

Reflecting quadratic graphs

A LEVEL LINKS

Scheme of work: 1f. Transformations – transforming graphs – $f(x)$ notation

Textbook: Pure Year 1, 4.6 Stretching graphs

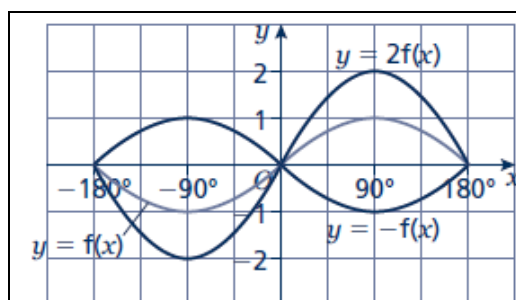
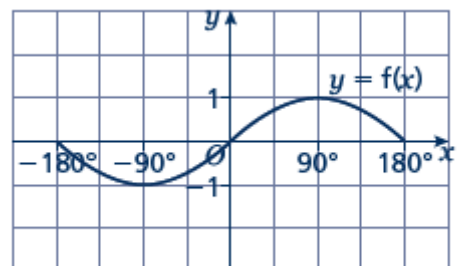
Key points

- The transformation $y = f(-ax)$ is a horizontal stretch of $y = f(x)$ with scale factor $\frac{1}{a}$ parallel to the x -axis and then a reflection in the y -axis.
- The transformation $y = -af(x)$ is a vertical stretch of $y = f(x)$ with scale factor a parallel to the y -axis and then a reflection in the x -axis.

Examples

Example 3 The graph shows the function $y = f(x)$.

Sketch and label the graphs of $y = 2f(x)$ and $y = -f(x)$.

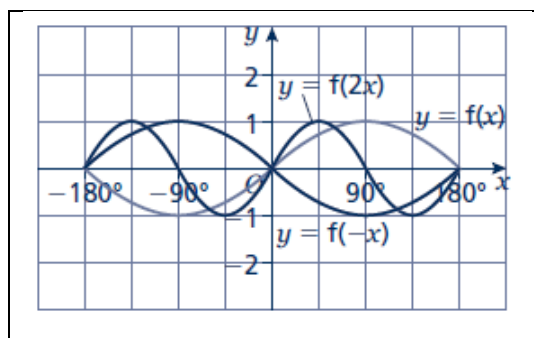
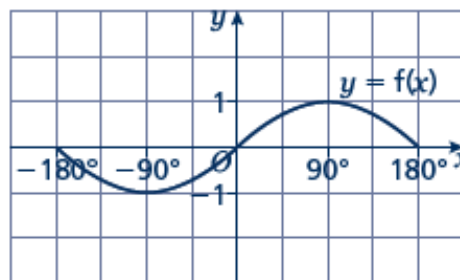


The function $y = 2f(x)$ is a vertical stretch of $y = f(x)$ with scale factor 2 parallel to the y -axis.

The function $y = -f(x)$ is a reflection of $y = f(x)$ in the x -axis.

Example 4 The graph shows the function $y = f(x)$.

Sketch and label the graphs of $y = f(2x)$ and $y = f(-x)$.

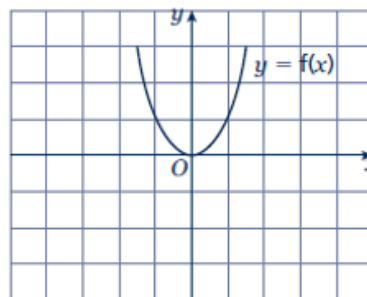


The function $y = f(2x)$ is a horizontal stretch of $y = f(x)$ with scale factor $\frac{1}{2}$ parallel to the x -axis.

The function $y = f(-x)$ is a reflection of $y = f(x)$ in the y -axis.

Practice questions

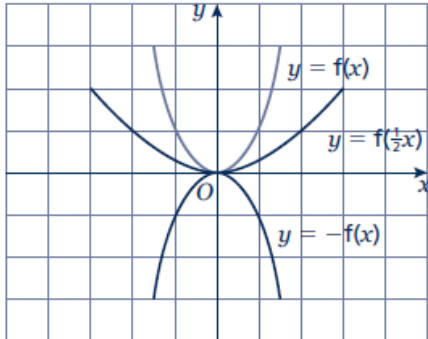
- 1 The graph shows the function $y = f(x)$. Copy the graph and, on the same axes, sketch and label the graphs of $y = -f(x)$ and $y = f\left(\frac{1}{2}x\right)$.



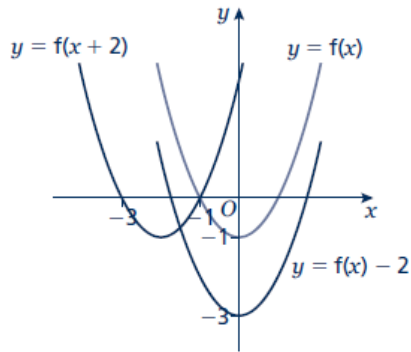
- 2 **a** Sketch and label the graph of $y = f(x)$, where $f(x) = (x - 1)(x + 1)$.
b On the same axes, sketch and label the graphs of $y = f(x) - 2$ and $y = f(x + 2)$.
- 3 **a** Sketch and label the graph of $y = f(x)$, where $f(x) = -(x + 1)(x - 2)$.
b On the same axes, sketch and label the graph of $y = f\left(-\frac{1}{2}x\right)$.

Answers

1



2



3

