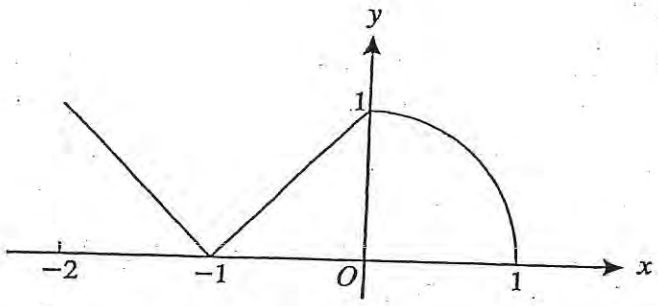
Transformations of Graphs [Ch. 10]

1 (i) Sketch the graph of $y = 3\sqrt{x}$, for $x \geqslant 0$. [1]

(ii) The graph of $y = 3\sqrt{x}$ is stretched by a factor of 2 parallel to the y-axis. State the equation of the transformed graph. [2]

(iii) Describe the single geometrical transformation that transforms the graph of $y = 3\sqrt{x}$ to the graph of $y = 3\sqrt{(x-k)}$. [2]

2



The diagram shows the graph of $y = f(x)$ for $-2 \leqslant x \leqslant 1$. Outside this interval $f(x)$ is zero.

Sketch, on separate diagrams, the graphs of

(i) $y = f(x+1)$, [2]

(ii) $y = -3f(x)$. [2]

Label each graph in the same way as in the diagram above.

3 (i) Sketch the curve $y = x^3$. [1]

(ii) Describe a transformation that transforms the curve $y = x^3$ to the curve $y = -x^3$. [2]

(iii) The curve $y = x^3$ is translated by p units, parallel to the x-axis. State the equation of the curve after it has been transformed. [2]

4 (i) Given that $f(x) = x^2$, sketch the graph of $y = f(x)$. [1]

The graph of $y = g(x)$ is obtained by reflecting the graph of $y = f(x)$ in the x-axis. The graph of $y = h(x)$ is obtained by translating the graph of $y = g(x)$ by +2 units parallel to the y-axis.

(ii) Sketch and label the graphs of $y = g(x)$ and $y = h(x)$ on a single diagram. [3]

(iii) Write down expressions for $g(x)$ and $h(x)$ in terms of x. [2]

5

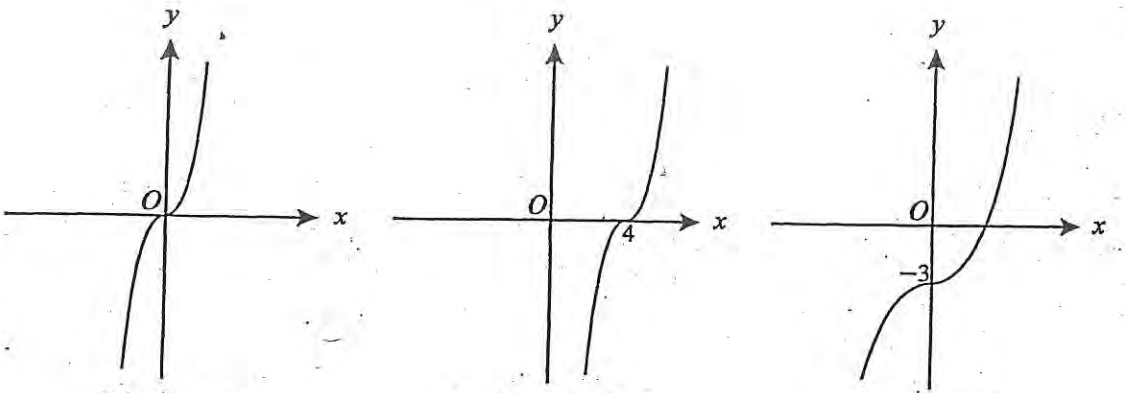
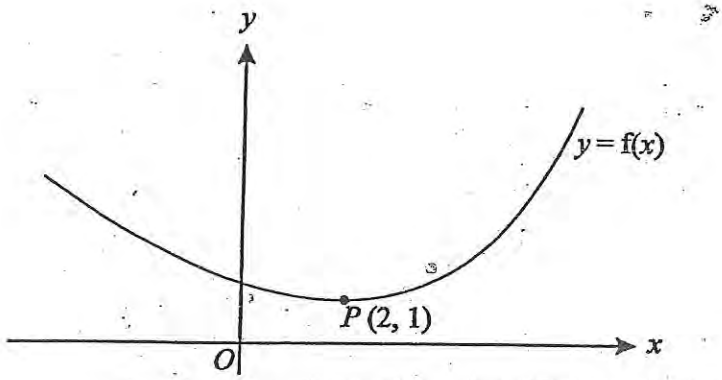


Diagram A shows the graph of $y = x^3$.

(i) The graph of $y = x^3$ is given a translation of +4 units parallel to the x-axis, as shown in diagram B. Write down the equation of the transformed graph. [2]

(ii) The graph of $y = x^3$ is given a stretch parallel to the x-axis with factor 2, followed by a translation of -3 units parallel to the y-axis, as shown in diagram C. Write down the equation of the transformed graph. [3]

6



The diagram shows the graph of $y = f(x)$. The point $P\,(2, 1)$ lies on the curve.

(i) Sketch, on separate diagrams, the following graphs. On each graph label the image of the point P, giving its coordinates.

(a) $y = -f(x)$. [1]

(b) $y = 2f(x+3)$. [3]

(ii) The graph of $y = 2f(x+3)$ is obtained from the graph of $y = f(x)$ by a sequence of two geometrical transformations. Describe each of these transformations fully. [2]