

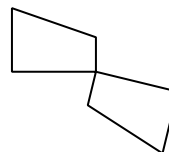
4-2 Transformations on the Coordinate Plane (Pages 197–203)

The movement of a geometric figure is called a **transformation**. Before a figure is transformed it is known as a **preimage**. After the transformation, the figure is referred to as an **image**. Transformations can be categorized as a reflection, translation, dilation, or rotation. In a **reflection**, the figure is flipped over a line. A **translation** is when a figure is slid horizontally, vertically, or both. In **dilations**, the figure is enlarged or reduced. A **rotation** is when a figure is turned around a point.

Example

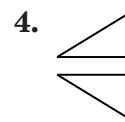
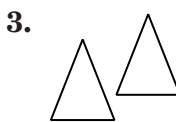
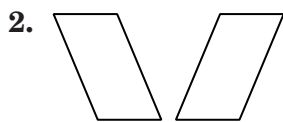
Which type of transformation does this picture show?

The figure has been rotated around the point that is the lower right corner of the original figure. This is a rotation.



Practice

Tell whether each geometric transformation is a translation, reflection, dilation, or rotation.



Find the coordinates of the vertices of the image.

- 5. Preimage is $\triangle ABC$ with vertices $A(1, 4)$, $B(5, 1)$, and $C(1, 1)$. The figure is translated 2 units right and 4 units up.
- 6. Preimage is $\triangle ABC$ with vertices $A(1, 4)$, $B(5, 1)$, and $C(1, 1)$. The figure is reflected about the y -axis.
- 7. Preimage is $\triangle ABC$ with vertices $A(1, 4)$, $B(5, 1)$, and $C(1, 1)$. The figure is rotated 90° about the origin.
- 8. Preimage is $\triangle ABC$ with vertices $A(1, 4)$, $B(5, 1)$, and $C(1, 1)$. The figure is dilated by a factor of 2.
- 9. **Standardized Test Practice** Find the coordinates of the vertices of the image when the quadrilateral $\square WXYZ$ is translated 5 units left and 4 units down. The preimage vertices are $W(1, 0)$, $X(2, 3)$, $Y(4, 1)$, and $Z(3, -3)$.
 - A $W'(4, 4)$, $X'(3, 1)$, $Y'(1, 3)$, $Z'(2, 7)$
 - B $W'(6, -4)$, $X'(8, -1)$, $Y'(9, -3)$, $Z'(8, -7)$
 - C $W'(-4, 4)$, $X'(-3, 1)$, $Y'(-1, 3)$, $Z'(-2, 7)$
 - D $W'(-4, -4)$, $X'(-3, -1)$, $Y'(-1, -3)$, $Z'(-2, -7)$

Answers: 1. rotation 2. reflection 3. translation 4. reflection 5. A'(3, 8), B'(7, 5), C'(3, 5) 6. A'(-1, 4), B'(-5, 1), C'(-1, 1) 7. A'(-4, 1), B'(-1, 5), C'(-1, 1) 8. A'(2, 8), B'(10, 2), C'(2, 2) 9. D