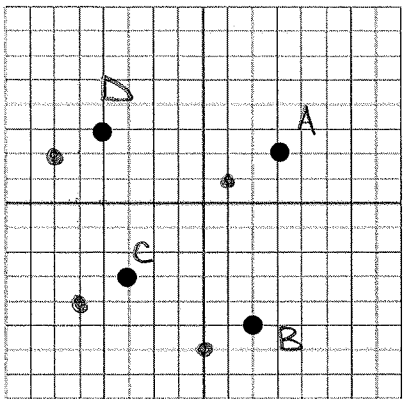
MORE PRACTICE - Transformations with Matrices



1a. Write the coordinates of the vertices of the trapezoid as a matrix.

$$\begin{matrix} A & B & C & D \end{matrix}\begin{bmatrix} 3 & 2 & -3 & -4 \\ 2 & -5 & -3 & 3 \end{bmatrix}$$

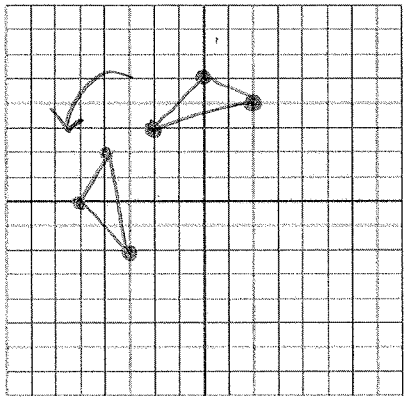
1b. The trapezoid is to be shifted down 1 and left 2. Write the translation matrix.

$$\begin{bmatrix} -2 & -2 & -2 & -2 \\ -1 & -1 & -1 & -1 \end{bmatrix}$$

1c. Write the matrix of the shifted triangle and draw it on the graph.

$$\begin{bmatrix} 3 & 2 & -3 & -4 \\ 2 & -5 & -3 & 3 \end{bmatrix} + \begin{bmatrix} -2 & -2 & -2 & -2 \\ -1 & -1 & -1 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & -5 & -6 \\ 1 & -6 & -4 & 2 \end{bmatrix}$$



The sides of a triangle with vertices A(-2, 3), B(0, 5), C(2, 4) is rotated 90.

2a. Draw the triangle and write a matrix for the original vertices.

$$\begin{bmatrix} -2 & 0 & 2 \\ 3 & 5 & 4 \end{bmatrix}$$

2b. Write the rotation matrix.

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

2c. Write the matrix for the rotated points and graph the new triangle.

$$\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}\begin{bmatrix} -2 & 0 & 2 \\ 3 & 5 & 4 \end{bmatrix} = \begin{bmatrix} -3 & -5 & -4 \\ -2 & 0 & 2 \end{bmatrix}$$

The vertices of △ABC are (1, 5), B(4, 0), and (-1, -4).

If the triangle is reflected across the x-axis:

3a. What reflection matrix should be used?

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

3b. Write the vertices of the reflected triangle.

$$\begin{bmatrix} 1 & 4 & -1 \\ 5 & 0 & -4 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 4 & -1 \\ 5 & 0 & -4 \end{bmatrix} = \begin{bmatrix} 1 & 4 & -1 \\ -5 & 0 & 4 \end{bmatrix}$$

THEN the triangle from 3b is dilated by a factor of 2:

4. Write the vertices of the dilated triangle.

$$2\begin{bmatrix} 1 & 4 & -1 \\ -5 & 0 & 4 \end{bmatrix} = \begin{bmatrix} 2 & 8 & -2 \\ -10 & 0 & 8 \end{bmatrix}$$

THEN the triangle from 4b is rotated 180°:

5a. What rotation matrix should be used?

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

5b. Write the vertices of the rotated triangle.

$$\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} 2 & 8 & -2 \\ -10 & 0 & 8 \end{bmatrix} = \begin{bmatrix} -2 & -8 & 2 \\ 10 & 0 & -8 \end{bmatrix}$$

THEN triangle from 5b is moved right 2 and up 4:

6a. What translation matrix should be used?

6b. Write the vertices of the translated triangle.

$$\begin{bmatrix} -2 & -8 & 2 \\ 10 & 0 & -8 \end{bmatrix} + \begin{bmatrix} 2 & 2 & 2 \\ 4 & 4 & 4 \end{bmatrix} = \begin{bmatrix} 0 & -6 & 4 \\ 14 & 4 & -4 \end{bmatrix}$$