

4-3**Using Matrices to Transform Geometric Figures****Lesson Quiz**

Transform triangle PQR with vertices $P(-1, -1)$, $Q(3, 1)$, and $R(0, 3)$. For each, show the matrix transformation and state the vertices of the image.

1. Translation 3 units to the left and 2 units up.
2. Dilation by a factor of 1.5.
3. Reflection across the x -axis.
4. 90° rotation, clockwise.

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1. Translation 3 units to the left and 2 units up.

$$\begin{bmatrix} -3 & -3 & -3 \\ 2 & 2 & 2 \end{bmatrix} + \begin{bmatrix} -1 & 3 & 0 \\ -1 & 0 & 3 \end{bmatrix} \quad P'(-4, 1), Q'(0, 3), R'(-3, 5)$$

2. Dilation by a factor of 1.5.

$$1.5 \begin{bmatrix} -1 & 3 & 0 \\ -1 & 1 & 3 \end{bmatrix} \quad P'(-1.5, -1.5), Q'(4.5, 1.5), R'(0, 4.5)$$

3. Reflection across the x -axis.

$$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} -1 & 3 & 0 \\ -1 & 1 & 3 \end{bmatrix} \quad P'(-1, 1), Q'(3, -1), R'(0, -3)$$

4. 90° rotation, clockwise.

$$\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} \begin{bmatrix} -1 & 3 & 0 \\ -1 & 1 & 3 \end{bmatrix} \quad P'(-1, 1), Q'(1, -3), R'(3, 0)$$