# Functions Worksheet

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**Questions in past papers often come up combined with other topics.**
**Topic tags have been given for each question to enable you to know if you can do the question or whether you need to wait to cover the additional topic(s).**

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**17** 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 17 is 4 marks)**

**18** $f(x) = 3x^2 - 2x - 8$

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

.....

**(Total for Question 18 is 3 marks)**

**9** The functions f and g are such that

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

(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 9 is 5 marks)**

**16** The functions f and g are given by

$$f(x) = \frac{12}{x+1} \quad \text{and} \quad g(x) = 5 - 3x$$

(a) Find $f(-3)$

.....

**(1)**

(b) Find $fg(1)$

.....

**(2)**

(c) Find $g^{-1}(4)$

.....

**(2)**

**(Total for Question 16 is 5 marks)**

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

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

**(3)**

**(Total for Question 15 is 6 marks)**

**16** 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 $g^{-1}: x \mapsto ...$

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

**(3)**

**(Total for Question 16 is 9 marks)**

**14** The function f is defined as

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

(a) Find f(10)

.....

**(1)**

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

$f^{-1}: x \mapsto$ .....

**(3)**

**(Total for Question 14 is 4 marks)**

**17** The functions g and h are such that

$$g(x) = \frac{11}{2x - 5}$$

$$h(x) = x^2 + 4 \qquad x \geqslant 0$$

(a) What value of $x$ must be excluded from any domain of g?

.....

**(1)**

(b) Solve $gh(x) = 1$

.....

**(3)**

**(Total for Question 17 is 4 marks)**

**10** 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 10 is 4 marks)**

**19** 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 19 is 4 marks)**

Qualification: IGCSE Edexcel A Higher
Areas: Functions
Subtopics: Inverse Functions, Completing The Square, Rearranging
Paper: Paper-1H / Series: 2021-January / Difficulty: Somewhat Challenging / Question Number: 22

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

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

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

**(Total for Question 22 is 3 marks)**

**25** The function g is defined as

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

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

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

**(4)**

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

.....

**(1)**

**(Total for Question 25 is 5 marks)**

**19** g is the function with domain $x \geqslant -3$ 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 $g^{-1} : x \mapsto \ldots$

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

**(4)**

**(Total for Question 19 is 5 marks)**

**24** The functions f and g are defined as

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

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

(a) Find fg(2)

.....

**(2)**

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

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

**(4)**

**(Total for Question 24 is 6 marks)**

**20** 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 $h^{-1} : x \mapsto \ldots$

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

**(Total for Question 20 is 4 marks)**

**19** The functions f and g are such that

$$f: x \mapsto 5x + 7$$
$$g: x \mapsto \frac{5}{2x - 9}$$

(a) State which value of $x$ cannot be included in any domain of g

.....

**(1)**

(b) Find fg(4)

.....

**(2)**

The function h is such that

$$h: x \mapsto 3x^2 - 12x + 8 \quad \text{where } x > 2$$

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

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

**(4)**

**(Total for Question 19 is 7 marks)**

**12** The functions f and g are such that

$$f(x) = 1 - 5x \qquad \text{and} \qquad g(x) = 1 + 5x$$

(a) Show that $gf(1) = -19$

**(2)**

(b) Prove that $f^{-1}(x) + g^{-1}(x) = 0$ for all values of $x$.

**(3)**

**(Total for Question 12 is 5 marks)**

**21** 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 $x \geqslant -2$

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

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

**(Total for Question 21 is 5 marks)**

**21** 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 21 is 7 marks)**

Qualification: IGCSE Edexcel A Higher

Areas: Functions

Subtopics: Composite Functions, Inequalities - Forming Quadratics, Inequalities - Solving Quadratic

Paper: Paper-2HR / Series: 2022-June / Difficulty: Hard / Question Number: 19

**19** $f(x) = x^2 - 4$

$g(x) = 2x + 1$

Solve $fg(x) > 0$

Show clear algebraic working.

.....

**(Total for Question 19 is 4 marks)**