

Board – CBSE

Class – 11

Topic – Relations and Functions

### Very Short Answer Type Questions (1 Mark)

1. Find  $a$  and  $b$  if  $(a - 1, b + 5) = (2, 3)$  If  $A = \{1,3,5\}$ ,  $B = \{2,3\}$  find: (Question-2, 3)

2.  $A \times B$

3.  $B \times A$

Let  $A = \{1,2\}$ ,  $B = \{2,3,4\}$ ,  $C = \{4,5\}$ , find (Question- 4,5)

4.  $A \times (B \cap C)$

5.  $A \times (B \cup C)$

6. If  $P = \{1,3\}$ ,  $Q = \{2,3,5\}$ , find the number of relations from  $A$  to  $B$

7. If  $A = \{1,2,3,5\}$  and  $B = \{4,6,9\}$ ,  $R = \{(x, y) : |x - y| \text{ is odd, } x \in A, y \in B\}$  Write  $R$  in roster form

Which of the following relations are functions. Give reason. (Questions 8 to 10)

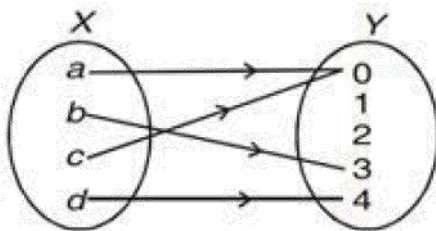
8.  $R = \{(1,1), (2,2), (3,3), (4,4), (4,5)\}$

9.  $R = \{(2,1), (2,2), (2,3), (2,4)\}$

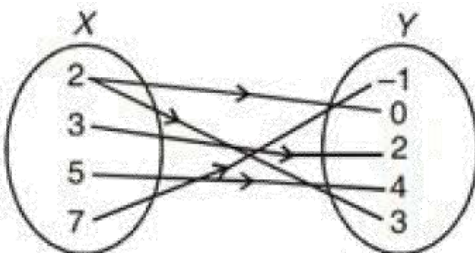
10.  $R = \{(1,2), (2,5), (3,8), (4,10), (5,12), (6,12)\}$

Which of the following arrow diagrams represent a function? Why? (Question- 1,12)

11.



12.



Let  $f$  and  $g$  be two real valued functions, defined by,  $f(x) = x^2$ ,  $g(x) = 3x + 2$ , find: (Question 13 to 16)

13.  $(f + g)(-2)$

14.  $(f - g)(1)$

15.  $(fg)(-1)$

16.  $\left(\frac{f}{g}\right)(0)$

17. If  $f(x) = x^3$ , find the value of,

$$\frac{f(5) + f(1)}{5 - 1}$$

18. Find the domain of the real function,  $f(x) = \sqrt{x^2 - 4}$

19. Find the domain of the function,  $f(x) = \frac{x^2 + 2x + 3}{x^2 - 5x + 6}$  Find the range of the following functions,

(Question- 20,21)

20.  $f(x) = \frac{1}{1-x^2}$

21.  $f(x) = x^2 + 2$

22. Find the domain of the relation,  $R = \{(x, y) : x, y \in \mathbb{Z}, xy = 4\}$

Find the range of the following relations: (Question-23, 24)

23.  $R = \{(a, b) : a, b \in \mathbb{N} \text{ and } 2a + b = 10\}$

24.  $R = \left\{\left(x, \frac{1}{x}\right) : x \in \mathbb{Z}, 0 < x < 6\right\}$

### Short Answer Type Questions (4 Marks)

25. Let  $A = \{1, 2, 3, 4\}$ ,  $B = \{1, 4, 9, 16, 25\}$  and  $R$  be a relation defined from  $A$  to  $B$  as,

$$R = \{(x, y) : x \in A, y \in B \text{ and } y = x^2\}$$

- Depict this relation using arrow diagram.
- Find domain of  $R$ .
- Find range of  $R$ .
- Write co-domain of  $R$ .

26. Let  $R = \{(x, y) : x, y \in \mathbb{N} \text{ and } y = 2x\}$  be a relation on  $\mathbb{N}$ . Find:

- Domain
- Codomain
- Range
- Is this relation a function from  $\mathbb{N}$  to  $\mathbb{N}$ ?

27. Let  $f(x) = \begin{cases} x^2, & \text{when } 1 \leq x \leq 2 \\ 2x, & \text{when } 2 \leq x \leq 5 \end{cases}$

$$g(x) = \begin{cases} x^2, & \text{when } 1 \leq x \leq 3 \\ 2x, & \text{when } 3 \leq x \leq 5 \end{cases}$$

Show that  $f$  is a function while  $g$  is not a function.

28. Find the domain and range of,  $f(x) = |2x - 3| - 3$

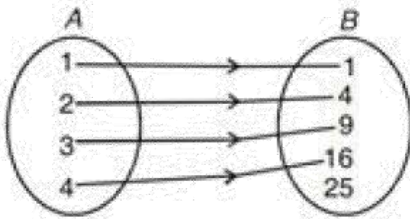
29. Draw the graph of the Greatest Integer function

30. Draw the graph of the Constant function,  $f: \mathbb{R} \rightarrow \mathbb{R}; f(x) = 2 \forall x \in \mathbb{R}$ . Also find its domain and range.

### Answer

1.  $a = 3, b = -2$
2.  $A \times B = \{(1,2), (1,3), (3,2), (3,3), (5,2), (5,3)\}$
3.  $B \times A = \{(2,1), (2,3), (2,5), (3,1), (3,3), (3,5)\}$
4.  $\{(1,4), (2,4)\}$
5.  $\{(1,2), (1,3), (1,4), (1,5), (2,2), (2,3), (2,4), (2,5)\}$
6.  $26 = 64$
7.  $R = \{(1,4), (1,6), (2,9), (3,4), (3,6), (5,4), (5,6)\}$
8. Not a function because 4 has two images.
9. Not a function because 2 does not have a unique image.
10. Function
11. Function
12. Not a function
13. 0
14. -4
15. -1
16. 0
17. 31
18.  $(-\infty, -02] \cup [2, \infty)$
19.  $\mathbb{R} - \{2,3\}$
20.  $(-\infty, 0) \cup [1, \infty)$
21.  $[2, \infty)$
22.  $\{-4, -2, -1, 1, 2, 4\}$
23.  $\{2, 4, 6, 8\}$
24.  $\left\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}\right\}$

25. a.



b.  $\{1,2,3,4\}$

c.  $\{1,4,9,16\}$

d.  $\{1,4,9,16,25\}$

26. i.  $\mathbb{N}$

ii.  $\mathbb{N}$

iii. Set of even natural numbers

yes,  $R$  is a function from  $\mathbb{N}$  to  $\mathbb{N}$ .

28. Domain is  $\mathbb{R}$

Range is  $[-3, \infty)$

30. Domain =  $\mathbb{R}$

Range =  $\{2\}$