1 The point R$(6, -3)$ is on the curve $y = \mathrm{f}(x)$.

(i) Find the coordinates of the image of R when the curve is transformed to $y = \frac{1}{2}\mathrm{f}(x)$. **[2]**

(ii) Find the coordinates of the image of R when the curve is transformed to $y = \mathrm{f}(3x)$. **[2]**

2 Fig. 8 shows the graph of $y = \mathrm{g}(x)$.

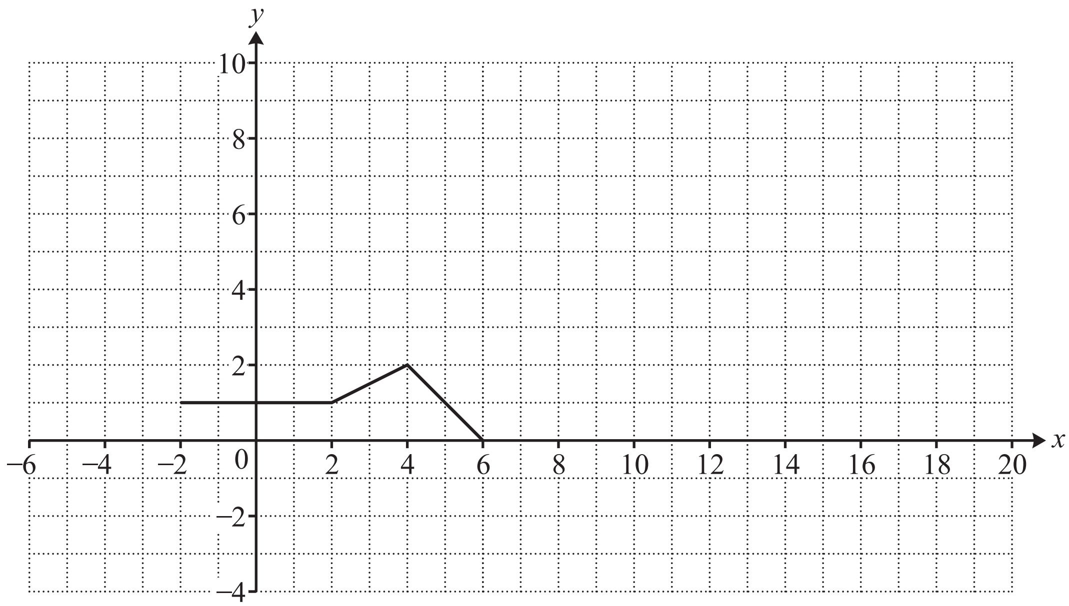


Fig. 8

Draw the graph of

(i) $y = \mathrm{g}(2x)$, **[2]**

(ii) $y = 3\mathrm{g}(x)$. **[2]**

3 The point P (6, 3) lies on the curve $y = f(x)$. State the coordinates of the image of P after the transformation which maps $y = f(x)$ onto

(i) $y = 3f(x)$, **[2]**

(ii) $y = f(4x)$. **[2]**

4 In this question, $f(x) = x^2 - 5x$. Fig. 4 shows a sketch of the graph of $y = f(x)$.

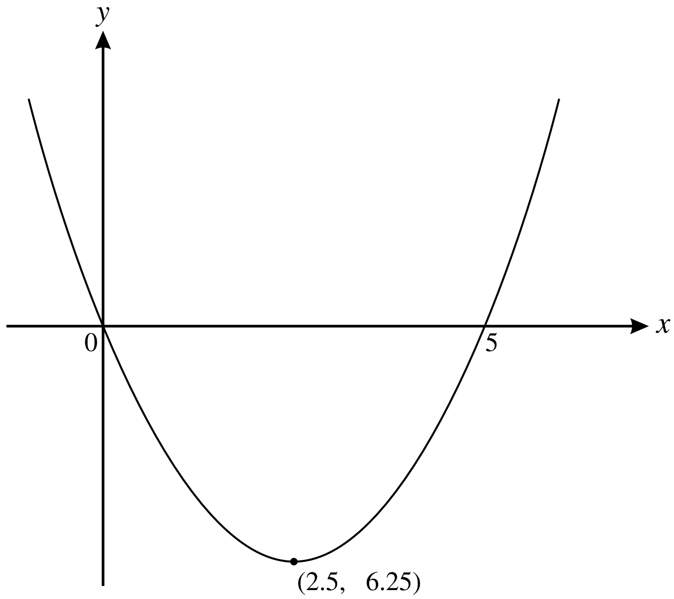


Fig. 4

On separate diagrams, sketch the curves $y = f(2x)$ and $y = 3f(x)$, labelling the coordinates of their intersections with the axes and their turning points. **[4]**

5 State the transformation which maps the graph of $y = x^2 + 5$ onto the graph of $y = 3x^2 + 15$. [2]

6

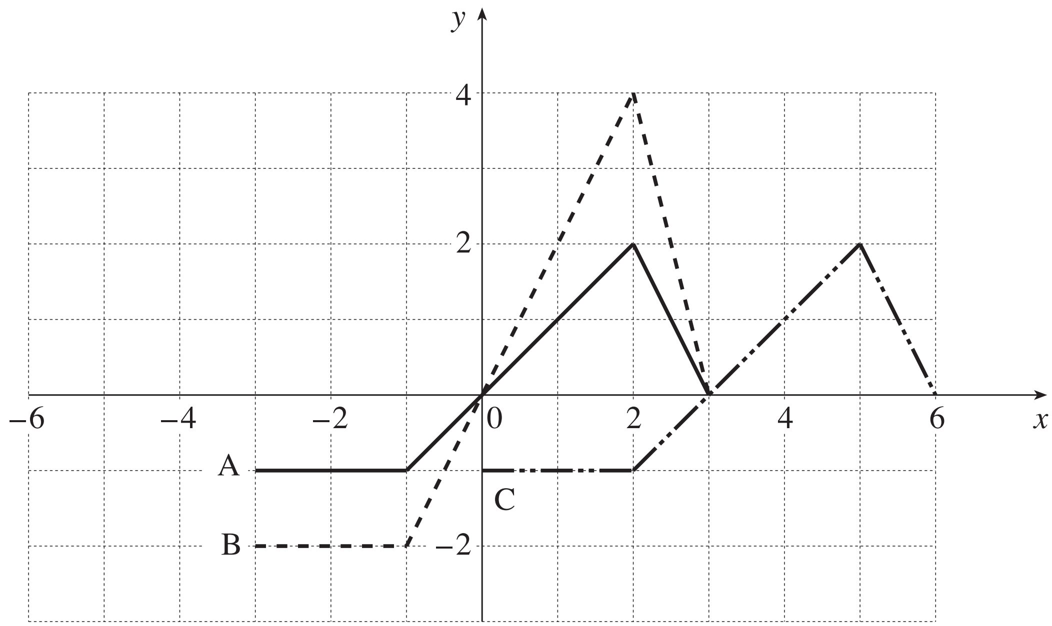


Fig. 3

Fig. 3 shows sketches of three graphs, A, B and C. The equation of graph A is $y = f(x)$.

State the equation of

(i) graph B, [2]

(ii) graph C. [2]

7 **(i)** Solve the equation $\cos x = 0.4$ for $0° \leqslant x \leqslant 360°$.

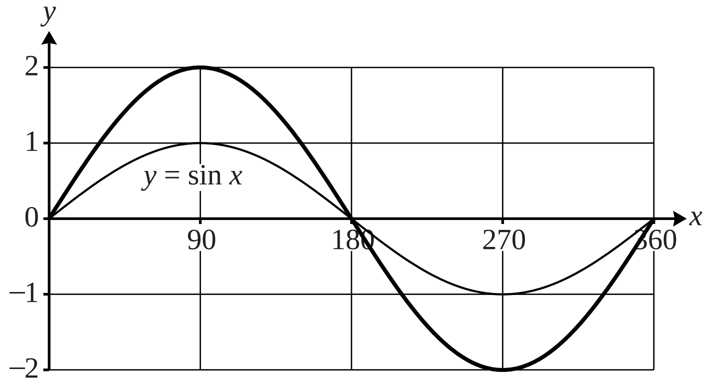
(ii) Describe the transformation which maps the graph of $y = \cos x$ onto the graph of $y = \cos 2x$. [5]

8 **(i)** The point P (4, –2) lies on the curve $y = \mathrm{f}(x)$. Find the coordinates of the image of P when the curve is transformed to $y = \mathrm{f}(5x)$. **[2]**

(ii) Describe fully a single transformation which maps the curve $y = \sin x°$ onto the curve $y = \sin(x - 90)°$. **[2]**

9 Figs. 5.1 and 5.2 show the graph of $y = \sin x$ for values of x from 0° to 360° and two transformations of this graph. State the equation of each graph after it has been transformed.

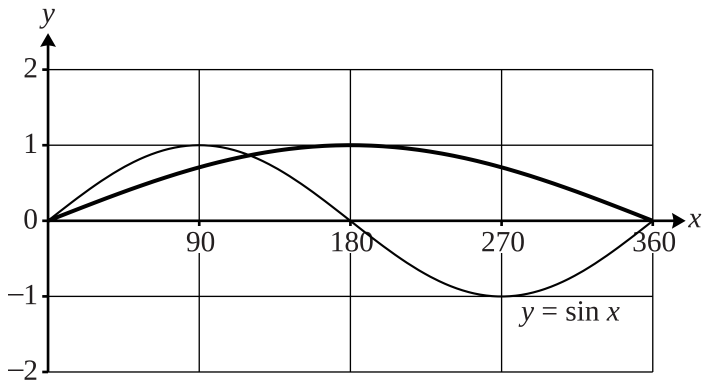
(i)



[1]

Fig. 5.1

(ii)



[2]

Fig. 5.2

10 The curve $y = f(x)$ has a minimum point at $(3, 5)$.

State the coordinates of the corresponding minimum point on the graph of

(i) $y = 3f(x)$, **[2]**

(ii) $y = f(2x)$. **[2]**

11

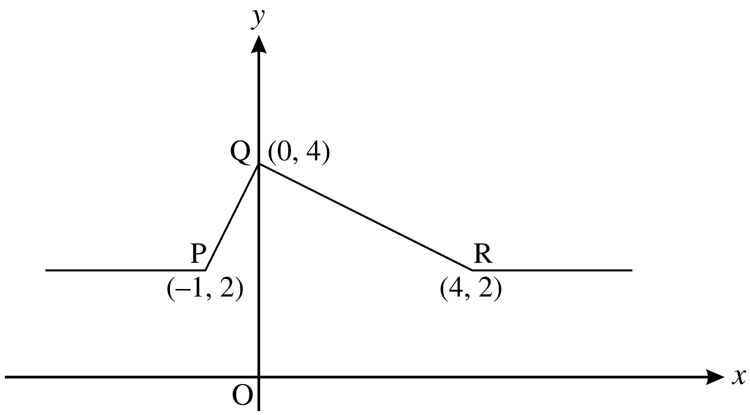


Fig. 5

Fig. 5 shows a sketch of the graph of $y = f(x)$. On separate diagrams, sketch the graphs of the following, showing clearly the coordinates of the points corresponding to P, Q and R.

(i) $y = f(2x)$ **[2]**

(ii) $y = \frac{1}{4}f(x)$ **[2]**

12 **Answer this question on the insert provided.**

Fig. 5 shows the graph of $y = \mathrm{f}(x)$.

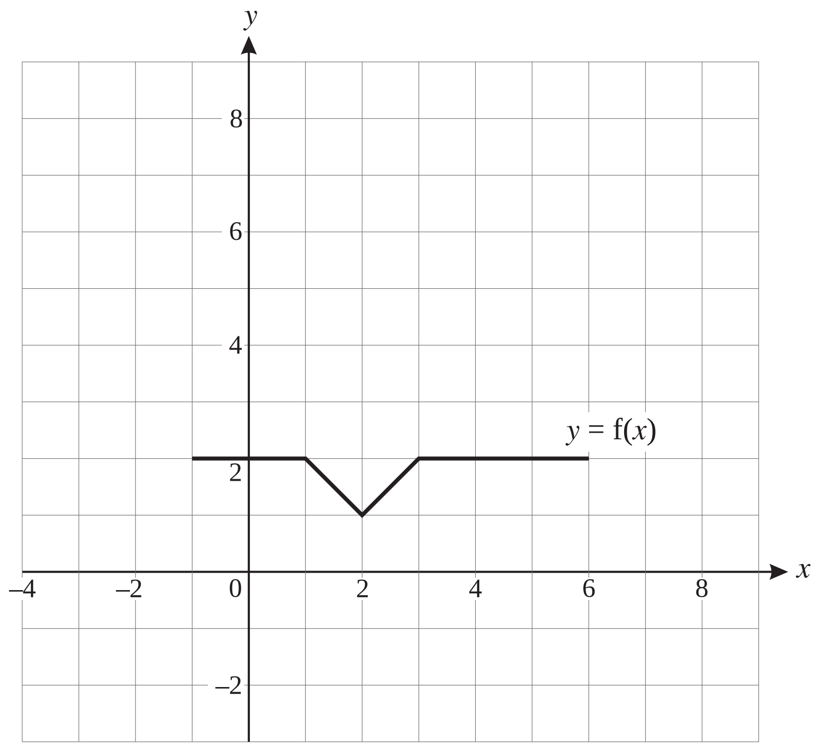


Fig. 5

On the insert, draw the graph of

(i) $y = \mathrm{f}(x - 2)$, **[2]**

(ii) $y = 3\mathrm{f}(x)$. **[2]**

13

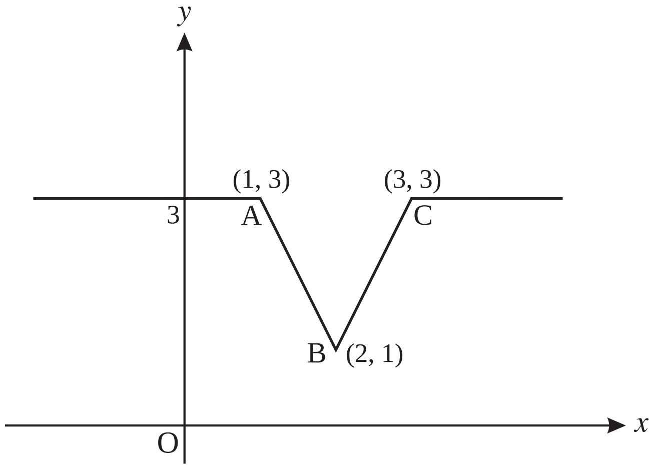


Fig. 4

Fig. 4 shows a sketch of the graph of $y = \mathrm{f}(x)$. On separate diagrams, sketch the graphs of the following, showing clearly the coordinates of the points corresponding to A, B and C.

(i) $y = 2\mathrm{f}(x)$ [2]

(ii) $y = \mathrm{f}(x+3)$ [2]

14 **(i)** On the same axes, sketch the graphs of $y = \cos x$ and $y = \cos 2x$ for values of x from 0 to 2π. **[3]**

(ii) Describe the transformation which maps the graph of $y = \cos x$ onto the graph of $y = 3\cos x$. **[2]**