Unit 1 · Function

WORKSHEET

Full marks 31

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 31

1 Key words [3]

Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

codomain	**composite**	**domain**	**identity**	**interchanges**	**inverse**	**many-to-one**	**one-to-one**	**onto**

When the output of one function is used as the input of another, the two make a _____ function. For $g \circ f$ to be defined, the range of f must lie in the _____ of g. A function that sends every element to itself is the _____ function. Only a function that is _____ has an _____ function. The graph of f^{-1} is the mirror image of the graph of f in the line $y = x$, because f^{-1} _____ the two coordinates of every point.

2 Multiple choice [5]

Choose the correct option for each of the following questions.

i. If $f(x) = 3x - 2$, what is $f^{-1}(x)$? [1]

a. $\frac{x+2}{3}$ **b.** $\frac{x-2}{3}$

c. $\frac{1}{3x-2}$ **d.** $3x + 2$

ii. $A = \{1, 2, 3\}$ and $B = \{4, 5, 6\}$. Which of these functions from A to B has an inverse? [1]

a. $\{(1, 4), (2, 4), (3, 6)\}$ **b.** $\{(1, 5), (2, 6), (3, 4)\}$

c. $\{(1, 4), (2, 5), (3, 5)\}$ **d.** $\{(1, 6), (2, 6), (3, 6)\}$

iii. If $f(x) = x^2$ and $g(x) = x - 1$, what is $f \circ g(3)$? [1]

a. 8 **b.** 4

c. 9 **d.** 2

iv. A function f has an inverse and $f(2) = 7$. What is $f^{-1}(7)$? [1]

a. 7 **b.** $\frac{1}{7}$

c. 2 **d.** -7

v. If $f(x) = 2x + 1$, what is $f \circ f(x)$? [1]

a. $4x + 2$ **b.** $4x^2 + 4x + 1$

c. $4x + 3$ **d.** $2x + 2$

3 Very short answers [3]

Write very short answers to the following questions.

a. If $f(x) = 5x + 4$ and $g(x) = x - 3$, find $g \circ f(x)$. [1]

b. The function $f = \{(1, a), (2, b), (3, c)\}$ is one-to-one onto. Write f^{-1} as a set of ordered pairs. [1]

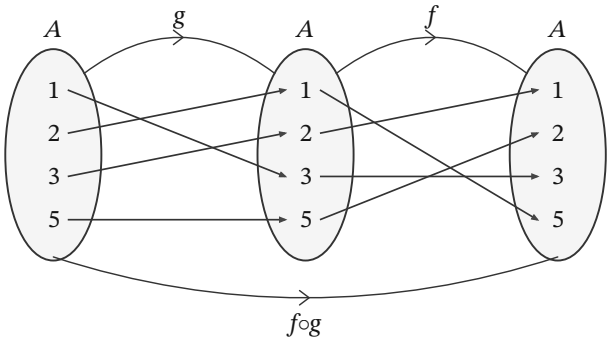
c. If $f^{-1}(x) = \dfrac{x-1}{4}$, find $f(x)$. [1]

4 Short answers [10]

Write short answers to the following questions.

a. Find the mistake. $f(x) = x + 3$ and $g(x) = 2x$. Ramesh finds $g \circ f(2)$ like this: [2]
$g(2) = 4$, then $f(4) = 7$, so $g \circ f(2) = 7$.
What has he done wrong? Find the correct value.

b. The mapping diagram shows g and f on the set $A = \{1, 2, 3, 5\}$. Write $g \circ f$ and $f \circ g$ as sets of ordered pairs. [2]



c. If $f(x) = \frac{2x+3}{5}$, find $f^{-1}(x)$ and $f^{-1}(3)$. **[2]**

d. Show that $f(x) = 4x - 7$ and $g(x) = \frac{x+7}{4}$ are inverses of each other. **[2]**

e. Explain why $f(x) = x^2$, on all real numbers, has no inverse. On which numbers would it have one? **[2]**

5 Long answers **[8]**

Solve the following problems. Show your working.

a. $f(x) = 2x - 1$ and $g(x) = x^2 + 1$. **[4]**

i. Find $g \circ f(x)$.

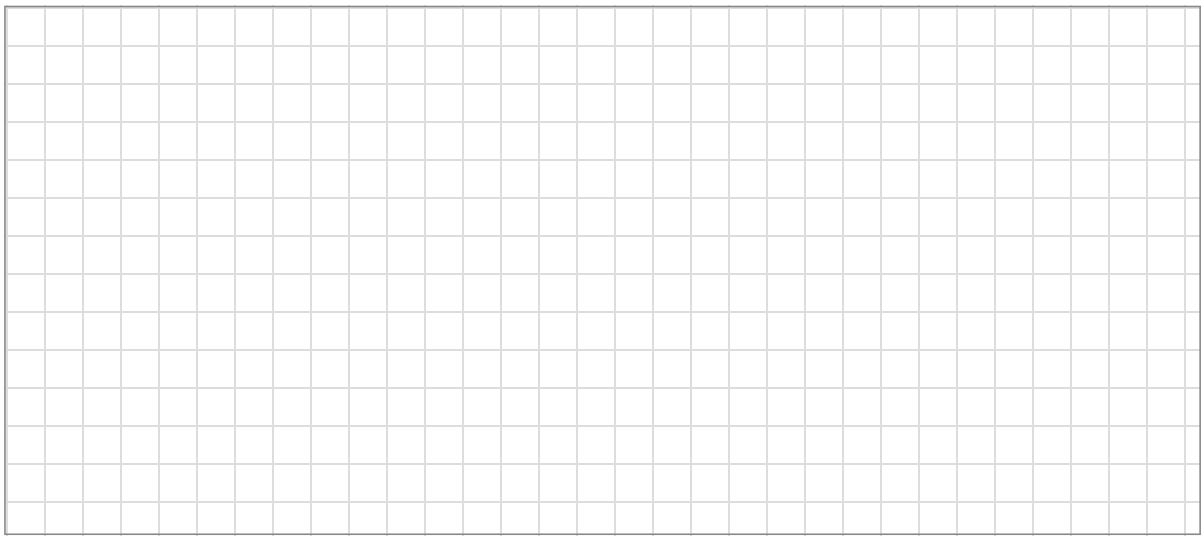
ii. Find $f \circ g(x)$. Is $g \circ f = f \circ g$?

iii. Solve $g \circ f(x) = 10$.

Answer:

b. A thermometer shows a temperature x in °C as $f(x) = \frac{9x}{5} + 32$ in °F. **[4]**

i. Find $f^{-1}(x)$. What does f^{-1} do?
ii. A child's temperature is 104 °F. Find it in °C.
iii. Find the temperature that is the same number in °C and in °F.
iv. Where do the graphs of f and f^{-1} meet?



Answer: _____

6 Think **[2]**

Think, then answer.

Find a function, other than $f(x) = x$, that is its own inverse ($f^{-1} = f$). Show that it is.

7 Activity: Rules and their undo (not marked)

With a partner: one of you uses a rule below on the number 3 and says only the answer. The other works out the steps that undo the rule, writes its inverse, and uses it to get 3 back. Take turns, and fill in the table together.

Rule $f(x)$	$f(3)$	Steps to undo it, in order	$f^{-1}(x)$	$f^{-1}(f(3))$
$2x + 5$				
$\frac{x-4}{3}$				
$10 - x$				
$x^3 + 1$				