Lesson 10

GCSE Mathematics
Functions I

10.1 Revision

Marks Available: 60

Question 1

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

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)** $f\left(\sqrt{2}\right)$

[6 marks]

Question 2

Sometimes the domain of a function is restricted.

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

(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 $m(x) = 25$ $\quad (x \in \mathbb{R})$

[3 marks]

Question 6

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

[3 marks]

Question 7

Let p and q be the functions,

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

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

Evaluate each of the following,

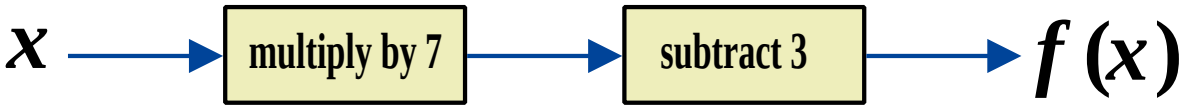
(i) $p\,q\,(3)$ **(ii)** $p\,q\,(-1)$

(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,

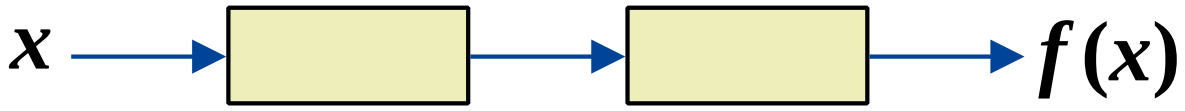
(i) $f(5)$ **(ii)** $f^{-1}(32)$

[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, $k(x) = \frac{x}{5} + 7, \quad x \in \mathbb{R}$

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

[5 marks]

Question 12

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

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

[4 marks]

Question 13

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

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

[5 marks]