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PGT (MATHS)

EXERCISE-2.2

1. Let $A = \{1,2,3, \ldots, 14\}$. Define a relation R from A to A by $R = \{(x, y): 3x - y = 0, \text{where } x, y \in A\}$. Write down its domain, codomain and range. [Ex.-2.2 Q.1]

Solution:

The given set is

$A = \{1, 2, 3, \ldots, 14\}$ and the relation R is

$R = \{(x, y): 3x - y = 0, \text{where } x, y \in A\}$

$R = \{(x, y): y = 3x, \text{where } x, y \in A\}$

$R = \{(1, 3), (2,6), (3,9), (4,12)\}$

Now,

Domain$= \{1, 2, 3, 4\}$

Range$= \{3, 6, 9, 12\}$

Codomain$= \{1, 2, 3, \ldots, 14\} = A$

2. Let $A = \{1, 2, 3, 5\}$ and $B = \{4, 6, 9\}$. Define a relation R from A to B by $R = \{(x, y): \text{the difference between } x \text{ and } y \text{ is odd};\ x \in A, y \in B\}$. Write R in roster form. [Ex.-2.2 Q.3]

Solution:

The given sets are

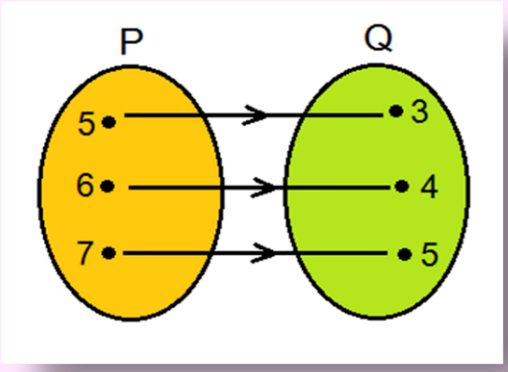
$A = \{1, 2, 3, 5\}$ and $B = \{4, 6, 9\}$ and the relation R is given by

$R = \{(x, y): \text{the difference between } x \text{ and } y \text{ is odd};\ x \in A, y \in B\}$.

$= \{(x, y): |x - y| = \text{odd};\ x \in A, y \in B\}$.

$= \{(1,4), (1, 6), (2, 9), (3, 4), (3,6), (5, 4), (5, 6)\}$.

3. The Figure shows a relationship between the sets P and Q. Write this relation (i) in set-builder form (ii) roster form. What is its domain and range? [Ex.-2.2 Q.4]



Solution:

The given sets are

$P = \{5, 6, 7\}$ and $Q = \{3, 4, 5\}$

(i) $R = \{(x, y):\ x - y = 2 \text{ where } x \in P, y \in Q\}$.

(ii) $R = \{(5, 3), (6, 4), (7, 5)\}$.

Domain $= \{5, 6, 7\}$

Range$= \{3, 4, 5\}$

4. Let $A = \{1, 2, 3, 4, 6\}$. Let R be the relation in A defined by

$\{(a, b): a \in A, b \in A$ and a divides $b\}$

Find: (i) R (ii) Domain of R (iii) Range of R. [Ex.-2.2 Q.5]

Solution:

Given, $A = \{1, 2, 3, 4, 6\}$

Therefore,

(i) $R = \{(a, b): a \in A, b \in A$ and a divides $b\}$

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

(ii) Domain $(R) = \{a: (a, b) \in R\} = \{1, 2, 3, 4, 6\}$

(iii) Range $(R) = \{b: (a, b) \in R\} = \{1, 2, 3, 4, 6\}$

5. Write the relation $R = \{(x, x^3): x$ is a prime number less than $10\}$ in roster form. [Ex.-2.2 Q.7]

Solution:

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

$= \{(x, x^3): x = 2, 3. 5, 7\}$

$= \{(2, 2^3), (3, 3^3), (5, 5^3), (7, 7^3)\}$

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