

SESSION 2020-21 CLASS XI
CHAPTER 1: SETS
PART 2

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SUBSETS

- **Subset** - A set B is said to be a subset of set A if all the elements present in set B are also present in set A and it is denoted by $B \subseteq A$.
- The cardinal number of a subset is either less than or equal to the set.
- Null set is a subset of every set .
- A set is a subset of itself.

Some of the obvious relations among these subsets are:
 $N \subset Z \subset Q, Q \subset R, T \subset R, N \not\subset T.$

- Watch the videos – <https://youtu.be/9Wvu-R04go>
- <https://youtu.be/xotLg-oLboY>
- <https://youtu.be/BhFgcf0VSYc>

Power Sets & Universal Sets

- **Power set** – The collection of all subsets of a set A is called the power set of A. It is denoted by $P(A)$. In $P(A)$, every element is a set.
- Number of elements of a Power set is equal to 2^n where 'n' is the number of elements of set A.

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

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

- **Universal Set** – A set which contains every element with reference to a context, is represented by 'U'
- Watch the videos – <https://youtu.be/8innwDI1bv8>
- <https://youtu.be/1obxIn-WD3A>

INTERVALS

- **Close Intervals** – The interval which includes the end points and is denoted by $[a,b]$

$$[a,b] = \{x: a \leq x \leq b\}$$

- **Open interval**- This interval contains all the elements between a and b except a and b . It is denoted by (a,b)

$$(a,b) = \{x: a < x < b\}$$

- **Semi close or semi open interval** – This interval is open on one end . It is denoted by $[a,b)$ or $(a,b]$

$$[a,b) = \{x: a \leq x < b\}$$

$$(a,b] = \{x: a < x \leq b\}$$

- Watch the video – https://youtu.be/745H_IYN87U

TASK

- Do exercise 1.3 NCERT and its examples

EXERCISE 1.3

1. Make correct statements by filling in the symbols \subset or $\not\subset$ in the blank spaces :

- (i) $\{ 2, 3, 4 \} \dots \{ 1, 2, 3, 4, 5 \}$ (ii) $\{ a, b, c \} \dots \{ b, c, d \}$
- (iii) $\{x : x \text{ is a student of Class XI of your school} \} \dots \{x : x \text{ student of your school} \}$
- (iv) $\{x : x \text{ is a circle in the plane} \} \dots \{x : x \text{ is a circle in the same plane with radius 1 unit} \}$
- (v) $\{x : x \text{ is a triangle in a plane} \} \dots \{x : x \text{ is a rectangle in the plane} \}$
- (vi) $\{x : x \text{ is an equilateral triangle in a plane} \} \dots \{x : x \text{ is a triangle in the same plane} \}$
- (vii) $\{x : x \text{ is an even natural number} \} \dots \{x : x \text{ is an integer} \}$

2. Examine whether the following statements are true or false:

- (i) $\{ a, b \} \not\subset \{ b, c, a \}$
- (ii) $\{ a, e \} \subset \{ x : x \text{ is a vowel in the English alphabet} \}$
- (iii) $\{ 1, 2, 3 \} \subset \{ 1, 3, 5 \}$
- (iv) $\{ a \} \subset \{ a, b, c \}$
- (v) $\{ a \} \in \{ a, b, c \}$
- (vi) $\{ x : x \text{ is an even natural number less than 6} \} \subset \{ x : x \text{ is a natural number which divides 36} \}$

3. Let $A = \{ 1, 2, \{ 3, 4 \}, 5 \}$. Which of the following statements are incorrect and why?

- (i) $\{ 3, 4 \} \subset A$ (ii) $\{ 3, 4 \} \in A$ (iii) $\{ \{ 3, 4 \} \} \subset A$
- (iv) $1 \in A$ (v) $1 \subset A$ (vi) $\{ 1, 2, 5 \} \subset A$
- (vii) $\{ 1, 2, 5 \} \in A$ (viii) $\{ 1, 2, 3 \} \subset A$ (ix) $\phi \in A$
- (x) $\phi \subset A$ (xi) $\{ \phi \} \subset A$

4. Write down all the subsets of the following sets

- (i) $\{ a \}$ (ii) $\{ a, b \}$ (iii) $\{ 1, 2, 3 \}$ (iv) ϕ

5. How many elements has $P(A)$, if $A = \phi$?

6. Write the following as intervals :

- (i) $\{ x : x \in \mathbb{R}, -4 < x \leq 6 \}$ (ii) $\{ x : x \in \mathbb{R}, -12 < x < -10 \}$
- (iii) $\{ x : x \in \mathbb{R}, 0 \leq x < 7 \}$ (iv) $\{ x : x \in \mathbb{R}, 3 \leq x \leq 4 \}$

7. Write the following intervals in set-builder form :

- (i) $(-3, 0)$ (ii) $[6, 12]$ (iii) $(6, 12]$ (iv) $[-23, 5)$

8. What universal set(s) would you propose for each of the following :

- (i) The set of right triangles. (ii) The set of isosceles triangles.

9. Given the sets $A = \{ 1, 3, 5 \}$, $B = \{ 2, 4, 6 \}$ and $C = \{ 0, 2, 4, 6, 8 \}$, which of the following may be considered as universal set (s) for all the three sets A, B and C

- (i) $\{ 0, 1, 2, 3, 4, 5, 6 \}$
- (ii) ϕ
- (iii) $\{ 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 \}$
- (iv) $\{ 1, 2, 3, 4, 5, 6, 7, 8 \}$

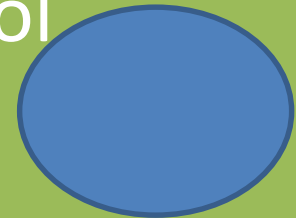
VENN DIAGRAMS

- A **Venn diagram** is an illustration of the relation between and among sets, group of objects that share something in common.

- **Universal Set** is represented by symbol



- Any set is represented by the symbol



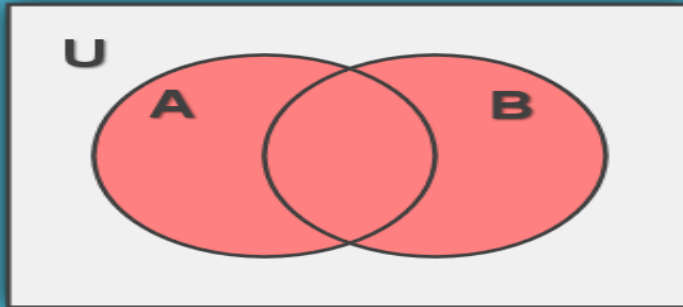
- WATCH THE VIDEOS:

<https://youtu.be/KoS1y8xridY>

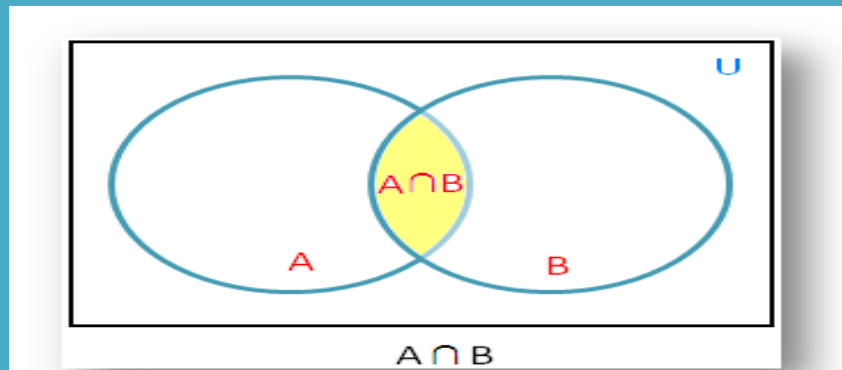
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- <https://youtu.be/1GB3ivbichw>

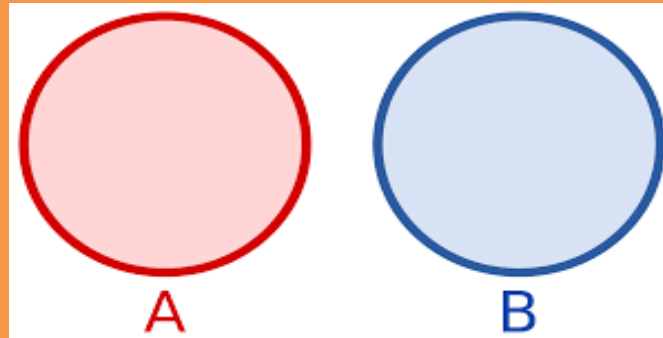
- Union of sets A and B ($A \cup B$)



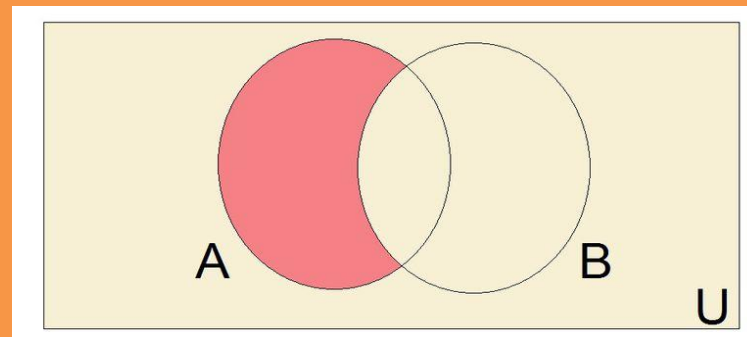
- Intersection of sets A and B ($A \cap B$)



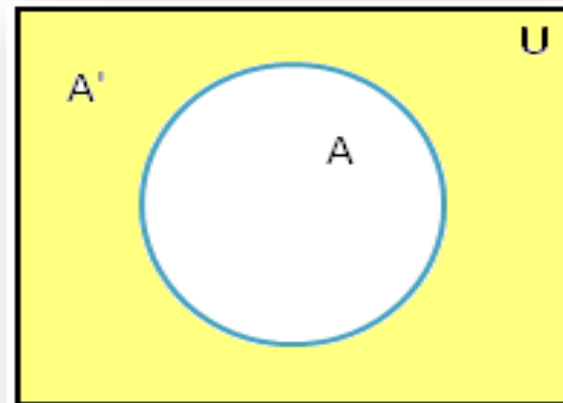
- Disjoint sets ($A \cap B = \phi$)



- Difference of a set ($A - B$)



- Complement of a Set(A')



Complement of A or A'