

MATHEMATICS ASSIGNMENT
CHAPTER 2 : RELATIONS AND FUNCTIONS

VERY SHORT ANSWER TYPE – 1 MARK QUESTIONS

1. Find x and y if
 - a. $(x^2 - 3x, y^2 - 5y) = (-2, -6)$
 - b. $(x + y, x - y) = (14, 4)$
 - c. $(11, 3x - y) = (5x + 2y, 11/2)$
2. Find the domain of the following functions:
 - a) $f(x) = \frac{x^2 - 1}{x - 1}$
 - b) $f(x) = \frac{3x + 1}{x^2 - 5x + 6}$
 - c) $f(x) = \frac{2x - 3}{(x - 1)(x + 2)}$
3. If $A = \{-3, -2, 0, 2, 3\}$ write the subset B of $A \times A$ such that first element of B is either -3 or +3. **HOTS**
4. Let $A = \{1, 2, 3\}$, $B = \{3, 4\}$; and $C = \{4, 5, 6\}$. Find $(A \times B) \cup (A \times C)$.
5. If $P = \{1, 0\}$, form the set $P \times P \times P$.
6. Let $A = \{1, 2\}$ and $B = \{3, 4\}$. Find the number of relations from A to B.
7. Let $A = \{x : x \text{ is a natural number } < 12\}$ and R be a relation in A defined by (x,y) in R if $x + y = 12$, then write R.
8. Find the set of values of x for which the real function $f(x) = 2x^4 - 16$ and $g(x) = x^4$ are equal.
9. A and B are two sets having 3 and 5 elements respectively and having 2 elements in common. Find the number of elements in $A \times B$. **HOTS**
10. Write the function given by the the sum of identity function and reciprocal function. **HOTS**

SHORT ANSWER TYPE - 4 MARK QUESTIONS

11. A and B are two sets given in such a way that $A \times B$ contains 6 elements. If three elements of $A \times B$ be (1, 3), (2, 5) and (3, 3), find $B \times A$. what are the total number of relations from A to B.
12. Find the domain and the range of following functions:
 - a. $f(x) = |x - 3|$
 - b. $f(x) = \frac{1}{\sqrt{3x - 4}}$ **HOTS**
 - c. $f(x) = \frac{3}{2 - x^2}$
 - d. $f(x) = x^2 + 6$
 - e. $f(x) = \sqrt{16 - x^2}$
 - f. $f(x) = \sqrt{x^2 - 1}$
 - g. $R = \{(x, y) : x, y \in N, x^2 + y^2 \leq 40\}$
13. If $f(x) = x^2 + \frac{1}{x^2}$ then show that $f(a) = f(1/a)$ and also evaluate $f(3/2) - f(2/3)$
14. Redefine the function $f(x) = |x - 1| + |x + 2|$ for $-3 \leq x \leq 3$.
15. If $R = \{(a, b) : a \in A \text{ and } b \in B\}$ be a relation from A to B, defined by $a + 2b = 8$, where A and B are the set of natural numbers, then write R as an ordered pair and also find the domain and range. Also find R^{-1} .
16. A function f is defined from the set of natural numbers to the set of real numbers as

$$f(x) = \begin{cases} x^2, & \text{if } 1 \leq x < 5 \\ x + 3, & \text{if } 5 \leq x < 8 \\ \frac{x-3}{2}, & \text{if } 8 \leq x \leq 11 \end{cases}$$

Write the function in roster form and also find its domain and range. Express f in arrow diagram.

17. A function f is defined by $f(x) = x^2 - 5$. Find $f(-4)$. Also find the pre-images of 44 under ' f '. what is $f \circ f(x)$.

18. Let $A = \{1, 2, 3, 4\}$, $B = \{-1, 0, 1\}$ and $C = \{3, 4\}$ then verify the following:

a) $A \times (B \cup C) = (A \times B) \cup (A \times C)$

b) $A \times (B - C) = (A \times B) - (A \times C)$

c) $A \times (B \cap C) = (A \times B) \cap (A \times C)$

19. If $f(x) = x^2 + 10$ and $g(x) = 2x - 6$ are two real functions find $f + g$, $f - g$, fg , f/g .

20. If $f(x) = \begin{cases} x^2, & \text{when } x < 0 \\ x, & \text{when } 0 \leq x \leq 1 \\ \frac{1}{x}, & \text{when } x \geq 1 \end{cases}$. Find (i) $f(\frac{1}{4})$, (ii) $f(2)$, (iii) $f(1)$, (iv) $f(-3)$.

Is f a function?

21. Let $A = \{2, 3, 4, 5, 6, 7, 8, 9\}$. Let R be the relation on A defined by

$$R = \{(x, y) : x, y \in A \text{ and } x \text{ divides } y\}, \text{ find } R, \text{ domain, range and inverse of } R.$$

22. Let $A = \{1, 2, 3, 4\}$. The function $f : A \rightarrow A$ and $g : A \rightarrow A$ are defined in the table given below.

x	1	2	3	4
$f(x)$	3	2	4	1
$g(x)$	4	3	2	2

Find the value of x , for which $(f \circ g)(x) = (g \circ f)(x)$. **HOTS**

23. Define the following functions and draw the graph in the indicated intervals:

a) Modulus function in $[-4, 4]$

b) Signum function in $[-6, 6]$

c) Greatest integer function in $[-3, 4]$

ANSWERS:

1. a) $x = 1, 2$; $y = 2, 3$.

b) $x = 9$; $y = 5$.

c) $x = 2$; $y = \frac{1}{2}$

2. a) $D_f = \mathbb{R} - \{1\}$

b) $D_f = \mathbb{R} - \{2, 3\}$

c) $D_f = \mathbb{R} - \{1, -2\}$.

7. 16

9. ± 2

10. 15

11. $B \times A = \{(3, 1), (3, 2), (3, 3), (5, 1), (5, 2), (5, 3)\}; 64$.

12.

a. $D_f = \mathbb{R}$; Range = $[0, \infty)$

b. $D_f = (\frac{4}{3}, \infty)$; Range = $(0, 1)$

c. $D_f = \mathbb{R} - \{-\sqrt{2}, \sqrt{2}\}$; Range = $]-\infty, 0] \cup]\frac{3}{2}, \infty[$

d. $D_f = \mathbb{R}$; Range = $[6, \infty)$

e. $D_f = [-4, 4]$; Range = $[0, 4]$

f. $D_f = \mathbb{R} - (-1, 1)$; Range = $[0, \infty)$

g. $D_f = \{1, 2, 3, 4, 5, 6\} = \text{Range}$

13. 0

14. $R = \{(6,1), (4,2), (2,3)\}$; $D_R = \{6, 4, 2\}$; Range = $\{1, 2, 3\}$; $R^{-1} = \{(1,6), (2,4), (3,2)\}$

15. $f = \{(1,1), (2,4), (3,9), (4,16), (5,8), (6,9), (7,10), (8, 5/2), (9,3), (10, 7/2), (11,4)\}$.

$D_f = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11\}$; Range = $\{1, 5/2, 3, 7/2, 4, 8, 9, 10, 16\}$.

16. $f(-4) = 11$; $x = \pm 7$; $f \circ f(x) = x^4 - 10x^2 + 20$.

17.

18. $(f + g)(x) = (x+2)^2$;

$(f - g)(x) = x^2 - 2x + 16$;

$(f \cdot g)(x) = 2x^3 - 6x^2 + 20x - 60$;

$\frac{f}{g}(x) = \frac{x^2+10}{2x-6}, x \neq 3$.

19. (i) $1/4$

(ii) $1/2$

(iii) 1

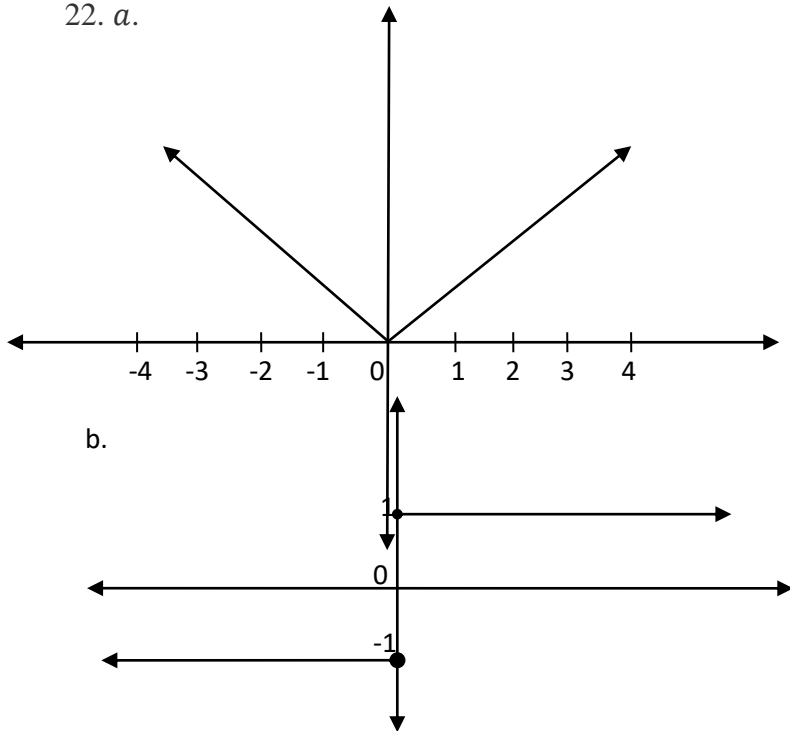
(iv) 9; Yes.

20. $R = \{(2,2)(2,4)(2,6)(2,8)(3,3)(3,6)(3,9)(4,4)(4,8)(5,5)(6,6)(7,7)(8,8)(9,9)\}$;

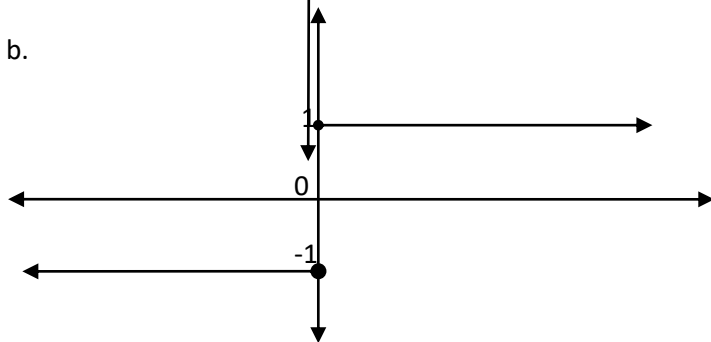
$D_f = \{2, 3, 4, 5, 6, 7, 8, 9\} = \text{Range}$.

21. $x = 3$.

22. a.



b.



c.

