

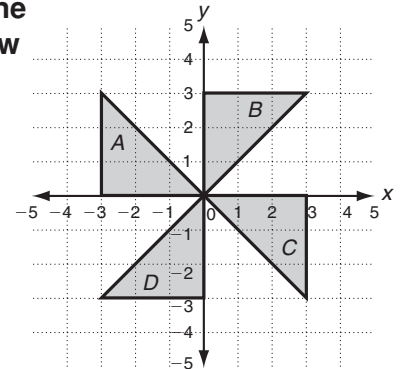


LESSON
4-3

Problem Solving

Using Matrices to Transform Geometric Figures

Sherrill is trying to re-create the pattern of a vintage quilt she saw at an antique store. The shaded parts of the figure show the pattern of the quilt.



1. What directions would you give Sherrill to help her draw triangle *A* on a grid?

2. a. What transformation can Sherrill use on triangle *A* to create triangle *B*?

 - b. What transformation matrix should she use to create triangle *B*? _____
3. a. What transformation can Sherrill use on triangle *A* to create triangle *C*? _____
 - b. What transformation matrix should she use to create triangle *C*? _____
4. a. What transformation can Sherrill use on triangle *A* to create triangle *D*? _____
 - b. What transformation matrix should she use to create triangle *D*? _____

Choose the letter for the best answer.

5. Jesse drew a rectangle represented by $R = \begin{bmatrix} 2 & 5 & 5 & 2 \\ -3 & -3 & -5 & -5 \end{bmatrix}$. He added the transformation matrix $\begin{bmatrix} 0 & 0 & 0 & 0 \\ 2 & 2 & 2 & 2 \end{bmatrix}$ to R and drew a second rectangle. Then he added the transformation matrix $\begin{bmatrix} -3 & -3 & -3 & -3 \\ 2 & 2 & 2 & 2 \end{bmatrix}$ to R and drew a third rectangle. Which describes the resulting figure?
 - A Rectangle
 - B Irregular hexagon
 - C Square
 - D Irregular octagon

6. Tina drew rectangle F with vertices at $(0, 0)$, $(0, 5)$, $(3, 5)$, and $(3, 0)$. She wants to transform F into a rectangle that is 6 units wide and 10 units long with the center of the rectangle located at the origin. Which list of transformations will accomplish that?
 - A Rotate F 90° clockwise, rotate F 90° counterclockwise, translate F 5 units left and 3 units down
 - B Reflect F over the x -axis, translate F 5 units down, rotate F 90° counterclockwise
 - C Translate F 3 units left, translate F 3 units down, rotate F 90° clockwise
 - D Reflect F over the y -axis, reflect F over the x -axis, rotate F by 180°

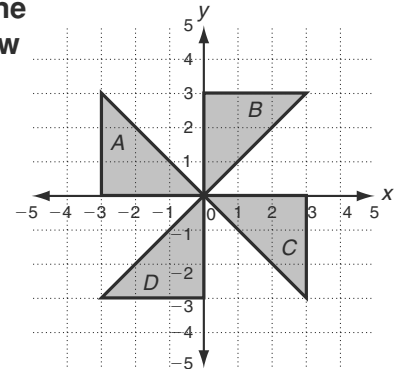


LESSON
4-3

Problem Solving

Using Matrices to Transform Geometric Figures

Sherrill is trying to re-create the pattern of a vintage quilt she saw at an antique store. The shaded parts of the figure show the pattern of the quilt.



1. What directions would you give Sherrill to help her draw triangle A on a grid?

Draw a triangle with vertices at $(0, 0)$, $(-3, 0)$, and $(-3, 3)$.

2. a. What transformation can Sherrill use on triangle A to create triangle B?

Rotate 90° clockwise

- b. What transformation matrix should she use to create triangle B?
3. a. What transformation can Sherrill use on triangle A to create triangle C?

$$\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$$

Rotate 180°

$$\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$$

- b. What transformation matrix should she use to create triangle C?
4. a. What transformation can Sherrill use on triangle A to create triangle D?

Rotate 90° counterclockwise

$$\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$$

- b. What transformation matrix should she use to create triangle D?

Choose the letter for the best answer.

5. Jesse drew a rectangle represented by

$$R = \begin{bmatrix} 2 & 5 & 5 & 2 \\ -3 & -3 & -5 & -5 \end{bmatrix}$$

He added the transformation matrix $\begin{bmatrix} 0 & 0 & 0 & 0 \\ 2 & 2 & 2 & 2 \end{bmatrix}$ to R

and drew a second rectangle. Then he added the transformation matrix

$$\begin{bmatrix} -3 & -3 & -3 & -3 \\ 2 & 2 & 2 & 2 \end{bmatrix}$$

to R and drew a third rectangle. Which describes the resulting figure?

- A Rectangle
- B Irregular hexagon
- C Square
- D Irregular octagon

6. Tina drew rectangle F with vertices at $(0, 0)$, $(0, 5)$, $(3, 5)$, and $(3, 0)$. She wants to transform F into a rectangle that is 6 units wide and 10 units long with the center of the rectangle located at the origin. Which list of transformations will accomplish that?

- A Rotate F 90° clockwise, rotate F 90° counterclockwise, translate F 5 units left and 3 units down
- B Reflect F over the x -axis, translate F 5 units down, rotate F 90° counterclockwise
- C Translate F 3 units left, translate F 3 units down, rotate F 90° clockwise
- D Reflect F over the y -axis, reflect F over the x -axis, rotate F by 180°