

# Understand Properties of Transformations

Name: \_\_\_\_\_

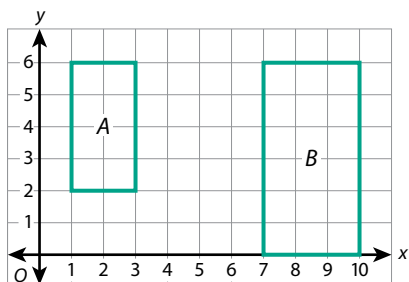
**Prerequisite: What properties can you use to compare shapes?**



**Study the example problem showing how to compare the properties of two shapes. Then solve problems 1–6.**

### Example

Compare the properties of quadrilaterals *A* and *B*.



You can use a table to show the comparison.

	Parallel Sides	Perpendicular Sides	Lengths of Opposite Sides	Angles
<b>A</b>	2 pairs	4 pairs	equal	4 right
<b>B</b>	2 pairs	4 pairs	equal	4 right

- 1** What types of quadrilaterals are figures *A* and *B* in the example problem? Explain how you know.

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**Use  $\triangle ABC$  and  $\triangle DEF$  to answer problems 2–3.**

- 2** In  $\triangle ABC$  the measure of angle *A* is  $30^\circ$ . In  $\triangle DEF$  the measure of angle *F* is  $60^\circ$ . Find the rest of the angle measures in each triangle and compare them.

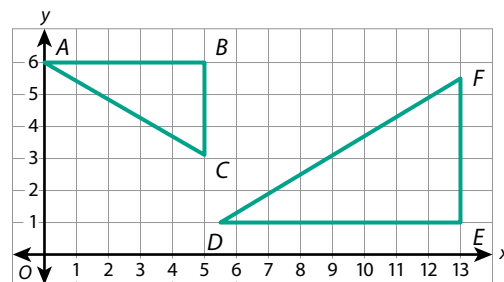
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- 3** What types of triangles are  $\triangle ABC$  and  $\triangle DEF$ ?

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**Solve.**

**4** Consider quadrilaterals  $RSTV$  and  $WXYZ$ .

**a.** Find the lengths of the sides of each quadrilateral. Explain how you got your answers.

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**b.** Compare the properties of the figures. What type of quadrilateral is each figure?

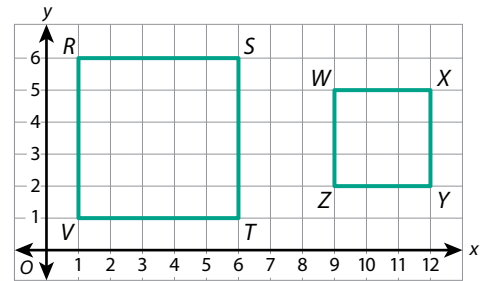
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**5** How are the triangles at the right alike? How are they different?

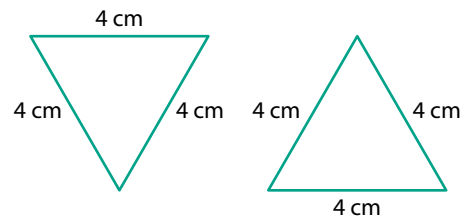
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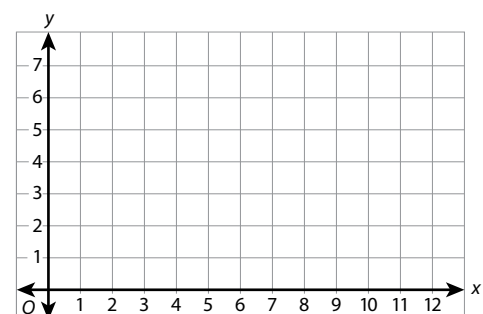


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**6** Draw two different quadrilaterals with the following properties on the coordinate plane.

- exactly 1 pair of parallel sides
- 2 pairs of perpendicular sides
- 2 right angles, 1 obtuse angle, 1 acute angle

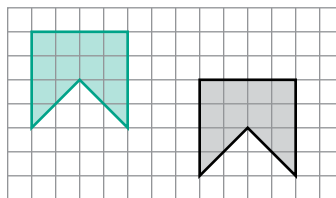


## Explore Properties of Transformations

**Study the example problem showing how to analyze a figure and its image after a transformation. Then solve problems 1–6.**

### Example

The gray figure is a transformation of the green figure. Compare the figures. Tell what is the same and what is different about the original figure and its image. Identify the transformation.



**Same:** The figures have the same shape and size. Parallel lines are still parallel and perpendicular lines are still perpendicular. The lengths of the sides are the same, and the measures of the angles are the same.

**Different:** The image is in a different location than the original figure.

The transformation is a translation.

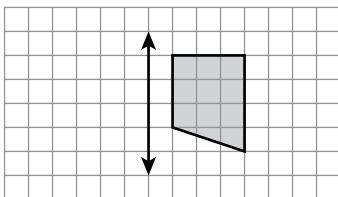
- 1** Describe how the original figure in the example problem was moved to get the image.

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- 2** A figure and a line of reflection are shown. Draw the image of the figure after it is reflected across the line.



- 3** Look at the image you drew in problem 2. Are the properties of the sides and angles in the image the same as the properties of the sides and angles in the original figure? Explain.

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### Vocabulary

**transformation** a change in position or size of a figure.

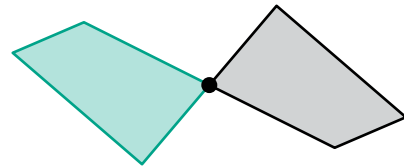
**translation** a transformation that moves each point of a figure the same distance and in the same direction.

**reflection** a transformation that flips a figure over a line of reflection.



**Solve.**

- 4 The gray figure is a transformation of the green figure. Identify the transformation and describe one way in which you could compare the properties of the lines and the angles in the original figure and its image.




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- 5 Consider the three figures on the grid.

- a. How was the green figure transformed to get image *A*?

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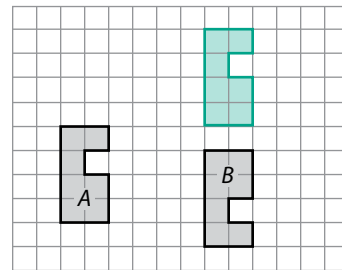
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- b. How was the green figure transformed to get image *B*?

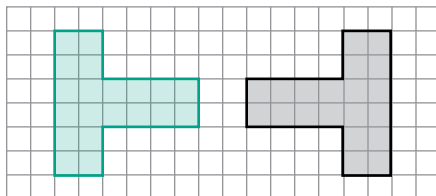
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- 6 Jarrod says that the gray figure is a rotation of the green figure. Imani says it is a reflection. Who is correct? Explain your reasoning. Draw any lines of reflection or centers of rotation on the grid.




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**Vocabulary**

**rotation** a transformation that turns a figure around a fixed point, or center of rotation.

## Reason and Write

**Study the example. Underline two parts that you think make it a particularly good answer and a helpful example.**

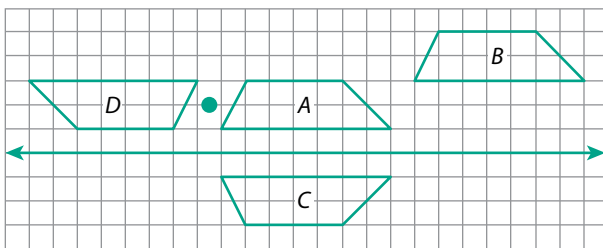
**Example**

Draw a trapezoid in the middle of the grid below. Label it *A*. Then draw the following transformations of your trapezoid.

- a translation 2 units up and 8 units right. Label this figure *B*.
- a reflection over a horizontal line of reflection. Label this figure *C*. Draw the line of reflection.
- a  $180^\circ$  counterclockwise rotation around a center of rotation. Label this figure *D*. Draw the point that is the center of rotation.

Explain how the properties of the lines and angles in your transformations are the same as the properties of the lines and angles in your original figure.

**Show your work.** Use words and drawings to explain your answer.



**After the figure is transformed:**

- **parallel lines are still parallel.**
- **the lengths of the sides are the same.**
- **the measures of the angles are the same.**
- **all the figures have the same shape and size.**

Where does the example...

- answer all parts of the problem?
- use words to explain?
- use drawings to explain?



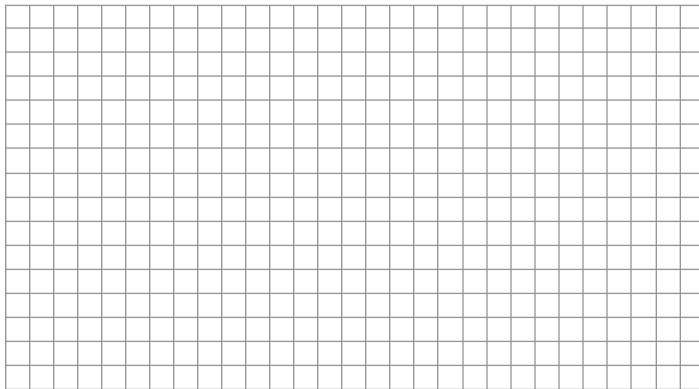
**Solve the problem. Use what you learned from the model.**

Draw a scalene right triangle in the middle of the grid below. Label it *J*. Then draw the following transformations of your triangle.

- a translation 3 units down and 9 units left. Label it *K*.
- a reflection over a vertical line of reflection. Label it *L*. Draw the line of reflection.
- a  $90^\circ$  clockwise rotation around a center of rotation. Label it *M*. Draw the point that is the center of rotation.

Explain how the properties of the lines and angles in your transformations are the same as the properties of the lines and angles in your original figure.

**Show your work.** Use words and drawings to explain your answer.



Did you ...

- answer all parts of the problem?
- use words to explain?
- use drawings to explain?

