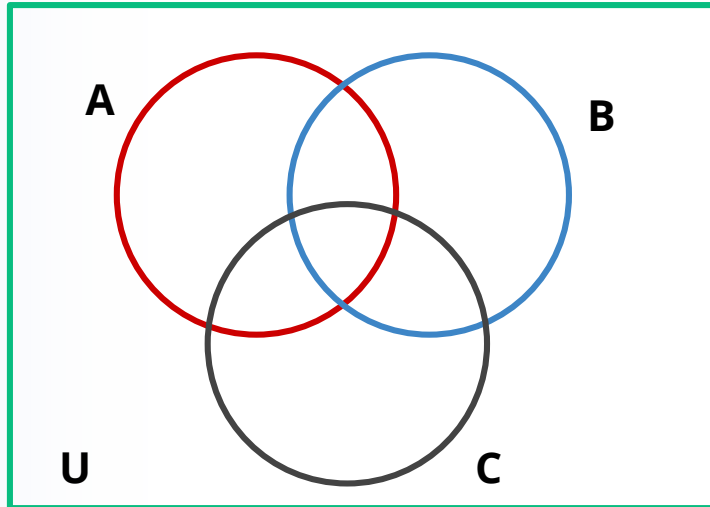


# Cardinal Number of Sets

## Sets

4



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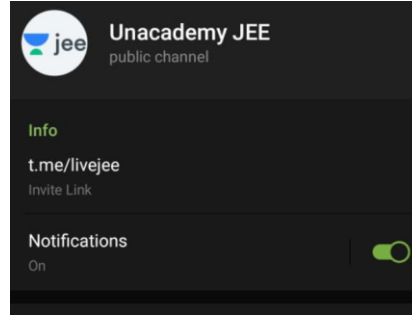
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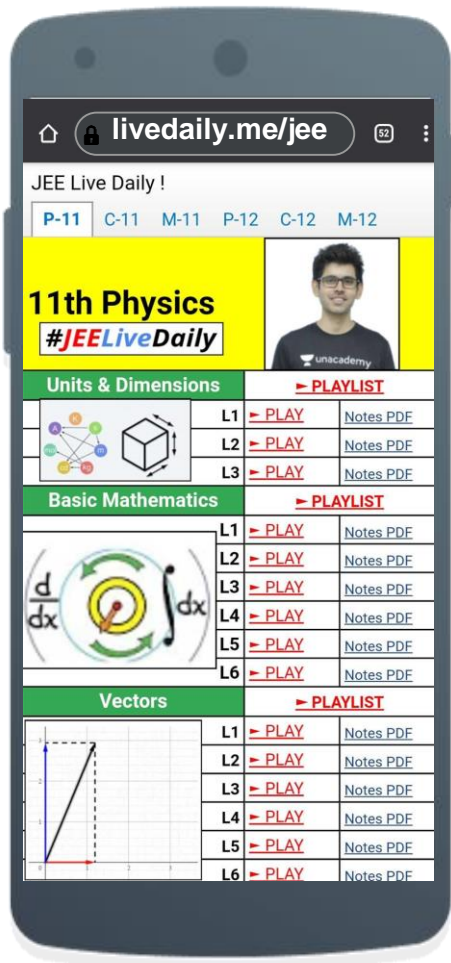
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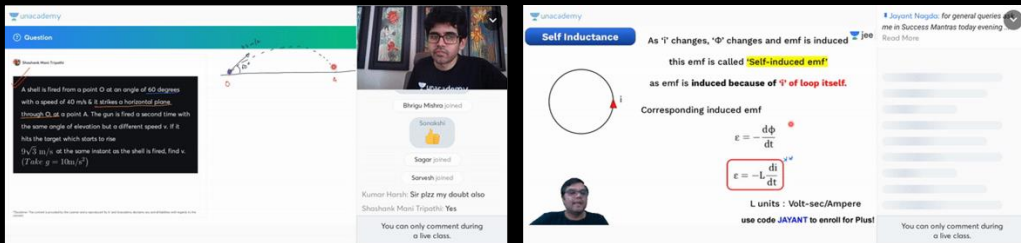
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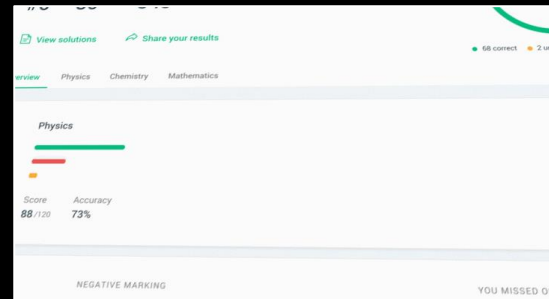
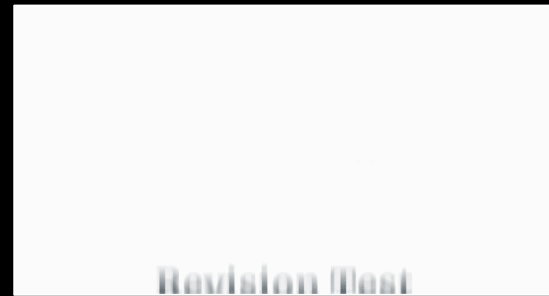


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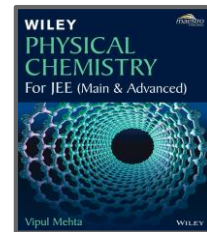
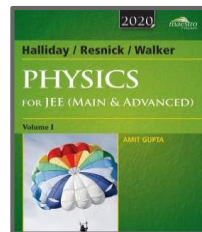
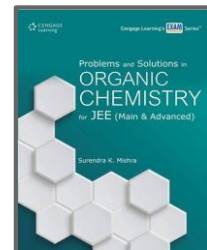
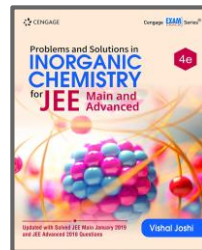
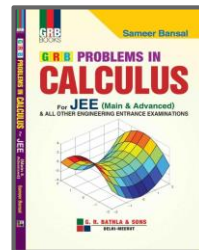
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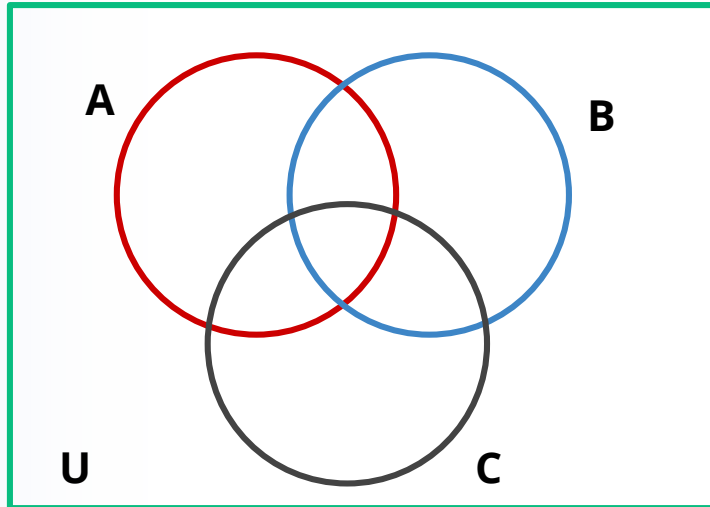
11<sup>th</sup> / 9, 1012<sup>th</sup> / Drop



# Cardinal Number of Sets

## Sets

4



# LET'S BEGIN!!



# Homework Question



# Example

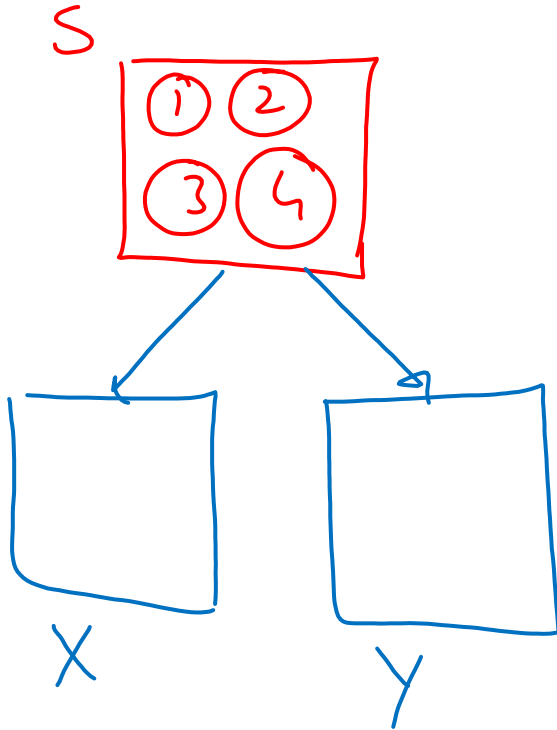
Let  $S = \{1, 2, 3, 4\}$ . The total number of unordered pairs of disjoint subsets of  $S$  is equal to

A. 25

B. 34

C. 42

~~D. 41~~



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

Ex:

$$\begin{cases} X = \{1, 2\} \\ Y = \{3\} \end{cases}$$

$$\begin{cases} X = \{3\} \\ Y = \{1, 2\} \end{cases}$$

Ex:

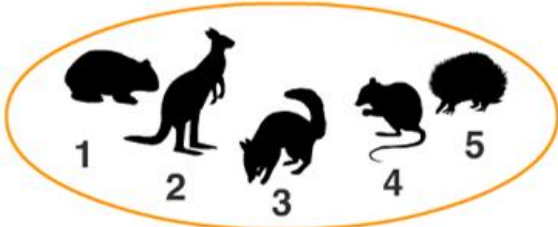
$$\begin{aligned} X &= \{ \} \\ Y &= \{ \} \end{aligned}$$

$$\frac{80}{2} + 1 \quad \bigg| \quad \frac{81 + 1}{2}$$
$$= 41 \checkmark \quad \downarrow \quad 41$$

# Cardinal Number of Sets

sets

5 elements



cardinal number = 5

a cardinal number is the number of elements in a set

5 elements

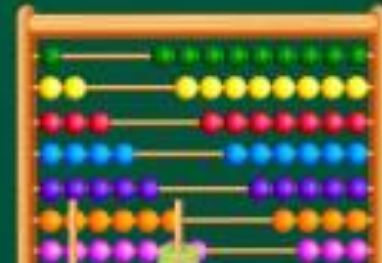
$$\{2, 4, 6, 8, 10\}$$

cardinal number = 5

6 elements

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

cardinal number = 6





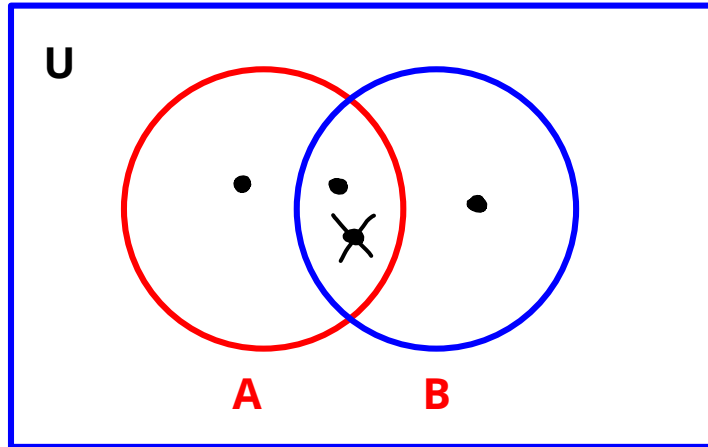


# Cardinal Number of Sets

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

1

$$n(A \cup B) = \underline{n(A)} + \underline{n(B)} - n(A \cap B)$$





### Example

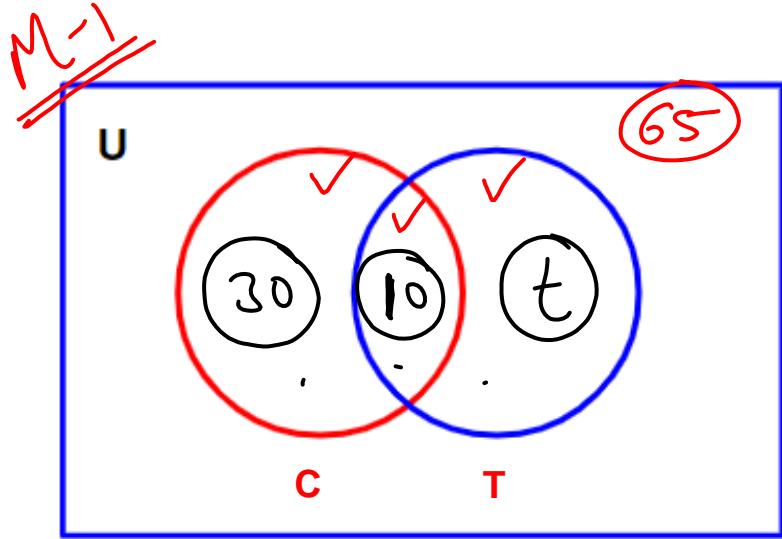
In a group of **65 people**, **40 like cricket**, **10** like both **cricket and tennis**.  
The number of persons liking tennis only and not cricket is

A. 35

☒ B. 25

C. 15

D. None of these



$$65 = 30 + 10 + t$$

$$\boxed{t = 25}$$

~~M-2~~

$$n(C \cup T) = 65$$
$$n(C) = 40$$
$$n(C \cap T) = 10$$
$$n(T) = ?$$

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

$$65 = 40 + x - 10$$

$$\boxed{x = 35}$$

$$\begin{aligned} n(T \text{ only}) &= n(T) - n(C \cap T) \\ &= 35 - 10 = \boxed{25} \end{aligned}$$



### Example

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

A. 600

☒ B. 700

C. 800

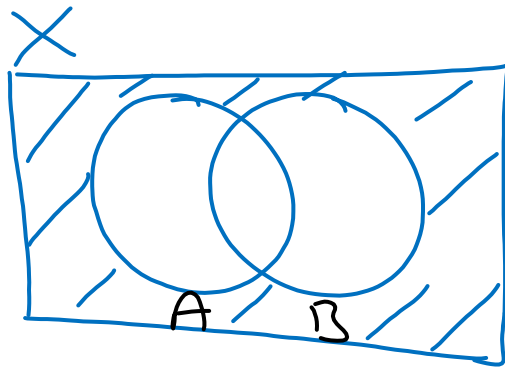
D. 900

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

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

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

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



$$\begin{aligned} n(A \cup B) &= 200 + 300 - 100 \\ &= 400 \end{aligned}$$



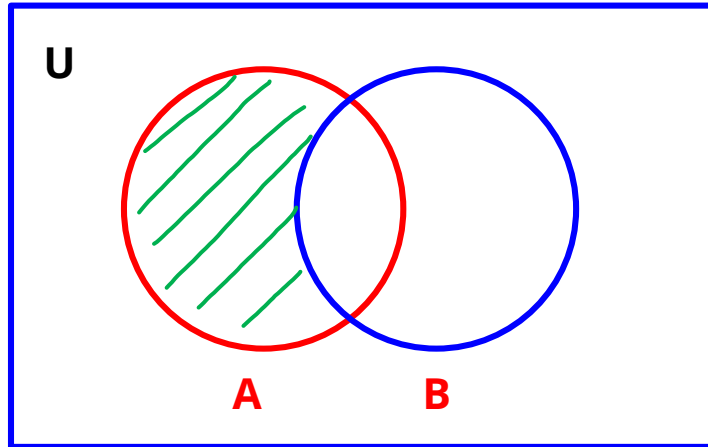


## Cardinal Number of Sets

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  $n(A \cap B) = 11$  then  $n(A \cup B) =$

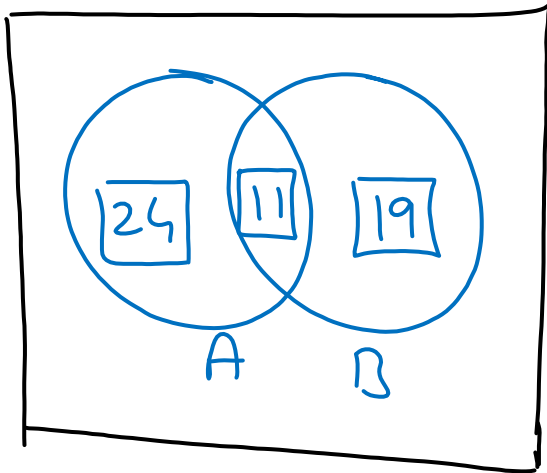
A. 43

B. 30

✓ C. 54

D. 35

M-1



M-2

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

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

$$n(A \cap B) = 11$$

---

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



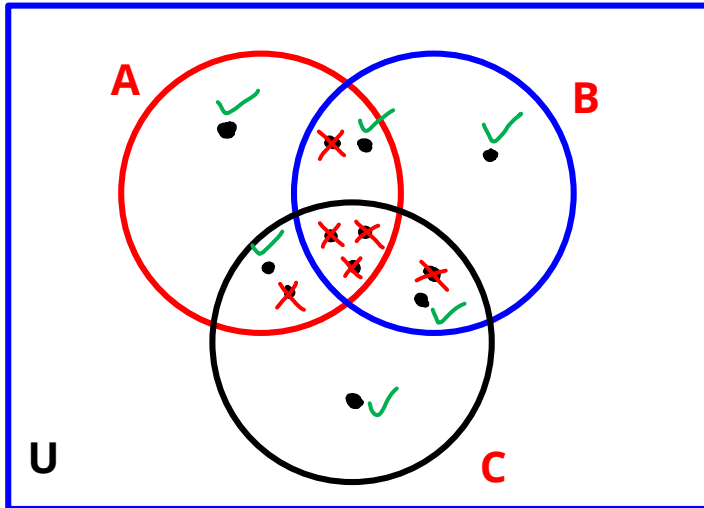


## Cardinal Number of Sets

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

3

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







### 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

$$\begin{aligned}
 n(A \cup B \cup C) &= n(A) + n(B) + n(C) - n(A \cap B) \\
 &\quad - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)
 \end{aligned}$$

$$092 = \overset{\textcircled{1}}{42} + \overset{\textcircled{2}}{51} + 68 - 30 - 28 - 36 + x$$

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





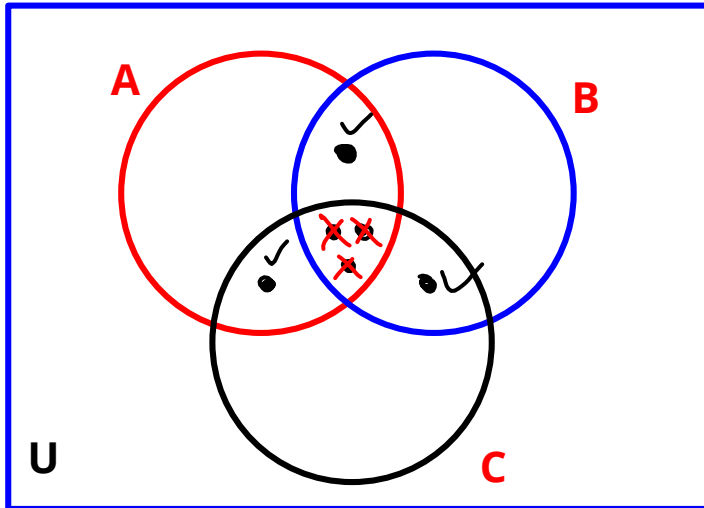


## Cardinal Number of Sets

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





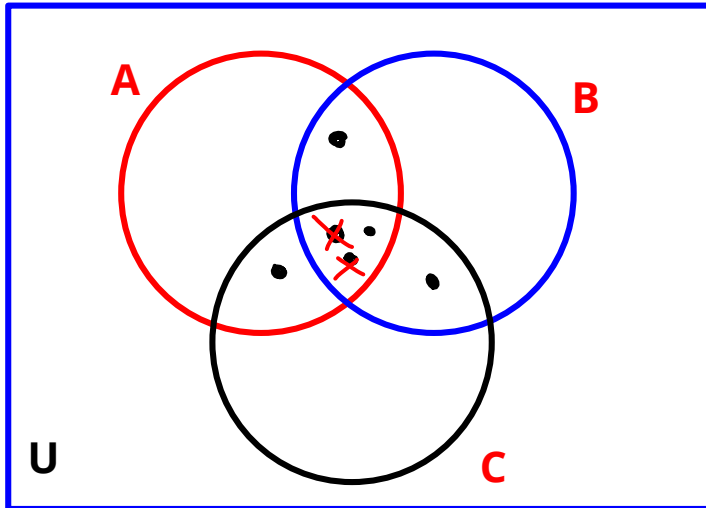


## Cardinal Number of Sets

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







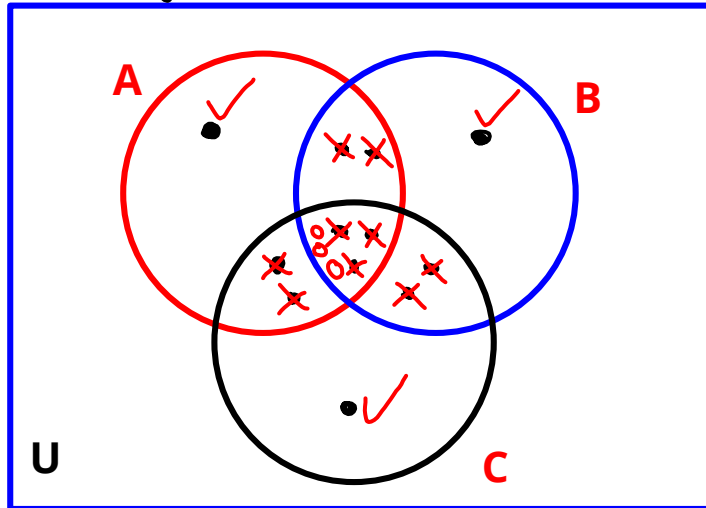
## Cardinal Number of Sets

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 ?

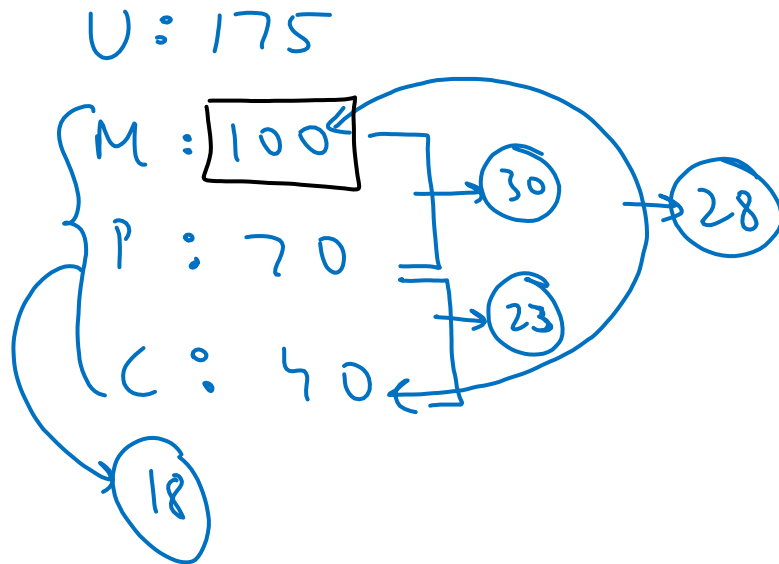
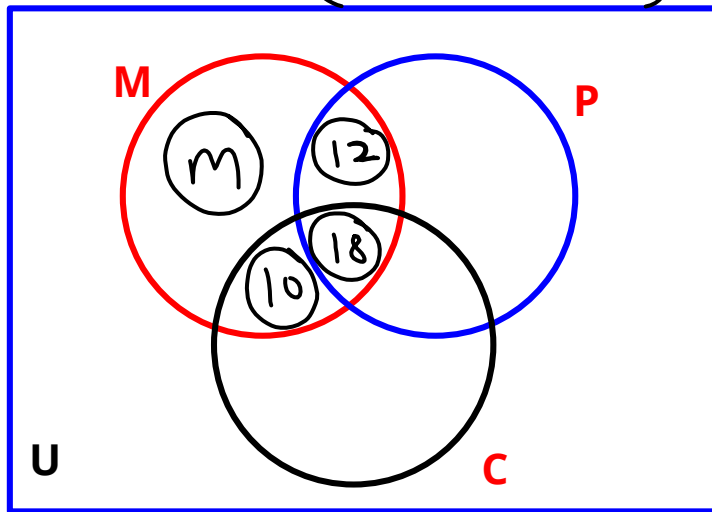
A. 35

B. 48

✓ C. 60

D. 22

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







### Example

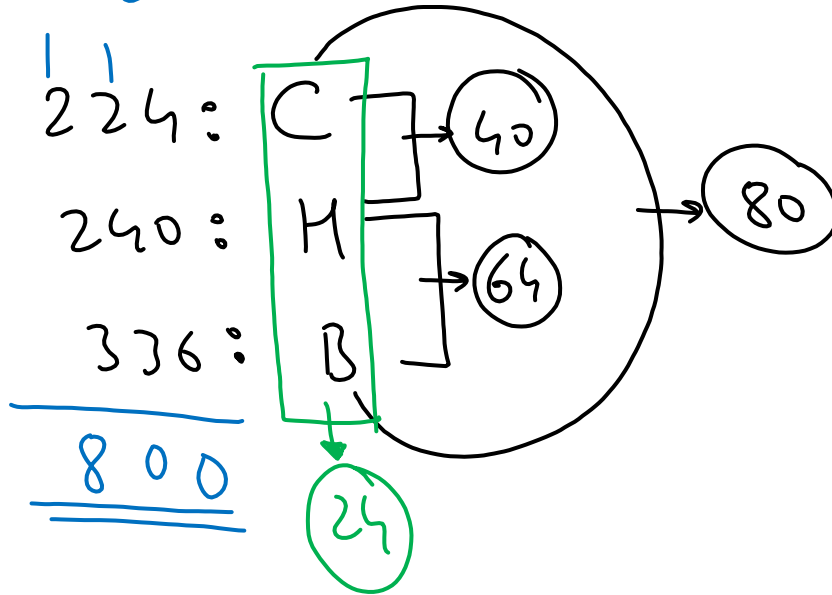
Out of 800 boys in a school, 224 played cricket, 240 played hockey and 336 played basketball. Of the total, 64 played both basketball and hockey; 80 played cricket and basketball and 40 played cricket and hockey; 24 played all the three games. The number of boys who did not play any game is

A. 160

B. 240

C. 216

D. 128



$$n(B \cup C \cup H) = 800 - (40 + 80 + 64) + 24$$

$$180 - n(\text{BUCUM})$$

Ans: 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

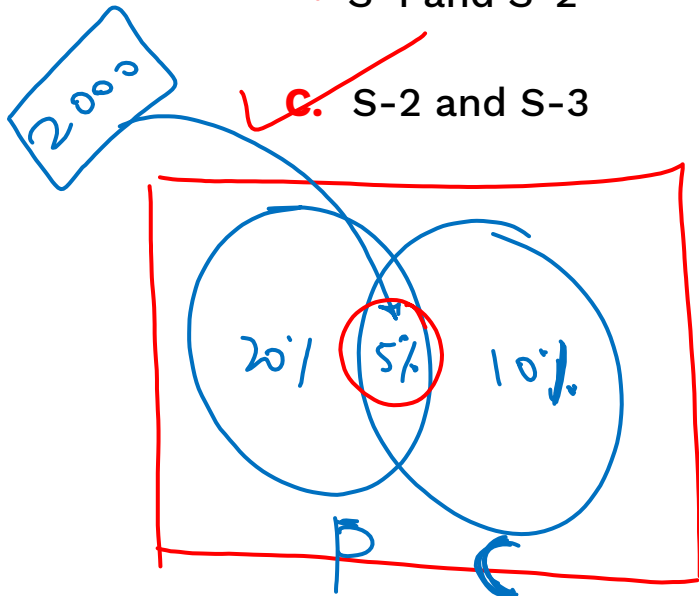
S - 3 : 40,000 families live in the town.

A. S-1 and S-2

B. S-1 and S-3

✓ C. S-2 and S-3

D. All are correct



$$\begin{aligned} n(P \cup C) &= 100 - 65 \\ &= 35\% \end{aligned}$$

$$\begin{aligned} n(P \cup C) &= n(P) + n(C) - n(P \cap C) \\ 35\% &= 25\% + 15\% - n(P \cap C) \end{aligned}$$

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

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

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

$$n(\text{town}) = 40,000$$



### 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

11<sup>th</sup>



Namo Sir | Physics

6:00 - 7:30 PM



Ashwani Sir | Chemistry

7:30 - 9:00 PM



Sameer Sir | Maths

9:00 - 10:30 PM

12<sup>th</sup>



Jayant Sir | Physics

1:30 - 3:00 PM



Anupam Sir | Chemistry

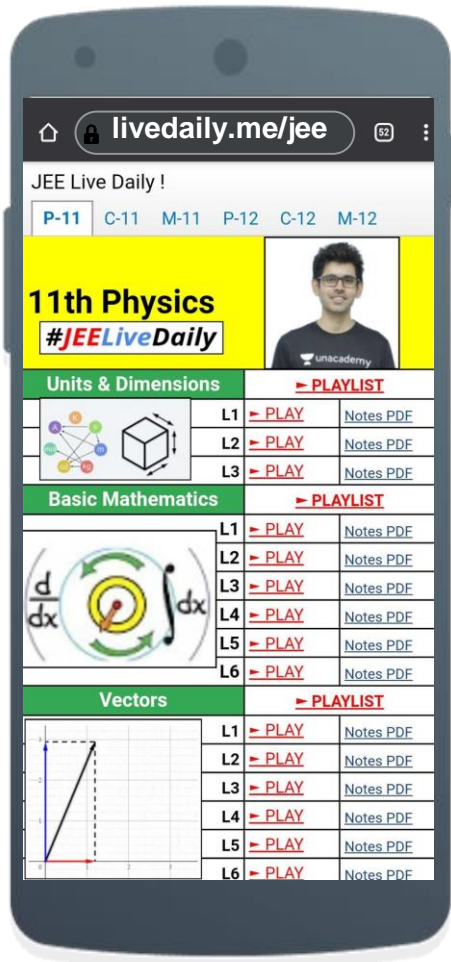
3:00 - 4:30 PM



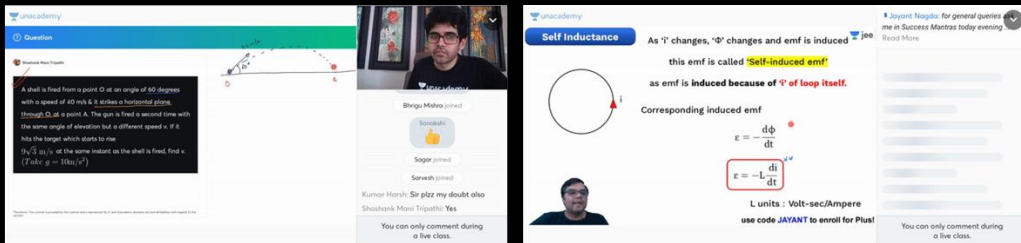
Nishant Sir | Maths

4:30 - 6:00 PM

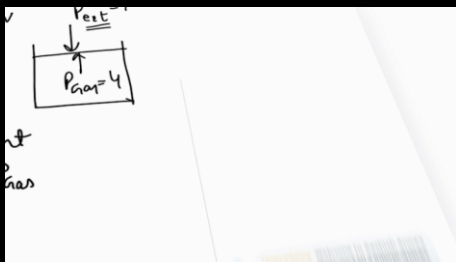
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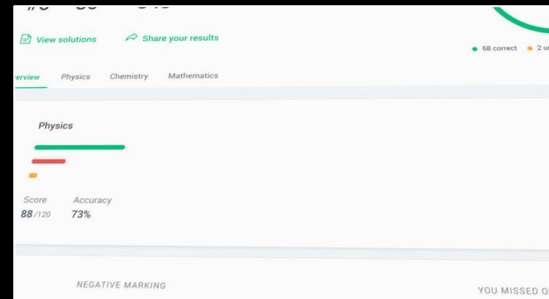
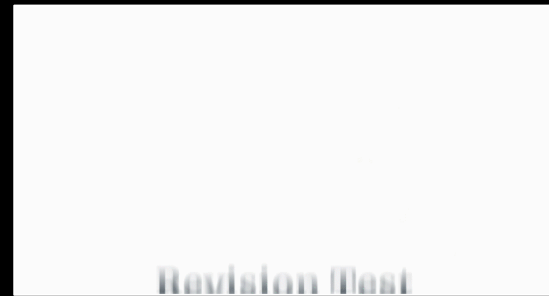


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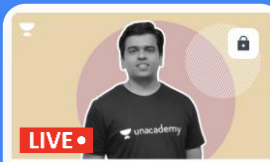


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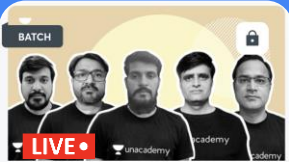
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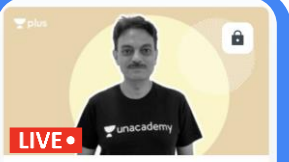
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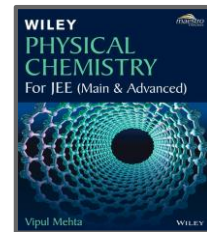
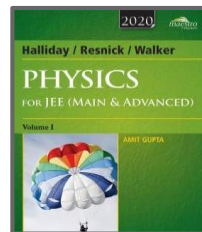
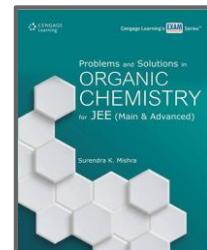
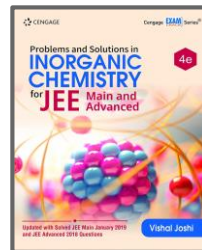
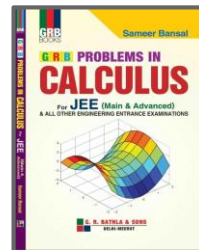
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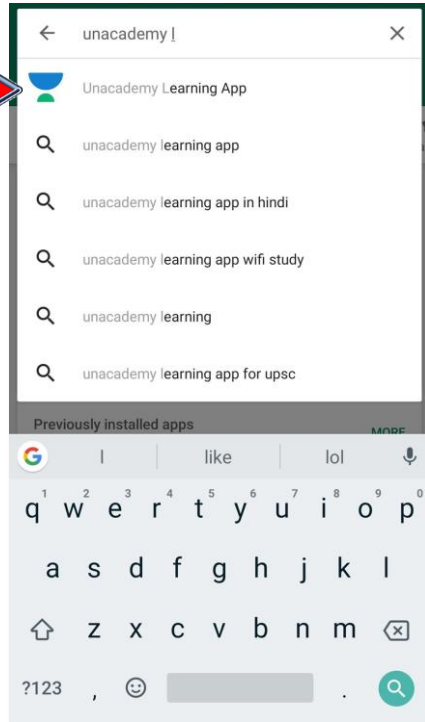


Naman Goyal  
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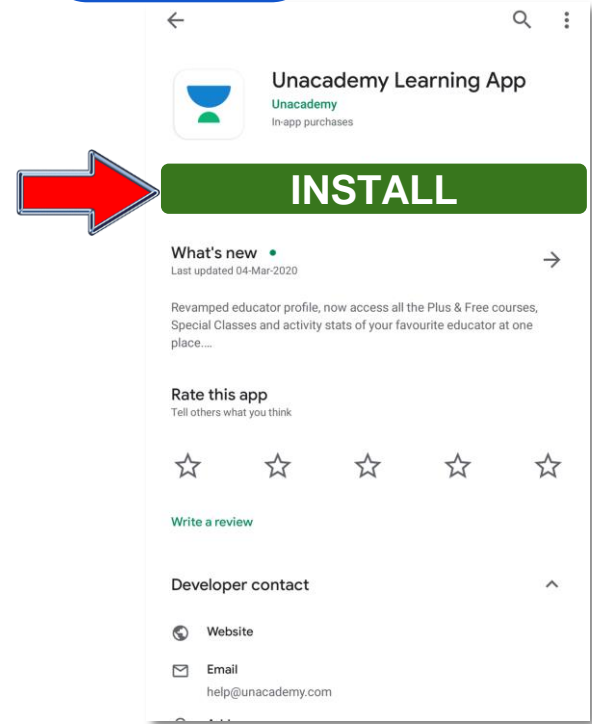


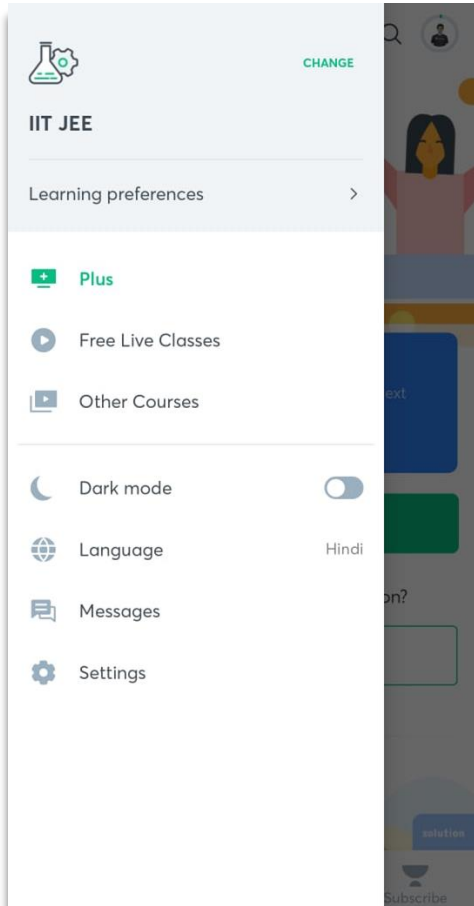
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