Functions 1

1. Two functions f and g are defined on the set of real numbers as follows :

$$f(x) = 2x - 3 \quad , \quad g(x) = \frac{x + 9}{4} \quad .$$

(a) Evaluate $f\left(g(-3)\right)$.

(b) Find an expression , in its simplest form, for $g\left(f(x)\right)$.

(c) Hence verify that $f^{-1}(x) = g\left(f(x)\right)$

2. The functions $f(x) = x^2 + 3$ and $h(x) = 7 + 3x$ are defined on the set of real numbers.

(a) Evaluate $h\left(f(2)\right)$.

(b) Find an expression , in its simplest form, for $f\left(h(x)\right)$.

(c) For what values of x would the functions f and h produce the same image ?

3. A function in terms of x is given as

$$f(x) = 3x(x - 1) + (3a + 3) \text{ , where } a \text{ is a constant.}$$

Given that $k = a + 1$ show that $f(k) = 3k^2$.

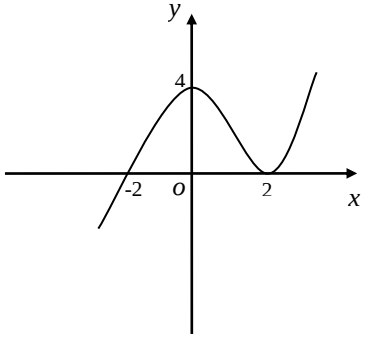
4. Two functions are defined as $f(x) = px^2 - 1$ and $h(x) = \frac{5x + q}{2}$, where p and q are constants.

(a) Given that $f(2) = h(2) = 7$, find the values of p and q .

(b) Find $h\left(f(x)\right)$.

(c) Find the value of the constant k when $2\left[h\left(f(x)\right)\right] - 4 = k\left[f(x)\right]$.

5. The graph of $y = f(x)$ is shown opposite.



(a) Draw a sketch of $y = -f(x)$.

(b) Draw a sketch of $y = f(-x)$.

(c) Draw a sketch of $y = f(x + 2)$.

(d) Draw a sketch of $y = 4 - f(x)$.