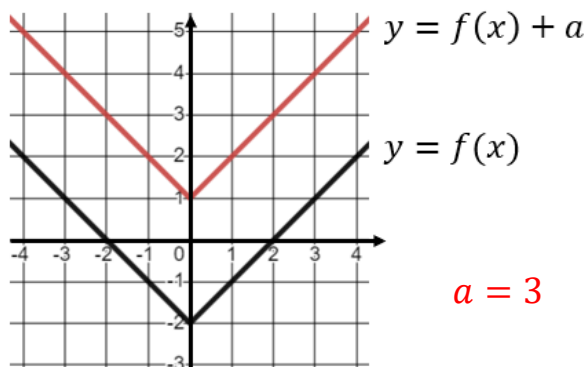


## Describing Transformations of Graphs

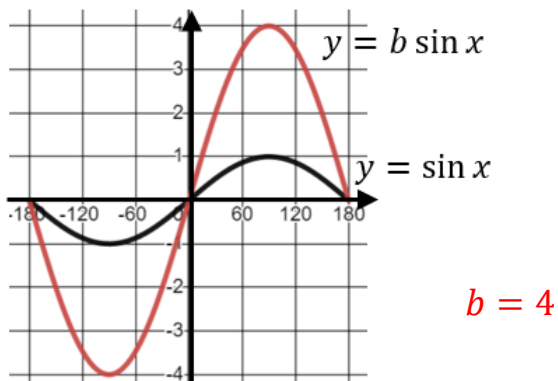
**(a)**

The graphs of  $y = f(x)$  and  $y = f(x) + a$  are shown below. Find the value of  $a$ .



**(b)**

The graphs of  $y = \sin x$  and  $y = b \sin(x)$  are shown below. Find the value of  $b$ .



**(c)**

The graph of  $y = f(x)$  is transformed to give the equation  $y = -f(x)$ . Describe the transformation in words.

*Reflected in the  $x$  – axis*

**(d)**

The graph of  $y = f(x)$  is transformed to give the equation  $y = f(x - 4)$ . Describe the transformation in words.

*Shifted to the right by 4 units  
or translated by  $\begin{pmatrix} 4 \\ 0 \end{pmatrix}$*

**(e)**

The graph of  $y = f(x)$  is transformed to give the equation  $y = f(2x)$ . Describe the transformation in words.

*Stretched with scale factor  $\frac{1}{2}$   
in the  $x$  – direction*

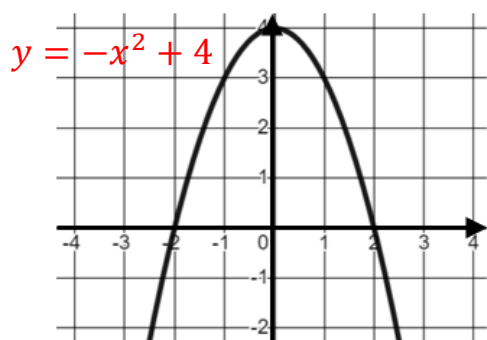
**(f)**

The graph of  $y = f(x)$  is transformed to give the equation  $y = f(-x)$ . Describe the transformation in words.

*Reflected in the  $y$  – axis*

**(g)**

The graph of  $y = x^2$  has been transformed to give the graph shown below. Write down the equation of the transformed graph.



**(h)**

The graph of  $y = \cos x$  has been transformed to give the graph shown below. Write down the equation of the transformed graph.

