

## Applications

1. Coordinates of key points and their images are shown in Figure 1.
  - a. For Exercises 1–3, the figure and its image after reflection in the  $y$ -axis (top right), the  $x$ -axis (bottom left), and both axes (bottom right) will look like this:

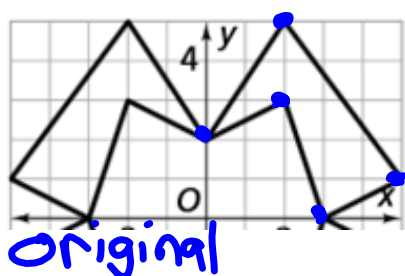


Figure 1

Point	A	B	C	D	E
Original Coordinates	(-5, 1)	(-2, 5)	(0, 2)	(-2, 3)	(-3, 0)
Coordinates After a Reflection in $y$ -axis	(5, 1)	(2, 5)	(0, 2)	(2, 3)	(3, 0)

1b.  $(x,y) \rightarrow (-x,y)$

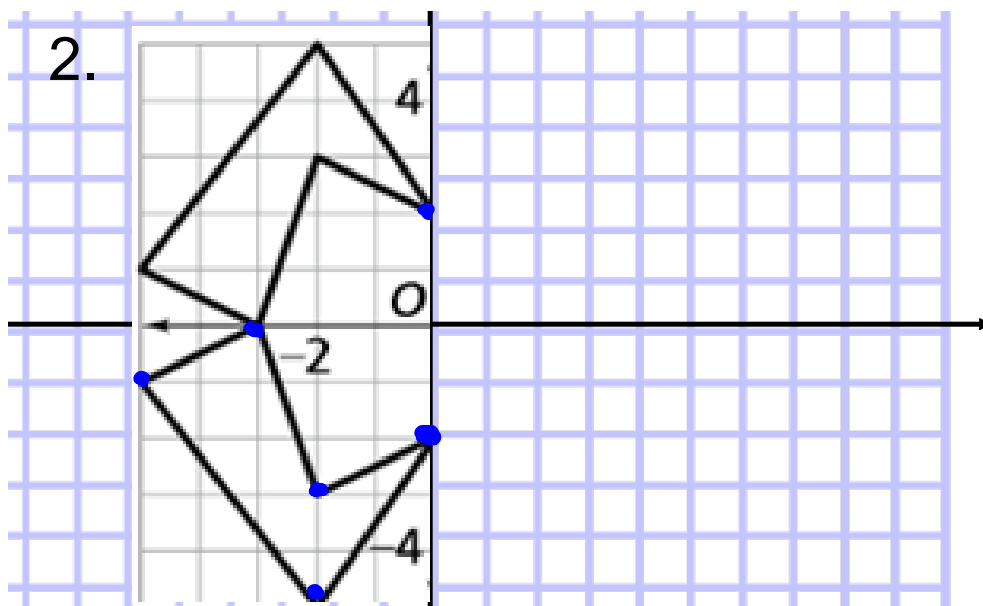


Figure 2

Point	A	B	C	D	E
Original Coordinates	(-5, 1)	(-2, 5)	(0, 2)	(-2, 3)	(-3, 0)
Coordinates After a Reflection in x-axis	(-5, -1)	(-2, -5)	(0, -2)	(-2, -3)	(-3, 0)



**b.**  $(x, y) \rightarrow (x, -y)$

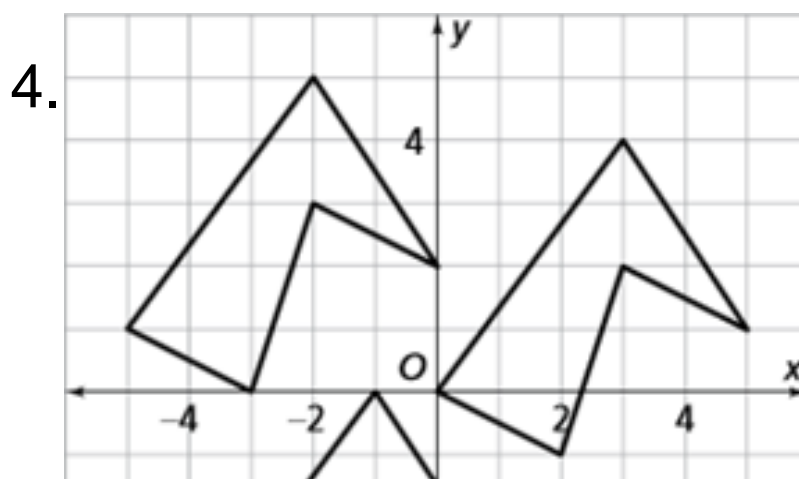
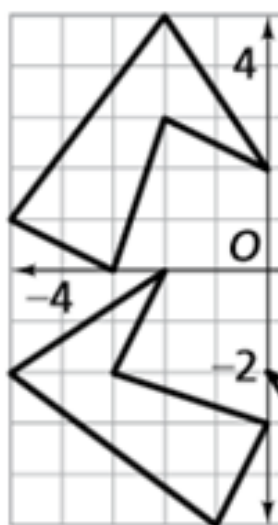


Figure 4

Point	A	B	C	D	E
Original Coordinates	(-5, 1)	(-2, 5)	(0, 2)	(-2, 3)	(-3, 0)
Coordinates After Translating B to (3, 4)	(0, 0)	(3, 4)	(5, 1)	(3, 2)	(2, -1)

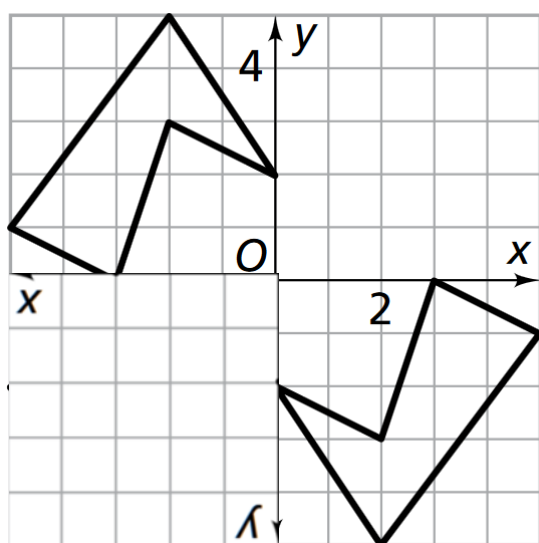
**b.**  $(x, y) \rightarrow (x + 5, y - 1)$ .

6.



b.  $(x, y) \rightarrow (-y, x)$ .

Point	A	B	C	D	E
Original Coordinates	(-5, 1)	(-2, 5)	(0, 2)	(-2, 3)	(-3, 0)
Coordinates After a 90° Rotation	(-1, -5)	(-5, -2)	(-2, 0)	(-3, -2)	(0, -3)



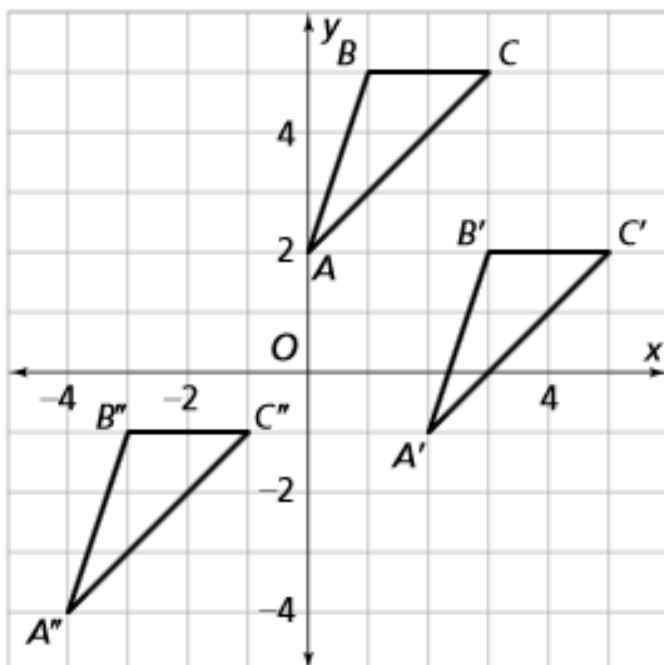
7. The table of coordinates for key points will look like Figure 7.

b.  $(x, y) \rightarrow (-x, -y)$ .

c. The composite is a half-turn.

## 9. Translation effects.

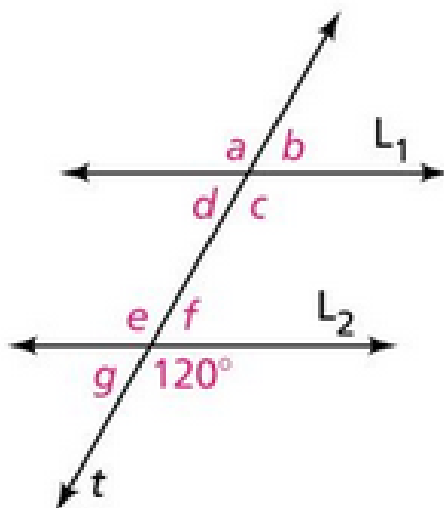
- a. The image after translation (i) is the right-most figure; the image after translation (ii) is the bottom left figure.



## b. Comparing slopes

- i. The slopes of  $\overline{AB}$  and  $\overline{A'B'}$  are both 3; the slopes of  $\overline{AC}$  and  $\overline{A'C'}$  are both 1; the slopes of  $\overline{CB}$  and  $\overline{C'B'}$  are both 0.
- ii. The slopes of  $\overline{AB}$  and  $\overline{A''B''}$  are both 3; the slopes of  $\overline{AC}$  and  $\overline{A''C''}$  are both 1; the slopes of  $\overline{CB}$  and  $\overline{C''B''}$  are both 0.
- c. Translations preserve slopes of lines and map lines onto parallel lines. This will be confirmed in Problem 3.4.

11. In the diagram below, lines  $L_1$  and  $L_2$  are parallel. What are the measures of angles  $a$ - $g$ ?



11. Angles  $a$ ,  $c$ , and  $e$  all measure  $120^\circ$ .  
Angles  $b$ ,  $d$ ,  $f$ , and  $g$  all measure  $60^\circ$ .

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1a.  $(x,y) \rightarrow (-x, y)$

1b.  $(x,y) \rightarrow (x, -y)$

1c.  $(x,y) \rightarrow (-y, x)$

1d.  $(x,y) \rightarrow (-x, -y)$

1e.  $(x,y) \rightarrow (x+a, y+b)$