

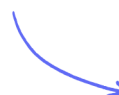
Calculator Questions

Functions

Introduction to Functions / Domain & Range / Composite Functions / Inverse Functions

Medium (5 questions)	/21
Hard (4 questions)	/28
Very Hard (4 questions)	/10
Total Marks	/59

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Medium Questions

1 $f(x) = 3x - 5$

The domain of $f(x)$ is $\{-3, 0, 2\}$.

Find the range of $f(x)$.

{ }

(2 marks)

2 (a) $f(x) = 7x - 4$ $g(x) = \frac{2x}{x-3}, x \neq 3$ $h(x) = x^2$

Find $g(6)$.

(1 mark)

(b) Find $fg(4)$.

(2 marks)

(c) Find $fh(x)$.

(1 mark)

3 $f(x) = 7 - 2x$ $g(x) = \frac{10}{x}, x \neq 0$ $h(x) = 27^x$

Find

i) $f(-3)$,

[1]

ii) $hg(30)$,

[2]

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

$f^{-1}(x) = \dots\dots\dots$ [2]

(5 marks)

4 (a) $f(x) = \frac{3}{x+2}, x \neq -2$ $g(x) = 8x - 5$

Work out $g\left(\frac{1}{4}\right)$.

(1 mark)

(b) Work out $ff(2)$.

(2 marks)

(c) Find $gg(x)$, giving your answer in its simplest form.

(2 marks)

(d) Find $g^{-1}(x)$.

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

(2 marks)

5 (a) f and g are functions such that

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

Find $f(-5)$

(1 mark)

(b) Find $fg(1)$.

(2 marks)

Hard Questions

1 (a) $g(x) = 1 - 2x$ $h(x) = \frac{1}{x}, x \neq 0$ $j(x) = 5^x$

Find $hh(x)$, giving your answer in its simplest form.

(1 mark)

(b) Find $j(5)$.

(1 mark)

(c) $j(x) = hg(-12)$

Find the value of x .

$x = \dots\dots\dots$

(2 marks)

2 (a) $f(x) = 3x + 2$ $g(x) = x^2 + 1$ $h(x) = 4^x$

Find $h(4)$.

(1 mark)

(b) Find $fg(1)$.

(2 marks)

(c) Find $gf(x)$ in the form $ax^2 + bx + c$.

(3 marks)

(d) Find x when $f(x) = g(7)$.

$x = \dots\dots\dots$

(2 marks)

(e) Find $f^{-1}(x)$.

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

(2 marks)

3 (a) $f(x) = 4x - 1$ $g(x) = x^2$ $h(x) = 3^{-x}$

Find in its simplest form

i) $f(x - 3)$,

[1]

ii) $g(5x)$.

[1]

(2 marks)

(b) Find $f^{-1}(x)$.

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

(2 marks)

(c) Find the value of $hh(1)$, correct to 4 significant figures.

(3 marks)

4 $g(x) = 8x - 5$ $h(x) = x^2 + 6$

i) Show that $hg(x) = 19$ simplifies to $16x^2 - 20x + 3 = 0$.

[3]

ii) Use the quadratic formula to solve $16x^2 - 20x + 3 = 0$.

Show all your working and give your answers correct to 2 decimal places.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

(7 marks)

Very Hard Questions

1

$$h(x) = 4^x.$$

Find x when $h^{-1}(x) = 2$.

$$x = \dots\dots\dots$$

(1 mark)

2 (a)

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

Show that $g(3x - 2) - h(-3)$ can be written as $9x^2 - 12x - 23$.

(2 marks)

(b) Find x when $f(61) = h(x)$.

$$x = \dots\dots\dots$$

(2 marks)

3 (a)

$$h(x) = 2^x$$

Solve the equation $h^{-1}(x) = 0.5$.

$$x = \dots\dots\dots$$

(1 mark)

(b) $\frac{1}{h(x)} = 2^{kx}$ Write down the value of k .

$$k = \dots\dots\dots$$

(1 mark)

4

$$h(x) = x^x, x > 0$$

i) Calculate $h(0.3)$. Give your answer correct to 2 decimal places.

[2]

ii) Find x when $h(x) = 256$.

$$x = \dots\dots\dots [1]$$

(3 marks)