4. Find the domain and range of the relation

$$R$$

given by $R = \{(x, y): y = x + \frac{6}{x};$ where $x, y \in N$ and $x < 6\}$.

Ans: Given: A relation

$$R$$

.

Domain and range are values of x and y for which relation is defined.

R is defined only for $x = \{1, 2, 3\}, y \in N$

$\therefore$ Domain of $R = \{1, 2, 3\}$

for, $x = 1, y = 7,$

$x = 2, y = 5,$

$x = 3, y = 5$.

$\therefore$ Range of $R = \{7, 5\}$.

8.If

$$R2 = \{(x, y) | x \text{ and } y \text{ are integers and } x^2 + y^2 = 64\}$$

is a relation, then find the value of

$$R2.$$

Ans: Given: A relation

$$R2 = \{(x, y) || \text{ x and y are integers and } x^2 + y^2 = 64\}$$

.

Use the given condition in a relation and then write the set in roster form.

Since,

$$64$$

is the sum of square of

$$0 \text{ and } \pm 8.$$

$\Rightarrow$ when $x = 0$, then $y^2 = 64,$

$\Rightarrow y = \pm 8$

$\Rightarrow x = 8$, then $y^2 = 64 - (8)^2 = 0$

$\Rightarrow x = -8$, then $y^2 = 64 - (-8)^2 = 0$

$\therefore R2 = \{(0, 8), (0, -8), (8, 0), (-8, 0)\}$

9.If

$$R_3 = \{(x, |x|) | x\}$$

is a real number is a relation, then find domain and range of

$$R_3.$$

Ans: Given: A relation

$$R_3 = \{(x, |x|) | x\}$$

is a real number.

The value of

$$x$$

represents the domain and the values of

y for all x.

Domain of

$$R_3 = \text{real number} \ .$$

Since, the image of any real number under

$$R_3$$

is a positive real number or zero.

Range of

$$R_3 = R^+ \cup \{0\} or (0, \infty).$$

38.The ordered pair

$$(5, 2)$$

belongs to the relation

$$R = \{(x, y) : y = x - 5, x, y \in Z\}.$$

Ans: Given: Ordered pair

$$(5, 2).$$

Relation

$$R = \{(x, y) : y = x - 5, x, y \in Z\}.$$

The ordered pair must satisfy the relation.

$R = \{(x, y) : y = x - 5, x, y \in Z\}$

If $x = 5$, then

$y = 5 - 5 = 0.$

Hence,

$$(5, 2)$$

does not belong to

$$R.$$

24. Let

$$n(A) = m \text{ and } n(B) = n.$$

Then, total number of non-empty relations that can be defined from

$$A \text{ to } B$$

is

(A).

$$m^n$$

(B).

$$n^m - 1$$

(C).

$$mn - 1$$

(D).

$$2^{mn} - 1$$

Ans: Given:

$$n(A) = m \text{ and } n(B) = n.$$

First, find the number of elements in

$$A \times B$$

and then find the number of relation by using

$$2^{m(A \times B)} - 1.$$

We have,

$n(A) = m$ and $n(B) = n$

$n(A \times B) = n(A) . n(B)$

$n(A \times B) = mn$

Total number of relations from

$$A \text{ to } B = 2^{mn} - 1.$$

Correct Answer: D