A238 Functions

Q1.

f and g are functions such that

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

Find gf(4).
Give your answer as a fraction.

....

(Total for question = 2 marks)

Q2.

f and *g* are functions such that

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

(a) Find *f*(–5)

....

(1)

(b) Find fg(1)

....

(2)

(Total for question = 3 marks)

Q3.

The function f is such that

$$f(x) = 4x - 1$$

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

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

(2)

The function g is such that

$$g(x) = kx^2 \text{ where } k \text{ is a constant.}$$

Given that fg(2) = 12

(b) work out the value of k

k = ...

(2)

(Total for question = 4 marks)

Q4.

For all values of x

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

(a) Find $g(-4)$

....

(1)

(b) Show that $gf(x) = 4x^2 - 12x + 11$

(2)

(c) Solve $fg(x) = gf(x)$

....

(4)

(Total for question = 7 marks)

Q5.

$$f(x) = \frac{1}{x+2} + \frac{1}{x-3}$$

(a) Work out f(5)

Give your answer as a fraction.

....

(2)

(b) Write down a value of x for which f(x) is not defined.

....

(1)

Given that f(x) = 4

(c) find the possible values of x.

Give your answer in the form $\dfrac{p \pm \sqrt{q}}{r}$ where p, q and r are positive integers.

....

(5)

(Total for question = 8 marks)

Q6.

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 = 6 marks)

Q7.

$f(x) = x^3$
$g(x) = 4x - 1$

(a) Find fg(2)

....
(2)

$h(x) = fg(x)$

(b) Find an expression for $h^{-1}(x)$

$h^{-1}(x) =$ ....
(3)

(Total for question = 5 marks)

Q8.

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 = 4 marks)

Q9.

f(x) = 4sin$x$°

(a) Find f(23)

Give your answer correct to 3 significant figures.

....

(1)

g(x) = 2x – 3

(b) Find fg(34)

Give your answer correct to 3 significant figures.

....

(2)

h(x) = (x + 4)^2

Ivan needs to solve the following equation h(x) = 25

He writes

$(x + 4)^2 = 25$
$x + 4 = 5$
$x = 1$

This is not fully correct.

(c) Explain why.

....

....

(1)

(Total for question = 4 marks)

Q10.

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 = 7 marks)

Q11.

The functions f and g are such that

$$f(x) = 5x + 3 \qquad g(x) = ax + b \qquad \text{where } a \text{ and } b \text{ are constants.}$$

$g(3) = 20$ and $f^{-1}(33) = g(1)$

Find the value of a and the value of b.

$a =$ ....

$b =$ ....

(Total for question = 5 marks)

Q12.

The functions f and g are such that

$$f(x) = 3(x - 4) \quad \text{and} \quad g(x) = \frac{x}{5} + 1$$

(a) Find the value of f(10)

....

(1)

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

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

(2)

(c) Show that ff(x) = 9x – 48

(2)

(Total for question = 5 marks)

Q13.

f(x) = 3x^2 − 2x − 8

Express f(x + 2) in the form $ax^2 + bx$

....

(Total for question is 3 marks)