

## Lesson 10

## GCSE Mathematics Functions I

### 10.1 Revision

Marks Available: 60

#### Question 1

The function  $f$  is given by,  $f(x) = x^2 - 1$ ,  $x \in \mathbb{R}$

Calculate;

(i)  $f(3)$

(ii)  $f(8)$

(iii)  $f(1)$

(iv)  $f(0)$

(v)  $f(5)$

(vi)  $f(-5)$

(vii)  $f(100)$

(viii)  $f\left(\frac{1}{2}\right)$

(ix)  $f\left(\frac{3}{2}\right)$

(x)  $f(\sqrt{2})$

[ 6 marks ]

#### Question 2

Sometimes the domain of a function is restricted.

Consider the function,  $g(x) = \frac{10}{x+1}$ ,  $x \in \mathbb{R}$ ,  $x \neq -1$

(i) What real number is not allowed into this function ?

[ 1 mark ]

(ii) Why is this function's domain restricted in this way ?

[ 2 marks ]

**Question 3**

This question involves the functions;

$$f(x) = 3x - 2, \quad x \in \mathbb{R}$$

$$g(x) = \frac{10}{x + 1}, \quad x \in \mathbb{R}, \quad x \neq -1$$

Determine the value of,

(i)  $f(13)$

(ii)  $g(0)$

(iii)  $ff(3)$

(iv)  $fg(4)$

(v)  $gf(1)$

[ 5 marks ]

**Question 4**

If  $v(x) = 3x^2 - 1$ ,  $x \in \mathbb{R}$ , find expressions that do not involve brackets for,

(i)  $v(7)$

(ii)  $v(10x)$

(iii)  $v(x + 4)$

**HINT : FOIL**

[ 1, 2, 3 marks ]

**Question 5**

If  $m(x) = 6x + 7$ , find  $x$  such that  $m(x) = 25$  ( $x \in \mathbb{R}$ )

[ 3 marks ]

**Question 6**

If  $s(x) = \frac{3x + 2}{4}$ , find  $x$  such that  $s(x) = 11$  ( $x \in \mathbb{R}$ )

[ 3 marks ]

**Question 7**

Let  $p$  and  $q$  be the functions,

$$p(x) = 4x + 7 \quad x \in \mathbb{R}$$

$$q(x) = 5x + 6 \quad x \in \mathbb{R}$$

Evaluate each of the following,

(i)  $p q(3)$

(ii)  $p q(-1)$

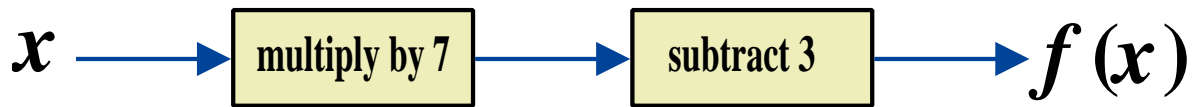
(iii)  $p q(4z)$

(iv)  $p q(3z + 1)$

[ 1, 1, 2, 2 marks ]

**Question 8**

Consider the following flow diagram;



(a) Write down (i)  $f(x)$

(ii)  $f^{-1}(x)$

[ 1, 2 marks ]

(b) Determine the value of,

(i)  $f(5)$

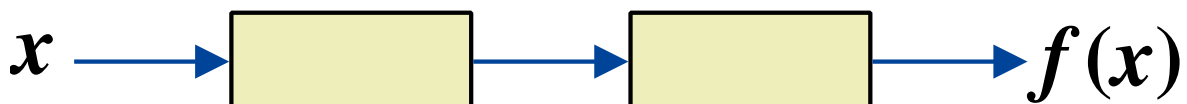
(ii)  $f^{-1}(32)$

[ 1, 1 marks ]

**Question 9**

(a) Fill in the flow diagram for the function

$$f(x) = 5(x - 9), \quad x \in \mathbb{R}$$



[ 1 mark ]

(b) Write down  $f^{-1}(x)$

[ 2 marks ]

(c) Determine the value of,

(i)  $f(12)$

(ii)  $f^{-1}(25)$

[ 1, 1 marks ]

**Question 10**

Consider the function,  $k(x) = \frac{x}{5} + 7$ ,  $x \in \mathbb{R}$

Find an expression for the inverse function,  $k^{-1}(x)$

**HINT :** Draw a flow diagram.

[ 4 marks ]

The GCSE examination often includes an awkward functions question.

Here is an example of a grade 8 question.

**Question 11**

For the function  $f(x) = 3x + 2$ ,  $x \in \mathbb{R}$ , determine  $x$  such that  $f(x) = f^{-1}(x)$

[ 5 marks ]

**Question 12**

Consider the function,  $f(x) = \frac{8}{3x} + 7$ ,  $x \in \mathbb{R}$ ,  $x \neq 0$

Find an expression for the inverse function  $f^{-1}(x)$

[ 4 marks ]

**Question 13**

Consider the function,  $f(x) = \frac{x+5}{x+3}$ ,  $x \in \mathbb{R}$ ,  $x \neq -3$

Find an expression for the inverse function  $f^{-1}(x)$

[ 5 marks ]

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