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SETS

PERIOD 2

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 6
CHAPTER NAME : SETS

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Learning outcome

Students will be able to know about cardinal number of a set ,types of sets

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Previous knowledge:

set-builder (Rule Method) form :

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

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

(*ii*) $B_3 = \left\{\frac{1}{3}, \frac{3}{5}, \frac{5}{7}, \frac{7}{9}, \frac{9}{11}, ...\right\}$

$= \left\{x : x = \frac{n}{n+2}\right.$, where n is an odd natural number$\}$

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

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Exercise- 6(B)

1) Find the cardinal number of the following sets :

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

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

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

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

Cardinal Number of a set; The number of elements in a set is called is Cardinal Number.

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

Cardinal number of set $A_1 = 5$

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

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

$\therefore$ 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*) $A_4 = \{b : b \in Z \text{ and } -7 < 3b - 1 \le 2\}$

$-7 < 3b - 1$

$\Rightarrow -7+1 < 3b-1+1$

(Adding 1 to both sides)

$\Rightarrow -6 < 3b$

$\Rightarrow -\frac{6}{3} < b$

(Dividing both sides by 3)

$\Rightarrow -2 < b$

Again $3b-1 \le 2$

$\Rightarrow 3b-1+1 \le 2+1$

(Adding 1 to both sides)

$\Rightarrow 3b \le 3$

$\Rightarrow b \le \frac{3}{3}$

(Dividing both sides by 3)

$\Rightarrow b \le 1$

$\therefore -2 < b \le 1$

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

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

Exercise- 6(B)

2) If P = {P : P is a letter in the word "PERMANENT"}. Find n (P).

Sol: P = (P : P is a letter in the word "PERMANENT"}

or P = {p, e, r, m, a, n, t)

n (P) = 7

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

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

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

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

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

Note : (i) A set with finite (limited) number of elements in it, is called a finite set, (ii) A set which is not finite is called an infinite set.

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Sol:

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

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

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

$\therefore$ It is an infinite set.

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

$5x - 3 \leq 20$

$\Rightarrow \quad 5x-3+3 \leq 20+3$

(Adding 3 to both sides)

$\Rightarrow \quad 5x \leq 20+3$

$\Rightarrow \quad 5x \leq 23$

$\Rightarrow \quad x \leq \frac{23}{5}$

(Dividing both sides by 5)

$\Rightarrow \quad x \leq 4.6$

$\therefore \quad B = \{0,1,2,3,4\}$

$\therefore$ It is a finite set.

Home assignment

Ex 6(B) - 5 to 9

AHA

1. What is empty set? Give an example.

2. What are equivalent sets? Give an example.

3. What are equal sets? Give an example.

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THANKING YOU

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