CHAPTER - 2 RELATIONS AND FUNCTIONS

EXERCISE :- 2.1

(Q.1). $\because \left(\frac{x}{3}+1,\ y-\frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$

$\therefore$ Corresponding Terms must be equal.

$\Rightarrow \frac{x}{3}+1 = \frac{5}{3}$ and $y - \frac{2}{3} = \frac{1}{3}$

$\frac{(x+3)}{3} = \frac{5}{3}$ $\quad$ $y = \frac{2}{3}+\frac{1}{3}$

$x+3 = 5$ $\quad$ $y = \frac{3}{3}$

$\boxed{x = 2}$ $\quad$ $\boxed{y = 1}$

(Q.2). $n(A) = 3$, $n(B) = 3$

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

$= 3 \times 3$

$\Rightarrow n(A.B) = 9$

$\therefore$ No. of elements in $(A.B) = 9$.

(Q.3). $G = \{7, 8\}$, $H = \{5, 4, 2\}$

$G \times H = \{(7,5), (7,4), (7,2), (8,5), (8,4), (8,2)\}$

$H \times G = \{(5,7), (5,8), (4,7), (4,8), (2,7), (2,8)\}$

(Q.4). (i). False.

Correct statement :- If $P = \{m, n\}$ and $Q = \{n, m\}$, then $P \times Q = \{(m,n), (m,m), (n,m), (n,n)\}$

(ii). True.

(iii). True.

Q.5). $A = \{-1, 1\}$

$A \times A \times A = \{-1, 1\} \times \{-1, 1\} \times \{-1, 1\}$

$= \{(-1,-1,-1), (-1,-1,1), (-1,1,-1)$
$(-1,1,1), (1,-1,-1), (1,-1,1),$
$(1,1,-1), (1,1,1)\}$

Q.6). $\because$ elements of $(A.B)$ are in pair.

$\therefore n(A) = 2$

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

$4 = 2 \times n(B)$

$2 = n(B)$

$\Rightarrow$ no. of elements in $B = 2$

$\because$ A is multiplied by B.

$\therefore$ 1 element must belong to A & 2nd to B.

$\Rightarrow A = \{a, b\}$ & $B = \{x, y\}$

Q.7). $A = \{1, 2\}$, $B = \{1, 2, 3, 4\}$, $C = \{5, 6\}$

$D = \{5, 6, 7, 8\}$

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

$= \{1, 2\} \times \phi$

$= \phi \quad \Rightarrow A \times (B \cap C) = \phi \quad \ldots (i)$

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

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

$\cap \{(1,5), (1,6), (2,5), (2,6)\}$

$= \phi$

$\because A \times (B \cap C) = (A \times B) \cap (A \times C) = \phi$

Thus proved.

(iii). $(A \times C)$

$= \{1, 2\} \times \{5, 6\}$

$= \{(1, 5), (1, 6), (2, 5), (2, 6)\}$

$(B \times D)$

$= \{1, 2, 3, 4\} \times \{5, 6, 7, 8\}$

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

$\because (B \times D) \cap (A \times C) = (A \times C)$

$\Rightarrow$ $B \times D$ contains all the elements of $(A \times C)$

$\therefore (A \times C) \subset (B \times D)$.

Q.8) $n(A.B) = n(A) \cdot n(B)$
$= 2 \times 2 = 4$

no. of subsets of $(A.B) = 2^n = 2^4 = 16$

$(A.B) = \{1, 2\} \times \{3, 4\}$
$= \{(1,3), (1,4), (2,3), (2,4)\}$

Subsets of $(A.B) = \phi, \{(1,3)\}, \{(1,4)\}, \{(2,3)\}$
$\{(2,4)\}, \{(1,3), (1,4)\}, \{(1,3), (2,3)\}$
$, \{(1,3), (2,4)\}, \{(1,3), (1,4), (2,3)\}$
$, \{(1,3), (1,4), (2,4)\}, \{(1,3), (2,3), (2,4)\}$
$, \{(1,4), (2,3), (2,4)\}, \{(1,4), (2,3)\}$
$, \{(1,4), (2,4)\}, \{(2,3), (2,4)\},$
$\{(1,3), (1,4), (2,3)\ (2,4)\}$

Scanned with CamScanner

your writing partner

Exercise :- 2.2

(Q.9) $\because n(A) \times n(B) = 3$ & x, y and z are 3 distinct elements.

$\therefore A = \{x, y, z\}$

& $B = \{1, 2\}$

(Q.10). $n(A) \times n(A) = 9$

$n^2(A) = 9$

$n(A) = 3$

$\because 1, 0, -1$ are 3 different numbers found in the product of A, A.

$\therefore A = \{-1, 0, +1\}$

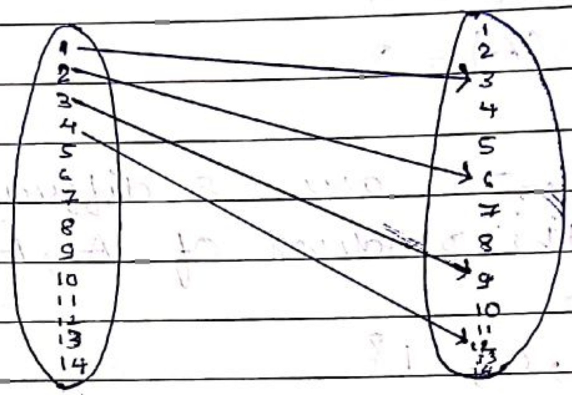
$A \times A = \{1, 0, -1\} \cdot \{1, 0, -1\}$

$= \{(1, 1), (1, 0), (1, -1), (0, 1), (0, 0), (0, -1), (-1, 1), (-1, 0), (-1, -1)\}$

EXERCISE :- 2.2

Q.1. if $x = 1$, $y = 1 \times 3 = 3$ $(x, y \in A)$
$x = 2$, $y = 2 \times 3 = 6$ $(x, y \in A)$
$x = 3$, $y = 3 \times 3 = 9$ $(x, y \in A)$
$x = 4$, $y = 4 \times 3 = 12$ $(x, y \in A)$
$x = 5$, $y = 5 \times 3 = 15$ $(x \in A, y \notin A)$

$\therefore$



Domain = $\{1, 2, 3, 4\}$
Codomain = $\{1, 2, 3, \ldots, 14\}$
Range = $\{3, 6, 9, 12\}$

Q.2. $R = \{(1, 6), (2, 7), (3, 8)\}$

Domain = $\{1, 2, 3\}$
Range = $\{6, 7, 8\}$

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

Q.4. $R = \{(x, y) : x = y + 2, 2 < y < 6\}$
$R = \{(5, 3), (6, 4), (7, 5)\}$

Domain = $\{5, 6, 7\}$
Range = $\{3, 4, 5\}$

Q.5 (i). $R = \{1, 2, 3, 4, 6\}$

(ii). Domain $= \{$ ~~0,1,2~~ $1, 2, 3, 4, 6\}$

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

Q.6. domain $= \{0, 1, 2, 3, 4, 5\}$

Range $= \{5, 6, 7, 8, 9, 10\}$

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

Q.8. $n(A.B) = n(A) \cdot n(B)$

$= 2 \times 3 = 6$

no. of relations between A & B $=$ ~~n(A.B)~~ 2^n

$(n = n(A.B)) = \underline{\underline{2^6}}$

Q.9. Range of $R = Z$.

Domain ~~Range~~ of $R = Z$;

EXERCISE :- 2.3

Q.1. (i). {(2,1), (5,1), (8,1), (11,1), (14,1), (17,1)}
Yes.
Domain = {2, 5, 8, 11, 14, 17}
Range = {1}

(ii). Yes.
Domain = {2, 4, 6, 8, 10, 12, 14}
Range = {1, 2, 3, 4, 5, 6, 7}

(iii). NO. Because there is no definite relation between x, y and x & ~~no~~ ~~of~~ successing x.

Q.2. (i). Domain = R
Range = [-∞, 0)

(ii). Domain = ~~{-3, -2, -1, 0, 1, 2, 3}~~ [-3, 3]
Range = [-3, 3]

Q.3. (i). $f(0)$: (i.e. when $x=0$)
$f(0) = 2 \times 0 - 5 = -5$

(ii). $f(7)$
$f(7) = 2 \times 7 - 5 = 14 - 5 = 9$

(iii). $f(-3)$
$f(-3) = 2 \times (-3) - 5 = -6 - 5 = -11$

Q.4). (i). $t(0)$:- $\left[t(c) = \frac{9c}{5} + 32 \right]$
$t(0) = \frac{9 \times 0}{5} + 32 = 32$

(ii). $t(28)$

$t_{(28)} = \frac{9 \times 28}{5} + 32$

$= 9 \times 5.6 + 32$

$= 50.4 + 32 = 82.4$

(iii). $t(-10)$

$t(-10) = \frac{9 \times \cancel{(-10)}^{-2}}{\cancel{5}} + 32$

$= -18 + 32$

$= 14$

(iv). $t(c) = 212$

$212 = \frac{9c}{5} + 32$

$212 - 32 = 9c/5$

$\frac{\cancel{180}^{20} \times 5}{\cancel{9}} = c \Rightarrow \boxed{c = 100}$

Q.5) (i). Range $= (-\infty, 0]$.

(ii). Range $= [2, \infty)$.

(iii). Range $= 0$.