Class 11 Solutions Chapter 2 Relations Ex 2.3 Q6

We have,

$$(x, y) \in R \Leftrightarrow x + 2y = 8$$

Now,

$$x + 2y = 8$$

$$\Rightarrow \quad x = 8 - 2y$$

Putting $y = 1, 2, 3$, we get $x = 6, 4, 2$ respectively

For $y = 4$, we get $x = 0 \notin N$

Also, for $y > 4$, $x \notin N$

$$\therefore \quad R = \{(6, 1), (4, 2), (2, 3)\}$$

Thus,

$$R^{-1} = \{(1, 6), (2, 4), (3, 2)\}$$

$$\Rightarrow \quad R^{-1} = \{(3, 2), (2, 4), (1, 6)\}$$

Class 11 Solutions Chapter 2 Relations Ex 2.3 Q7

We have,

$$A = \{3, 5\}, \quad B = \{7, 11\}$$

and, $R = \{(a, b) : a \in A, b \in B, a - b \text{ is odd}\}$

For the elements of the given sets A and B, we find that

$3 - 7 = -4$, $3 - 11 = -8$, $5 - 7 = -2$ and $5 - 11 = -6$

$$\therefore \quad (3, 7) \notin R, \ (3, 11) \notin R, \ (5, 7) \notin R \text{ and } (5, 11) \notin R,$$

Thus, R is an empty relation from A into B.

Class 11 Solutions Chapter 2 Relations Ex 2.3 Q8

We have,

$$A = \{1, 2\} \text{ and } B = \{3, 4\}$$

$$\therefore \quad n(A) = 2 \text{ and } n(B) = 2$$

$$\Rightarrow \quad n(A) \times n(B) = 2 \times 2 = 4$$

$$\Rightarrow \quad n(A \times B) = 4 \qquad [\because n(A \times B) = n(A) \times n(B)]$$

So, there are $2^4 = 16$ relations from A to B. $\left[\begin{array}{l} \because n(x) = a, n(y) = b \\ \Rightarrow \text{Total number of relations} = 2^{ab} \end{array}\right]$

Class 11 Solutions Chapter 2 Relations Ex 2.3 Q9

(i) We have,

$$R = \{(x, x+5) : x \in \{0,1,2,3,4,5\}\}$$

For the elements of the given sets, we find that

$$R = \{(0,5), (1,6), (2,7), (3,8), (4,9), (5,10)\}$$

Clearly, Domain$(R) = \{0,1,2,3,4,5\}$ and Range$(R) = \{5,6,7,8,9,10\}$

(ii) We have,

$$R = \{(x, x^3) : x \text{ is a prime number less than } 10\}$$

For the elements of the given sets, we find that

$$x = 2,3,5,7$$

$\therefore$ $(2,8) \in R$, $(3,27) \in R$, $(5,125) \in R$ and $(7,343) \in R$

$\Rightarrow$ $R = \{(2,8), (3,27), (5,125), (7,343)\}$

Clearly, Domain$(R) = \{2,3,5,7\}$ and Range$(R) = \{8,27,125,343\}$

Class 11 Solutions Chapter 2 Relations Ex 2.3 Q10

(i) We have,

$$R = \{(a,b) : a \in N,\ a < 5,\ b = 4\}$$

$\Rightarrow$ $a = 1,2,3,4$ and $b = 4$

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

Clearly, Domain$(R) = \{1,2,3,4\}$ and Range$(R) = \{4\}$

(ii) We have,

$$S = \{(a,b) : b = |a-1|,\ a \in z \text{ and } |a| \le 3\}$$

$\Rightarrow$ $a = -3,\ -2,\ -1,\ 0,\ 1,\ 2,\ 3$

For $a = -3,-2,-1,0,1,2,3$ we get
$b = 4,3,2,1,0,1,2$ respectively

Thus, $S = \{(-3,4), (-2,3), (-1,2), (0,1), (2,1), (3,2)\}$

Domain$(S) = \{-3,-2,-1,0,1,2,3\}$ and
Range$(R) = \{0,1,2,3,4\}$

********** END **********