



**SpeedLabs**

**MATHS**

**CBSE 11<sup>th</sup>**

**TEEVRA EDUTECH PVT. LTD.**

# Sets

## Exercise- 1.5

1. Let  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ ,  $A = \{1, 2, 3, 4\}$ ,  $B = \{2, 4, 6, 8\}$  and  $C = \{3, 4, 5, 6\}$ . Find

(i)  $A'$  (ii)  $B'$  (iii)  $(A \cup C)'$  (iv)  $(A \cup B)'$  (v)  $(A)'$  (vi)  $(B - C)'$

**Ans.**  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$$A = \{1, 2, 3, 4\}$$

$$B = \{2, 4, 6, 8\}$$

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

$$(i) A' = \{5, 6, 7, 8, 9\}$$

$$(ii) B' = \{1, 3, 5, 7, 9\}$$

(iii)

$$A \cup C = \{1, 2, 3, 4, 5, 6, 8\}$$

$$\therefore (A \cup C)' = \{7, 8, 9\}$$

$$(iv) A \cup B = \{1, 2, 3, 4, 6, 8\}$$

$$(A \cup B)' = \{5, 7, 9\}$$

$$(v) (A')' = A = \{1, 2, 3, 4\}$$

$$(vi) B - C = \{2, 8\}$$

$$\therefore (B - C)' = \{1, 3, 4, 5, 6, 7, 9\}$$

2. If  $U = \{a, b, c, d, e, f, g, h\}$ , find the complements of the following sets:

$$(i) A = \{a, b, c\}$$

$$(ii) B = \{d, e, f, g\}$$

$$(iii) C = \{a, c, e, g\}$$

$$(iv) D = \{f, g, h, a\}$$

**Ans.**  $U = \{a, b, c, d, e, f, g, h\}$

$$(i) A = \{a, b, c\}$$

$$A' = \{d, e, f, g, h\}$$

$$(ii) B = \{d, e, f, g\}$$

$$\therefore B' = \{a, b, c, h\}$$

$$(iii) C = \{a, c, e, g\}$$

$$\therefore C' = \{b, d, f, h\}$$

$$(iv) D = \{f, g, h, a\}$$

$$\therefore D' = \{b, c, d, e\}$$

3. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

- (i)  $\{x: x \text{ is an even natural number}\}$
- (ii)  $\{x: x \text{ is an odd natural number}\}$
- (iii)  $\{x: x \text{ is a positive multiple of } 3\}$
- (iv)  $\{x: x \text{ is a prime number}\}$
- (v)  $\{x: x \text{ is a natural number divisible by } 3 \text{ and } 5\}$
- (vi)  $\{x: x \text{ is a perfect square}\}$
- (vii)  $\{x: x \text{ is perfect cube}\}$
- (viii)  $\{x: x + 5 = 8\}$
- (ix)  $\{x: 2x + 5 = 9\}$
- (x)  $\{x: x \geq 7\}$
- (xi)  $\{x: x \in \mathbb{N} \text{ and } 2x + 1 > 10\}$

**Ans.**  $U = \mathbb{N}$ : Set of natural numbers

- (i)  $\{x: x \text{ is an even natural number}\}' = \{x: x \text{ is an odd natural number}\}$
- (ii)  $\{x: x \text{ is an odd natural number}\}' = \{x: x \text{ is an even natural number}\}$
- (iii)  $\{x: x \text{ is a positive multiple of } 3\}' = \{x: x \in \mathbb{N} \text{ and } x \text{ is not a multiple of } 3\}$
- (iv)  $\{x: x \text{ is a prime number}\}' = \{x: x \text{ is a positive composite number and } x = 1\}$
- (v)  $\{x: x \text{ is a natural number divisible by } 3 \text{ and } 5\}' = \{x: x \text{ is a natural number that is not divisible by } 3 \text{ or } 5\}$
- (vi)  $\{x: x \text{ is a perfect square}\}' = \{x: x \in \mathbb{N} \text{ and } x \text{ is not a perfect square}\}$
- (vii)  $\{x: x \text{ is a perfect cube}\}' = \{x: x \in \mathbb{N} \text{ and } x \text{ is not a perfect cube}\}$
- (viii)  $\{x: x + 5 = 8\}' = \{x: x \in \mathbb{N} \text{ and } x \neq 3\}$
- (ix)  $\{x: 2x + 5 = 9\}' = \{x: x \in \mathbb{N} \text{ and } x \neq 2\}$
- (x)  $\{x: x \geq 7\}' = \{x: x \in \mathbb{N} \text{ and } x < 7\}$
- (xi)  $\{x: x \in \mathbb{N} \text{ and } 2x + 1 > 10\}' = \{x: x \in \mathbb{N} \text{ and } x \leq 9/2\}$

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

- (i)  $(A \cup B)' = A' \cap B'$
- (ii)  $(A \cap B)' = A' \cup B'$

**Ans.**  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$A = \{2, 4, 6, 8\}$ ,  $B = \{2, 3, 5, 7\}$

(i)

$$(A \cup B)' = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}' = \{1, 9\}$$

$$A' \cap B' = \{1, 3, 5, 7, 9\} \cap \{1, 4, 6, 8, 9\} = \{1, 9\}$$

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

(ii)

$$(A \cap B)' = \{2\}' \cup \{1, 2, 3, 3, 4, 5, 6, 7, 8\}'$$

$$A' \cup B' = \{1, 3, 5, 7, 9\} \cup \{1, 4, 6, 8, 9\} = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

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

5. Draw appropriate Venn diagram for each of the following:

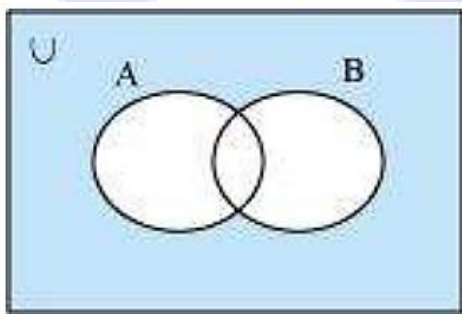
(i)  $A \cup B'$

(ii)  $(A' \cap B)'$

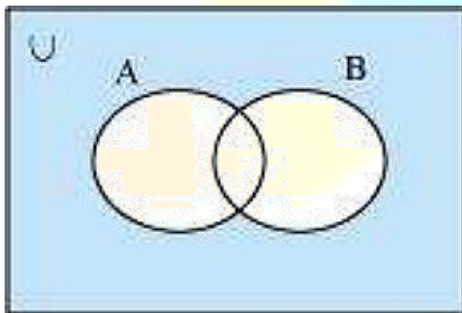
(iii)  $(A \cap B)'$

(iv)  $A' \cup B'$

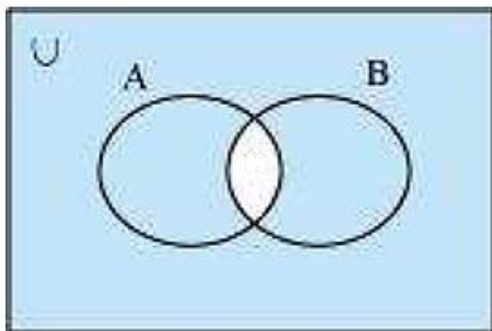
Ans. (i)  $A \cup B'$



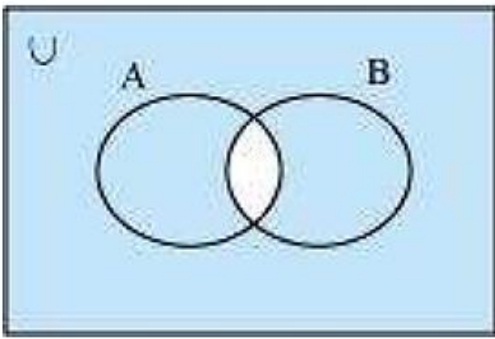
(ii)  $(A' \cap B)'$



(iii)  $(A \cap B)'$



(iv)  $A' \cup B'$



6. 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  $A'$

**Ans.**  $A'$  is the set of all equilateral triangles.

7. Fill in the blanks to make each of the following a true statement:

(i)  $A \cup A' = \dots$

(ii)  $\phi' \cap A = \dots$

(iii)  $A \cap A' = \dots$

(iv)  $U' \cap A = \dots$

**Ans.** (i)  $A \cup A' = U$

(ii)  $\phi' \cap A = U \cap A = A$   
 $\therefore \phi' \cap A = A$

(iii)  $A \cap A' = \phi$

(iv)  $U' \cap A = \phi \cap A = \phi$   
 $\therefore U' \cap A = \phi$