1. **[8 marks]**

The functions f and g are defined as

$$f(x) = \frac{1}{2}x + 4$$

$$g(x) = \frac{2x}{x+1}$$

(a) Work out f(6)

.....

(1)

(b) Work out fg(–3)

.....

(2)

(c) $g(a) = -2$

Work out the value of a.

a = ...

(2)

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

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

2. **[8 marks]**

The functions f and g are defined as follows.

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

$$g(x) = \sqrt{x-1}$$

(a) (i) State which value of x cannot be included in the domain of f.

.....

(ii) State which **values** of x cannot be included in the domain of g.

.....

(3)

(b) Calculate fg(10)

.....

(3)

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

.....

3. **[6 marks]**

$$f: x \mapsto 2x - 1$$

$$g: x \mapsto \frac{3}{x}, \quad x \neq 0$$

(a) Find the value of

(i) f(3),

.....

(ii) fg(6).

.....

(2)

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

.....

(2)

(c) (i) Express the composite function gf in the form $gf: x \mapsto ...$

.....

(ii) Which value of x must be excluded from the domain of gf?

$x =$ .....

(2)

4. **[7 marks]**

The function f is defined as

$$f(x) = \frac{x - 6}{2}$$

(a) Find $f(8)$

.....

(1)

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

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

(2)

The function g is defined as

$$g(x) = \sqrt{x - 4}$$

(c) Which values of x cannot be included in a domain of g?

.....

(2)

(d) Express the function gf in the form $gf(x) = ...$
Give your answer as simply as possible.

$gf(x) =$ .....

(2)

5. **[7 marks]**

The function f is defined as $f(x) = \frac{x}{x-1}$.

(a) Find the value of

(i) f(3),

.....

(ii) f(–3).

.....

(2)

(b) State which value(s) of x must be excluded from the domain of f.

.....

(1)

(c) (i) Find ff(x).
Give your answer in its most simple form.

ff(x) = ...

(ii) What does your answer to (c)(i) show about the function f?

.....

.....

(4)

6. **[6 marks]**

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

(a) Find the value of f(11)

.....

(1)

(b) State which value of x must be excluded from any domain of f

.....

(1)

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

.....

(3)

(d) State the value which cannot be in any range of f

.....

(1)

7. **[7 marks]**

f is the function such that

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

(a) Find f(0.5)

.....

(1)

(b) Find ff(–1)

.....

(2)

(c) Find the value of x that cannot be included in any domain of f

.....

(1)

(d) Express the inverse function f^{-1} in the form $f^{-1}(x) = ...$
Show clear algebraic working.

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

(3)

8. **[9 marks]**

$f(x) = (x - 1)^2$

(a) Find f(8)

.....

(1)

(b) The domain of f is all values of x where $x \geqslant 7$
Find the range of f.

.....

(2)

$g(x) = \dfrac{x}{x - 1}$

(c) Solve the equation $g(x) = 1.2$

.....

(2)

(d) (i) Express the inverse function g^{-1} in the form $g^{-1}(x) = ...$

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

(ii) Hence write down $gg(x)$ in terms of x.

$gg(x) =$.....

9. **[5 marks]**

(a) $f(x) = 2x + 1$

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

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

(2)

(b) $g(x) = 2 + x$
$h(x) = x^2$

Solve the equation $hg(x) = h(x)$.

$x =$ .....

(3)

10. **[7 marks]**

The function f is defined as $f(x) = \frac{3}{4 + x}$

(a) Find the value of f(1)

.....

(1)

(b) State which value of x must be excluded from any domain of f.

.....

(1)

The function g is defined as $g(x) = 5 + x$

(c) Given that $g(a) = 7$, find the value of a.

$a =$ .....

(1)

(d) Calculate fg(1)

.....

(2)

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

$fg(x) =$ .....

(2)

11. **[3 marks]**

f is a function such that

$f(x) = \dfrac{1}{x^2 + 1}$

(a) Find $f(\frac{1}{2})$

.....

(1)

g is a function such that

$g(x) = \sqrt{x-1} \quad x \geqslant 1$

(b) Find $fg(x)$
Give your answer as simply as possible.

$fg(x) =$ .....

(2)

12. **[4 marks]**

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

$g(x) = kx^2$ where k is a constant.

Given that $fg(2) = 12$

(b) work out the value of k

$k =$ .....

(2)

13. **[5 marks]**

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

(a) (i) Find $gf(x)$

.....

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

.....

(2)

(b) Solve the equation $gf(x) = g^{-1}(x)$

.....

(3)