

## Essential Question

How can you reflect a figure in a coordinate plane?

Reflections: A rigid motion is a reflection iff it uses a line to reflect a figure.

Biconditional Definitions:

Rigid Motion:

Reflection:

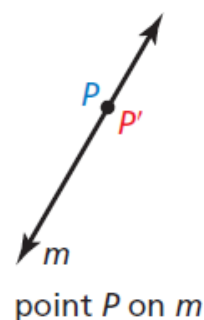
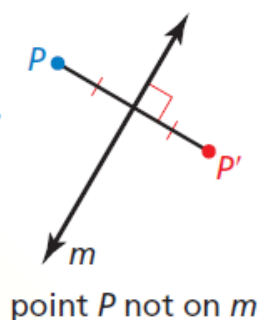
## Core Concept

### Reflections

A **reflection** is a transformation that uses a line like a mirror to reflect a figure. The mirror line is called the **line of reflection**.

A reflection in a line  $m$  maps every point  $P$  in the plane to a point  $P'$ , so that for each point one of the following properties is true.

- If  $P$  is not on  $m$ , then  $m$  is the perpendicular bisector of  $\overline{PP'}$ , or
- If  $P$  is on  $m$ , then  $P = P'$ .



Graph  $\triangle ABC$  with vertices  $A(1, 3)$ ,  $B(5, 2)$ , and  $C(2, 1)$  and its image after the reflection described.

a. In the line  $n: x = 3$

b. In the line  $m: y = 1$

$A(1, 3)$

$B(5, 2)$

$C(2, 1)$

Graph  $\overline{FG}$  with endpoints  $F(-1, 2)$  and  $G(1, 2)$  and its image after a reflection in the line  $y = x$ .

## Core Concept

### Coordinate Rules for Reflections

- If  $(a, b)$  is reflected in the  $x$ -axis, then its image is the point  $(a, -b)$ .
- If  $(a, b)$  is reflected in the  $y$ -axis, then its image is the point  $(-a, b)$ .
- If  $(a, b)$  is reflected in the line  $y = x$ , then its image is the point  $(b, a)$ .
- If  $(a, b)$  is reflected in the line  $y = -x$ , then its image is the point  $(-b, -a)$ .

$$x\text{-axis} : (a, b) \rightarrow (a, -b)$$

$$y\text{-axis} : (a, b) \rightarrow (-a, b)$$

$$y = x : (a, b) \rightarrow (b, a)$$

$$y = -x : (a, b) \rightarrow (-b, -a)$$

**The vertices of  $\triangle JKL$  are  $J(1, 3)$ ,  $K(4, 4)$ , and  $L(3, 1)$ .**

- A.** Graph  $\triangle JKL$  and its image after a reflection in the  $x$ -axis.
- B.** Graph  $\triangle JKL$  and its image after a reflection in the  $y$ -axis.
- C.** Graph  $\triangle JKL$  and its image after a reflection in the line  $y = x$ .
- D.** Graph  $\triangle JKL$  and its image after a reflection in the line  $y = -x$ .

## Postulate

### **Postulate 4.2 Reflection Postulate**

A reflection is a rigid motion.



Graph  $\triangle ABC$  with vertices  $A(3, 2)$ ,  $B(6, 3)$ , and  $C(7, 1)$  and its image after the glide reflection.

**Translation:**  $(x, y) \rightarrow (x - 12, y)$

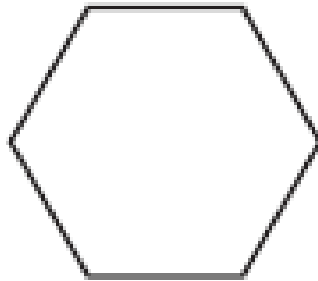
**Reflection:** in the  $x$ -axis

How many lines of symmetry does each hexagon have?

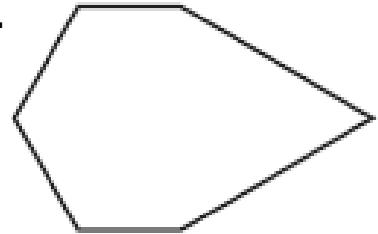
a.



b.



c.



# Homework 4.2

P186 # 3, 4  
7, 8, 13, 15, 17  
24, 25, 27