

Stretching cubic graphs

Stretching graphs

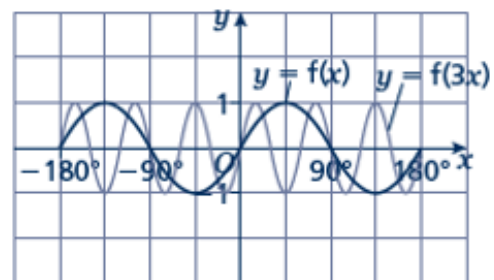
A LEVEL LINKS

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

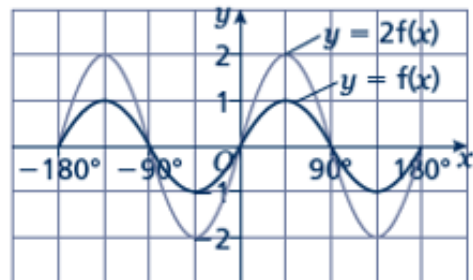
Textbook: Pure Year 1, 4.6 Stretching graphs

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.

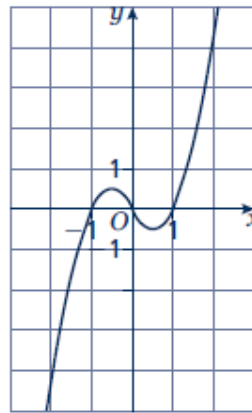


- The transformation $y = af(x)$ is a vertical stretch of $y = f(x)$ with scale factor a parallel to the y -axis.



Practice questions

- 1 The graph shows the function $y = f(x)$.
- Sketch the graph of $y = -f(x)$.
 - Sketch the graph of $y = 2f(x)$.



2

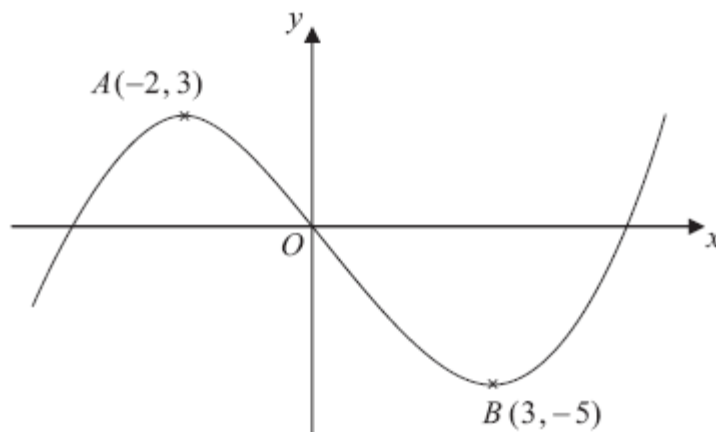


Figure 1

Figure 1 shows a sketch of the curve with equation $y = f(x)$. The curve has a maximum point A at $(-2, 3)$ and a minimum point B at $(3, -5)$.

Sketch the curve with equation $y = 2f(x)$.

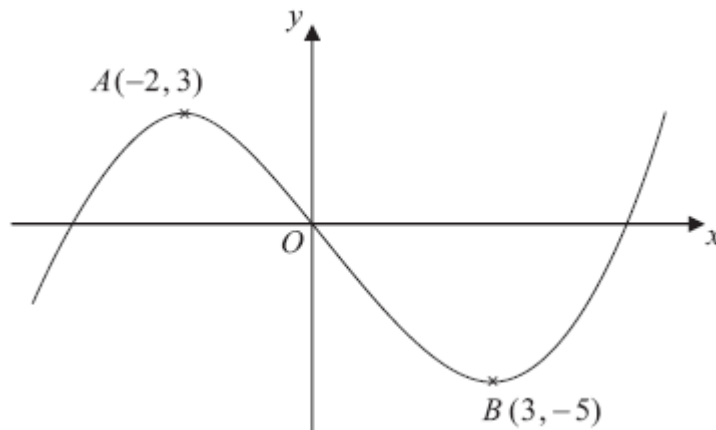


Figure 1

Figure 1 shows a sketch of the curve with equation $y = f(x)$. The curve has a maximum point A at $(-2, 3)$ and a minimum point B at $(3, -5)$.

Sketch the curve with equation $y = 2f(x)$.

3

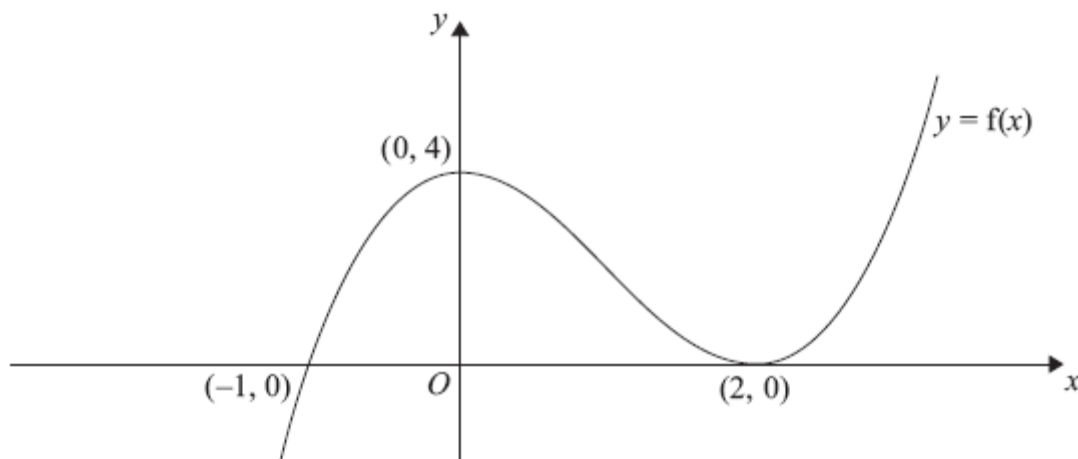


Figure 1

Figure 1 shows a sketch of the curve C with equation $y = f(x)$.

The curve C passes through the point $(-1, 0)$ and touches the x -axis at the point $(2, 0)$.

The curve C has a maximum at the point $(0, 4)$.

The equation of the curve C can be written in the form.

$$y = x^3 + ax^2 + bx + c,$$

where a , b and c are integers.

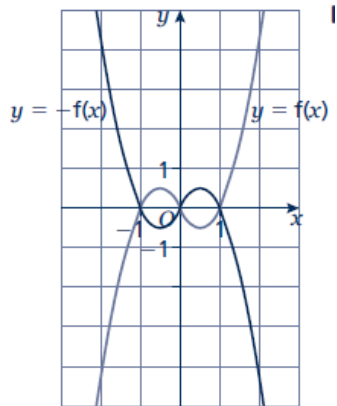
(a) Calculate the values of a , b and c .

(b) Sketch the curve with equation $y = f(\frac{1}{2}x)$.

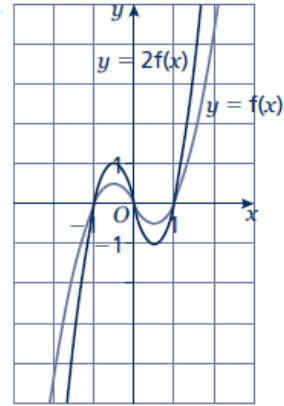
Show clearly the coordinates of all points where the curve crosses or meets the coordinate axes.

Answers

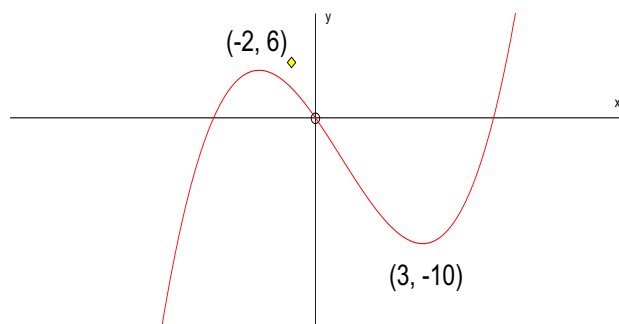
1 a



b



2



3

a

$$f(x) = (x+1)(x-2)^2$$

$$= (x+1)(x^2 - 4x + 4) = x^3 - 3x^2 + 4$$

b

