
DAY 45
MCA CET 2025
MATHS
Algebra
SET
THEORY
KEEP LEARNING
MCA
VISION ACADEMY
YOUR CAREER GUIDE
INEXORABLE
MAH MCA CET 2025
FREE CRASH COURSE

MCA VISION ACADEMY
KEEP LEARNING
YOUR CAREER GUIDE

JOIN US ON WHATSAPP

JOIN US ON TELEGRAM

subs

FOR MAH MCA CET 2025

Set Theory

Set: A collection of well defined objects is called SETS.

Set of vowels of english.

$$A = \{a, e, i, o, u\}$$

Representation of SETS

* Name of sets will always be in CAPITALS.
* Always use { }

(i) Listing Method

$A = \{a, e, i, o, u\}$

elements.

* No sep. allowed

(ii) Set builder Method

$A = \{x : x \text{ is vowels of English alphabets}\}$

Types of Sets:

No element present.

(i) EMPTY SETS / NULL SET $A = \{\ \} = `\phi'$

(ii) SINGLETON SETS $A = \{1\}$ Only one element presen

(iii) FINITE SETS $\Rightarrow$ countable set. $A = \{1, 2, \ldots \ldots 100\}$

(iv) INFINITE SETS $\Rightarrow$ Uncountable elements in set

$B = \{x : x \text{ is whole no.}\}$

$B = \{0, 1, 2, 3 \ldots \ldots - - - \}$

CARDINAL NUMBER OF SETS

- Expressed only for FINITE SETS
- No. of elements present in a SET

$A = \{a, e, i, o, u\}$

$n(A) = 5$

EQUIVALENT SETS

$A = \{a, b, c\}$ $n(A) = 3$

$B = \{1, 2, 3\}$ $n(B) = 3$

No. of elements in A and B set are equal

[CARDINAL NO is equal]

$n(A) = n(B)$

EQUAL SETS

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

$B = \{1, 2, 3\} \longrightarrow n(B) = 3$

$\boxed{A = B}$

Elements in set A and B are same.

$\subseteq \Rightarrow$ symbol for subset

SUBSET

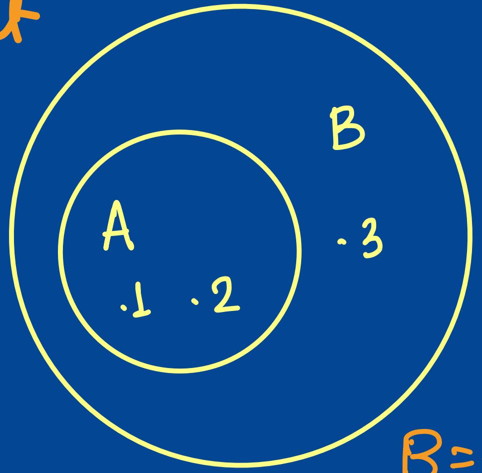
$A = \{1, 2\}$

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

$A \subseteq B$

NOTE:

No. of subset of a finite set with n elements is 2^n



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

$A = \{1, 2\}$

SUPER SET

if $A \subseteq B$ and $A \neq B$

$B \supset A$

$n(B) = 3$

2^3

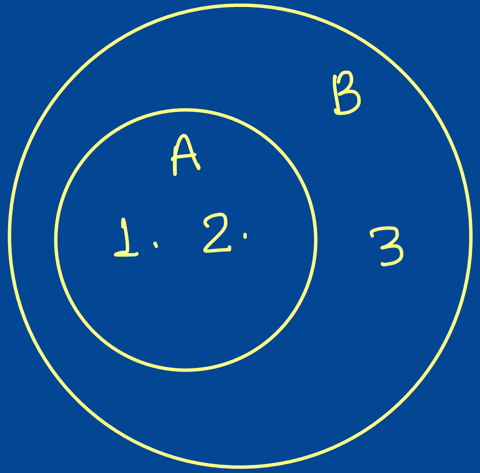
PROPER SUBSET $\subset$

If $A \subseteq B$

and every element of <u>set B</u> is not element of A

$\therefore A \subset B$

symbol for proper set.



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

$A \subseteq B \; / \; B \subseteq A$

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

UNIVERSAL SET

$U = \{1, 2, 3, 4, 5\}$

Null set (ϕ) is a subset for all sets

POWER SET

A set of all subsets of a given set is called as Power set

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

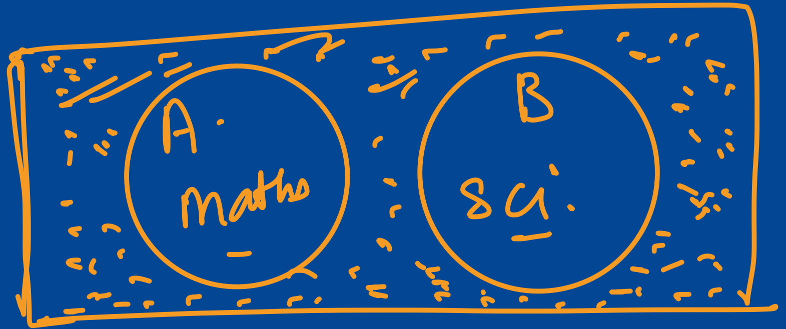
$P(A) = \{\phi, \{1\}, \{2\}, \{3\}, \{1, 2\} \{2, 3\} \{1, 3\} \{1, 2, 3\}\}$

* Power set is non-empty.
* If A is a finite set of n elements, then number of elements in P(A) will be 2^n.

2^n

VENN- DIAGRAM

U = class

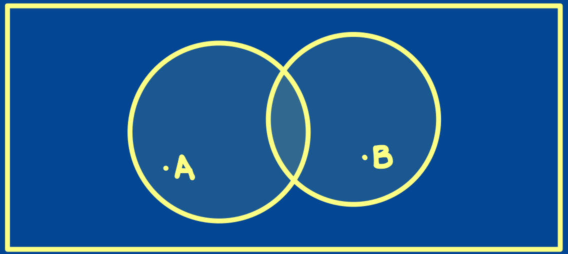


OPERATIONS ON SETS

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

1. UNION OF SETS

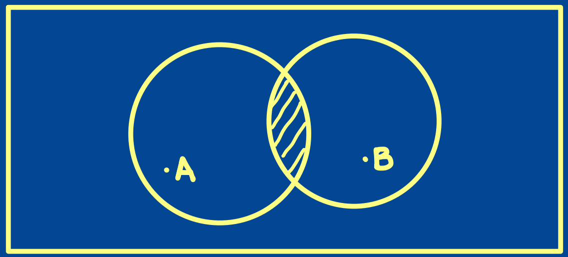
Collection of all elements of A and B.



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

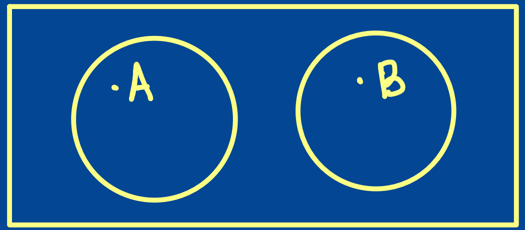
2. INTERSECTION OF SETS

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



3. DISJOINT SETS

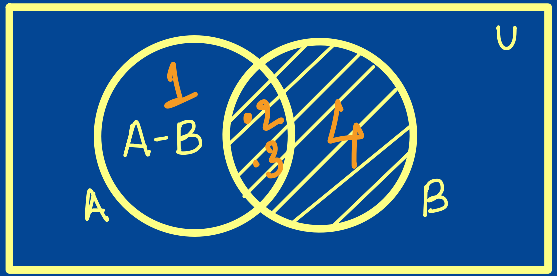
$A \cap B = \{\} = \phi$

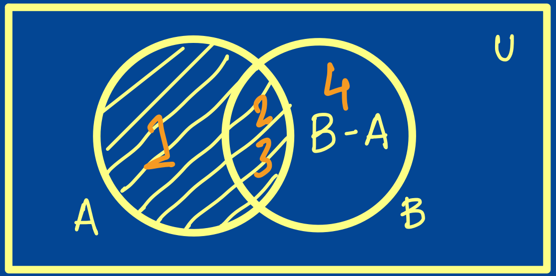


4. DIFFERENCE OF SETS

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

$B = \{2, 3, 4\}$



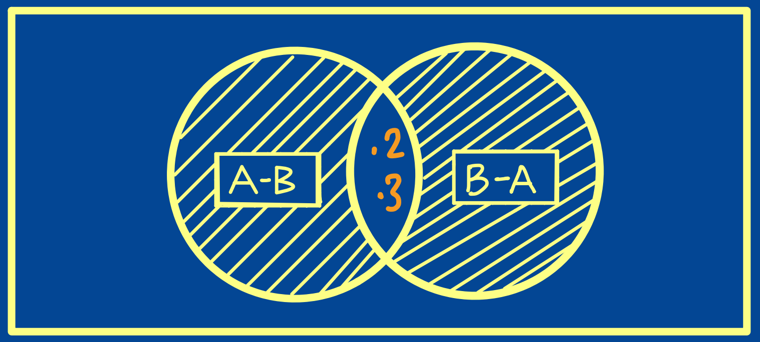


$A - B = \{1\}$

$B - A = \{4\}$

$A - B =$

5. SYMMETRIC DIFFERENCE OF TWO SETS



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

$B = \{2, 3, 4\}$

$A - B = \{1\}$

$B - A = \{4\}$

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

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

6. CARTESIAN PRODUCT OF SETS

$A = \{a, b\}$

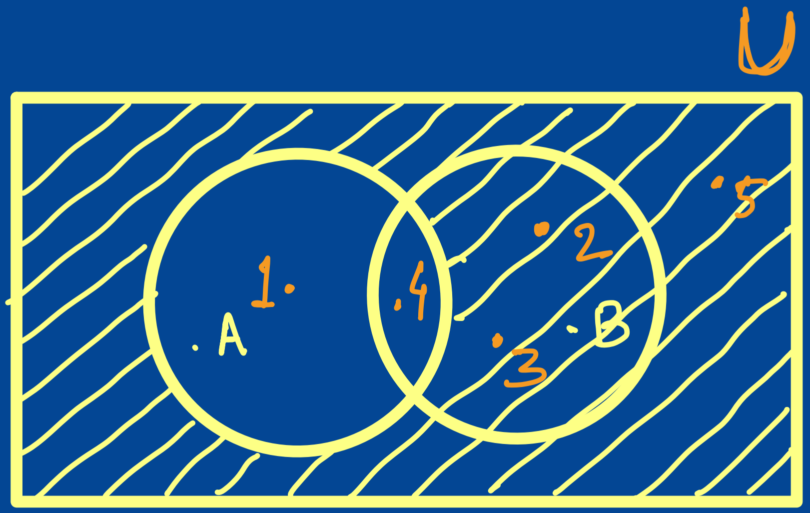
$B = \{c, d\}$

$A \times B =$

B↓ \ A→	a	b
c	(a,c)	(b,c)
d	(a,d)	(b,d)

COMPLEMENT OF SETS

A^c or $A' =$



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

$(A')' = A$

If A, B, C are three finite sets.

1. $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

2. $n(A \cup B) = n(A) + n(B)$ if $A \cap B = \phi$

3. $n(A - B) = n(A) - n(A \cap B)$

4. $n(A \Delta B) = n(A - B) + n(B - A)$

$= n(A) + n(B) - 2n(A \cap B)$

5. $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$

6. $n(A' \cup B') = n(U) - n(A \cap B)$

7. $n(A' \cap B') = n(U) - n(A \cup B)$

A A A A A A

If A x B= {(1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (2, 3)}.
then A is equal to

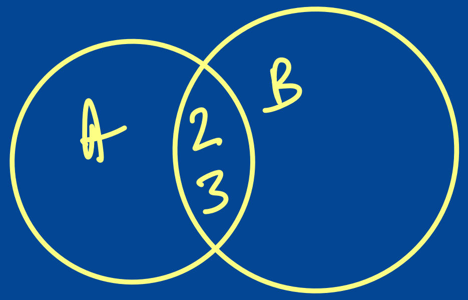
(a) (1, 2)

(b) (1, 2, 3)

(c) (2, 3)

(d) None of these

$A = \{1, 2\}$



$\subset \Rightarrow$ proper set

$\subseteq \Rightarrow$ subset

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

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

Which of the following is correct?

(a) $A \cap B \subset \boxed{A \cup B}$

(b) $A \cap B \subseteq A \cup B$

(c) $A \cup B \subset A \cap B$

(d) None of these

$$n(A-B) = n(A) - n(A \cap B)$$
$$= 8 - 2 = 6$$

If n(A) = 8, n(A ∩ B) = 2, then n(A - B) is equal to

(a) 8

(b) 2

(c) 6

(d) 9

subsets = $2^n = 2^3 = 8 - 1$

$= \underline{7}$

If A = {a, b, c}, then what is the number of proper subsets of A?

(a) 5 (b) 6 (c) 7 (d) 8

$\{a, b, c\}$ ~~X~~

PROPER SET = $2^n - 1$

n = no. of elements in set.

$A \cap B \{1, 2\}$

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

If $A = \{1, 2, 5, 6\}$ and $B = \{1, 2, 3\}$, then what is $(A \times B) \cap (B \times A)$ equal to?

(a) $\{(1, 1), (2, 1), (6, 1), (3, 2)\}$

(b) $\{(1, 1), (1, 2), (2, 1), (2, 2)\}$

(c) $\{(1, 1), (2, 2)\}$

(d) $\{(1, 1), (1, 2), (2, 5)\ (2, 6)\}$

$(1, 1)\ (1, 2)$
$(2, 1)\ (2, 2)$

$A - B$
$B - A$

$n(A) = 4$ $n(B) = 3$

If the cardinality of a set A is 4 and that of a set B is 3, then what is the cardinality of the set $\boxed{A \Delta B?}$

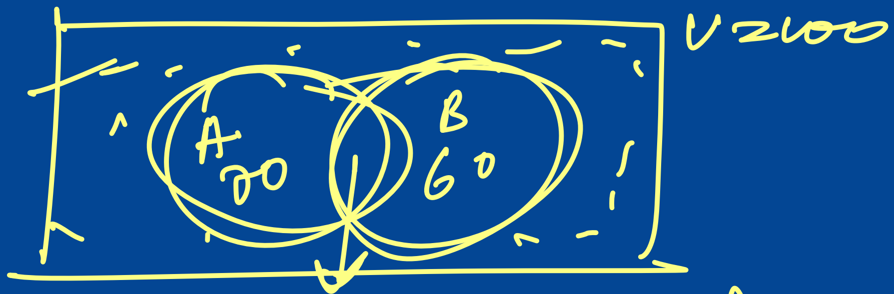
(a) 1

(b) 5

(c) 7

~~(d)~~ Can't be determined as the sets A and B are not given.

$A \Delta B$



$V=100$ $\quad n(A)=70 \quad n(B)=60$

$n(A\cap B)=40$

In a class of 100 students, 70 have taken Science, 60 have taken Mathematics and 40 have taken both Science and Mathematics. The number of students who have not taken Science or Mathematics or both Science and Mathematics, is equal to

(a) 90 ~~(b)~~ 10 (c) 30 (d) 20

$n(A)+n(B)-n(A\cap B)$

$=70+60-40$

$=90$

$n(A) = \boxed{3}$

$n(B) = \boxed{6}$

$n(A \cup B) = 6$

8

7

9

If a set A contains 3 elements and another set B contains 6 elements, then the number of elements in A U B would be

(a) 9

(b) either 8 or 9

(c) either 7 or 8 or 9

(d) either 6 or 7 or 8 or 9

The set of intelligent students in a class is

(a) a null set

(b) a singleton set

(c) a finite set

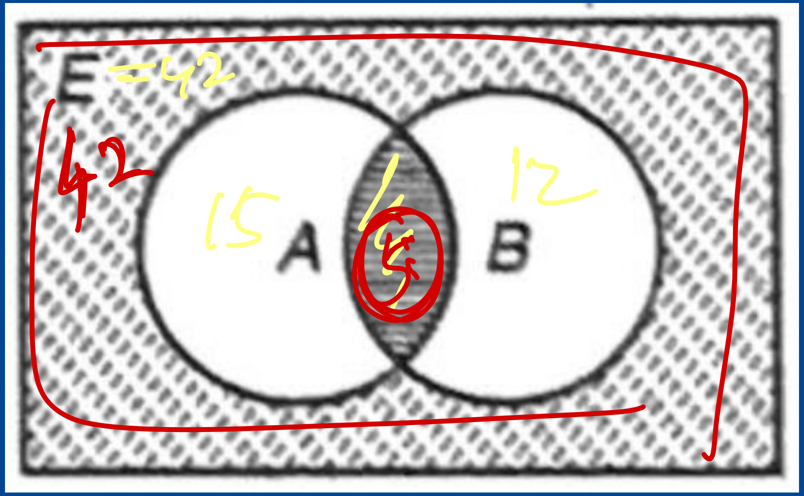
(d) not a well defined collection

$n(A)+n(B)-n(A\cup B) = 27-22=5$

22

Consider the following venn-diagram.

$20+5$



If |E| = 42, |A|=15, |B|=12 and |A U B| = 22, then the area represented by the shaded portion in the above venn-diagram is

(a) ~~25~~ (b) 27 (c) 32 (d) 37