Pearson
Edexcel

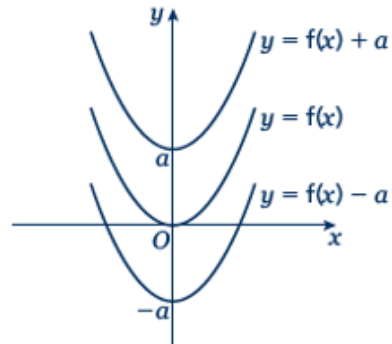# Translating graphs

A LEVEL LINKS
Scheme of work: 1f. Transformations – transforming graphs – f(*x*) notation

Key points

- The transformation $y = f(x) \pm a$ is a translation of $y = f(x)$ parallel to the *y*-axis; it is a vertical translation.
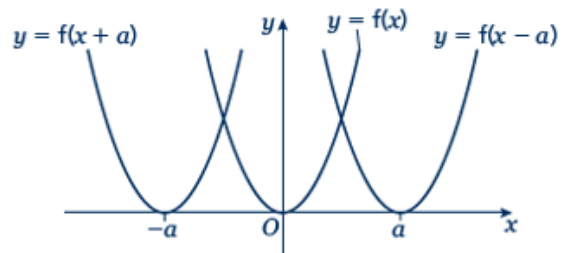
  As shown on the graph,
  - $y = f(x) + a$ translates $y = f(x)$ up
  - $y = f(x) - a$ translates $y = f(x)$ down.

- The transformation $y = f(x \pm a)$ is a translation of $y = f(x)$ parallel to the *x*-axis; it is a horizontal translation.

  As shown on the graph,
  - $y = f(x + a)$ translates $y = f(x)$ to the left
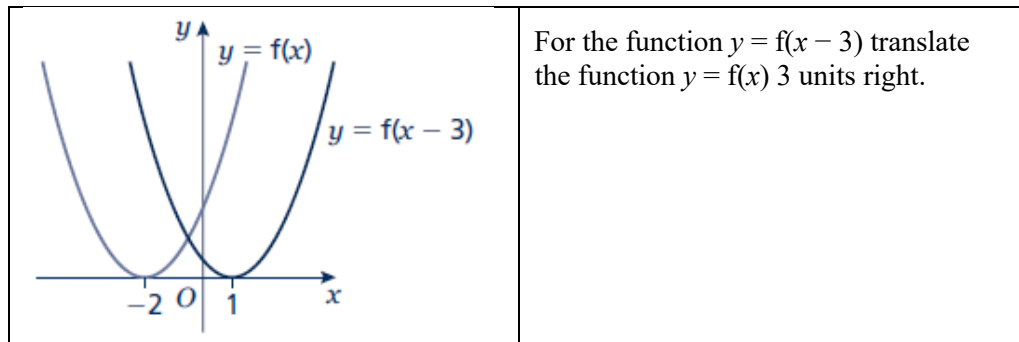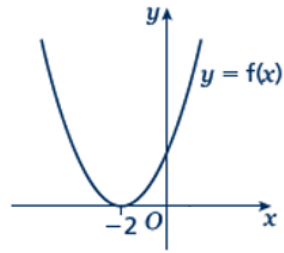 - $y = f(x - a)$ translates $y = f(x)$ to the right.

Example 1   The graph shows the function $y = f(x)$.

Sketch the graph of $y = f(x) + 2$.

	For the function $y = f(x) + 2$ translate the function $y = f(x)$ 2 units up.

Example 2   The graph shows the function $y = f(x)$.

Sketch the graph of $y = f(x - 3)$.

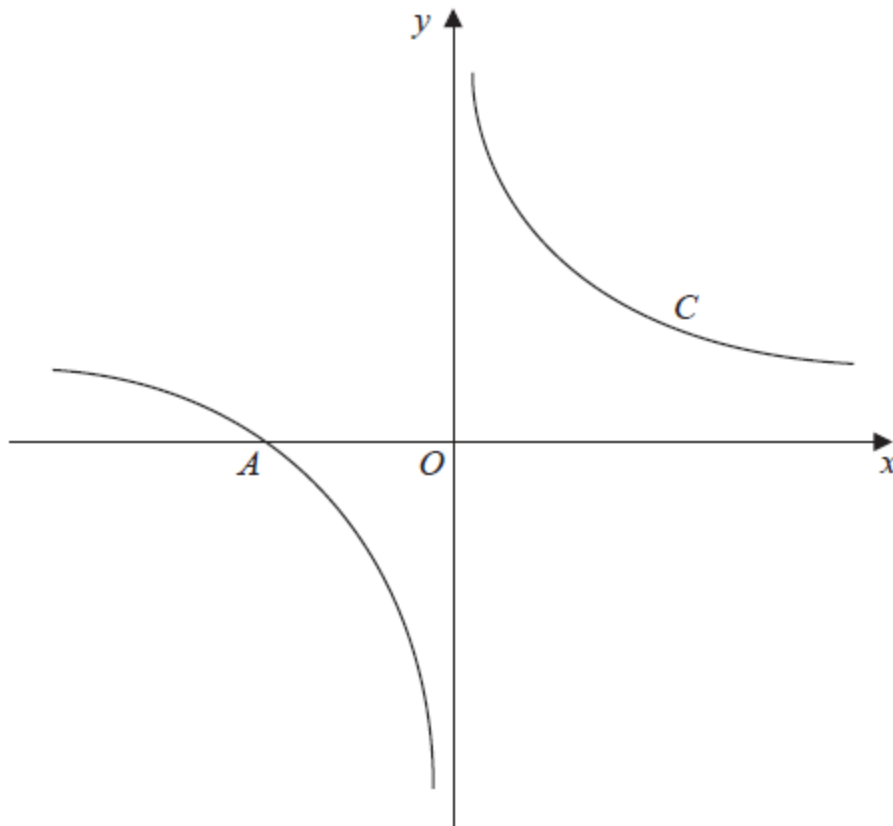|	
	For the function $y = f(x - 3)$ translate the function $y = f(x)$ 3 units right.

Practice question

1

Figure 1

Figure 1 shows a sketch of the curve C with equation

$$y = \frac{1}{x} + 1, \qquad x \neq 0.$$

The curve C crosses the x-axis at the point A.

(*a*) State the x-coordinate of the point A.

The curve D has equation $y = x^2(x - 2)$, for all real values of x.

(*b*) On a copy of Figure 1, sketch a graph of curve D. Show the coordinates of each point where the curve D crosses the coordinate axes.
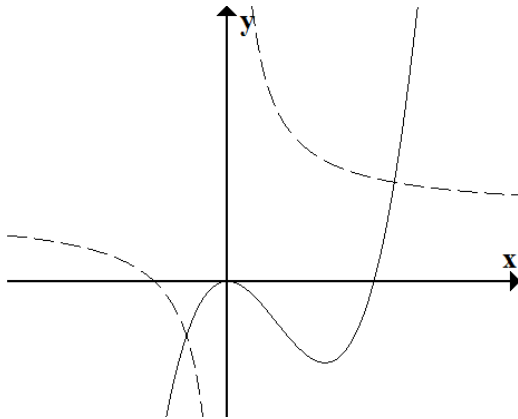
(*c*) Using your sketch, state, giving a reason, the number of real solutions to the equation

$$x^2(x - 2) = \frac{1}{x} + 1.$$

Answers

1   (a) -1

     (b)

Shape Touches at $(0,0)$

Crosses at $(2,0)$ **only**

     (c)   2 solutions as **curves** cross twice