

SET

Set is a collection of definite well defined objects.

Set is denoted by capital letter.

For example:

$$A = \{a, b, c, d, e\}$$

BINARY OPERATIONS ON A SET

Let,

G a non-empty set

$$G \times G = \{(a, b) : a \in G, b \in G\}.$$

Above line is read as: G cross G equal to (a, b) such that 'a' belongs to 'G', 'b' belongs to 'G'.

If

$$f : G \times G \rightarrow G,$$

Above line is read as 'f' is such that G cross G is equal to G .

Here 'f' is an operation of 'X' on two groups 'G' and 'G'.

The output of ' $G \times G$ ' is also a ' G ' so this type of operation is known as Binary Operation on a set G .

And,

Operation 'f' on 'G' and 'G' can be denoted as ' GfG ', or ' afb ' where $(a \in G, b \in G)$.

$+$, \times , etc symbols are used in Binary Operations.

Binary Operations examples:-

$$1) \quad a + b \in G, \forall a, b \in G.$$

Above line is read as 'a' plus 'b' belongs to 'G', for all 'a', 'b' belongs to 'G'.

Here, \forall à for all.

$$2) \quad a * b = G, \forall a, b \in G.$$

3) Addition of natural numbers is also a natural number.

Natural number are also known as all non-negative or positive numbers (0,1,2,3,4.....).

If, N à Set of natural numbers

$$A + b \in N, \forall a, b \in N.$$

Above line is read as 'a' plus 'b' belongs to 'N', for all 'a', 'b' \in 'N'.

4) Subtraction is not binary operation on N (natural numbers).

N à Set of natural numbers.

$$3 - 5 = -2 \notin N, \text{ whereas } 3, 5 \in N.$$

Above line is read as three minus five is not belongs to 'N', whereas three, five belongs to 'N'.

5) Subtraction is binary operation on I (integer numbers).

$I \rightarrow$ Set of integer numbers

$$3 - 5 = -2 \in I, \forall a, b \in I.$$

Related Posts:

1. SET
2. Mathematical induction
3. Relation
4. Net 34
5. prove that- $A \times (B \cap C) = (A \times B) \cap (A \times C)$
6. Prove that- $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
7. prove that - $(A \cap B) \times (C \cap D) = (A \times C) \cap (B \times D)$
8. Show that- $(P \cap Q) \times (R \cap S) = (P \times R) \cap (Q \times S)$
9. Algebraic structure
10. Group
11. Show that $\{\dots, -4, -3, -2, -1, 0, 1, 2, 3, 4, \dots\}$ is group
12. Show that $a * b = b * a$
13. if $a * c = c * a$ and $b * c = c * b$, then $(a * b) * c = c * (a * b)$
14. Undirected Graph and Incident Matrix
15. Prove the following by using the principle of mathematical induction for all $n \in \mathbb{N}$, $1^3 + 2^3 + 3^3 + \dots + n^3 = [n(n+1)/2]^2$
16. Prove that $G = \{-1, 1, i, -i\}$ is a group under multiplication.
17. Hasse diagram for the "less than or equal to" relation on the set $S = \{0, 1, 2, 3, 4, 5\}$