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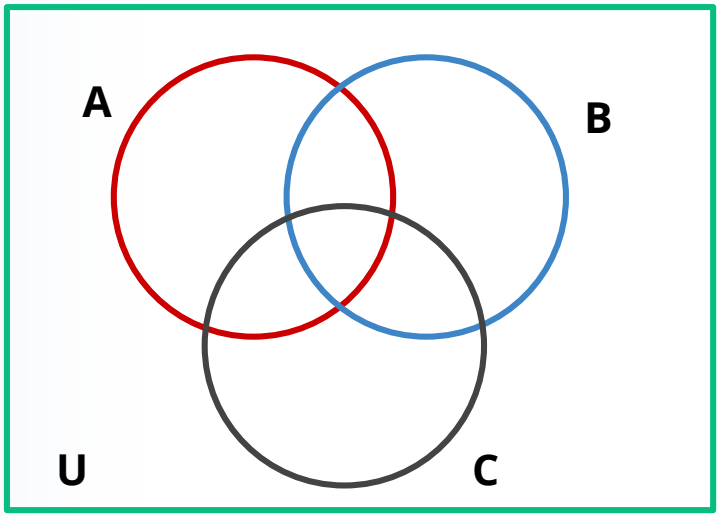
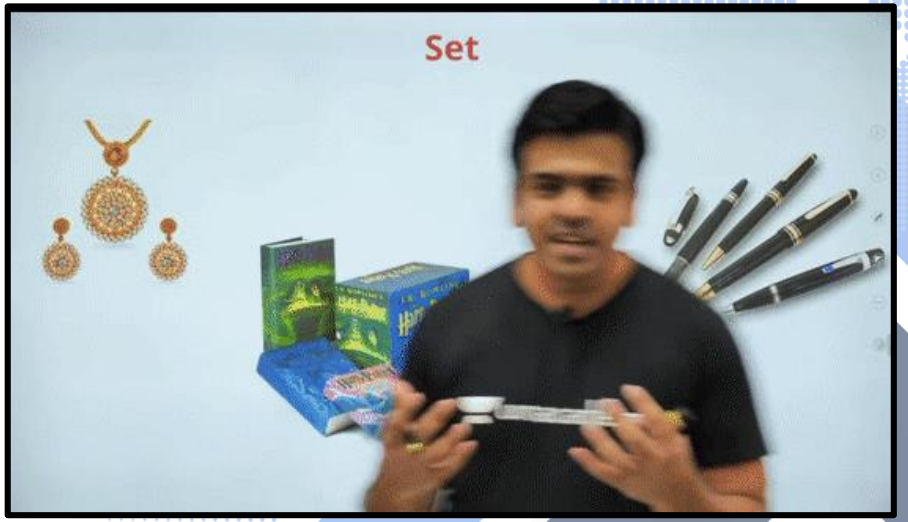
Laws of Sets

Sets 3





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Sameer Chincholikar

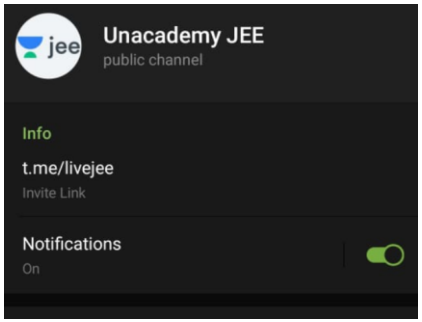
B.Tech, M.Tech - IIT-Roorkee

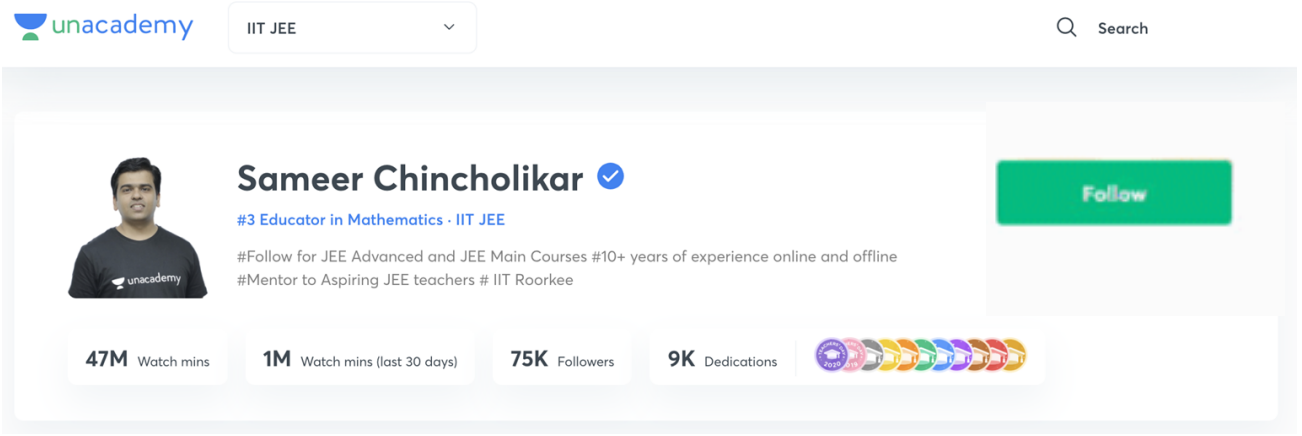
- **10+** years Teaching experience
- Taught **1 Million+** Students
- **100+** Aspiring Teachers Mentored

sameer_iitr

#JEELiveDaily

Telegram Channel





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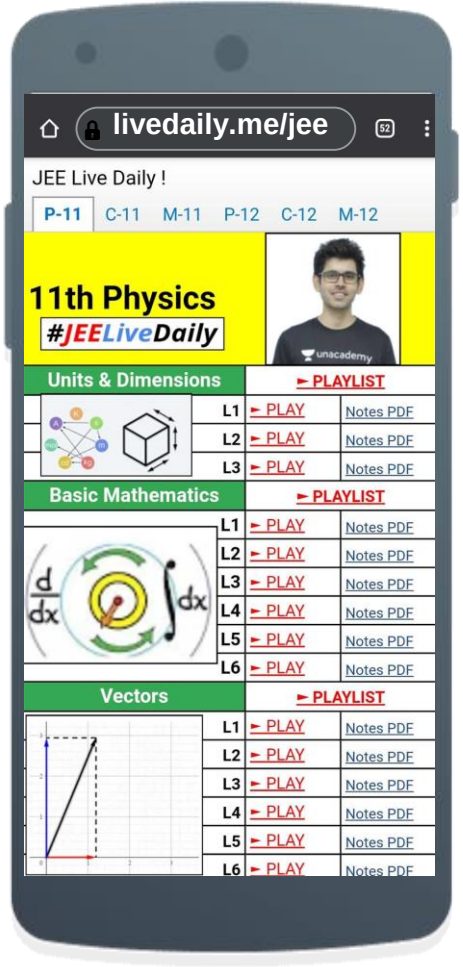

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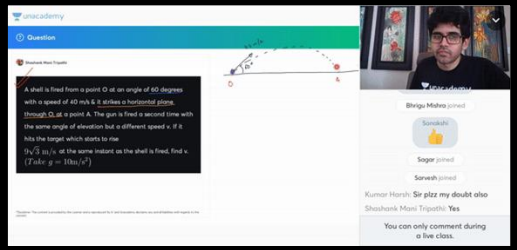

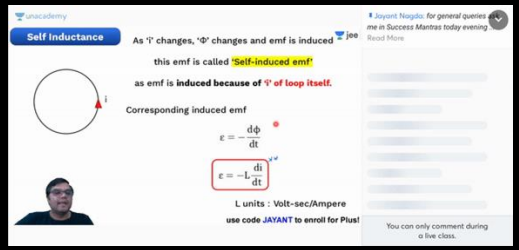

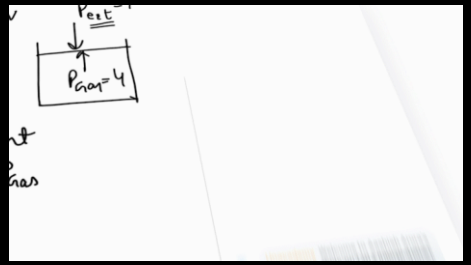

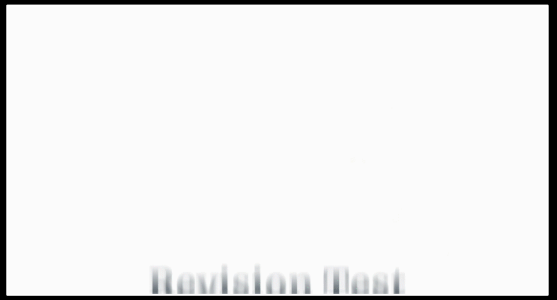

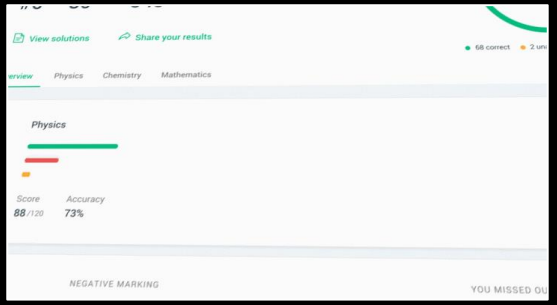

+ **LIVE** Class Environment
  - + **LIVE Polls** & **Leaderboard**
  - + **LIVE Doubt** Solving
  - + **LIVE** Interaction

+ **Performance** Analysis
  - + **Weekly Test Series**
  - + **DPPs** & **Quizzes**

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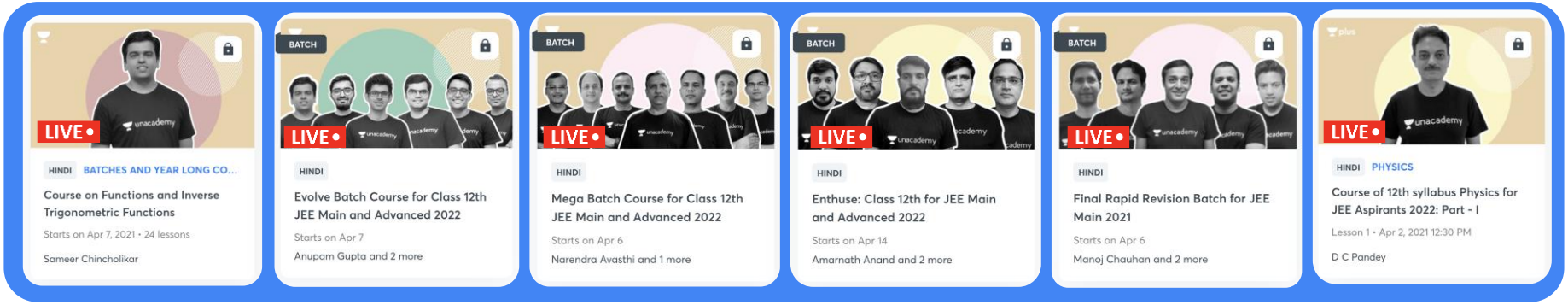

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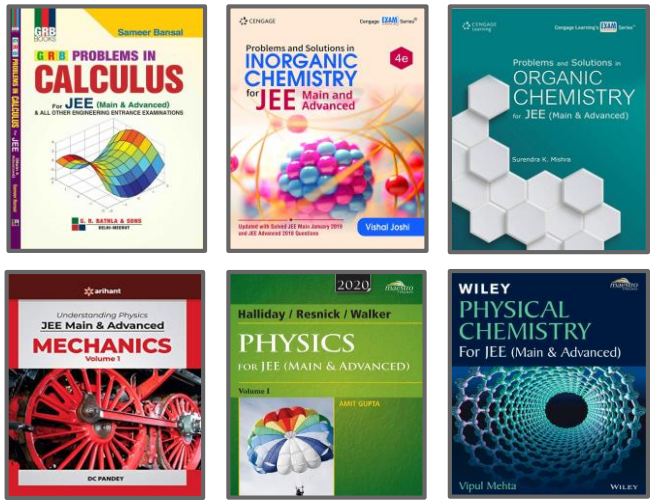

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Top Results

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

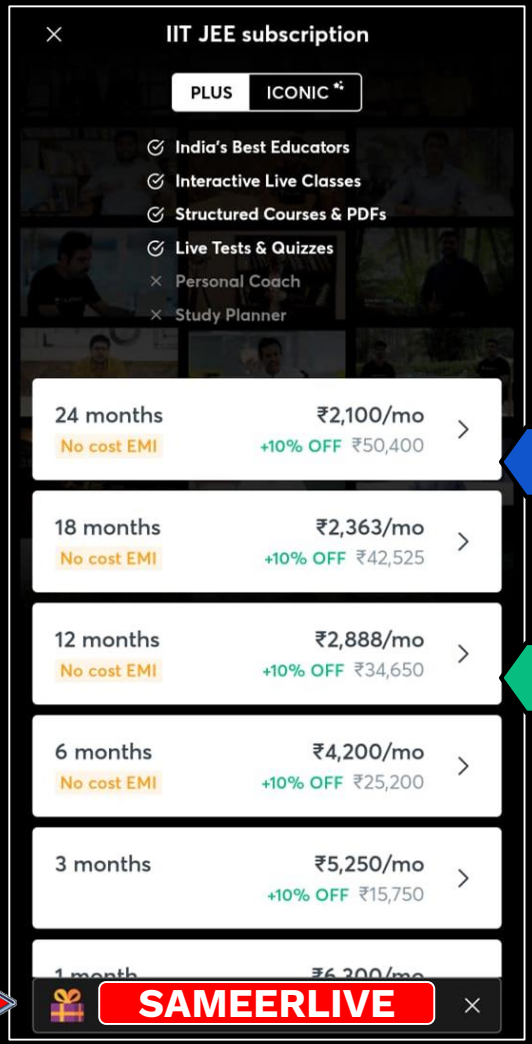
Ayush Kale
98.85

Ayush Gupta
98.67

Megh Gupta
98.59

Naman Goyal
98.48

MIHIR PRAJAPATI
98.16



11th / 9, 10

12th / Drop

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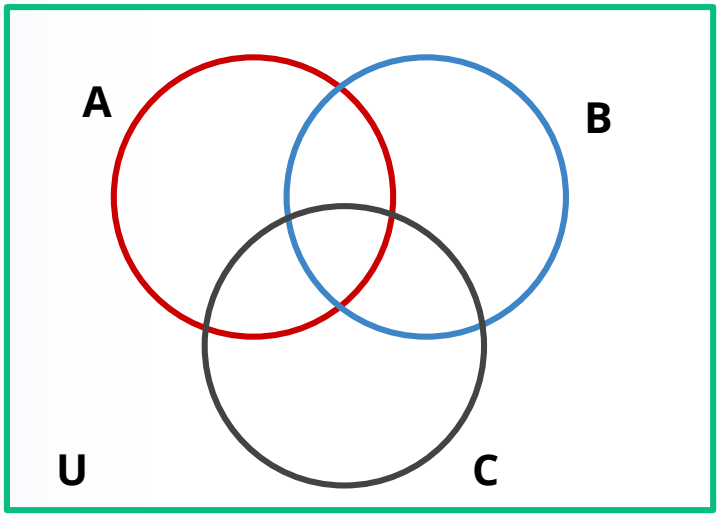
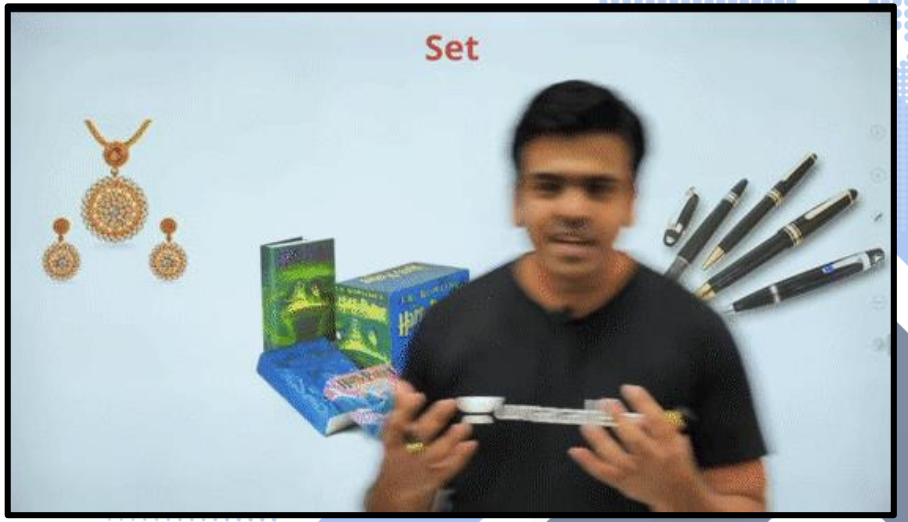
Laws of Sets

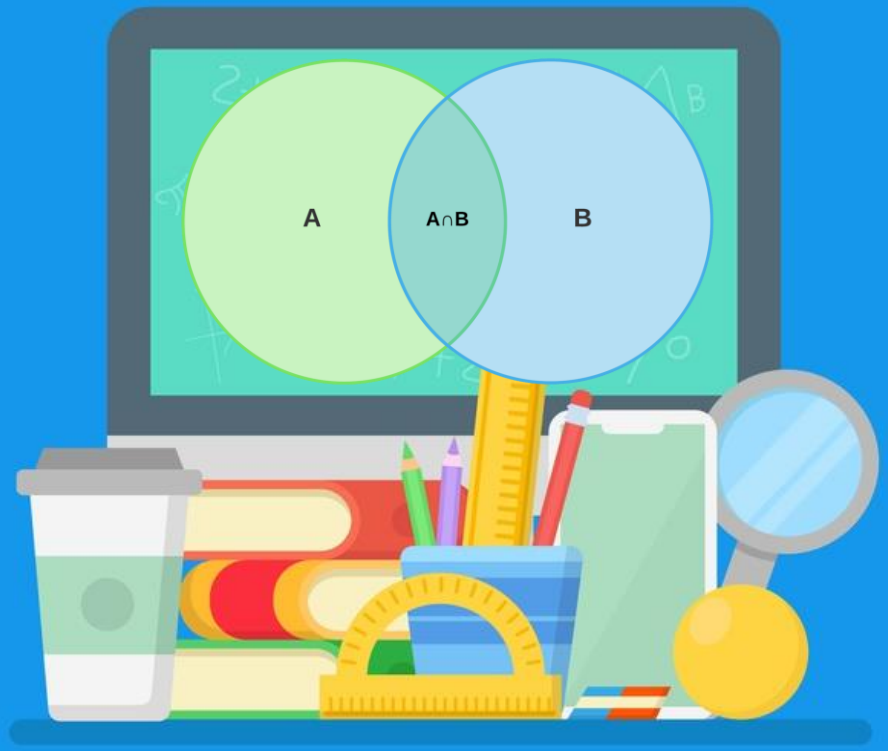
Sets 3





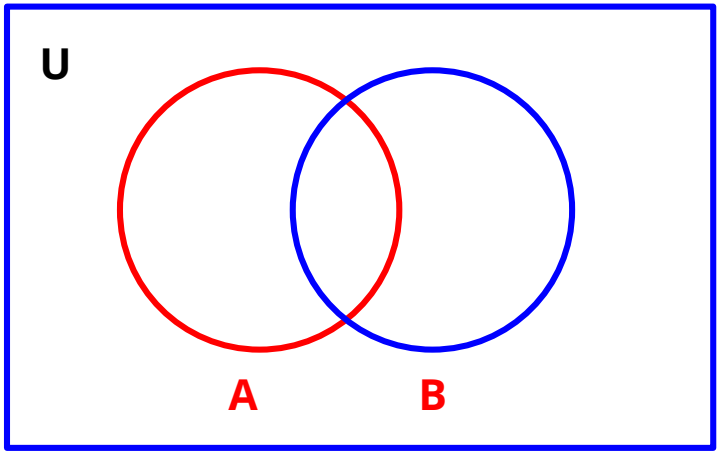
LET'S BEGIN!!

Laws of Algebra of Sets (Properties of Sets)



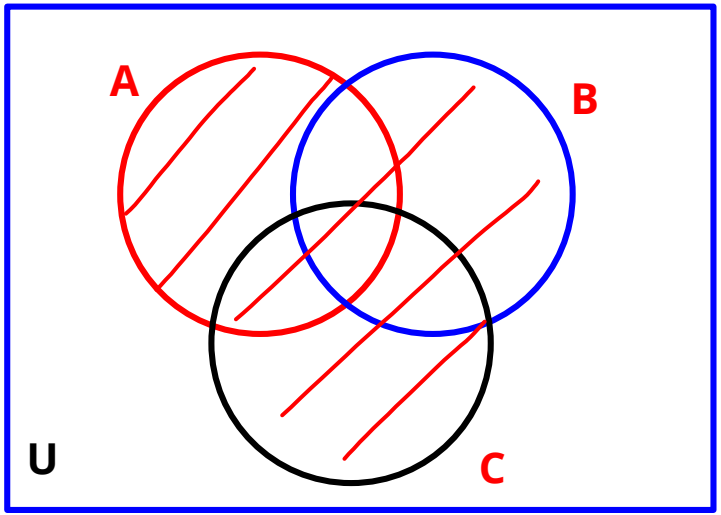
Laws of Algebra of Sets (Properties of Sets)

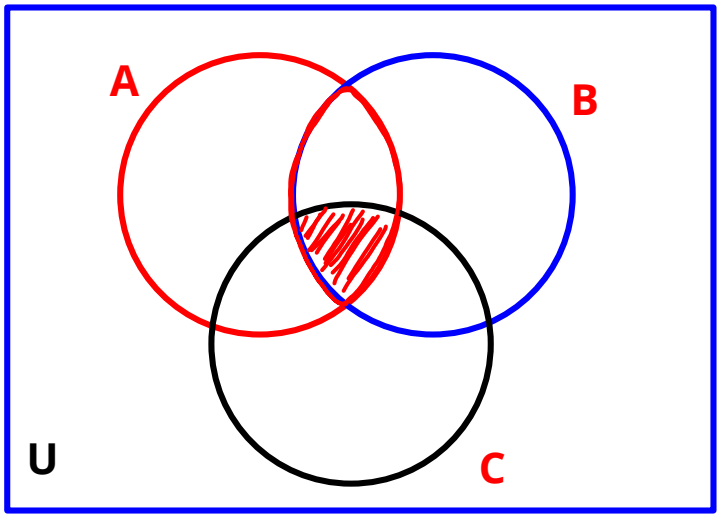
1 **Commutative law :** $A \cup B = B \cup A$;
$A \cap B = B \cap A$



Laws of Algebra of Sets (Properties of Sets)

2 **Associative law :** $(A \cup B) \cup C = A \cup (B \cup C)$;
$(A \cap B) \cap C = A \cap (B \cap C)$



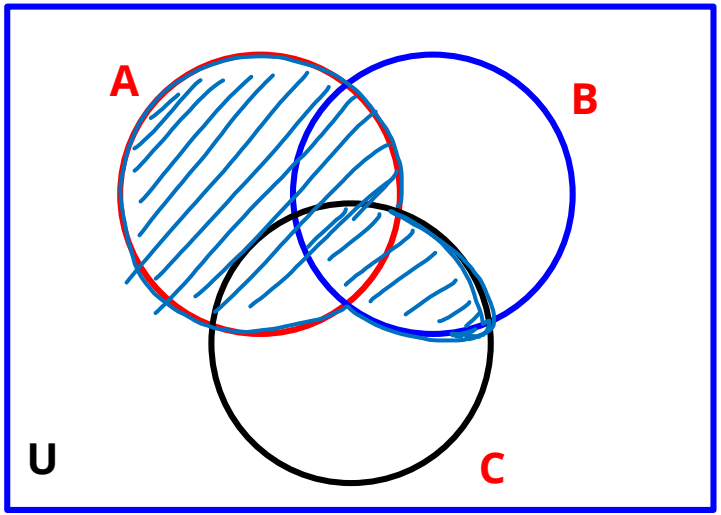


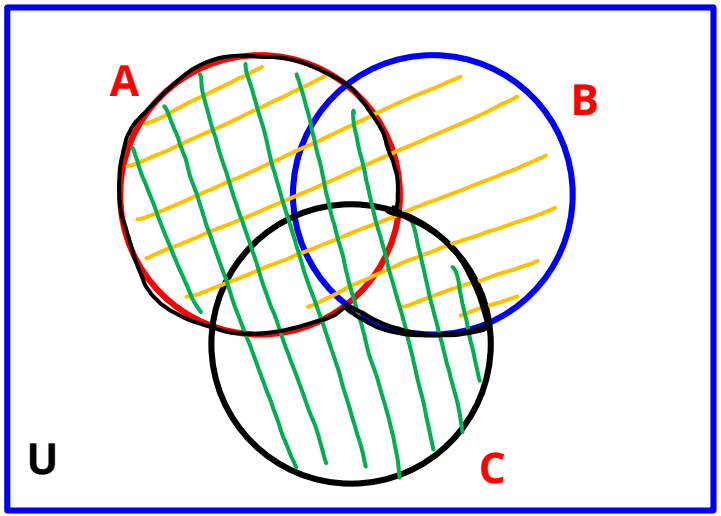
$2 \times (3+5) = 2 \times 3 + 2 \times 5$

Laws of Algebra of Sets (Properties of Sets)

3 **Distributive law :** $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$;

$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

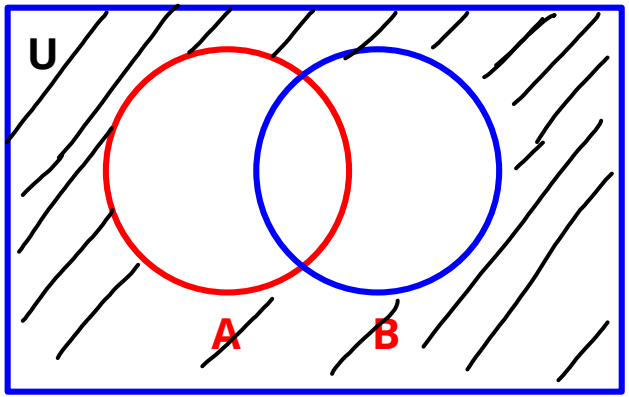


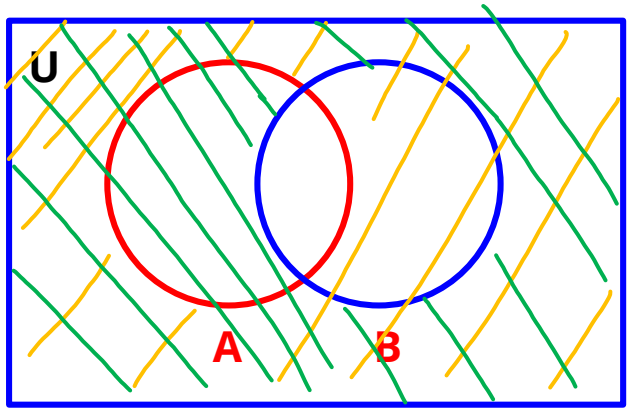


Laws of Algebra of Sets (Properties of Sets)

4 **De-morgan law :** $(A \cup B)' = A' \cap B'$

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





Laws of Algebra of Sets (Properties of Sets)

5 **Identity law :** $A \cap U = A$;

$A \cup \phi = A$

Laws of Algebra of Sets (Properties of Sets)

6 **Complement law:** $A \cup A' = U$,

$A \cap A' = \phi$,

$(A')' = A$

Laws of Algebra of Sets (Properties of Sets)

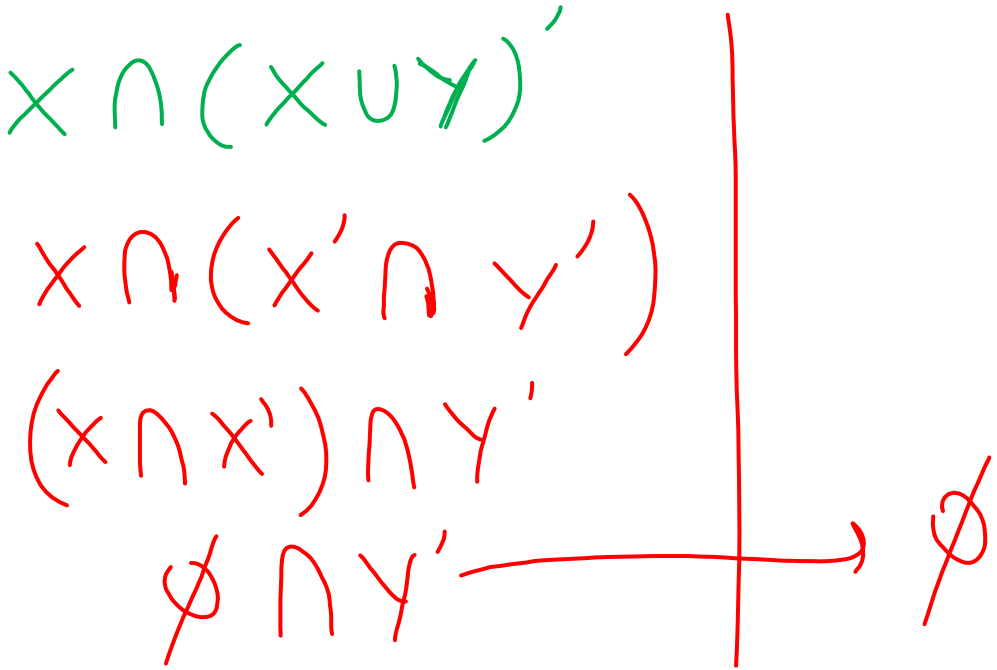
7 **Idempotent law:** $A \cap A = A$,

$A \cup A = A$

Example

If **X** and **Y** are two sets and X' denotes the complement of X, then **X ∩ (X U Y)'** equals

A. X **B.** Y **C.** Φ **D.** None of these



Example

If **A = {1, 3, 5, 7, 9, 11, 13, 15, 17}, B ={2, 4, ..., 18}** and N the set of natural numbers is the universal set, then **A' ∪ ((A ∪ B) ∩ B')** is

A. ϕ **B.** N **C.** A **D.** B

$$A' \cup ((A \cup B) \cap B')$$

$$A' \cup ((A \cap B') \cup (B \cap B'))$$

$$B \cap B' = \phi$$

$$A' \cup (A \cap B')$$

$(A' \cup A) \cap (A' \cup B')$

$\downarrow$

$U \cap (A' \cup B')$

$A' \cup B'$

$(A \cap B)' \longrightarrow (\phi)' \longrightarrow U$

Example

The set **(A ∩ B')' U (B ∩ C')** is equal to

A. A' U B U C **B.** A' U B **C.** A' ∩ C' **C.** A' ∩ B

$(A \cap B')' \cup (B \cap C')$

$(A' \cup B) \cup (B \cap C')$

$A' \cup B$

Example

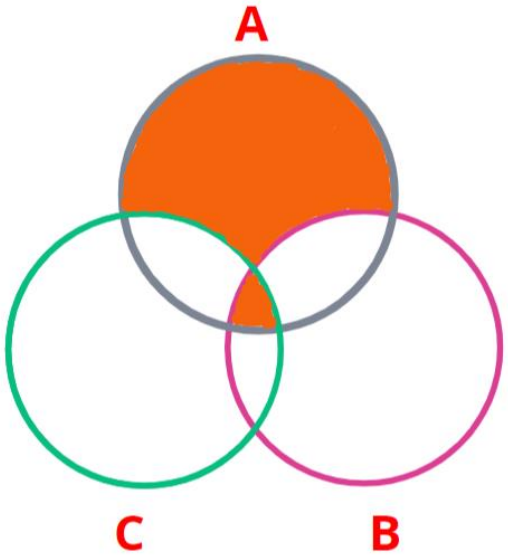
The shaded region in the given figure is

A. $A \cap (B \cup C)$

B. $A \cup (B \cap C)$

C. $A - (B \Delta C)$

D. $A - (B \cup C)$



Example

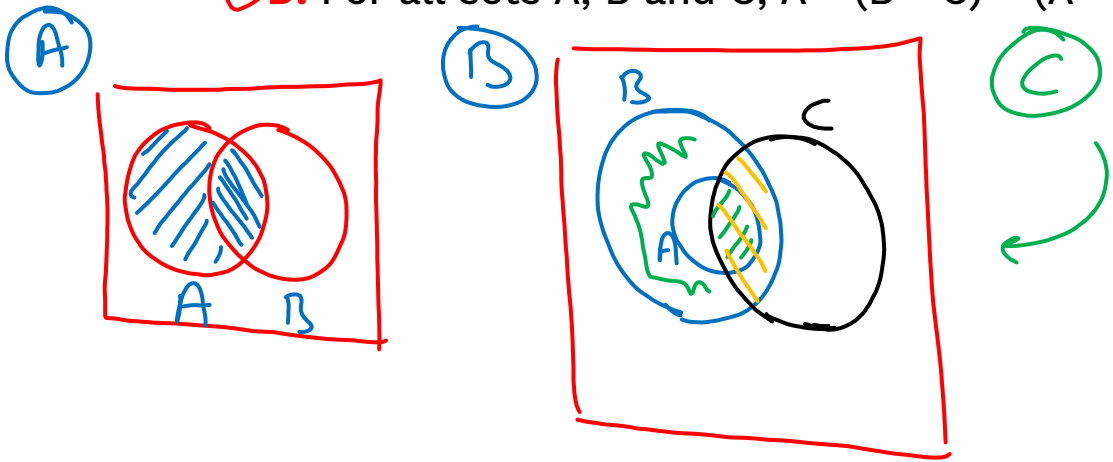
Identify the **incorrect** statement :

A. For all sets A and B, $(A - B) \cup (A \cap B) = A$

B. For all sets A, B and C, if $A \subset B$, then $A \cap C \subset B \cap C$

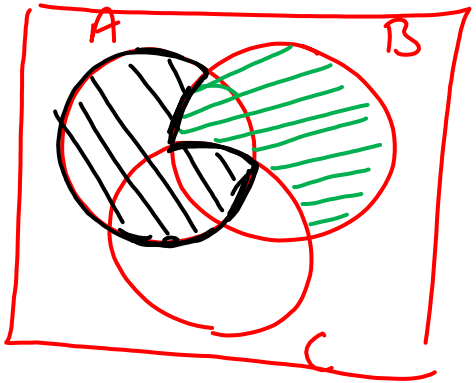
C. For all sets A, B and C, if $A \subset B$, then $A \cup C \subset B \cup C$

D. For all sets A, B and C, $A - (B - C) = (A - B) - C$

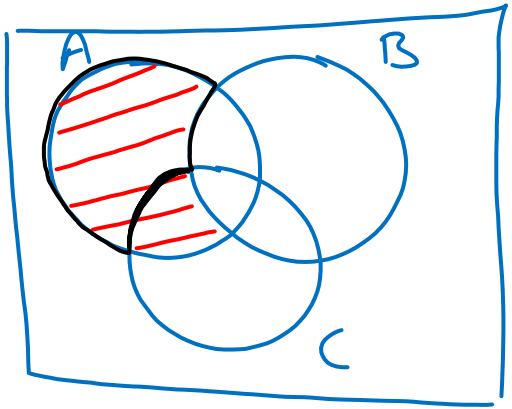


(D)

$A - (B - C)$



$(A - B) - C$



Example

The set **(A U B U C) ∩ (A ∩ B' ∩ C')' ∩ C'** is equal to

A. A ∩ B **B.** A ∩ C' **C.** B ∩ C' **D.** B' ∩ C'

$$(A \cup B \cup C) \cap (A \cap B' \cap C')' \cap C'$$

$$(A \cup B \cup C) \cap (A' \cup B \cup C) \cap C'$$

$$(A \cap A') \cup (B \cup C) \cap C'$$

$$\downarrow$$

$$\emptyset$$

$(B \cup C) \cap C'$

$(B \cap C') \cup (C \cap C')$

ϕ

$(B \cap C')$

Example

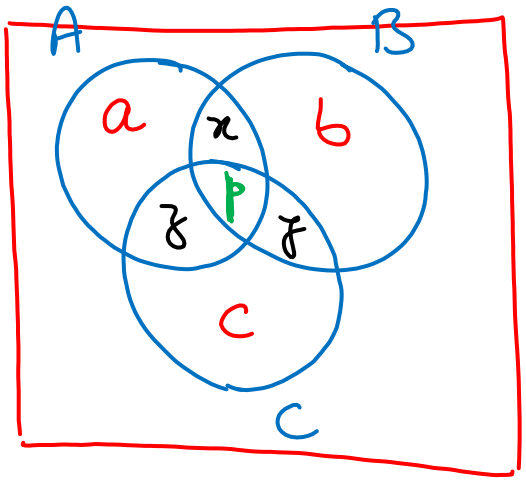
Let A, B and C be three sets and X be the set of all elements which belong to exactly two of the sets A, B and C, Then X is equal to

A. $(A \cap B) \cup (B \cap C) \cup (C \cap A)$

B. $A \Delta (B \Delta C)$

C. $(A \cup B) \cap (B \cup C) \cap (C \cup A)$

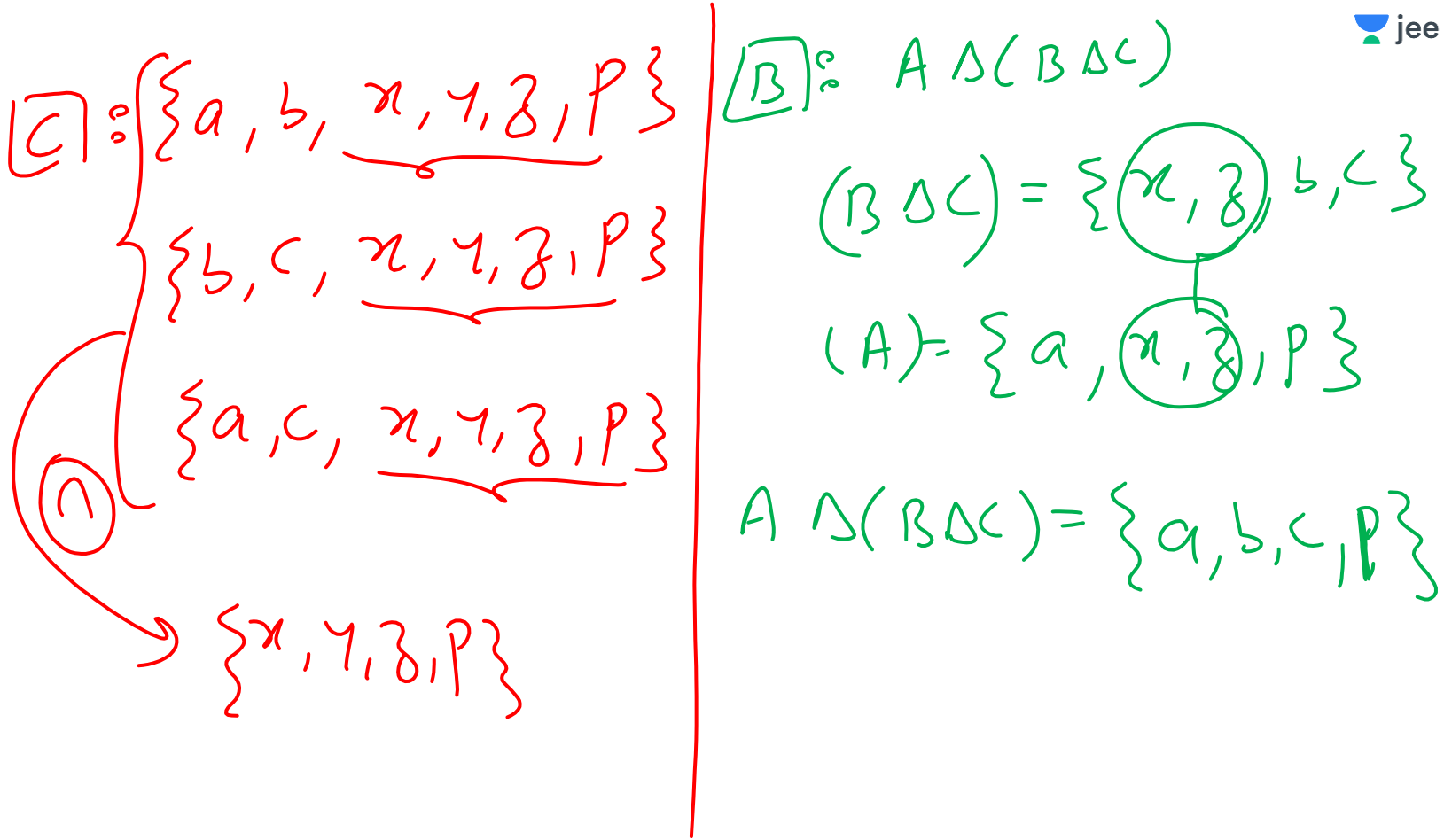
D. $(A \cup B \cup C) - [A \Delta (B \Delta C)]$



$X = \{x, y, z\}$

A : $\{x, P\}, \{y, P\}, \{z, P\}$

$\{x, y, z, P\}$


C : {a, b, x, y, z, p}
{b, c, x, y, z, p}
{a, c, x, y, z, p}
∩
{x, y, z, p}
B : A Δ (B Δ C)
(B Δ C) = {x, z, b, c}
(A) = {a, x, z, p}
A Δ (B Δ C) = {a, b, c, p}

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

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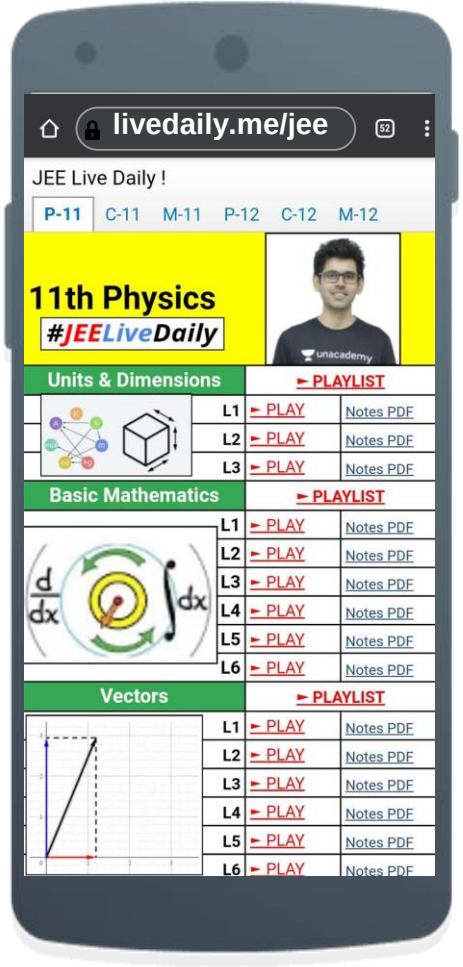

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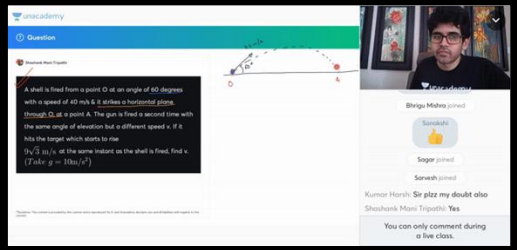

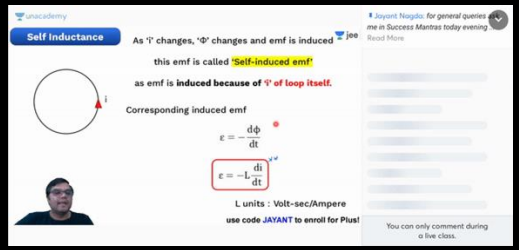

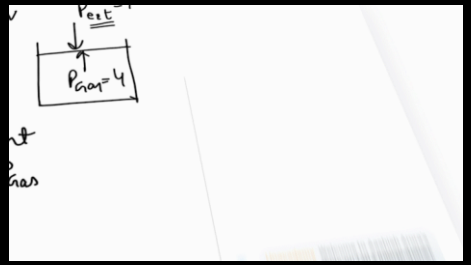

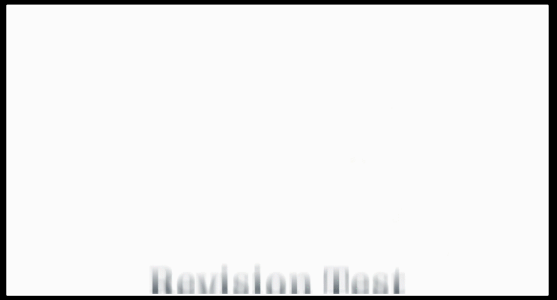

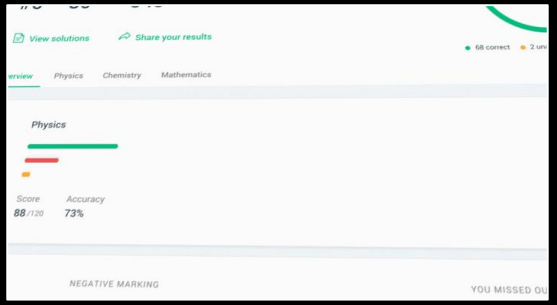

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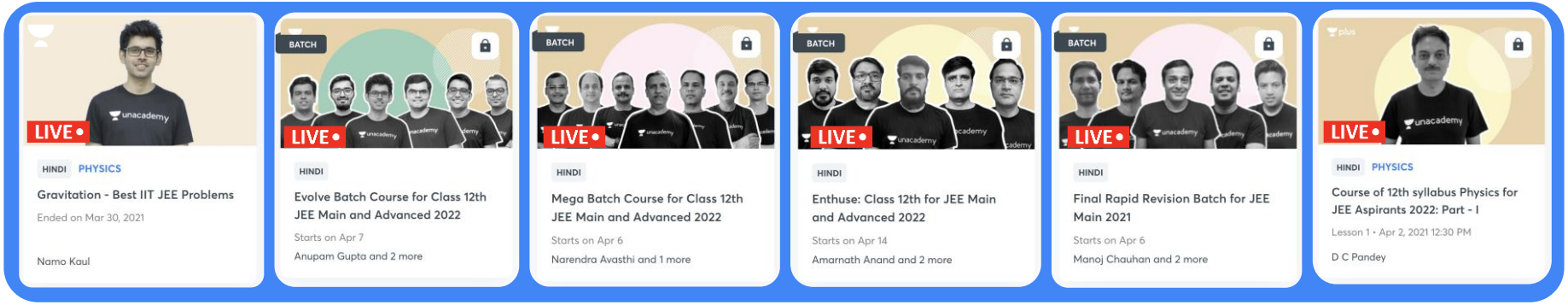

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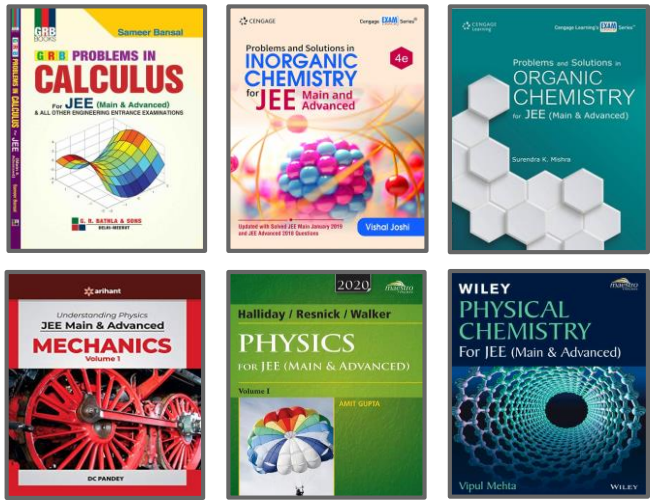

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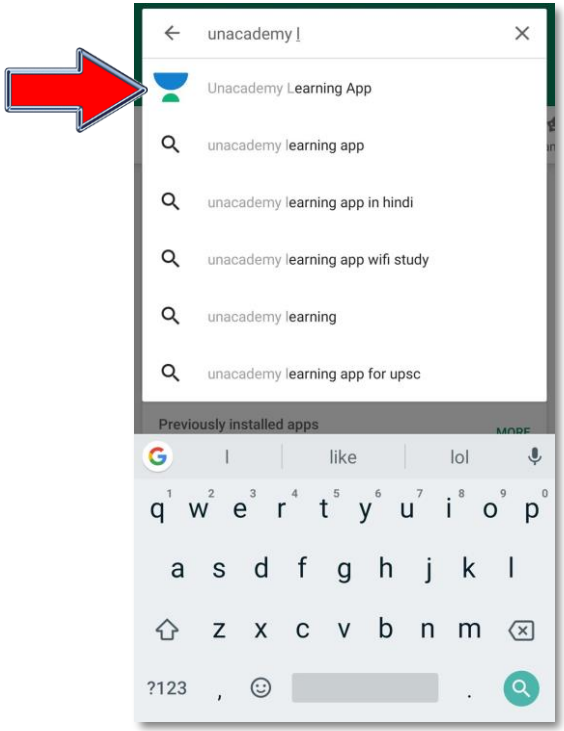
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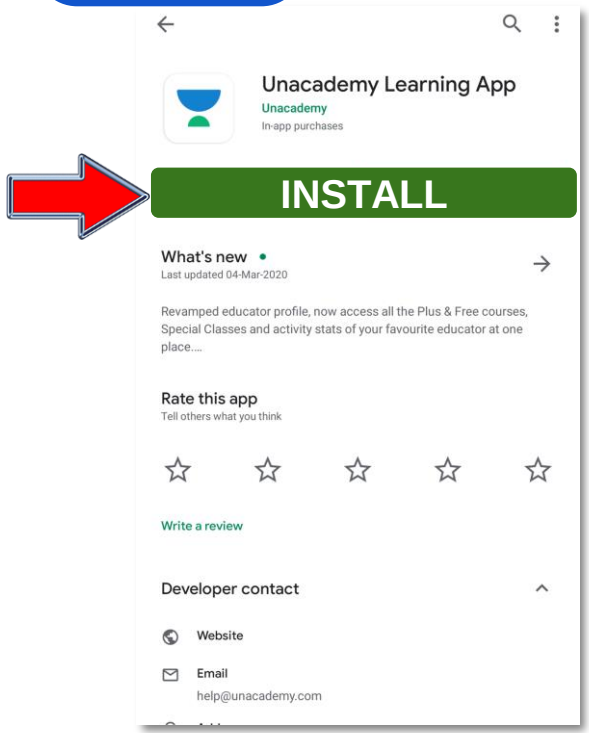
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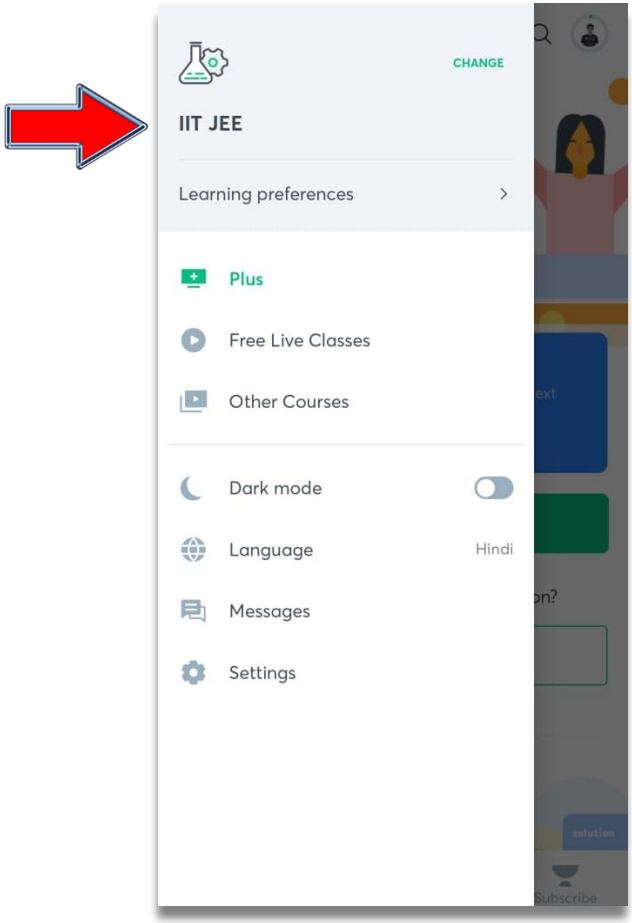
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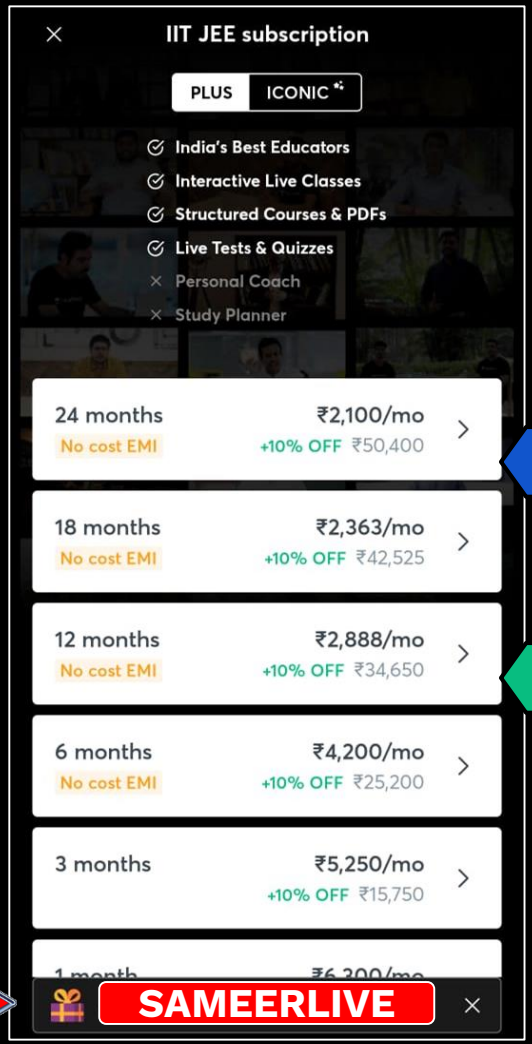

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