

Problem 3.2 *continued*

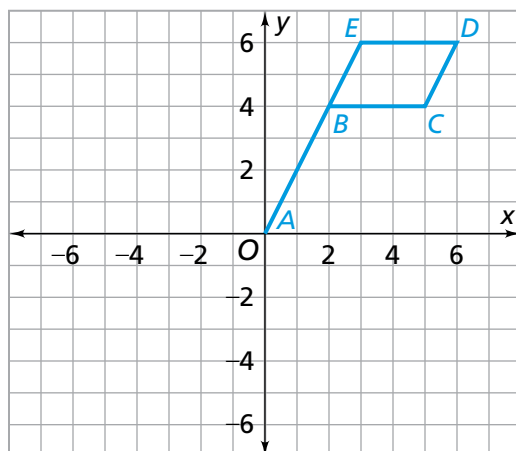
- C** Write a rule showing how coordinates of key points on Mug 3 relate to their images after a translation to Mug 4: $(x, y) \rightarrow (\square, \square)$.
- D** In Investigation 1, you learned that a translation of a segment, such as \overline{AF} , “moved” the segment to a *parallel* image segment.
1. Find the image of \overline{AF} on Mug 2, Mug 3, or Mug 4. Show that the image is parallel to \overline{AF} .
 2. How does the coordinate rule for any translation guarantee that a segment and its image will be parallel?
- E** Suppose a translation moves a figure a units horizontally and b units vertically on a coordinate grid. What rule describes the coordinates of each image point?

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3.3 Spinning on a Grid

Coordinate Rules for Rotations

Look again at the flag in the first quadrant.



- ?** What coordinate rules for rotations would rotate the flag 90° or 180° counterclockwise about point A?



In this Problem, you will find rules relating coordinates of key points on the flag to coordinates of their images after quarter- and half-turn rotations.

Problem 3.3



- A** Rotate points A – E 90° counterclockwise about the origin. Copy and complete the table showing the coordinates of points A' – E' , which are the images of points A – E .

Point	A	B	C	D	E
Original Coordinates	(0, 0)	(2, 4)	■	■	■
Coordinates After a 90° Rotation	■	■	■	■	■

- Write a rule for the pattern relating the coordinates of key points to the coordinates of their images after a rotation of 90° : $(x, y) \rightarrow (\square, \square)$.
 - Would your rule give the correct coordinates if the flag started in the second, third, or fourth quadrant? Justify your answer with sketches and examples of coordinates that match.
 - Do any points remain unchanged under this rotation? Explain.
 - Do the flag and its image make a symmetric design?
- B** Rotate points A – E another 90° counterclockwise about the origin so that they rotate a total of 180° . Copy and complete the table showing the coordinates of points A'' – E'' , which are the images of points A' – E' .

Point	A	B	C	D	E
Original Coordinates	(0, 0)	(2, 4)	■	■	■
Coordinates After a 180° Rotation	■	■	■	■	■

- Write a rule for the pattern relating the coordinates of key points to the coordinates of their images after a rotation of 180° : $(x, y) \rightarrow (\square, \square)$.
- Would your rule give the correct coordinates if the flag started in the second, third, or fourth quadrant? Justify your answer with sketches and examples of coordinates that match.

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