

MATHEMATICS · JEE MAIN

Sets

Chapter-wise previous year questions, with answer key

22

PYQS

2020–2025

PAPERS

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TOPICS

Set Operations

Subsets and Power Set

Types of Sets

Venn Diagrams

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

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Set Operations · 12 PYQs

Q1 JEE Main 2023 · 6 Apr · Shift 1

Let $A = \{x \in \mathbb{R} : [x + 3] + [x + 4] \leq 3\}$,

$$B = \left\{ x \in \mathbb{R} : 3^x \left(\sum_{r=1}^{\infty} \frac{3}{10^r} \right)^{x-3} < 3^{-3x} \right\},$$

where $[t]$ denotes greatest integer function. Then,

(A) $B \subset C, A \neq B$

(B) $A \subset B, A \neq B$

(C) $A = B$

(D) $A \cap B = \phi$

[Step-by-step solution ► prepwisar.in/questions/zlffFX8FRU](https://www.prepwisar.in/questions/zlffFX8FRU)

Q2 JEE Main 2022 · 29 Jul · Shift 1

Let $S = \{4, 6, 9\}$ and $T = \{9, 10, 11, \dots, 1000\}$. If

$$A = \{a_1 + a_2 + \dots + a_k : k \in \mathbb{N}, a_1, a_2, a_3, \dots, a_k$$

$\in S\}$, then the sum of all the elements in the set $T - A$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/l8dv8bScb7](https://www.prepwisar.in/questions/l8dv8bScb7)

Q3 JEE Main 2022 · 28 Jul · Shift 2

$$\text{Let } S = \left\{ x \in [-6, 3] - \{-2, 2\} : \frac{|x+3|-1}{|x|-2} \geq 0 \right\} \text{ and}$$

$$T = \{x \in \mathbb{Z} : x^2 - 7|x| + 9 \leq 0\}.$$

Then the number of elements in $S \cap T$ is :

(A) 7

(B) 5

(C) 4

(D) 3

[Step-by-step solution ► prepwisar.in/questions/EjjzetkTQu](https://www.prepwisar.in/questions/EjjzetkTQu)

Q4 JEE Main 2022 · 25 Jul · Shift 2

Let $A = \{1, 2, 3, 4, 5, 6, 7\}$. Define $B = \{T \subseteq A : \text{either } 1 \notin T \text{ or } 2 \in T\}$ and $C = \{T \subseteq A : T \text{ the sum of all the elements of } T \text{ is a prime number}\}$. Then the number of elements in the set $B \cup C$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/l5nI1VGejB](https://www.prepwisar.in/questions/l5nI1VGejB)

Q5 JEE Main 2022 · 28 Jun · Shift 1

Let $A = \{1, a_1, a_2, \dots, a_{18}, 77\}$ be a set of integers with $1 < a_1 < a_2 < \dots < a_{18} < 77$.

Let the set $A + A = \{x + y : x, y \in A\}$ contain exactly 39 elements. Then, the value of $a_1 + a_2 + \dots + a_{18}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/tUVPDH5SDe](https://www.prepwiser.in/questions/tUVPDH5SDe)

Q6 JEE Main 2022 · 26 Jun · Shift 1

Let $A = \{n \in \mathbb{N} : \text{H.C.F.}(n, 45) = 1\}$ and

Let $B = \{2k : k \in \{1, 2, \dots, 100\}\}$. Then the sum of all the elements of $A \cap B$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/BKzRbAUQrN](https://www.prepwiser.in/questions/BKzRbAUQrN)

Q7 JEE Main 2021 · 27 Aug · Shift 1

If $A = \{x \in \mathbb{R} : |x - 2| > 1\}$,

$B = \{x \in \mathbb{R} : \sqrt{x^2 - 3} > 1\}$,

$C = \{x \in \mathbb{R} : |x - 4| \geq 2\}$ and Z is the set of all integers, then the number of subsets of the set $(A \cap B \cap C)^c \cap Z$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/1i7dm2H7ek](https://www.prepwiser.in/questions/1i7dm2H7ek)

Q8 JEE Main 2021 · 27 Jul · Shift 2

Let $A = \{n \in \mathbb{N} : n^2 \leq n + 10,000\}$, $B = \{3k + 1 : k \in \mathbb{N}\}$ and $C = \{2k : k \in \mathbb{N}\}$, then the sum of all the elements of the set $A \cap (B - C)$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/qnN65PAcao](https://www.prepwiser.in/questions/qnN65PAcao)

Q9 JEE Main 2021 · 24 Feb · Shift 1

Let $A = \{n \in \mathbb{N} : n \text{ is a 3-digit number}\}$

$$B = \{9k + 2 : k \in \mathbb{N}\}$$

and $C = \{9k + l : k \in \mathbb{N} \text{ for some } l (0 < l < 9)\}$

If the sum of all the elements of the set $A \cap (B \cup C)$ is 274×400 , then l is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/pJjqOyrhPr](https://www.prepwiser.in/questions/pJjqOyrhPr)

Q10 JEE Main 2020 · 4 Sep · Shift 2

Let

$$\bigcup_{i=1}^{50} X_i = \bigcup_{i=1}^n Y_i = T$$

where each X_i contains 10 elements and each Y_i contains 5 elements. If each element of the set T is an element of exactly 20 of sets X_i 's and exactly 6 of sets Y_i 's, then n is equal to :

- (A) 30 (B) 50
(C) 15 (D) 45

[Step-by-step solution ► prepwisser.in/questions/NEJiis3Nbk](https://www.prepwisser.in/questions/NEJiis3Nbk)

Q11 JEE Main 2020 · 3 Sep · Shift 1

Consider the two sets :

$A = \{m \in \mathbb{R} : \text{both the roots of } x^2 - (m+1)x + m + 4 = 0 \text{ are real}\}$
and $B = [-3, 5)$.

Which of the following is not true?

- (A) $A \cap B = \{-3\}$
(B) $B - A = (-3, 5)$
(C) $A \cup B = \mathbb{R}$
(D) $A - B = (-\infty, -3) \cup (5, \infty)$

[Step-by-step solution ► prepwisser.in/questions/vrcqUNvPm7](https://www.prepwisser.in/questions/vrcqUNvPm7)

Q12 JEE Main 2020 · 7 Jan · Shift 2

Let $X = \{n \in \mathbb{N} : 1 \leq n \leq 50\}$. If

$A = \{n \in X : n \text{ is a multiple of } 2\}$ and

$B = \{n \in X : n \text{ is a multiple of } 7\}$, then the number of elements in the smallest subset of X containing both A and B is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/g2BOV5Us2j](https://www.prepwisser.in/questions/g2BOV5Us2j)

Subsets and Power Set · 5 PYQs

Q13 JEE Main 2024 · 27 Jan · Shift 2

Let A and B be two finite sets with m and n elements respectively. The total number of subsets of the set A is 56 more than the total number of subsets of B . Then the distance of the point $P(m, n)$ from the point $Q(-2, -3)$ is :

- (A) 8 (B) 10
(C) 4 (D) 6

[Step-by-step solution ► prepwisser.in/questions/wwh01Kztll](https://www.prepwisser.in/questions/wwh01Kztll)

Q14 JEE Main 2023 · 8 Apr · Shift 1

Let the number of elements in sets A and B be five and two respectively. Then the number of subsets of $A \times B$ each having at least 3 and at most 6 elements is :

- (A) 782 (B) 772
(C) 752 (D) 792

[Step-by-step solution ► prepwisar.in/questions/xdILqiFivE](https://www.prepwisar.in/questions/xdILqiFivE)

Q15 JEE Main 2022 · 26 Jul · Shift 2

Let $A = \{1, 2, 3, 4, 5, 6, 7\}$ and $B = \{3, 6, 7, 9\}$. Then the number of elements in the set $\{C \subseteq A : C \cap B \neq \phi\}$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/jaUg_yzTJw](https://www.prepwisar.in/questions/jaUg_yzTJw)

Q16 JEE Main 2021 · 27 Aug · Shift 2

Let $S = \{1, 2, 3, 4, 5, 6, 9\}$. Then the number of elements in the set $T = \{A \subseteq S : A \neq \phi \text{ and the sum of all the elements of } A \text{ is not a multiple of } 3\}$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/AQh6XbkE7r](https://www.prepwisar.in/questions/AQh6XbkE7r)

Q17 JEE Main 2020 · 6 Sep · Shift 1

Set A has m elements and set B has n elements. If the total number of subsets of A is 112 more than the total number of subsets of B , then the value of $m.n$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/IBe2A9-jS-](https://www.prepwisar.in/questions/IBe2A9-jS-)

Types of Sets · 3 PYQs

Q18 JEE Main 2025 · 22 Jan · Shift 1

Let $A = \{1, 2, 3, \dots, 10\}$ and $B = \{\frac{m}{n} : m, n \in A, m < n \text{ and } \gcd(m, n) = 1\}$. Then $n(B)$ is equal to :

- (A) 29 (B) 31
(C) 37 (D) 36

[Step-by-step solution ► prepwisar.in/questions/zQftv9q2sc](https://www.prepwisar.in/questions/zQftv9q2sc)

Q19 JEE Main 2023 · 10 Apr · Shift 1

The number of elements in the set $\{n \in \mathbb{Z} : |n^2 - 10n + 19| < 6\}$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/JJNot8k1mpQ](https://www.prepwisar.in/questions/JJNot8k1mpQ)

Q20 JEE Main 2022 · 25 Jun · Shift 2

Let $A = \{x \in \mathbb{R} : |x + 1| < 2\}$ and $B = \{x \in \mathbb{R} : |x - 1| \geq 2\}$. Then which one of the following statements is NOT true?

- (A) $A - B = (-1, 1)$ (B) $B - A = \mathbb{R} - (-3, 1)$
(C) $A \cap B = (-3, -1]$ (D) $A \cup B = \mathbb{R} - [1, 3)$

[Step-by-step solution ► prepwisar.in/questions/jZhZjbp3oF](https://www.prepwisar.in/questions/jZhZjbp3oF)

Venn Diagrams · 2 PYQs

Q21 JEE Main 2024 · 6 Apr · Shift 1

Let $A = \{n \in [100, 700] \cap \mathbb{N} : n \text{ is neither a multiple of 3 nor a multiple of 4}\}$. Then the number of elements in A is

- (A) 300 (B) 310
(C) 290 (D) 280

[Step-by-step solution ► prepwisser.in/questions/2YHBNBrBHU](https://www.prepwisser.in/questions/2YHBNBrBHU)

Q22 JEE Main 2021 · 26 Aug · Shift 1

Out of all the patients in a hospital 89% are found to be suffering from heart ailment and 98% are suffering from lungs infection. If $K\%$ of them are suffering from both ailments, then K can not belong to the set :

- (A) {80, 83, 86, 89} (B) {84, 86, 88, 90}
(C) {79, 81, 83, 85} (D) {84, 87, 90, 93}

[Step-by-step solution ► prepwisser.in/questions/INVdinFCSH](https://www.prepwisser.in/questions/INVdinFCSH)

Answer key — Sets

Numbers match the question numbers above. For full working, open the solution link under each question.

1	C	2	11	3	D	4	107	5	702	6	5264	7	256	8	832
9	5	10	A	11	D	12	29	13	B	14	D	15	112	16	80
17	28	18	B	19	6	20	B	21	A	22	C				

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