

1 The function f is defined as

$$f: x \mapsto \frac{2x}{x-6} \quad x \neq 6$$

(a) Find $f(10)$

.....
(1)

(b) Express the inverse function f^{-1} in the form $f^{-1}: x \mapsto \dots$

$f^{-1}: x \mapsto \dots$
(3)

(Total for Question 1 is 4 marks)

2 The functions f and g are such that

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

$$g(x) = \frac{x}{3x + 1}$$

(a) State the value of x that cannot be included in any domain of g

.....
(1)

(b) Find $gf(x)$

Simplify your answer.

$gf(x) =$
(2)

(c) Express the inverse function g^{-1} in the form $g^{-1}(x) = \dots$

$g^{-1}(x) =$
(3)

(Total for Question 2 is 6 marks)

3 f is the function such that $f(x) = 4 - 3x$

(a) Work out $f(5)$

(1)

g is the function such that $g(x) = \frac{1}{1 - 2x}$

(b) Find the value of x that cannot be included in any domain of g

(1)

(c) Work out $fg(-1.5)$

(2)

(Total for Question 3 is 4 marks)

4 The function f is such that

$$f(x) = \frac{3x - 5}{4}$$

(a) Find $f(-7)$

.....
(1)

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) = \dots$

$$f^{-1}(x) = \dots\dots\dots$$

(2)

The function g is such that

$$g(x) = \sqrt{19 - x}$$

(c) Find $fg(3)$

.....
(2)

(d) Which values of x cannot be included in any domain of g ?

.....
(2)

(Total for Question 4 is 7 marks)

5 The functions f and g are defined as

$$f: x \mapsto 5x - 7$$

$$g: x \mapsto \frac{5x}{x + 4}$$

(a) Write down the value of x that must be excluded from any domain of g

.....
(1)

(b) Find $gf(2.6)$

.....
(2)

(c) Solve $fg(x) = 2$

$x =$
(3)

(d) Express the inverse function g^{-1} in the form $g^{-1}: x \mapsto \dots$

$g^{-1}: x \mapsto$
(3)

(Total for Question 5 is 9 marks)

6 The function f is such that $f(x) = (x - 4)^2$ for all values of x .

(a) Find $f(1)$

.....
(1)

(b) State the range of the function f .

.....
(1)

The function g is such that $g(x) = \frac{4}{x+3}$ $x \neq -3$

(c) Work out $fg(2)$

.....
(2)

(Total for Question 6 is 4 marks)

7 The functions f and g are defined as

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

(a) State which value of x must be excluded from any domain of the function f .

.....
(1)

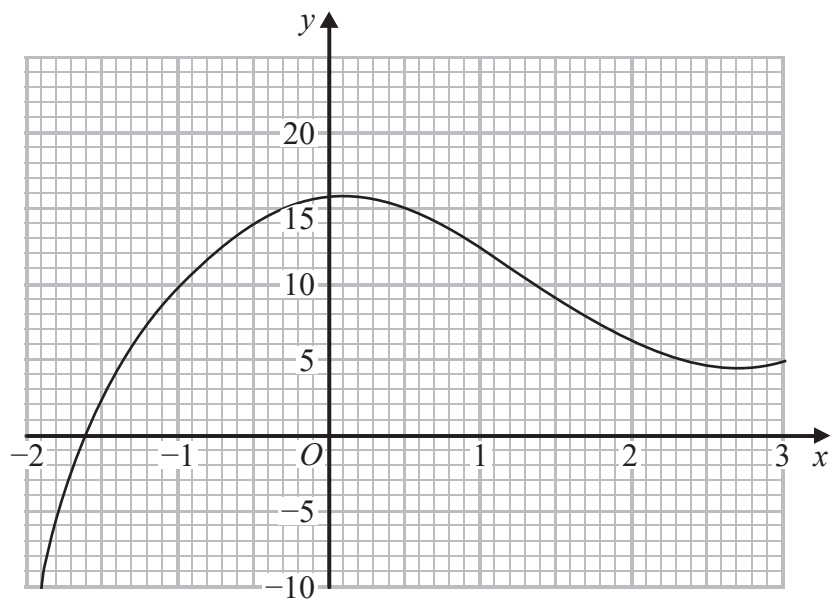
(b) Find $fg(x)$.
Simplify your answer.

$fg(x) =$
(2)

(c) Express the inverse function f^{-1} in the form $f^{-1}(x) = \dots$

$f^{-1}(x) =$
(3)

Part of the curve with equation $y = h(x)$ is shown on the grid.



- (d) Find an estimate for the gradient of the curve at the point where $x = -0.5$
Show your working clearly.

.....
(3)

(Total for Question 7 is 9 marks)

8 The functions f and g are defined as

$$f(x) = x^2 + 6$$

$$g(x) = x - 10$$

(a) Find $fg(3)$

.....
(2)

(b) Solve the equation $fg(x) = f(x)$
Show clear algebraic working.

.....
(3)

The function h is defined as

$$h(x) = \frac{2x - 4}{x}$$

(c) State the value of x that cannot be included in the domain of h

.....
(1)

(d) Express the inverse function h^{-1} in the form $h^{-1}(x) = \dots$

$$h^{-1}(x) = \dots$$

(3)

(Total for Question 8 is 9 marks)

9 g is the function with domain $x \geq -3$ such that $g(x) = x^2 + 6x$

(a) Write down the range of g^{-1}

(1)

(b) Express the inverse function g^{-1} in the form $g^{-1}: x \mapsto \dots$

$g^{-1}: x \mapsto$

(4)

(Total for Question 9 is 5 marks)

10 Two functions, f and g are defined as

$$f : x \mapsto 1 + \frac{1}{x} \quad \text{for } x > 0$$

$$g : x \mapsto \frac{x+1}{2} \quad \text{for } x > 0$$

Given that $h = fg$

express the inverse function h^{-1} in the form $h^{-1} : x \mapsto \dots$

$h^{-1} : x \mapsto \dots$

(Total for Question 10 is 4 marks)

11 The function f is such that $f(x) = x^2 - 8x + 5$ where $x \leq 4$

Express the inverse function f^{-1} in the form $f^{-1}(x) = \dots$

$$f^{-1}(x) = \dots\dots\dots$$

(Total for Question 11 is 3 marks)

12

The function f is defined as $f(x) = \frac{\sqrt{x^2 + k^2}}{x}$ for $x > 0$ and where k is a positive number.

(a) Find the value of p for which $f^{-1}(p) = k$

$$p = \quad (3)$$

The function g is defined as $g(x) = x^2$ for $x > 0$

(b) Given that $gf(a) = k$ for $k > 1$
find an expression for a in terms of k .

$$a = \quad (3)$$

(Total for Question 12 is 6 marks)

13 The functions f and g are such that

$$f(x) = x^2 - 2x \qquad g(x) = x + 3$$

The function h is such that $h(x) = fg(x)$ for $x \geq -2$

Express the inverse function $h^{-1}(x)$ in the form $h^{-1}(x) = \dots$

$$h^{-1}(x) = \dots\dots\dots$$

(Total for Question 13 is 5 marks)

14 The functions f and g are defined as

$$f(x) = 5x^2 - 10x + 7 \quad \text{where } x \geq 1$$

$$g(x) = 7x - 6$$

(a) Find $fg(2)$

.....
(2)

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) = \dots$

$f^{-1}(x) = \dots$
(4)

(Total for Question 14 is 6 marks)

15 The functions f and g are such that

$$f(x) = x + 25 \qquad g(x) = x^2 - 12x$$

The function h is such that $h(x) = fg(x)$

The domain of h is $\{x : x \leq 6\}$

Express the inverse function h^{-1} in the form $h^{-1}(x) = \dots$

$$h^{-1}(x) = \dots\dots\dots$$

(Total for Question 15 is 4 marks)

16 The function f is such that $f(x) = 3x - 2$

(a) Find $f(5)$

.....
(1)

The function g is such that $g(x) = 2x^2 - 20x + 9$ where $x \geq 5$

(b) Express the inverse function g^{-1} in the form $g^{-1}(x) = \dots$

$g^{-1}(x) = \dots$
(4)

(Total for Question 16 is 5 marks)

17 The function f is such that $f(x) = 5 + 6x - x^2$ for $x \leq 3$

(a) Express $5 + 6x - x^2$ in the form $p - (x - q)^2$ where p and q are constants.

.....
(2)

(b) Using your answer to part (a), find the range of values of x for which $f^{-1}(x)$ is positive.

.....
(5)

(Total for Question 17 is 7 marks)

18 The function g is defined as

$$g:x \mapsto 5 + 6x - x^2 \quad \text{with domain } \{x:x \geq 3\}$$

(a) Express the inverse function g^{-1} in the form $g^{-1}:x \mapsto \dots$

$$g^{-1}:x \mapsto \dots \dots \dots (4)$$

(b) State the domain of g^{-1}

$$\dots \dots \dots (1)$$

(Total for Question 18 is 5 marks)