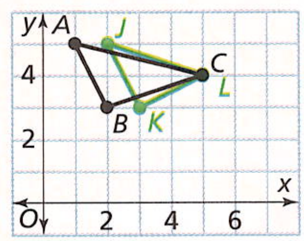
B. Is △*ABC* ≅ △*JKL*?



You can start by mapping one vertex to its corresponding vertex.



Translate point *L* 1 unit left and 1 unit up to map it to point *C*.



Rotate △*JKL* about point *L* so that side *LK* aligns with side *CB*.

There is no sequence of transformations that maps △*JKL* directly onto △*ABC*, so △*ABC* is NOT congruent to △*JKL*.

Try It!

Are the figures congruent? Explain.