

SESSION 2020-21
CLASS XI MATHS
Chapter 1: SETS
Part 3

By MATHEMATICS DEPARTMENT

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New Delhi

OPERATION ON SETS

- **Union of sets-** The union of two sets A and B is set of elements which are in A, in B or in both A or B. It is represented by $A \cup B$.

$$A \cup B = \{ x: x \in A \text{ or } x \in B \}$$

Eg: $A = \{ 2, 5, 7 \}$ $B = \{ 4, 5, 9 \}$ Then $A \cup B = \{ 2, 5, 7, 4, 9 \}$

- Some Properties of the Operation of Union :
- (i) $A \cup B = B \cup A$ (Commutative law)
- (ii) $(A \cup B) \cup C = A \cup (B \cup C)$ (Associative law)
- (iii) $A \cup \phi = A$ (Law of identity element, ϕ is the identity of U)
- (iv) $A \cup A = A$ (Idempotent law)
- (v) $U \cup A = U$ (Law of U)

- Watch this video - <https://youtu.be/YHe4fE3d6II>
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OPERATION ON SETS

- **Intersection of sets** – The intersection of two sets has only the elements common to both sets. It is represented by $A \cap B$

$$A \cap B = \{x: x \in A \text{ and } x \in B\}$$

Eg: $A = \{1,3,4\}$ $B = \{2,8,3,1\}$ Then $A \cap B = \{3,1\}$

WATCH THE VIDEO:

<https://youtu.be/9QW906yiHdQ>

OPERATION ON SETS

- **Disjoint sets** – Two sets are said to be disjoint sets if they have no element in common. We can also say, two disjoint sets are sets whose intersection is empty set or null set.

Eg: $A = \{2, 5\}$ $B = \{7, 9\}$ As $A \cap B = \phi$

Therefore A and B are disjoint sets.

- **Difference of two sets**- The difference of two sets, written $A - B$ is the set of all elements of set A that are not elements of set B.

Eg : $A = \{4, 8, 7\}$ $B = \{5, 9, 4\}$ $A - B = \{8, 7\}$ $B - A = \{5, 9\}$

Watch this video - <https://youtu.be/qF27zIHjkTs>

TASK

- Do exercise 1.4 NCERT and its examples

EXERCISE 1.4

1. Find the union of each of the following pairs of sets :

(i) $X = \{1, 3, 5\}$ $Y = \{1, 2, 3\}$

(ii) $A = \{a, e, i, o, u\}$ $B = \{a, b, c\}$

(iii) $A = \{x : x \text{ is a natural number and multiple of } 3\}$
 $B = \{x : x \text{ is a natural number less than } 6\}$

(iv) $A = \{x : x \text{ is a natural number and } 1 < x \leq 6\}$
 $B = \{x : x \text{ is a natural number and } 6 < x < 10\}$

(v) $A = \{1, 2, 3\}$, $B = \phi$

2. Let $A = \{a, b\}$, $B = \{a, b, c\}$. Is $A \subset B$? What is $A \cup B$?

3. If A and B are two sets such that $A \subset B$, then what is $A \cup B$?

4. If $A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5, 6\}$, $C = \{5, 6, 7, 8\}$ and $D = \{7, 8, 9, 10\}$; find

(i) $A \cup B$ (ii) $A \cup C$ (iii) $B \cup C$ (iv) $B \cup D$

(v) $A \cup B \cup C$ (vi) $A \cup B \cup D$ (vii) $B \cup C \cup D$

5. Find the intersection of each pair of sets of question 1 above.

6. If $A = \{3, 5, 7, 9, 11\}$, $B = \{7, 9, 11, 13\}$, $C = \{11, 13, 15\}$ and $D = \{15, 17\}$; find

(i) $A \cap B$ (ii) $B \cap C$ (iii) $A \cap C \cap D$

(iv) $A \cap C$ (v) $B \cap D$ (vi) $A \cap (B \cup C)$

(vii) $A \cap D$ (viii) $A \cap (B \cup D)$ (ix) $(A \cap B) \cap (B \cup C)$

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

7. If $A = \{x : x \text{ is a natural number}\}$, $B = \{x : x \text{ is an even natural number}\}$

$C = \{x : x \text{ is an odd natural number}\}$ and $D = \{x : x \text{ is a prime number}\}$, find

(i) $A \cap B$ (ii) $A \cap C$ (iii) $A \cap D$

(iv) $B \cap C$ (v) $B \cap D$ (vi) $C \cap D$

8. Which of the following pairs of sets are disjoint

(i) $\{1, 2, 3, 4\}$ and $\{x : x \text{ is a natural number and } 4 \leq x \leq 6\}$

(ii) $\{a, e, i, o, u\}$ and $\{c, d, e, f\}$

(iii) $\{x : x \text{ is an even integer}\}$ and $\{x : x \text{ is an odd integer}\}$

9. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$; find

(i) $A - B$ (ii) $A - C$ (iii) $A - D$ (iv) $B - A$

(v) $C - A$ (vi) $D - A$ (vii) $B - C$ (viii) $B - D$

(ix) $C - B$ (x) $D - B$ (xi) $C - D$ (xii) $D - C$

10. If $X = \{a, b, c, d\}$ and $Y = \{f, b, d, g\}$, find

(i) $X - Y$ (ii) $Y - X$ (iii) $X \cap Y$

11. If R is the set of real numbers and Q is the set of rational numbers, then what is $R - Q$?

12. State whether each of the following statement is true or false. Justify your answer.

(i) $\{2, 3, 4, 5\}$ and $\{3, 6\}$ are disjoint sets.

(ii) $\{a, e, i, o, u\}$ and $\{a, b, c, d\}$ are disjoint sets.

(iii) $\{2, 6, 10, 14\}$ and $\{3, 7, 11, 15\}$ are disjoint sets.

(iv) $\{2, 6, 10\}$ and $\{3, 7, 11\}$ are disjoint sets.

- Dear students

You are advised to revise the previous content regularly.

Happy learning.