CW
4/7/2021

Ch-6

Date
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Sets

Q1.) Write the following sets in roster (Tabular) form

(i) $A_1 = \{x : 2x+3 = 11\}$

$\therefore 2x + 3 = 11$

$\Rightarrow 2x = 11-3$

$\Rightarrow 2x = 8$

$\Rightarrow x = \frac{8}{2} \Rightarrow x = 4$

Given set in roster (Tabular) form is

$A_1 = \{4\}$

(ii) $A_2 = \{x : x^2 - 4x - 5 = 0\}$

$\therefore x^2 - 4x - 5 = 0$

$\Rightarrow x^2 - 5x + x - 5 = 0$

$\Rightarrow x(x-5) + 1(x-5) = 0$

$\Rightarrow (x-5)(x+1) = 0$

$\therefore$ Either $x-5=0$ or $x+1=0$

$\Rightarrow x = 5 \quad \Rightarrow x = -1$

$\therefore$ Given set in roster (Tabular) form is

$A_2 = \{5, -1\}$

(v) $A_5 = \{x : x = 4n, n \in W \text{ and } n < 4\}$

$\because x = 4n$

$\therefore$ when $n = 0$ $\quad x = 4 \times 0$

$\Rightarrow$ when $n = 1$ $\quad x = 0$

$\Rightarrow$ when $n = 2$ $\quad x = 4 \times 1$

$\Rightarrow$ when $n = 3$ $\quad x = 4$

$x = 4 \times 2$

$\therefore$ Given set in roster $\quad x = 8$

(Tabular) From is $\quad x = 8$

$A_5 = \{0, 4, 8, 12\}$ $\quad x = 4 \times 3$

$x = 12$

$n > 5\}$

(i) $B_1 = \{6, 9, 12, 15, \ldots\}$
$= \{x : x = 3n + 3 ; n \in N\}$

(ii) $B_2 = \{11, 13, 17, 19\}$
$= \{x : x$ is a prime number between 10 & 20

(iii) $B_3 = \left\{\frac{1}{3}, \frac{3}{5}, \frac{5}{7}, \frac{7}{9}, \frac{9}{11}, \ldots\right\}$

$= \left\{x : x = \frac{n}{n+2}$, where n is an odd natural no$\right\}$

(iv) $B_4 = \{8, 27, 64, 125, 216\}$
$= \{x : x = n^3 ; n \in N$ and $2 \leq n \leq 6\}$

(v) $B_5 = \{-5, -4, -3, -2, -1\}$
$= \{x : x \in Z, -5 \leq x \leq -1\}$

(vi) $B_6 = \{\ldots -6, -3, 0, 3, 6, \ldots\}$
$= \{x : x = 3n, n \in Z\}$

$= \{m, e, r, o, t\}$

(ii) The set of letters in the word 'UNIVERSAL'.

Ans → Roster Form of the set of letters in the word 'UNIVERSAL' $= \{U, n, i, v, e, r, s, a, l\}$

(iii) $A = \{x : x = y + 3, y \in N \text{ and } y > 3\}$

Ans → ~~$A = \{x : x = y + 3, y \in N \text{ and } y > 3\}$~~

$x = y + 3$

when $y = 4$

(iv) ~~$B = \{p : p \in W \text{ and } p^2 < 20\}$~~

when $y = 5$ $\quad x = 4 + 3 = 7$

when $y = 6$ $\quad x = 5 + 3 = 8$

when $y = 7$ $\quad x = 6 + 3 = 9$

when $y = 8$ $\quad x = 7 + 3 = 10$

$x = 8 + 3 = 11$

∴ Roster Form of the given set $A = \{7, 8, 9, 10, 11 \ldots\}$

(iv) $B = \{p : p \in W \text{ and } p^2 < 20\}$

Ans → when $p^2 = 0$

$p = \sqrt{0} = 0$

when $p^2 = 1$

$p = \sqrt{1} = 1$

(v) $C = \{x$

Ans → $5 <$

But w

$\therefore x = 6, 8$

∴ Roster

$16, 18,$

note: w

greater

called

Q6) List th

(i) $\{x : x^2$

$x^2 - 2$

$\Rightarrow x^2 - 3x$

$\Rightarrow x(x - 3$

$\Rightarrow (x + 1)($

∴ either

∴ elemen

3 and-

(ii) $\{x : x -$

$x = 24$

when y

$\frac{10}{2} > x$

$5 > x$

∴ Elements of the given set $\{x : 4-2x > -6, x \in Z\}$ are $4, 3, 2, 1, 0, -1 \ldots\ldots$

EXERCISE 6(B)

Q1) Find the cardinal number of the following sets:

(i) $A_1 = \{-2, -1, 1, 3, 5\}$.

Cardinal number of set $A_1 = 5$

(ii) $A_2 = \{x : x \in N \text{ and } 3 \leq x < 7\}$

$= \{3, 4, 5, 6\}$

∴ cardinal number of set $A_2 = 4$

(iii) $A_3 = \{p : p \in w \text{ and } 2p - 3 < 8\}$

$2p - 3 < 8$

$\Rightarrow 2p - 3 + 3 < 8 + 3$

Adding 3 to both sides)

$\Rightarrow 2p < 11$

$\Rightarrow p < \frac{11}{2}$ (Dividing both sides by 2)

$\Rightarrow p < 5.5$

$\therefore A_3 = \{0, 1, 2, 3, 4, 5\}$

$\therefore$ Cardinal number of set $A_3 = 6$

(iv) $A_4 = \{b : b \in z \text{ and } -7 < 3b - 1 \leq 2\}$

$-7 < 3B - 1$

$\Rightarrow -7 + 1 < 3b - 1 + 1$ (Adding 1 to both sides)

$\Rightarrow -6 < 3b$

$\Rightarrow \frac{-6}{3} < b$ (Dividing both sides by 3)

$\Rightarrow -2 < b$

Again $3b - 1 \leq 2$

$\Rightarrow 3b - 1 + 1 \leq 2 + 1$ (Adding 1 to both sides)

$\Rightarrow 3b \leq 3$

$\Rightarrow b \leq \frac{3}{3}$ (Dividing both sides by 3)

$\Rightarrow b \leq 1$

$\therefore -2 < b \leq 1$

$\therefore$ Given set $A_4 = \{-1, 0, 1\}$

$\therefore$ cardinal number of set $A_4 = 3$

3.) State which of the following sets are finite and which are infinite:

(i) $A = \{x : x \in Z \text{ and } x < 10\}$

$= \{\ldots\ldots, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$= \{9, 8, 7, 6, 5, 4, 3, 2, 1, 0, -1, -2, -3, -4, \ldots\ldots\}$

∴ It is an infinite set.

(ii) $B = \{x : x \in W \text{ and } 5x - 3 \leq 20\}$

$5x - 3 < 20$

$\Rightarrow 5x - 3 + 3 \leq 20 + 3$ (Adding 3 to both sides)

$\Rightarrow 5x \leq 20 + 3$

$\Rightarrow 5x \leq 23$

$\Rightarrow x \leq \frac{23}{5}$ (Dividing both sides by 5)

$\Rightarrow x \leq 4.6$

∴ $B = \{0, 1, 2, 3, 4\}$

∴ It is a finite set.

(iii) $P = \{y : y = 3x - 2, x \in N \text{ an } x > 5\}$

$y = 3x - 2$

when $x = 6$, $y = 3 \times 6 = 2 = 18 - 2 = 16$

when $x = 7$, $y = 3 \times 7 - 2 = 21 - 2 = 19$

~~when $x = 7$ $y = 3 \times 8 - 2 = 24 - 2 = 22$~~

when $x = 8$, $y = 3 \times 8 - 2 = 24 - 2 = 22$

when $x = 9$, $y = 3 \times 9 - 2 = 27 - 2 = 25$

∴ $P = \{16, 19, 22, 25, \ldots\ldots\}$

∴ It is an infinite set.

(iv) $M = \{M : M = \frac{3}{n}; n \in W \text{ and } 6 < n \leq 15\}$

$M = \frac{3}{n}$

when $n = 7$ $\quad M = \frac{3}{7}$

when $n=8$, $M = \frac{3}{8}$

when $n=9$, $M = \frac{3}{9}$

when $n=10$ $M = \frac{3}{10}$

when $n=11$ $M = \frac{3}{11}$

when $n=12$ $M = \frac{3}{12}$

when $n=13$ $M = \frac{3}{13}$

when $n=14$ $M = \frac{3}{14}$

when $n=15$ $M = \frac{3}{15}$

$\therefore M = \left\{\frac{3}{7}, \frac{3}{8}, \frac{3}{9}, \frac{3}{10}, \frac{3}{11}, \frac{3}{12}, \frac{3}{13}, \frac{3}{14}, \frac{3}{15}\right\}$

$\therefore$ It is a finite set.