



## MATHEMATICS OF CLASS XI

### CHAPTER -2 RELATION AND FUNCTIONS

#### VERY SHORT ANSWER TYPE – 1 MARK QUESTIONS

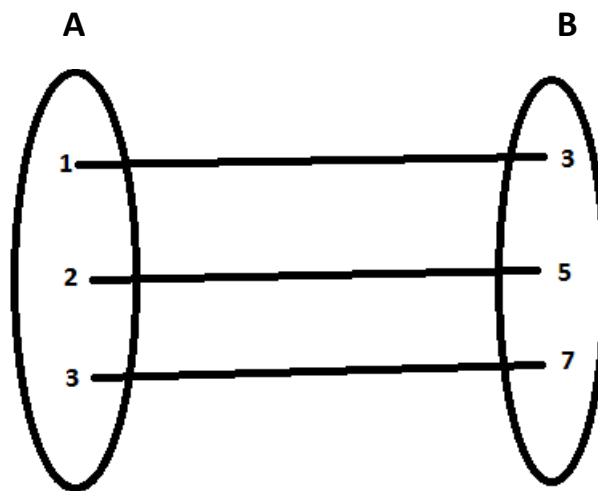
- Find  $x$  and  $y$  if
  - $(x^2 - 3x, y^2 - 5y) = (-2, -6)$
  - $(x + y, x - y) = (14, 4)$
  - $(11, 3x - y) = (5x + 2y, 11/2)$
- Let  $A = \{1, 2, 3, 4\}$ ,  $B = \{1, 5, 9, 11, 15, 16\}$  and  $f = \{(1, 5), (2, 9), (3, 1), (4, 5), (2, 11)\}$ 
  - Is  $f$  a relation from  $A$  to  $B$ ? Why?
  - Is  $f$  a function from  $A$  to  $B$ ? Why?
- Find the domain of the following functions:
  - $f(x) = \frac{x^2 - 1}{x - 1}$
  - $f(x) = \frac{3x + 1}{x^2 - 5x + 6}$
  - $f(x) = \frac{2x - 3}{(x - 1)(x + 2)}$
- 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  $+3$ .
- Let  $A = \{1, 2, 3\}$ ,  $B = \{3, 4\}$ ; and  $C = \{4, 5, 6\}$ . Find  $(A \times B) \cup (A \times C)$ .
- If  $P = \{1, 0\}$ , form the set  $P \times P \times P$ .
- Let  $A = \{1, 2\}$  and  $B = \{3, 4\}$ . Find the number of relation from  $A$  to  $B$ .
- 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  $R$ .
- Find the set of values of  $x$  for which real function  $f(x) = 2x^4 - 16$  and  $g(x) = x^4$  are equal.



10. A and B are two sets having 3 and 5 elements respectively and having 2 elements in common. Find the number of elements in  $A \times B$ .
11. Write the function given by the sum of identity function and reciprocal function.

### SHORT ANSWER TYPE – 4 MARK QUESTIONS

12. 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 relation from A to B.
13. In given figure write the relation in



- (i) Set-builder form      (ii) Roster form. Also write the domain and the range.

14. Find the domain and the range of following functions:

a.  $f(x) = |x - 3|$



b.  $f(x) = \frac{1}{\sqrt{3x-4}}$

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.  $R = \{(x, y) : x, y \in N, x^2 + y^2 \leq 20\}$

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. If  $f(x) = x^2 + \frac{1}{x^2}$  then show that  $f(a) = f(1/a)$  and also evaluate  $f(3/2) - f(2/3)$

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

19. 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)  $A \times (B \cap C) = (A \times B) \cap (A \times C)$

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

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

Is  $f$  a function?

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

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

23. Let  $R$  be a relation from  $N$  to  $N$  defined by  $R = \{(x,y) : x,y \in N \text{ and } y = x^2\}$ .

(i)  $(x,x) \in R \forall x \in N$

(ii)  $(a,b) \in R \Rightarrow (b,a) \in R, \forall a,b \in N$

(iii)  $(a,b) \in R, (b,c) \in R \Rightarrow (a,c) \in R, \forall a,b,c \in N$

(iv) Is the relation a function?

24. 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  $(f \circ g)(x) = (g \circ f)(x)$ .

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



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- a) Modulus function in  $[-4, 4]$
- b) Signum function in  $[-6, 6]$
- c) Greatest integer function in  $[-3, 4]$