Transformations of Graphs [Ch. 10]

(i) Sketch the graph of \( y = 3\sqrt{x} \), for \( x \geq 0 \).

(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.

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

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

Sketch, on separate diagrams, the graphs of

(i) \( y = f(x+1) \),
(ii) \( y = -3f(x) \).

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

(i) Sketch the curve \( y = x^3 \).

(ii) Describe a transformation that transforms the curve \( y = x^3 \) to the curve \( y = -x^3 \).

(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.

(i) Given that \( f(x) = x^2 \), sketch the graph of \( y = f(x) \).

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.

(iii) Write down expressions for \( g(x) \) and \( h(x) \) in terms of \( x \).
Transformations of Graphs [Ch. 10]

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]

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]