Date :- 5 Sept, 21

Sets :-

It is a collection of well defined objects.

e.g → (i) List of all batsmans who scored 200+ in odi.

(ii) List of 5 Best teacher. X.

(iii) Collection of all teacher ✓

Set of all natural Natural No ≡ N

≡ {1, 2, 3, 4, ----}

- Set → Capital letter A, B, C
  → elements. { }

(J) ⟶ S ≡ {Jan, June, July}

(ii) Set of whole No. ≡ W

≡ {0, 1, 2, 3, 4, ----}

(iii) set of integers ≡ Z (I)

≡ {..., -3, -2, -1, 0, 1, 2, 3, 4, 5 ...}

(Z^-) (Z^+)

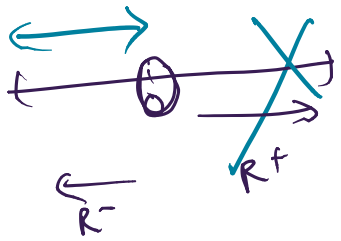
Non negative integer ≡ $Z - Z^-$

≡ $Z^+ \cup \{0\}$

≡ W

(iv) Set of all Real No. $\equiv$ R

$\equiv (-\infty, \infty)$



positive Real No $\equiv (0, \infty)$

Negative Real No $\equiv (-\infty, 0)$

Non-negative Real No $\equiv R^+ \cup \{0\}$

$\equiv [0, \infty)$

Non-positive Real No $\equiv R^- \cup \{0\}$

$\equiv (-\infty, 0]$

(v) Set of Rational No $\equiv Q$

$\left(\frac{p}{q}, p, q \in I, q \neq 0\right)$

Set of Irrational No $\equiv Q^c \equiv R - Q$

Quadratic eqn $= \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$D > 0$

$D = 0$

$D < 0$

$\sqrt{-2}$ → imaginary no.

Representation of set

$\{1, 2, 3, 4, 5 \cdots\}$ ⇒ Roaster form or Tabular form

$\{\frac{p}{q}, p, q \in Z, q \neq 0\}$ ⇒ set builder form.

Eg.

(1) Roaster form

(i) set of all vowels of Eng. Alpha.

$= \{a, e, i, o, u\}$

(ii) set of all even no.

$= \{2, 4, 6, 8, 10 \ldots\}$

$\downarrow \ \downarrow \ \downarrow \ \downarrow$

$n \ \ n \ \ n \ \ n$

Set-builder form

$\hookrightarrow \{x : \text{property}, \text{property condition}\}$

$\downarrow$

such that

$= \{x : x = 2n, n \in N\}$

$x = 2 \times 1 = 2$

$x = 2 \times 2 = 4$

6

(iii) set of all letter 'UNIVERSE'

$\{U, N, I, V, E, R, S\}$

(iv) set of all vowels of 'ALGEBRA'

$\{A, E\}$

(i) set of squares of integers.

(v) Set of squares of integers.

$\ldots \to -2, -1, 0, 1, 2, 3, 4 \ldots$

$\{0, 1, 4, 9, 16 \ldots\}$

$\{x : x = n^2, 1 \le n \le 3, n \in N\}$

(v) $\left\{x : x = \frac{n}{n^2+1}\right.$ & $\left. 1 \le n \le 3, n \in N \right\}$

$n = 1, 2, 3.$

$n=1, \quad x = \frac{1}{1+1} = \frac{1}{2}$

$n=2, \quad x = \frac{2}{4+1} = \frac{2}{5}$

$n=3, \quad x = \frac{3}{9+1} = \frac{3}{10}$

$S = \left\{\frac{1}{2}, \frac{2}{5}, \frac{3}{10}\right\}$

↳ Roaster form.

⇒ Set-builder.

$\left\{x : x = \frac{n}{n^2+1}, 1 \le n \le 3\right\}$

(vi) $\{x : x \in Z, x^2 < 20\}$ $-4, -3, -2, -1$ & $0, 1, 4, 9, 14, 5$

$\Rightarrow \{-4, -3, -2, -1, 0, 1, 2, 3, 4\}$ ✓

(vii) $S = \left\{x : x \text{ is integer}, -\frac{1}{2} < x < \frac{9}{2}\right\}$

$S = \{0, 1, 2, 3, 4\}$ ✓

(viii) $\{x : x = 1, 1 \le n \le 5\}$

$2n-1$

$n = 1, 2, 3, 4, 5$

$n=1, \; x = \frac{1}{2-1} = 1$

$n=2, \; x = \frac{1}{4-1} = \frac{1}{3}$

$n=3, \; x = \frac{1}{5}$

$n=4, \; x = \frac{1}{7}$

$n=5 \quad = \frac{1}{9}$

$\left\{1, \frac{1}{3}, \frac{1}{5}, \frac{1}{7}, \frac{1}{9}\right\}$

(ix) $\{a_n : n \in N, \; a_{n+1} = 3a_n \; \& \; a_1 = 1\}$

$a_{n+1} = 3a_n \quad \& \; a_1 = 1$

$\{a_1, a_2, a_3, a_4, a_5 \ldots\}$

$a_1 = 1$

$a_{n+1} = 3a_n$

$n=1, \; a_{n+1} = a_2 = 3a_1 = 3 \times 1 = 3$

$n=2, \; a_3 = 3a_2 = 3 \times 3 = 9$

$n=3, \; a_4 = 3 \times a_3 = 3 \times 9 = 27$

$\{1, 3, 9, 27, 81 \ldots\}$

(x) $\{a_n : n \in N, \; a_{n+2} = a_{n+1} + a_n, \; a_1 = a_2 = 1\}$

$\{a_1, a_2, a_3, a_4, a_5, a_6, a_7 \ldots\}$

$a_1 = 1$

$a_2 = 1$

$n=1, \; a_3 = a_2 + a_1 = 1 + 1 = 2$

$n=2, \; a_4 = a_3 + a_2 = 2 + 1 = 3$

$n=3,\ a_5 = a_4 + a_3 = 3+2 = 5$

$a_6 = a_5 + a_4 = 5+3 = 8$

$\{1, 1, 2, 3, 5, 8, 13, 21 \ldots\}$ → ∃ Fabo. series

(IST) → $\{a_n : n \in \{0, 1, 2, 3, 4, 5 \ldots\}, a_n = a_{n-1} a_{n-2} + 1,$ $n > 1$, $a_0 = a_1 = 1\}$

⇒ $\{a_1, a_2, a_3, a_4, a_5 \ldots\}$

$a_n = a_{n-1} a_{n-2} + 1$

$n=2$ $\quad a_2 = a_1 \times a_0 + 1$

$= 1 \times 1 + 1 = 2$

$a_3 = a_2 \times a_1 + 1$

$= 2 \times 1 + 1 = 3$

$a_4 = a_3 \times a_2 + 1 = 3 \times 2 + 1$

$= 7$

$a_5 = a_4 \times a_3 + 1 = 7 \times 3 + 1 = 22$

$\{1, 1, 2, 3, 7, 22, 155 \ldots\}$ Ans

Convert to set-builder form

(i) set all letters of PROBABILITY

↳ $\{x : x$ is a letter of PROBABILITY$\}$

$\{x \mid :$

$\{x :$ ⇒ such that

(II) set of all even natural no.

$\Rightarrow \{x : x = 2n,\ n \in N\}$

(III) set of all odd number

$\hookrightarrow \{x : x = 2n-1,\ n \in N\}$

(IV) $\{\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9}, \frac{9}{10}\}$

$\hookrightarrow \{x : x = \frac{n}{n+1},\ 1 \le n \le 9,\ n \in N\}$

or $n < 10,\ n \in N.$

Q $\{\frac{1}{1^2}, \frac{1}{2^2}, \frac{1}{3^2}, \frac{1}{4^2}, \frac{1}{5^2} \ldots\}$

$\Rightarrow \{x : x = \frac{1}{n^2},\ n \in N.\}$ ⟹ upto ...

$\{x : x = \frac{1}{n^2},\ n > 6,\ n \in N\}$ upto $\frac{1}{25}$

⇒ set of all positive number whose cube is odd.

$\{x : x = 2n-1,\ n \in N\}$ $(\text{odd})^3 = \text{odd} \times \text{odd} \times \text{odd}$

& $(\text{even})^3 = \text{even}$

Q → $\{0, 1, 1, 2, 3, 5, 8, 13, \ldots\}$

$\Rightarrow \{a_n : a_n = a_{n-1} + a_{n-2},\ n > 2,\ a_1 = a_2 = 1\}$