1 f and g are functions such that

$$f(x) = \frac{2}{x^2} \qquad \text{and} \qquad g(x) = 4x^3$$

(a) Find f(–5)

.....

(1)

(b) Find fg(1)

.....

(2)

(Total for Question 1 is 3 marks)

2 f and g are functions such that

$$f(x) = \frac{12}{\sqrt{x}} \quad \text{and} \quad g(x) = 3(2x + 1)$$

(a) Find g(5)

.....

(1)

(b) Find gf(9)

.....

(2)

(c) Find $g^{-1}(6)$

.....

(2)

(Total for Question 2 is 5 marks)

3 The functions f and g are such that

$$f(x) = (2x + 3)^2 \quad \text{and} \quad g(x) = 2x - 1$$

(a) Find $gf(-3)$

.....

(2)

(b) Find $g^{-1}(x)$

$g^{-1}(x) =$ .....

(2)

(Total for Question 3 is 4 marks)

4 The function f is given by

$$f(x) = 2x^3 - 4$$

(a) Show that $f^{-1}(50) = 3$

(2)

The functions g and h are given by

$$g(x) = x + 2 \text{ and } h(x) = x^2$$

(b) Find the values of x for which

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

.....

(4)

(Total for Question 4 is 6 marks)

5 The functions f and g are such that

$$f(x) = 3x - 1 \quad \text{and} \quad g(x) = x^2 + 4$$

(a) Find $f^{-1}(x)$

$f^{-1}(x) =$ .....

(2)

Given that $fg(x) = 2gf(x)$,

(b) show that $15x^2 - 12x - 1 = 0$

(5)

(Total for Question 5 is 7 marks)

6 For all values of x

$$f(x) = (x + 1)^2 \quad \text{and} \quad g(x) = 2(x - 1)$$

(a) Show that $gf(x) = 2x(x + 2)$

(2)

(b) Find $g^{-1}(7)$

.....

(2)

(Total for Question 6 is 4 marks)

7 $f(x) = \sqrt[3]{x}$
$g(x) = 2x + 3$

$h(x) = fg(x)$

Find $h^{-1}(x)$

$h^{-1}(x) =$ .....

(Total for Question 7 is 3 marks)

8 The functions g and h are such that

$$g(x) = \sqrt[3]{2x - 5} \qquad h(x) = \frac{1}{x}$$

(a) Find g(16)

.....

(1)

(b) Find $hg^{-1}(x)$
Give your answer in terms of x in its simplest form.

$hg^{-1}(x) =$ .....

(3)

(Total for Question 8 is 4 marks)

9 The functions f and g are such that

$$f(x) = 3x^2 + 1 \quad \text{for } x > 0 \qquad \text{and} \qquad g(x) = \frac{4}{x^2} \quad \text{for } x > 0$$

(a) Work out gf(1)

.....

(2)

The function h is such that $h = (fg)^{-1}$

(b) Find $h(x)$

.....

(4)

(Total for Question 9 is 6 marks)