

# ULTIMATE MATHEMATICS

MATHS: BY AJAY MITTAL (9891067390)

CHAPTER: SETS CLASS No: 2 (S-2)

## Operation on sets

(1) Union of sets: Symbol:  $\cup$

$$A = \{1, 2, 3\} \quad B = \{3, 4, 5, 2\}$$

$$A \cup B = \{1, 2, 3, 4, 5\}$$

(2) Intersection of two sets:  $\cap$  (common)

$$A \cap B = \{2, 3\}$$

(3) ~~Difference~~ Difference of two sets

$$A - B = \{1\}$$

$$B - A = \{4, 5\}$$

(4) Symmetric Difference of two sets: Symbol  $\Delta$

$$A \Delta B = (A - B) \cup (B - A)$$

$$A \Delta B = \{1, 4, 5\}$$

\* Universal set:  $U$  (or)  $\mathcal{U}$

e.g.  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

(3) Complement of a set: (opposite)

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

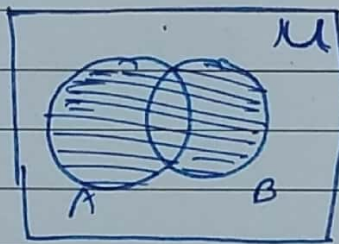
$$A = \{2, 3, 5, 6\}$$

$$A' = \{1, 4, 7, 8\}$$

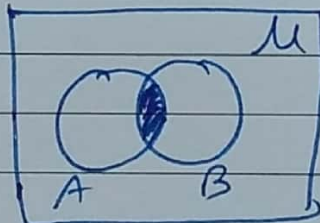
eg  $A \cup A' = \{1, 2, 3, 4, 5, 6, 7, 8\} = U$

Venn diagram

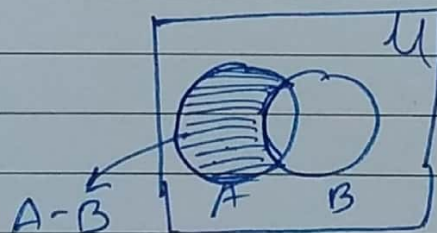
(1)  $A \cup B$



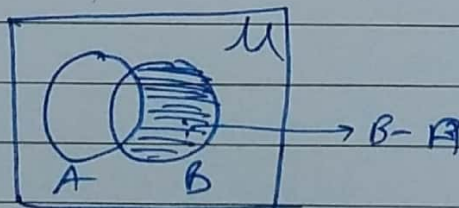
(2)  $A \cap B =$



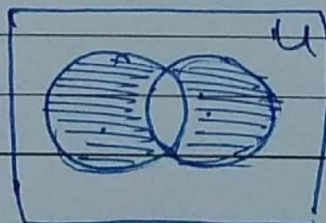
(3)  $A - B =$



(4)  $B - A$



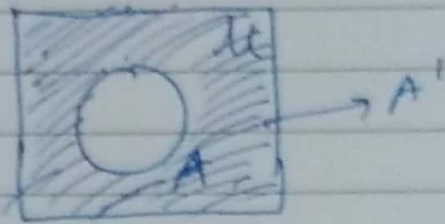
(5)  $A \Delta B$



$$A \Delta B = (A - B) \cup (B - A)$$



(6)  $A'$

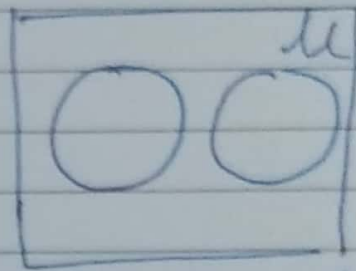


(7) Disjoint Sets

$$A = \{1, 2, 3\}$$

$$B = \{5, 6, 7\}$$

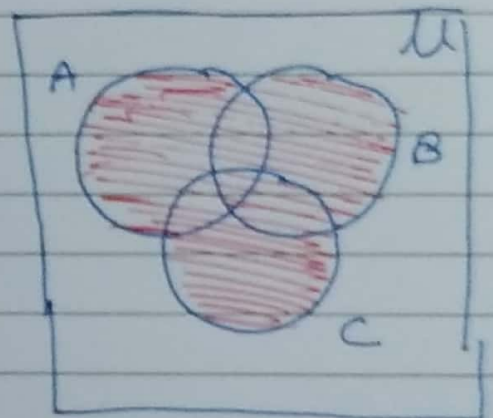
$$A \cap B = \{\} = \phi$$



$$\therefore A \cap B = \phi$$

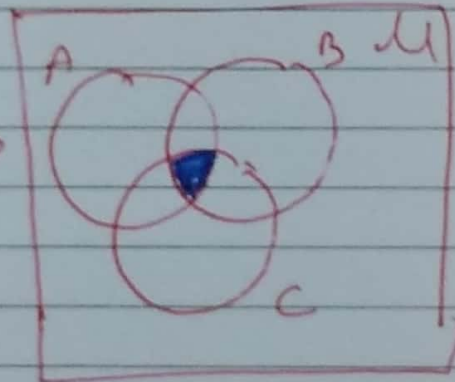
(8)

$$A \cup B \cup C$$



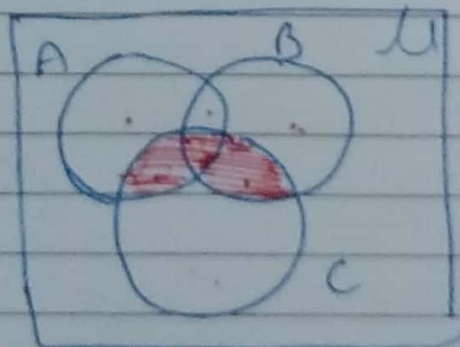
(9)

$$A \cap B \cap C$$



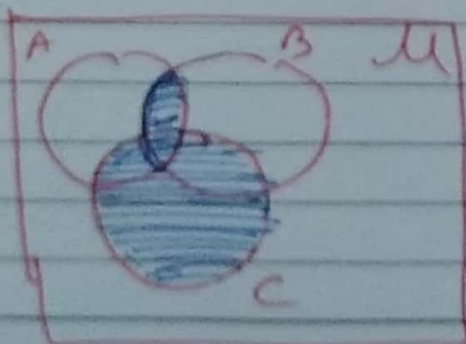
(10)

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



(11)

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



# SETS

Topic : CLASS - 5-2

Date : .....

Page No. : (4)

eg  $A = \{1, 2, 3\}$ ,  $B = \{1, 2, 3, 4, 5\}$

$A \subset B$  ;  $B \not\subset A$

eg No of Subsets in of set  $A = 2^n$

here  $n = 3$

No of Subsets  $= 2^3 = 8$

Subsets =  $\{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}, \phi$

✓ Improper Subsets :  $\phi, \{1, 2, 3\} = 2$

✓ Proper Subsets  $\{1\}, \dots, \{2, 3\} = 6$

✓ No of proper Subsets  $= 2^n - 2$

✓ Super set :  $B$  is a superset of  $A$

Q.11 Two finite sets have 'm' and 'n' elements.

The total number of subsets of the first set is 56 more than the total number of subsets of the second set. Find the values of m & n

Sol<sup>n</sup> =  
No of Subsets of 1<sup>st</sup> set  $= 2^m$   
No of Subsets of 2<sup>nd</sup> set  $= 2^n$

Acc. to Q.11

$2^m - 2^n = 56$

$2^m - 2^n = 64 - 8$

$2^m - 2^n = 2^6 - 2^3$

Comparing we get

Ans  $m = 6$  ;  $n = 3$



Qn. 2

$$A = \{1, \{2\}, 3\}$$

$$2 \notin A$$

write

$$P(A)$$

$$\{2\} \in A$$

$$P(A) = \left\{ \{1\}, \{\{2\}\}, \{3\}, \{1, \{2\}\}, \{1, 3\}, \{\{2\}, 3\}, \{1, \{2\}, 3\}, \phi \right\}$$

Qn. 3

$$A = \phi$$

write

$$P(A) \text{ \& } P(P(A))$$

Soln - here no of elements in set A :  $n = 0$

no of subsets of set A :  $2^n = 2^0 = 1$

subset of A :  $\phi$

$$P(A) = \{ \phi \}$$

no of elements in  $P(A) = 1$

no of subsets of  $P(A) = 2^1 = 2$

$$\text{subsets of } P(A) = \{ \phi \}, \phi$$

$$P(P(A)) = \{ \{ \phi \}, \phi \}$$

# ← ULTIMATE MATHEMATICS →

Topic : SETS Class: 2 Date: .....

Page No. : (1)

## WORKSHEET No: 2 (S-2)

Qns 1 → Two finite sets have 'p' and 'q' elements. The number of subsets of the first set is 112 more than that of the second set. Find the values of p and q.

Qns 2 → If  $B = \{2, 3, 4, 5\}$   
Write  $P(B)$

Qns 3 → If  $A = \phi$   
Write  $P(A)$ ,  $P(P(A))$ ,  $P(P(P(A)))$

Qns 4 → If  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

and  $A = \{1, 2, 3, 5\}$ ;  $B = \{2, 4, 6, 7\}$ ;  $C = \{2, 3, 4, 8\}$

- Find
- (1)  $(A \cup B) \cap C$
  - (2)  $(A \cap B) \cup C$
  - (3)  $(A - B)'$
  - (4)  $(B - C)'$
  - (5)  $(A \cup C)'$
  - (6)  $(A \cup B) \cap (A \cup C)$
  - (7)  $(A \cap B) \cup (B \cap C)$
  - (8)  $A \Delta B$
  - (9)  $(B \Delta C)'$
  - (10)  $A \cap C'$

Qns 5 → Draw venn diagram of

- (1)  $(A - B)'$
- (2)  $(A - B) \cup (B - A)$



- (3)  $(A \cap B)'$   
 (4)  $(A \cup B)'$   
 (5)  $(A \Delta B)'$   
 (6)  $(A \cup B) \cap C$   
 (7)  $(B - C) \cap A$   
 (8)  $(A - B) \cup C$   
 (9)  $(A \cap B) \cup C$   
 (10)  $(A \cup B \cup C)'$

Q. 6  $\rightarrow$  If sets A and B are defined as

$$A = \{ (x, y) : y = \frac{1}{x} ; x \neq 0, x \in \mathbb{R} \}$$

$$B = \{ (x, y) : y = -x, x \in \mathbb{R} \}, \text{ then}$$

- (A)  $A \cap B = A$  (B)  $A \cap B = B$  (C)  $A \cap B = \phi$  (D)  $A \cup B = A$

Q. 7  $\rightarrow$  If  $A = \{ 2, 3, 5, 6 \}$  write the number of proper subsets.

Q. 8  $\rightarrow$  If  $U = \{ 1, 2, 3, 4, 5, 6, 7, 8, 9 \}$ ,  $A = \{ 2, 4, 6, 8 \}$   
 $B = \{ 2, 3, 5, 9 \}$

Verify that (i)  $(A \cup B)' = A' \cap B'$

(2)  $(A \cap B)' = A' \cup B'$

Q. 9  $\rightarrow$  Let  $U$  be the set of all triangles in a plane.  
 If  $A$  is the set of all triangles with at least one angle different from  $60^\circ$ , what is  $A'$ ?