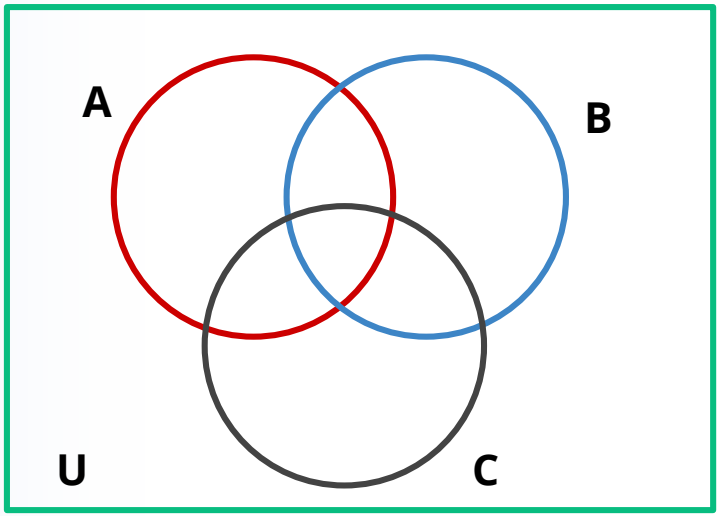
Cardinal Number of Sets

Sets

4

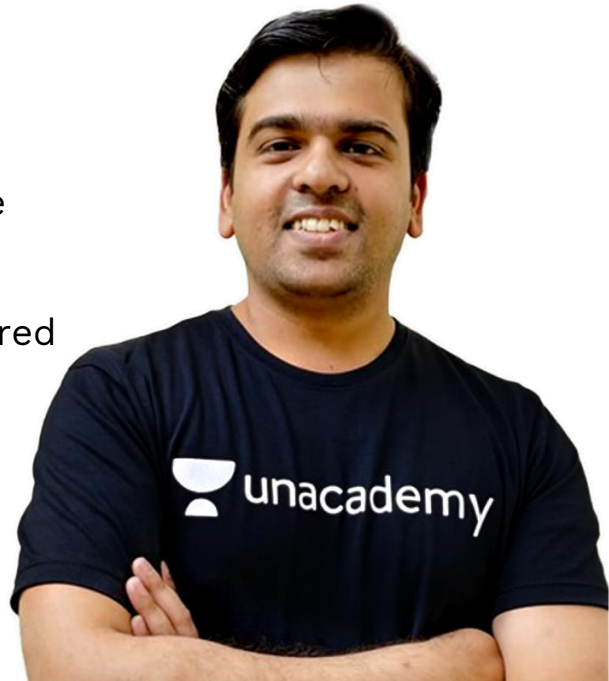


jee LIVE daily 3.0

Sameer Chincholikar

B.Tech, M.Tech - IIT-Roorkee

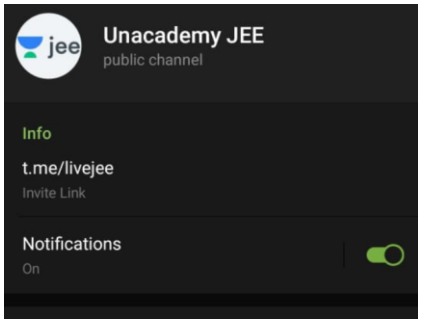
- **10+** years Teaching experience
- Taught **1 Million+** Students
- **100+** Aspiring Teachers Mentored

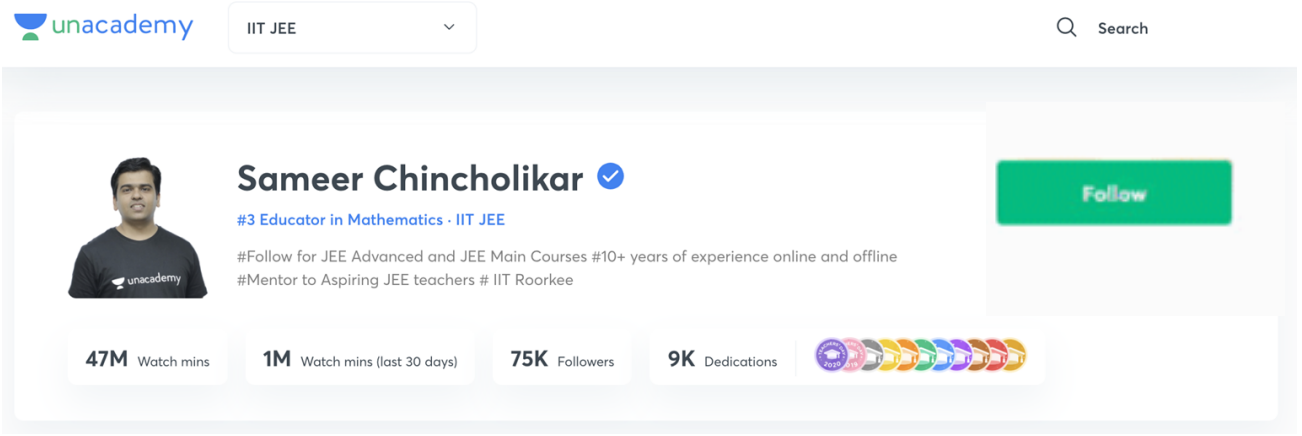


sameer_iitr

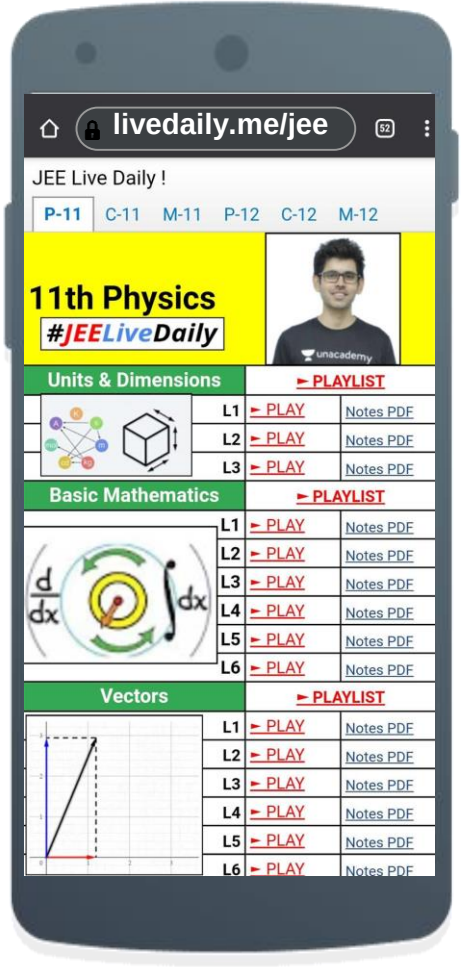
#JEELiveDaily

Telegram Channel

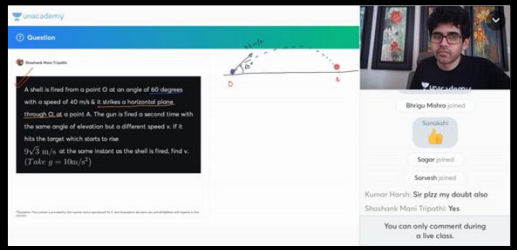


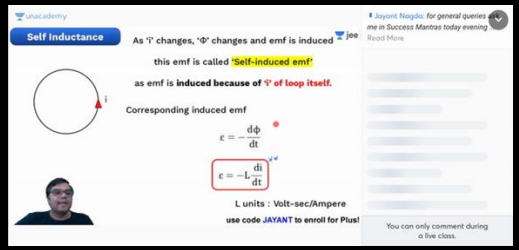


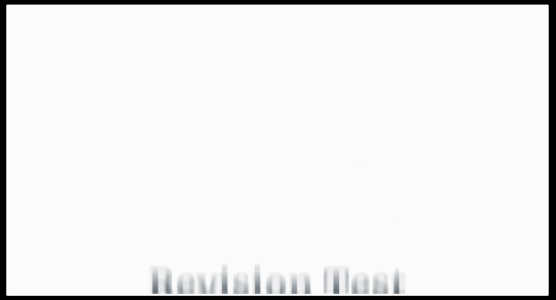
livedaily.me/jee

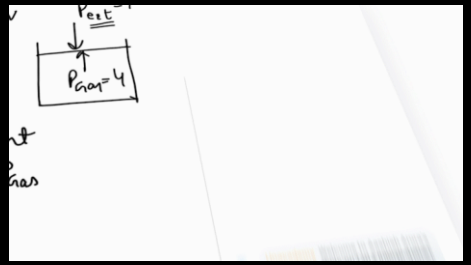


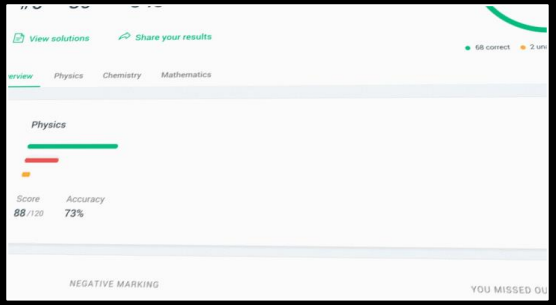
Unacademy Subscription











+ LIVE Class Environment

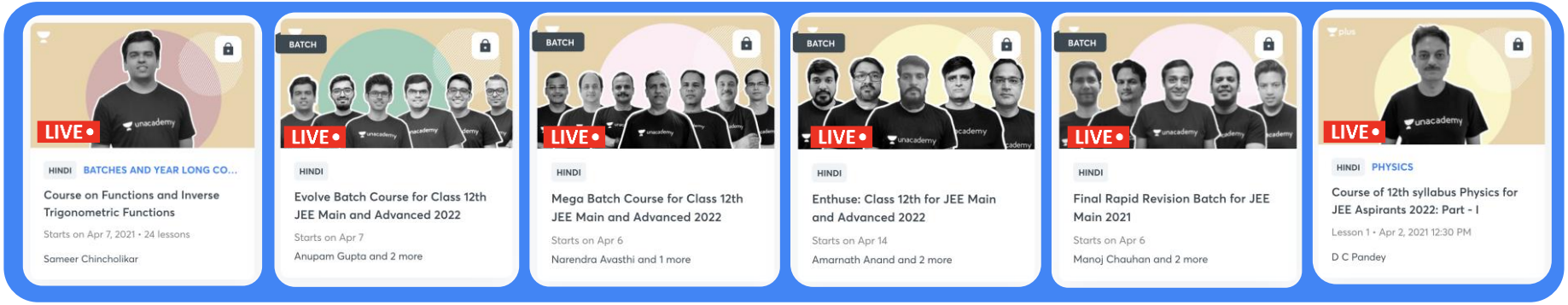
- **LIVE Polls** & **Leaderboard**
- **LIVE Doubt** Solving
- **LIVE** Interaction

+ Performance Analysis

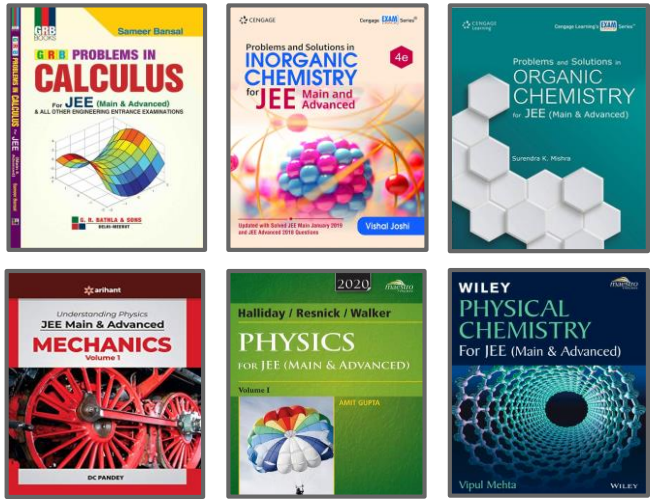
- **Weekly Test Series**
- **DPPs** & **Quizzes**

India's BEST Educators

Unacademy Subscription



If you want to be the BEST
"Learn" from the BEST



jee

Top Results

Bratin Mondal

100 %ile

Amaiya Singhal
99.97

Adnan
99.95

Ashwin Prasanth
99.94

Tanmay Jain
99.86

Kunal Lalwani
99.81

Utsav Dhanuka
99.75

Aravindan K Sundaram
99.69

Manas Pandey
99.69

Mihir Agarwal
99.63

Akshat Tiwari
99.60

Sarthak Kalankar
99.59

Vaishnovi Arun
99.58

Devashish Tripathi
99.52

Maroof
99.50

Tarun Gupta
99.50

Siddharth Kaushik
99.48

Mihir Kothari
99.39

Sahil
99.38

Vaibhav Dhanuka
99.34

Pratham Kadam
99.29

Shivam Gupta
99.46

Shrish
99.28

Yash Bhaskar
99.10

Subhash Patel
99.02

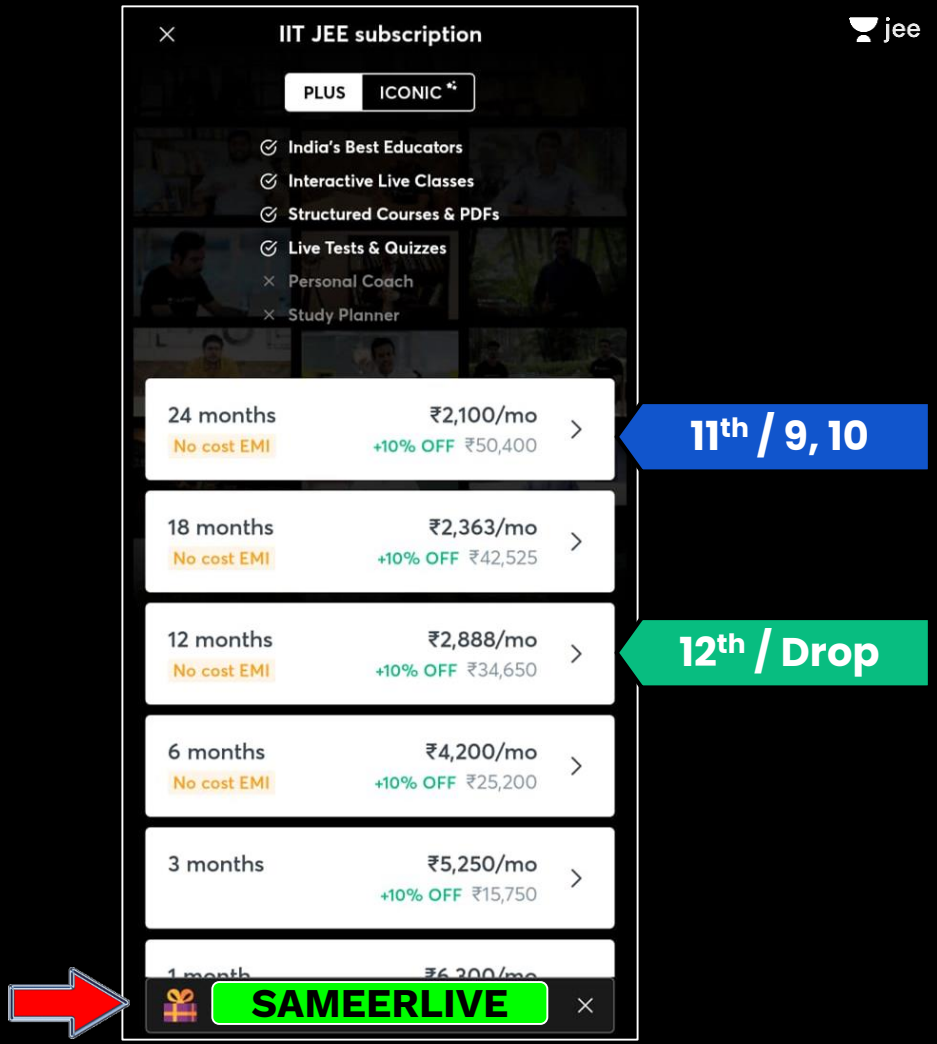
Ayush Kale
98.85

Ayush Gupta
98.67

Megh Gupta
98.59

Naman Goyal
98.48

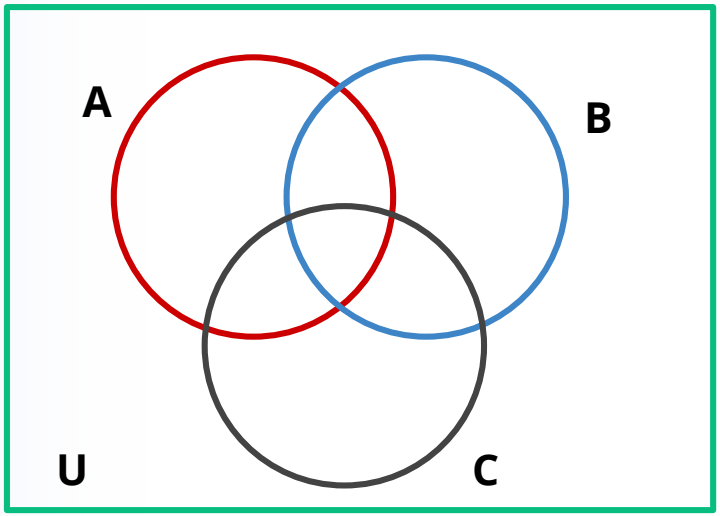
MIHIR PRAJAPATI
98.16


IIT JEE subscription
PLUS
ICONIC
India's Best Educators
Interactive Live Classes
Structured Courses & PDFs
Live Tests & Quizzes
Personal Coach
Study Planner
24 months
No cost EMI
₹2,100/mo
+10% OFF ₹50,400
18 months
No cost EMI
₹2,363/mo
+10% OFF ₹42,525
12 months
No cost EMI
₹2,888/mo
+10% OFF ₹34,650
6 months
No cost EMI
₹4,200/mo
+10% OFF ₹25,200
3 months
₹5,250/mo
+10% OFF ₹15,750
SAMEERLIVE
jee
11th / 9, 10
12th / Drop

Cardinal Number of Sets

Sets

4



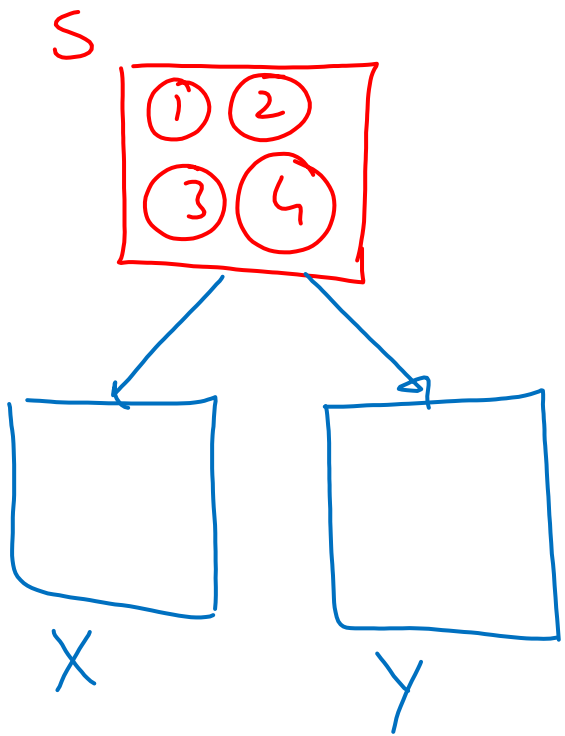
LET'S BEGIN!!

Homework Question

Example

Let **S = {1, 2, 3, 4}.** The total number of unordered pairs of disjoint subsets of S is equal to

A. 25 **B.** 34 **C.** 42 **D.** 41



$3 \times 3 \times 3 \times 3 = 81$

Eg: $X = \{1, 2\}$, $Y = \{3\}$

$X = \{3\}$, $Y = \{1, 2\}$

Eg: $X = \{\}$, $Y = \{\}$

$$\frac{80}{2} + 1 = 41 \checkmark$$

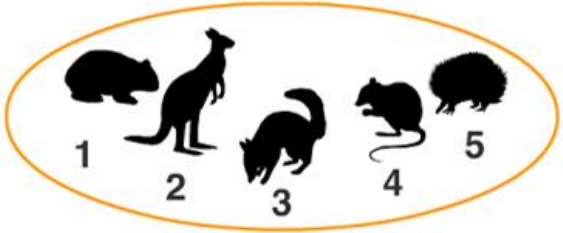
$$\frac{81+1}{2} \downarrow 41$$

Cardinal Number of Sets

jee

sets

5 elements



cardinal number = 5

a cardinal number is the number of elements in a set

5 elements

{ 2, 4, 6, 8, 10 }

cardinal number = 5

6 elements

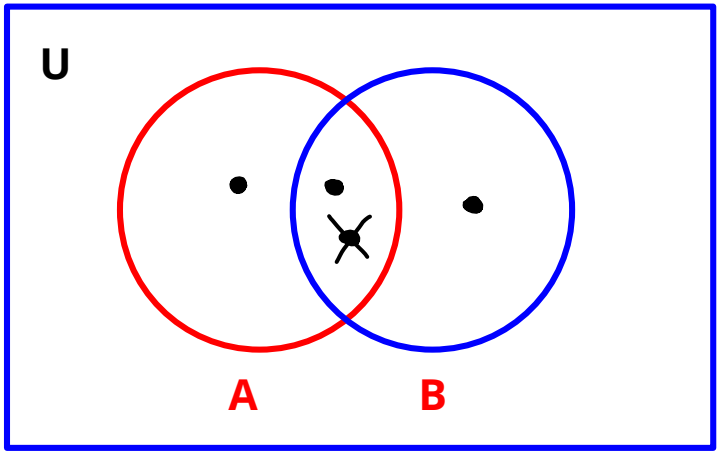
{1, 3, 5, 7, 9, 11}

cardinal number = 6

Cardinal Number of Sets

If A, B, C are finite sets and U be the finite universal set then

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

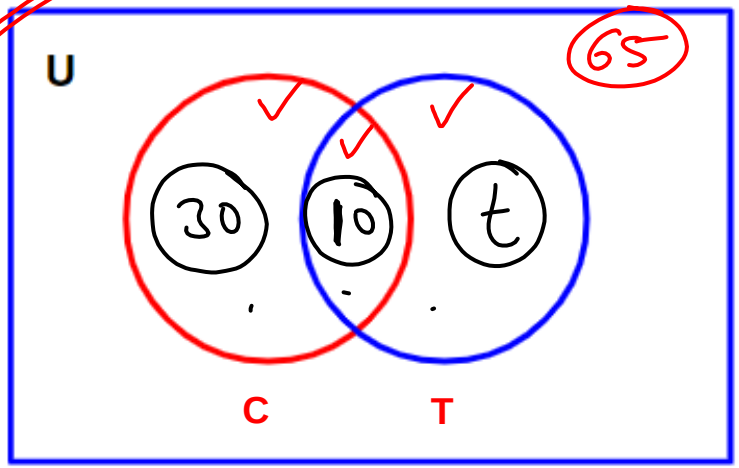


Example

In a group of **65 people, 40 like cricket, 10** like both **cricket and tennis.** The number of persons liking tennis only and not cricket is

A. 35 **B.** 25 **C.** 15 **D.** None of these

M-1



$65 = 30 + 10 + t$

$t = 25$

M-2

$n(C \cup T) = 65$

$n(C) = 40$

$n(C \cap T) = 10$

$n(T) = ?$

$$n(C \cup T) = n(C) + n(T) - n(C \cap T)$$

$$65 = 40 + x - 10$$

$$\boxed{x = 35}$$

$$n(T \text{ only}) = n(T) - n(C \cap T)$$

$$= 35 - 10 = \boxed{25}$$

Example

Let X be the universal set for sets A and B. If n(A) = 200, n(B) = 300 and n(A ∩ B) = 100, the **n(A' ∩ B')** is equal to 300 provided n(X) is equal to:

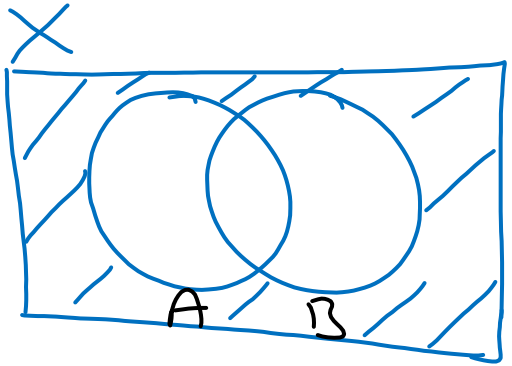
A. 600 **B.** 700 **C.** 800 **D.** 900

$n(A' \cap B')$

$= n((A \cup B)')$

$= n(X) - n(A \cup B)$

$\Rightarrow 300 = n(X) - n(A \cup B)$



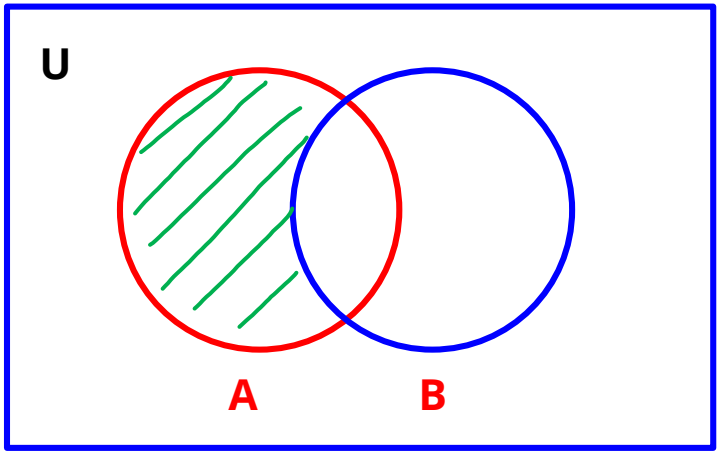
$n(A \cup B) = 200 + 300 - 100$

$= 400$

Cardinal Number of Sets

If A, B, C are finite sets and U be the finite universal set then

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

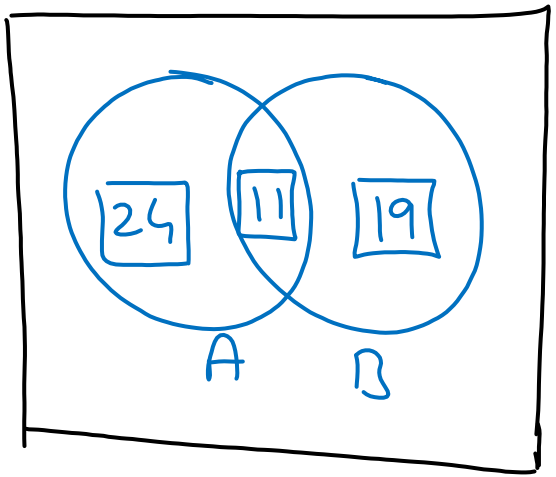


Example

If **A** and **B** are two sets such that **n(A - B) = 24, n (B - A) = 19** and **n(A ∩ B) = 11** then **n(A ∪ B) =**

A. 43 **B.** 30 **C.** 54 **D.** 35

M-1



M-2

$n(A) - n(A \cap B) = 24$

$n(B) - n(A \cap B) = 19$

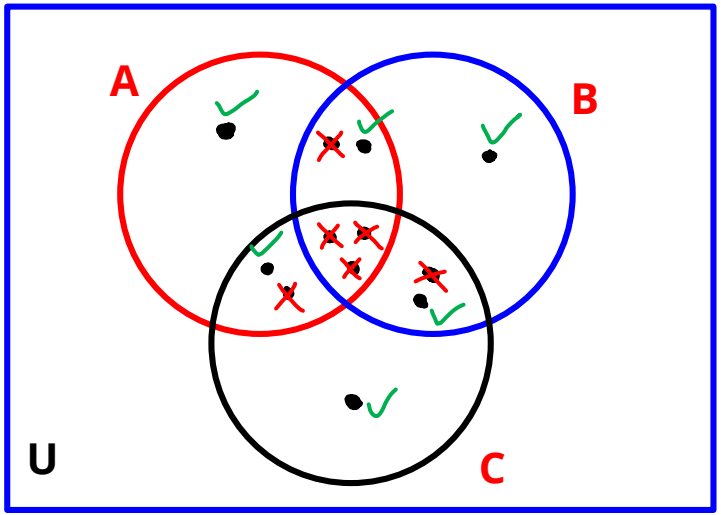
$n(A \cap B) = 11$

$n(A) + n(B) - n(A \cap B) = 54$

Cardinal Number of Sets

If A, B, C are finite sets and U be the finite universal set then

3 $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$



Example

In a city, three daily newspapers **A, B, C** are published. **42%** of the people in that city read A, **51%** read B and **68%** read C. **30%** read A and B; **28%** read B and C; **36%** read A and C; **8%** do not read any of the three newspapers. The percentage of persons who read all the three papers is

A. 25% **B.** 18% **C.** 20% **D.** None of these

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

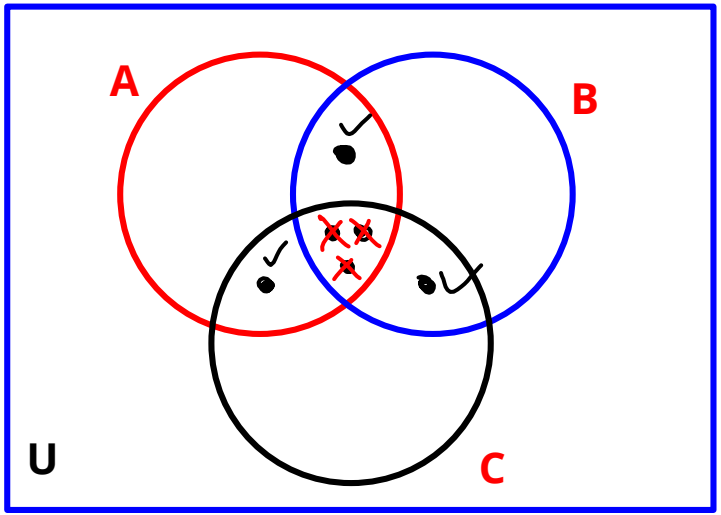
$$92 = (42 + 51) + 68 - 30 - 28 - 36 + x$$

$$\Rightarrow \boxed{x = 25}$$

Cardinal Number of Sets

If A, B, C are finite sets and U be the finite universal set then

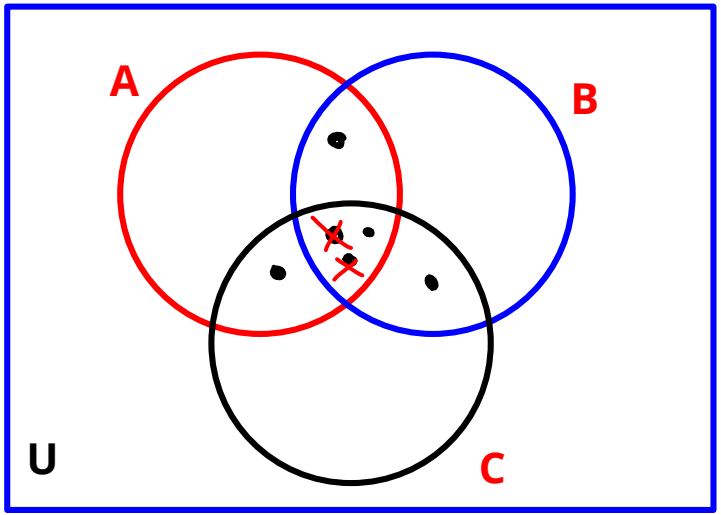
4 **Number of elements in exactly two of the sets A, B, C**
= n(A ∩ B) + n(B ∩ C) + n (C ∩ A) - 3n(A ∩ B ∩C)



Cardinal Number of Sets

If A, B, C are finite sets and U be the finite universal set then

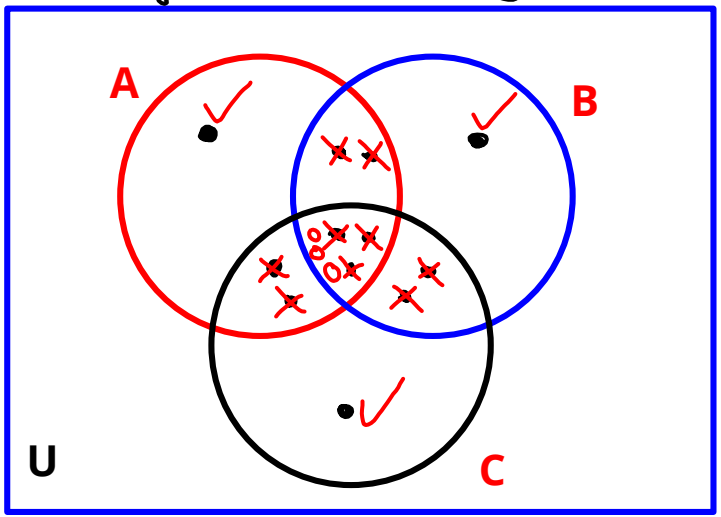
5 **Number of elements in at least two of the sets A, B, C**
$= n(A \cap B) + n(B \cap C) + n(C \cap A) - 2n(A \cap B \cap C)$



Cardinal Number of Sets

If A, B, C are finite sets and U be the finite universal set then

6 **Number of elements in exactly one of the sets A, B, C**
$= n(A) + n(B) + n(C) - 2n(A \cap B) - 2n(B \cap C) - 2n(A \cap C) + 3n(A \cap B \cap C)$

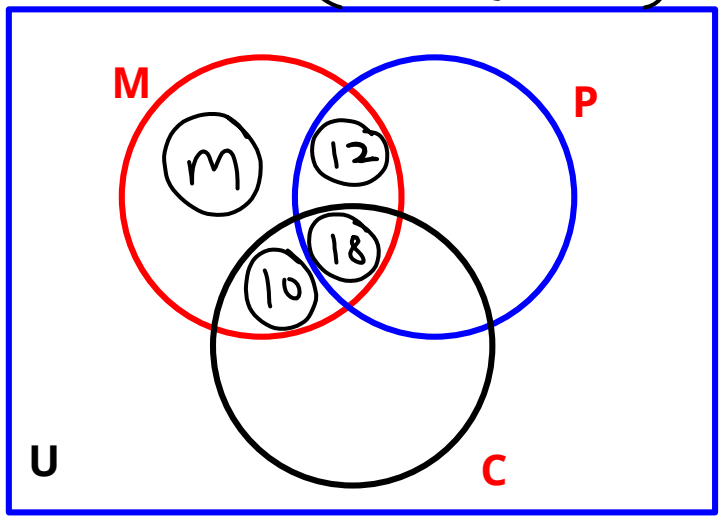


Example

A class has **175 students.** The following data shows the number of students opting one or more subjects : Mathematics 100, Physics 70, Chemistry 40, Mathematics and Physics 30, Mathematics and Chemistry 28, Physics and Chemistry 23, Mathematics & Physics & Chemistry 18. How many students have ~~offered~~ opted Mathematics alone ?

A. 35 **B.** 48 **C.** 60 **D.** 22

$m = 100 - (12 + 18 + 10)$



U : 175

M : 100

P : 70

C : 40

30

28

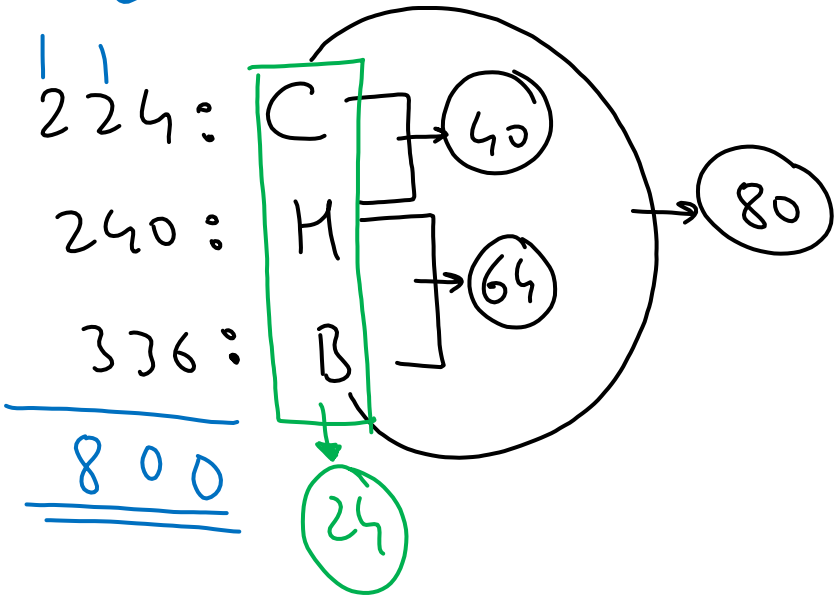
23

18

Example

Out of 800 boys in a school, **224** played cricket, **240** played hockey and **336** played basketball. Of the total, **64** played both basketball and hockey; **80** played cricket and basketball and **40** played cricket and hockey; **24** played all the three games. The number of boys who did not play any game is

A. 160 **B.** 240 **C.** 216 **D.** 128



$n(B \cup C \cup H) =$

$[800 - (40 + 80 + 64) + 24]$

$$180 - n(B \cup C \cup H)$$

Ans: $\boxed{160}$

Example

In a certain town **25%** families own a phone and **15%** own a car. **65%** own neither a phone nor a car. **2000 families** own both a car and a phone. Consider the following statements in this regard.

S - 1 : 10% families own both car and phone

S - 2 : 35% families own either a car or a phone

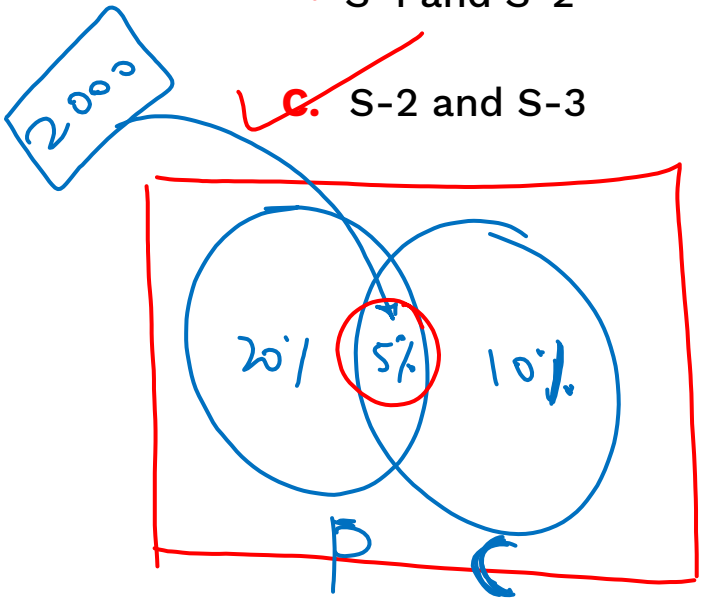
S - 3 : 40,000 families live in the town.

A. S-1 and S-2

B. S-1 and S-3

C. S-2 and S-3

D. All are correct



$n(P \cup C) = 100 - 65$

$= 35\%$

$n(P \cup C) = n(P) + n(C) - n(P \cap C)$

$35\% = 25\% + 15\% - n(P \cap C)$

$n(P \cap C) = 5\%$

$n(\text{town}) = ?$

$\frac{5}{100} \times n(\text{town}) = 2000$

$n(\text{town}) = 40000$

Example

From **50 students** taking examinations in Mathematics, Physics and Chemistry, each of the student has passed in at least one of the subject, **37** passed Mathematics, **24** Physics and **43** Chemistry. At most **19** passed Mathematics and Physics, at most **29** Mathematics and Chemistry and at most **20** Physics and Chemistry. The largest possible number that could have passed all three examination is

A. 14 **B.** 15 **C.** 13 **D.** 20

$$n(M \cup P \cup C) =$$

$$50 = (37 + 24 + 43) - [19 + 29 + 20] + x$$

Daily | TIMETABLE

jee

11th

Namo Sir | Physics

6:00 - 7:30 PM

Ashwani Sir | Chemistry

7:30 - 9:00 PM

Sameer Sir | Maths

9:00 - 10:30 PM

12th

Jayant Sir | Physics

1:30 - 3:00 PM

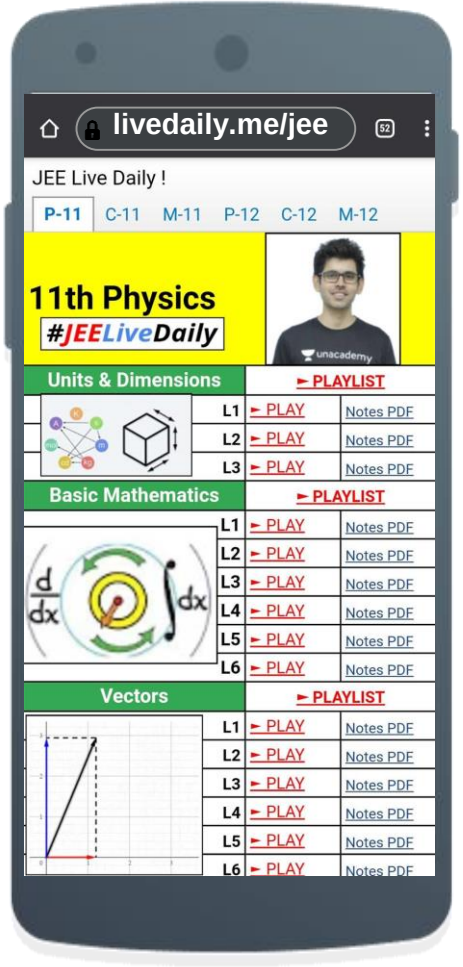
Anupam Sir | Chemistry

3:00 - 4:30 PM

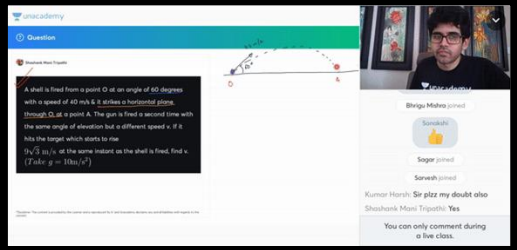
Nishant Sir | Maths

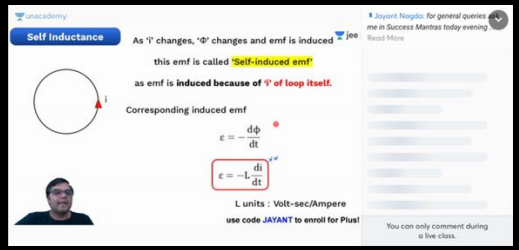
4:30 - 6:00 PM

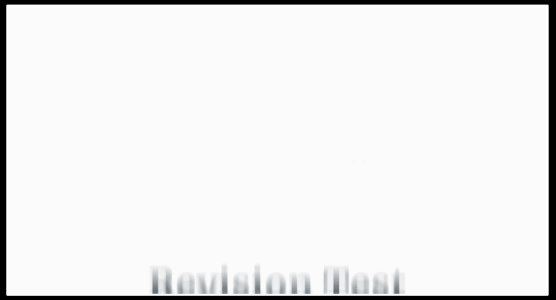
livedaily.me/jee

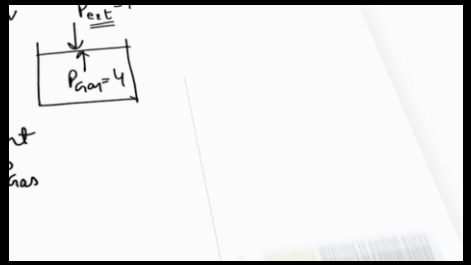


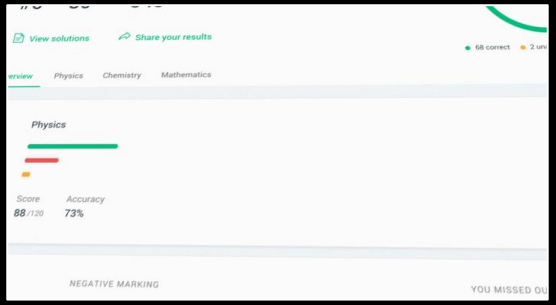
Unacademy Subscription











+ LIVE Class Environment

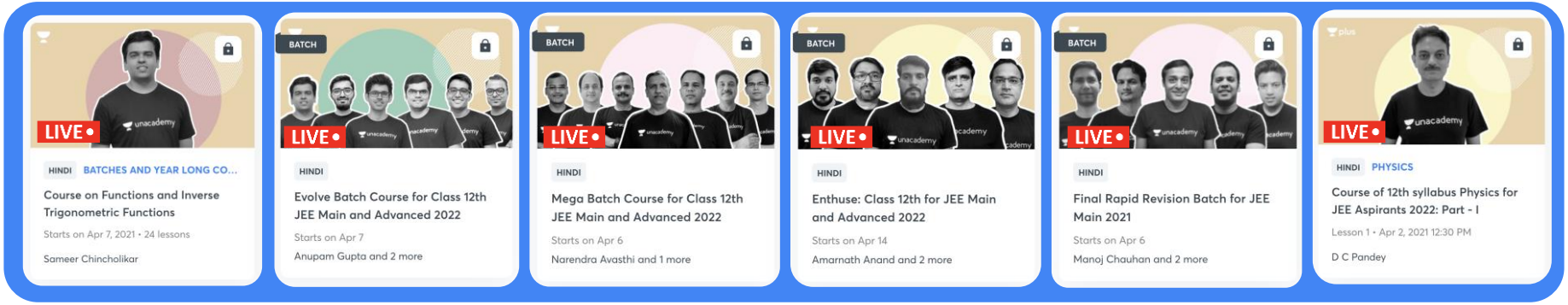
- **LIVE Polls** & **Leaderboard**
- **LIVE Doubt** Solving
- **LIVE** Interaction

+ Performance Analysis

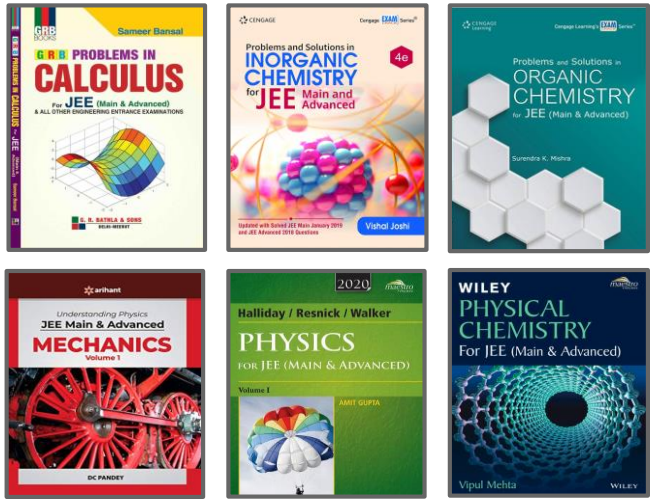
- **Weekly Test Series**
- **DPPs** & **Quizzes**

India's BEST Educators

Unacademy Subscription



If you want to be the BEST
"Learn" from the BEST



jee

Top Results

Bratin Mondal

100 %ile

Amaiya Singhal
99.97

Adnan
99.95

Ashwin Prasanth
99.94

Tanmay Jain
99.86

Kunal Lalwani
99.81

Utsav Dhanuka
99.75

Aravindan K Sundaram
99.69

Manas Pandey
99.69

Mihir Agarwal
99.63

Akshat Tiwari
99.60

Sarthak Kalankar
99.59

Vaishnovi Arun
99.58

Devashish Tripathi
99.52

Maroof
99.50

Tarun Gupta
99.50

Siddharth Kaushik
99.48

Mihir Kothari
99.39

Sahil
99.38

Vaibhav Dhanuka
99.34

Pratham Kadam
99.29

Shivam Gupta
99.46

Shrish
99.28

Yash Bhaskar
99.10

Subhash Patel
99.02

Ayush Kale
98.85

Ayush Gupta
98.67

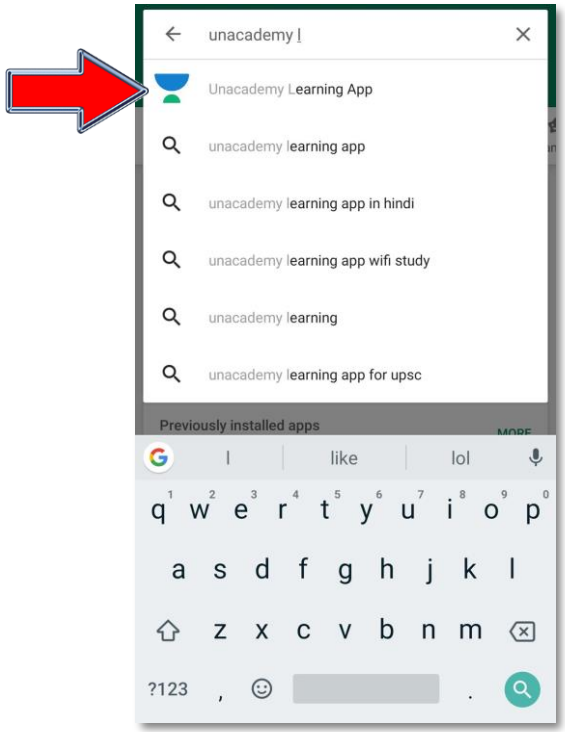
Megh Gupta
98.59

Naman Goyal
98.48

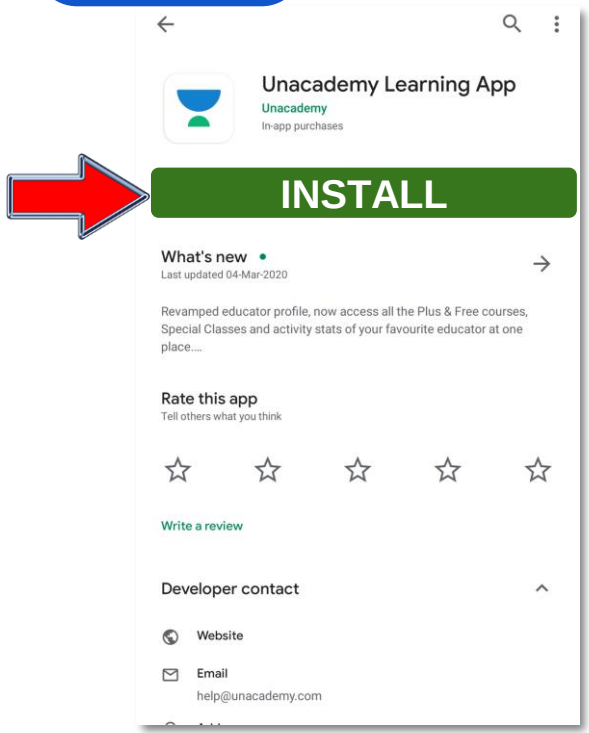
MIHIR PRAJAPATI
98.16

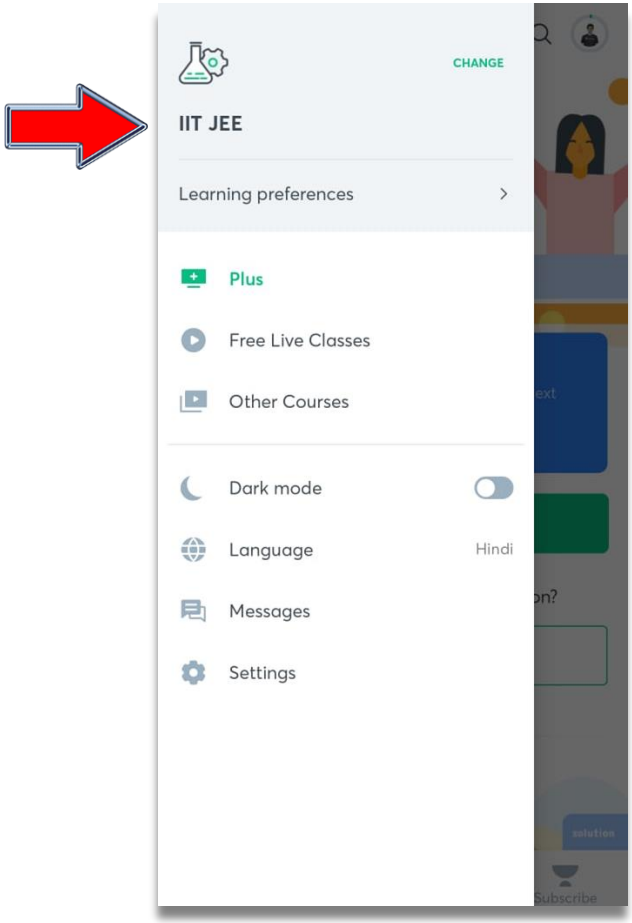
jee

Step 1

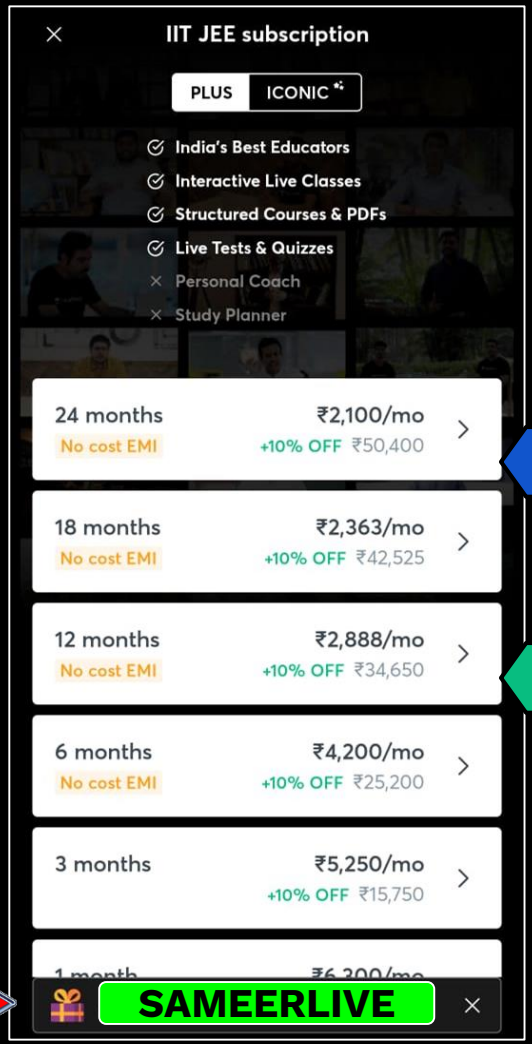


Step 2




CHANGE
IIT JEE
Learning preferences
Plus
Free Live Classes
Other Courses
Dark mode
Language
Hindi
Messages
Settings


9:41



11th / 9, 10

12th / Drop

jee

jee

EVOLVE 3.0 BATCH

JEE Main & Advanced 2022

Started on 7th April

unacademy | USAT

India's Biggest Test Series

USAT

(Unacademy Scholarship Assessment Test)

Every Sunday At 12 PM - 3 PM

Enroll Now for Free

Scholarship Worth Rs 1 Crore*

Thank You

@sameer_iitr

#JEELiveDaily

+ SUBSCRIBE

jee

LIKE & SHARE

PDF Download Now !