EXAM PAPERS PRACTICE

GCSE OCR Math J560

Functions

Answers

"We will help you to achieve A Star "

Answer 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.

$$fg(x) = f(g(x))$$

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

$$= \frac{1}{(\sqrt{x-1})^2 + 1}$$

$$= \frac{1}{x \cancel{-1} \cancel{+1}}$$

$$\underline{fg(x) = \frac{1}{x}}$$

Answer 2

FUNCTION

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

SET OF INPUT VALUES

(a) State one value of x which cannot be included in any domain of f.

CAN'T DIVIDE BY ZERO

SO $x + 1 \neq 0$, $x - 2 \neq 0$

$-1 \quad -1 \qquad +2 \quad +2$

$\underline{x \neq -1} \qquad \underline{x \neq 2}$

Answer 3

(c) g(a) = –2

Work out the value of a.

$$g(a) = \frac{2a\cancel{(a+1)}}{\cancel{a+1}} = -2(a+1)$$

$$2a = -2a - 2$$
$$+2a \qquad +2a$$

$$\frac{\cancel{4}a}{\cancel{4}} = \frac{-2}{4}$$

$$a = -\frac{1}{2}$$

Answer 4

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

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

$$g(a) = 5 + a = 7$$
$$-5 \qquad -5$$

$$a = 2$$

Answer 5

(c) Find g(−3)

$$g(-3) = (-3)^2 - 25$$
$$= 9 - 25 = \underline{\underline{-16}}$$

Answer 6

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)

$$f(6) = \frac{1}{2} \times 6 + 4$$
$$= 3 + 4$$
$$= \underline{\underline{7}}$$

Answer 7

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.

$$fg(x) = f(g(x))$$

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

$$= \frac{1}{(\sqrt{x-1})^2 + 1}$$

$$= \frac{1}{x \cancel{-1} \cancel{+1}}$$

$$fg(x) = \frac{1}{x}$$

Answer 8

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

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

$$f(x+2) = 3(x+2)^2 - 2(x+2) - 8$$

$$= 3(x+2)(x+2) \boxed{-2}(x+2) - 8$$

F O I L

$$= 3[x^2 + 2x + 2x + 4] - 2x - 4 - 8$$

$$= 3x^2 + 6x + 6x + 12 - 2x - 4 - 8$$

$$= 3x^2 + 10x + 0$$

$$= \underline{3x^2 + 10x}$$

Answer 9

f is a function such that

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

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

$$f\left(\frac{1}{2}\right) = \frac{1}{\left(\frac{1}{2}\right)^2 + 1}$$

$$= \frac{1}{\frac{1}{4} + 1}$$

$$= \frac{1}{5/4}$$

$$= \frac{4}{5}$$

Answer 10

The function f is such that

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

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

$$y = 4x - 1$$

$x \leftrightarrow y$ $\quad x = 4y - 1$

$+1 \qquad +1$

$$\frac{x+1}{4} = \frac{4y}{4}$$

$$y = \frac{x+1}{4}$$

$$\underline{\underline{f^{-1}(x) = \frac{x+1}{4}}}$$

FINDING AN INVERSE FUNCTION $f^{-1}(x)$

- WRITE $y = \dots$
- SWAP x AND y
- REARRANGE TO $y = \dots$
- WRITE $f^{-1}(x) = \dots$

Answer 11

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

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

SET OF INPUT VALUES

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

CAN'T DIVIDE BY ZERO SO

$\underline{x=0}$ MUST BE EXCLUDED

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Answer 12

$$f(x) = \sqrt{x-6}$$

(a) Find f(10)

$f(10) = \sqrt{10-6}$

$= \sqrt{4}$

$= \underline{2}$

SET OF
INPUT VALUES

Answer 13

(a) Show that $\dfrac{x^2 + 3x}{2x^2 + 5x - 3}$ can be written as $\dfrac{x}{kx - 1}$

FACTORISE TOP AND BOTTOM THEN CANCEL.

State the value of k.

TOP : $x^2 + 3x = x(x+3)$

BOTTOM : $2x^2 + 5x - 3 = (2x-1)(x+3)$

SO $\dfrac{x^2+3x}{2x^2+5x-3} = \dfrac{x\cancel{(x+3)}}{(2x-1)\cancel{(x+3)}} = \dfrac{x}{2x-1}$

$k = $ 2

Answer 14

The functions g and h are defined as

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

$$h(x) = x + 4$$

(a) Find the value of g(1)

$$g(1) = \frac{1}{2\times1-5} = \frac{1}{-3} = \underline{-\frac{1}{3}}$$

Answer 15

The functions g and h are defined as

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

$$h(x) = x + 4$$

(a) Find the value of g(1)

$$g(1) = \frac{1}{2\times1-5} = \frac{1}{-3} = \underline{-\frac{1}{3}}$$