

Linear transformations with Matrices lesson 9 - Reflection in the y axis

Magic Monk Tutorials

1 Reflect the point $P = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$ about the y axis.

Use the general formula for linear transformations with the reflection matrix

$$R = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}.$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = R \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 \\ -1 \end{pmatrix} = \begin{pmatrix} -1 \\ -1 \end{pmatrix}$$

2 Reflect the point $P = \begin{pmatrix} -6 \\ 2 \end{pmatrix}$ about the y axis.

As before,

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = R \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} -6 \\ 2 \end{pmatrix} = \begin{pmatrix} 6 \\ 2 \end{pmatrix}$$

3 Reflect the line that passes through $(0, 2)$ and $(4, 0)$ in the y axis.

Since our original line passes through $(0, 2)$ and $(4, 0)$, our transformed line will pass through the points $(0, 2)$ and $(4, 0)$ reflected in the y axis. Find where these points are mapped to.

$$(0, 2) \mapsto (0, 2)$$

$$(4, 0) \mapsto (-4, 0)$$

Now we wish to find a line that passes through the points $(-4, 0)$ and $(0, 2)$. Substitute these two points into our general line $y = mx + c$ and solve for m and c .

$$0 = -4m + c$$

$$c = 4m$$

and

$$2 = 0m + c$$

$$c = 2 \text{ and } m = 1/2.$$

Therefore our transformed line is $y = 1/2x + 2$.