



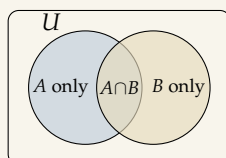
A Premier Institute for Pre-Medical & Pre Engineering

**SRI VIDYA
ARADHANA
ACADEMY**
"Transforming Your DREAMS Into Reality...!"**NEET/JEE****Topic: Sets**

Mathematics

Assignment 04 • Venn Diagrams & Cardinality (Two Sets)

Chetan Sir

"Show up every single day — consistency beats intensity over two years."

$$n(A \cup B) = n(A) + n(B) - n(A \cap B); \quad n(\text{only } A) = n(A) - n(A \cap B); \quad n(\text{neither}) = n(U) - n(A \cup B);$$

$$\text{overlap bounds: } \max(0, n(A) + n(B) - n(U)) \leq n(A \cap B) \leq \min(n(A), n(B)).$$

SECTION A : USING THE FORMULA

- If $n(X) = 28$, $n(Y) = 32$ and $n(X \cup Y) = 50$, find $n(X \cap Y)$. **[NCERT]**
- Let $n(A) = 20$, $n(A \cup B) = 42$ and $n(A \cap B) = 4$. Find $n(B)$, $n(A - B)$ and $n(B - A)$.

(A) consistent (B) inconsistent, as $n(A \cup B) = 550 > 500$

(C) consistent, with 50 (D) impossible to judge owning neither

- In a school of 33 teachers, 15 teach Mathematics and 24 teach Physics. At least how many teach both?

(A) 6 (B) 5 (C) 4 (D) 3

- If $n(A) = 5$ and $n(B) = 9$ with $n(U) = 12$, the maximum and minimum values of $n(A \cup B)$ are

(A) 14, 9 (B) 12, 9 (C) 12, 5 (D) 14, 5

- A survey shows 63% like cheese and 76% like apples. If $x\%$ like both, then

(A) $0 \leq x \leq 63$ (B) $39 \leq x \leq 63$
(C) $39 \leq x \leq 76$ (D) $13 \leq x \leq 63$

- A market group surveyed 1000 consumers: 720 liked product A and 450 liked B. The least number that liked both is

(A) 170 (B) 270 (C) 450 (D) 720

SECTION B : WORD PROBLEMS

- In a class of 35 students, 24 like cricket and 16 like football; each likes at least one. How many like both? **[NCERT]**
- In a group of 65 people, 40 like cricket and 10 like both cricket and tennis; each likes at least one. Find (i) those who like tennis only, (ii) those who like tennis. **[NCERT]**
- In a survey of 700 college students, 180 drink Limca, 275 drink Mirinda and 95 drink both. Find (i) how many drink Limca only, (ii) how many drink neither.
- Of 200 individuals with a skin disorder, 120 were exposed to chemical C_1 , 50 to C_2 and 30 to both. Find the number exposed to (i) C_1 but not C_2 , (ii) C_2 but not C_1 , (iii) C_1 or C_2 . **[NCERT]**

SECTION C : REASONING, MAXIMUM & MINIMUM

- Of 500 car owners, 400 own a Maruti, 200 own a Hyundai and 50 own both. This data is

SECTION D : CARDINALITY (MCQ)

- If $n(U) = 700$, $n(A) = 200$, $n(B) = 300$ and $n(A \cap B) = 100$, then $n(A' \cap B')$ is
(A) 400 (B) 600 (C) 300 (D) 200
- If $n(A) = 16$, $n(B) = 14$ and $n(A \cup B) = 25$, then $n(A \cap B)$ is
(A) 30 (B) 50 (C) 5 (D) 25
- In a city, 20% travel by car, 50% by bus and 10% by both. The percentage travelling by car or bus is
(A) 80% (B) 40% (C) 60% (D) 70%

15. If $A \subseteq B$, then $n(A \cap B)$ equals
 (A) $n(A)$ (B) $n(B)$ (C) 0 (D) $n(A) + n(B)$
16. Every teacher teaches Mathematics or Physics: 15 teach Maths, 24 teach Physics and 6 teach both. The number of teachers is
 (A) 33 (B) 34 (C) 35 (D) 45
18. In a hostel, 65% of students like tea and 82% like coffee. If $x\%$ like both, then
 (A) $47 \leq x \leq 65$ (B) $17 \leq x \leq 65$
 (C) $47 \leq x \leq 82$ (D) $0 \leq x \leq 65$
19. In a town every person reads at least one of the newspapers A and B . If 70% read A , 55% read B and 4500 people read both, find the total population of the town.

SECTION E : MATCH THE COLUMNS

17. For two sets A, B , match the data in Column I with the required value in Column II.

Column I

- (i) $n(A)=10, n(B)=15, n(A \cup B)=20: n(A \cap B)$
 (ii) $n(A)=8, n(B)=12, n(A \cap B)=5: n(A \cup B)$
 (iii) $n(A \cup B)=30, n(A \cap B)=5, n(A)=18: n(B)$
 (iv) $n(U)=60, n(A \cup B)=35: n((A \cup B)')$

Column II

- (P) 5
 (Q) 15
 (R) 17
 (S) 25

20. If $n(A) = 25, n(B) = 40$ and $n(U) = 60$, the maximum and minimum possible values of $n(A \cap B)$ are
 (A) 40, 5 (B) 25, 5 (C) 25, 0 (D) 40, 0
21. If $n(A) = 18, n(B) = 12$ and $n(A \cap B) = 6$, find $n(A \triangle B)$.
22. In an examination, 80% passed in English, 85% in Mathematics and 75% in both. If 40 students failed in both subjects, find the total number of students.

SECTION F : ADDITIONAL PROBLEMS

ANSWER KEY

- | | | | |
|--|------------------------------------|-----------|-------------------|
| 1. 10 | 2. $n(B)=26, n(A-B)=16, n(B-A)=22$ | 3. 5 | 4. (i) 25 (ii) 35 |
| 5. (i) 85 (ii) 340 | 6. (i) 90 (ii) 20 (iii) 140 | 7. B | 8. A |
| 9. B | 10. B | 11. A | 12. C |
| 13. C | 14. C | 15. A | 16. A |
| 17. $i \rightarrow P, ii \rightarrow Q, iii \rightarrow R, iv \rightarrow S$ | 18. A | 19. 18000 | 20. B |
| 21. 18 | 22. 400 | | |