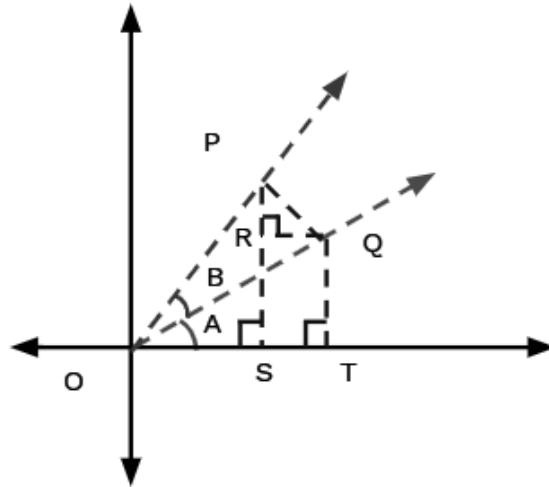


Compound Angles

Trigonometry

5



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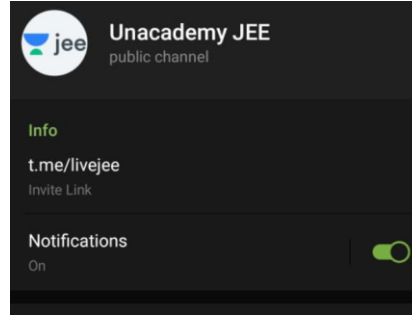
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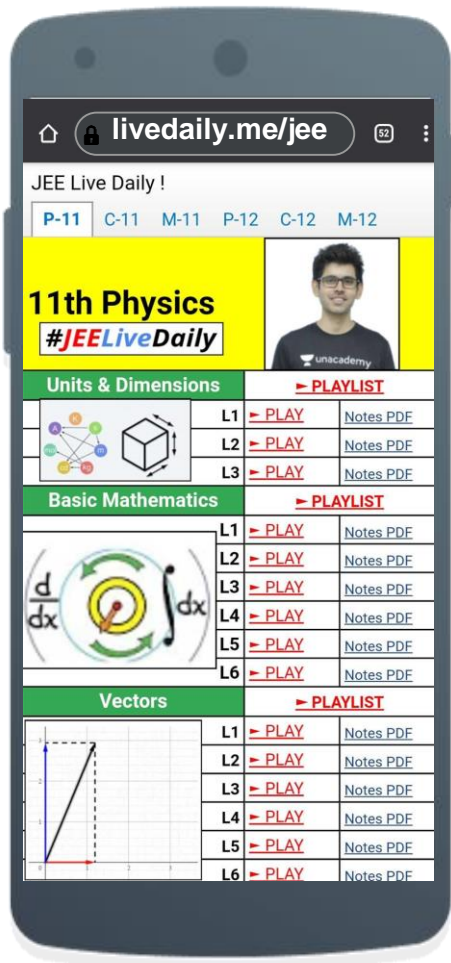
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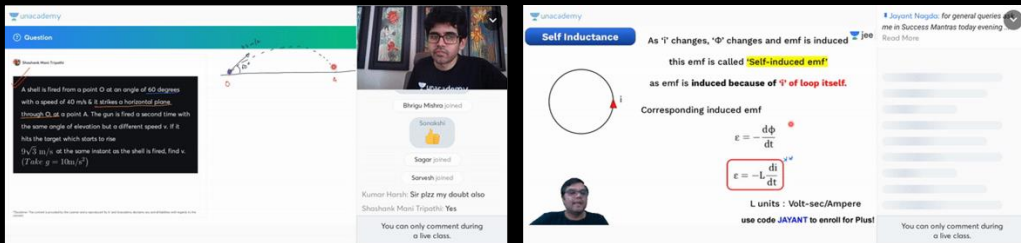
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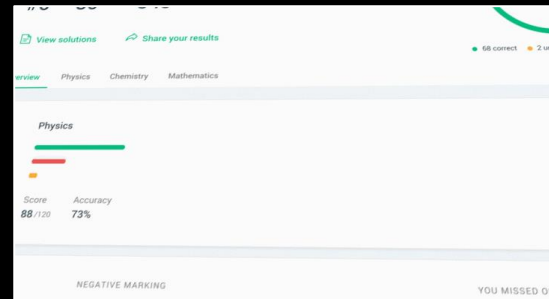
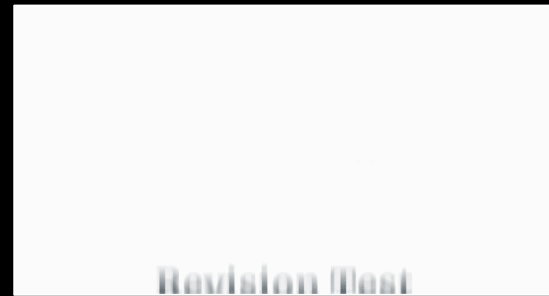


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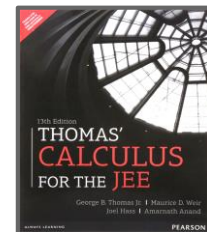
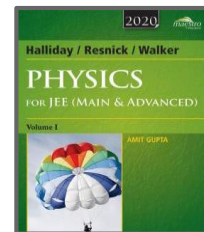
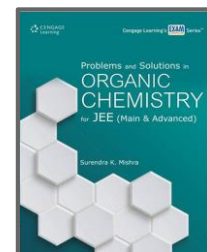
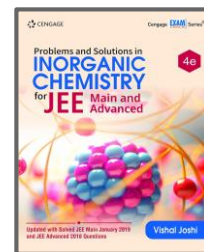
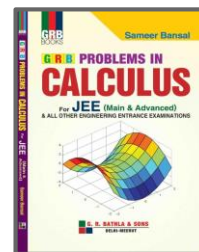
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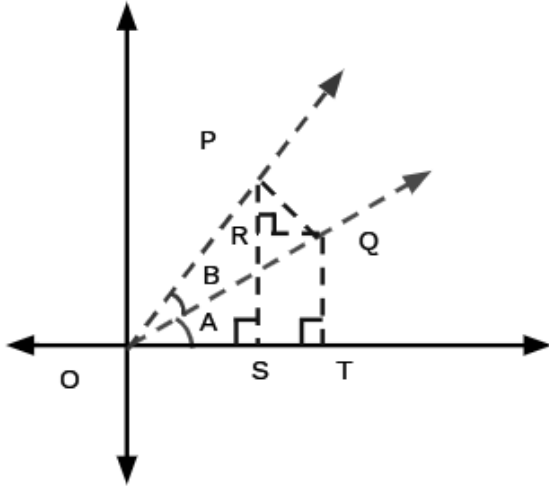


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LET'S BEGIN!!

Trigonometry





If $\tan \theta = \frac{3}{4}$ and θ is not in the 1st Quadrant, then find the value of

$$\left\{ \frac{\sin(90^\circ + \theta) - \cot(180^\circ - \theta)}{\tan(270^\circ - \theta) - \cos(270^\circ + \theta)} \right\}$$

$$\frac{(+\cos \theta) - (-\cot \theta)}{(+\tan \theta) - (+\sin \theta)}$$

$$\left(\frac{\cos \theta + \cot \theta}{\tan \theta - \sin \theta} \right) \text{ --- (1)}$$

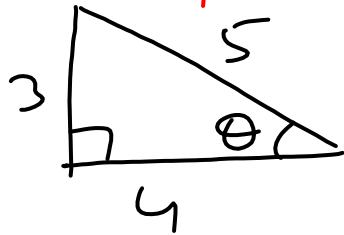
Now.

$$\tan \theta = \frac{3}{4} \quad (+ve)$$

| |
|-----|
| (A) |
| (T) |

 $\Rightarrow \left(\theta \text{ lies in } 3^{\text{rd}} \text{ Quad} \right)$

$$\tan \theta = \frac{3}{4}$$



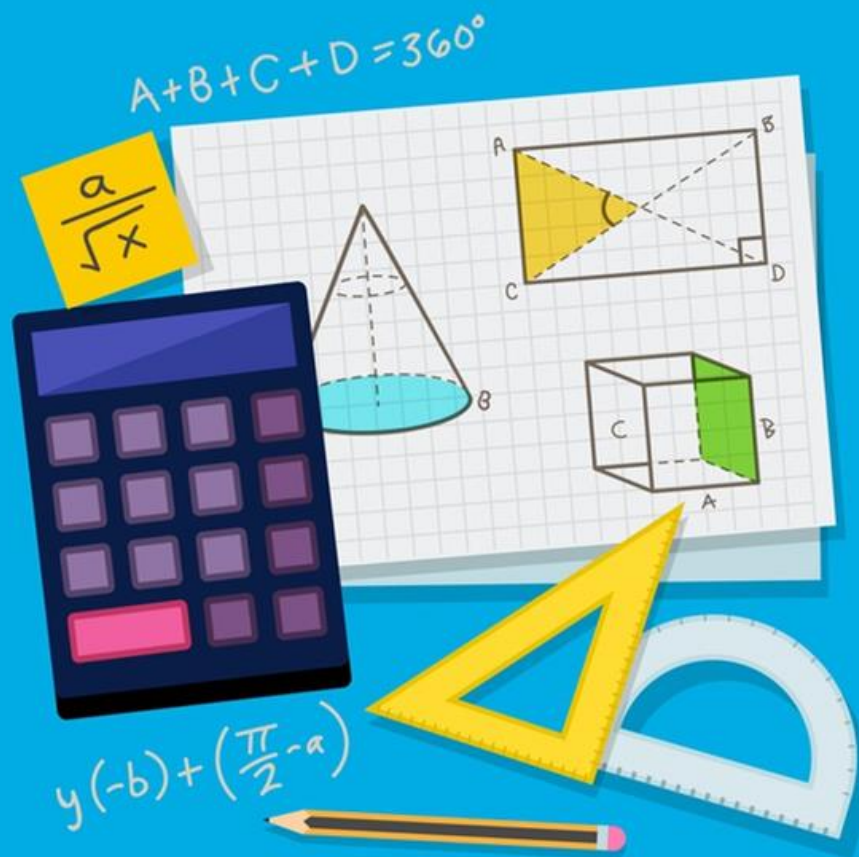
$$\sin \theta = -\frac{3}{5}$$

$$\cos \theta = -\frac{4}{5}$$

Use in Exp ①:

$$\frac{-\frac{4}{5} + \frac{4}{3}}{\frac{4}{3} - \left(-\frac{3}{5}\right)}$$

$$= \frac{-12 + 20}{20 + 9} = \frac{8}{29}$$



Compound Angle Formulae



How much is $\sin 75^\circ$?

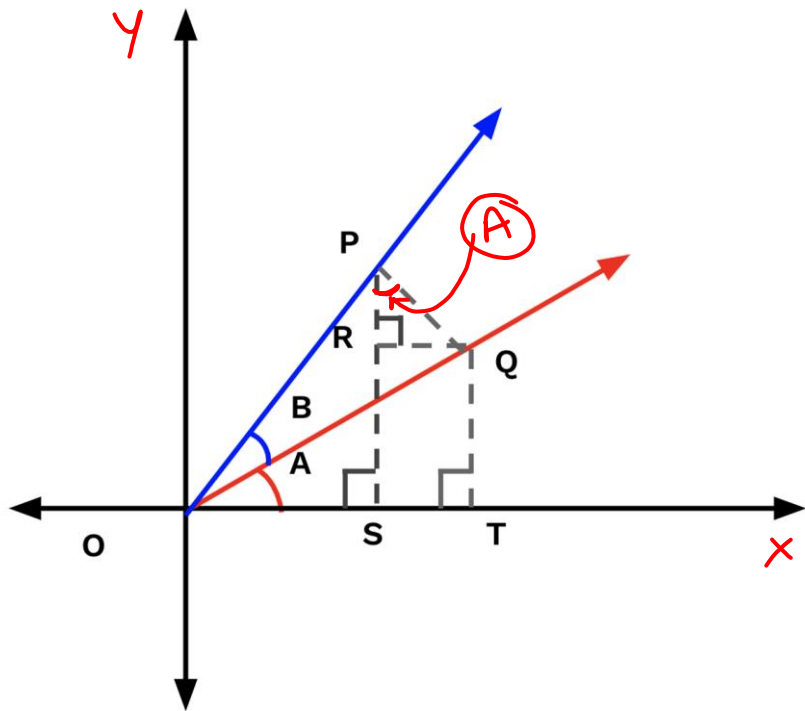
$$\sin(45^\circ + 30^\circ)$$

↑ ↑

$$\sin(A + B) = ?$$



1. $\sin(A+B)$



$$\sin(A+B) = \frac{PS}{OP}$$

$$= \frac{PR + RS}{OP}$$

$$= \frac{PR + QT}{OP}$$

$$= \frac{PR}{OP} \times \frac{PQ}{PQ} + \frac{QT}{OP} \times \frac{OQ}{OQ}$$

$$= (\cos A)(\sin B) + (\sin A)(\cos B)$$



$$\textcircled{1} \sin(A+B) = \sin A \cos B + \cos A \sin B$$



2. $\sin(A-B)$

$$\begin{cases} \cos(-\theta) = \cos \theta \\ \sin(-\theta) = -\sin \theta \end{cases}$$

$$= \sin(A + (-B))$$

$$= \sin(A) \cos(-B) + \cos A \sin(-B)$$

$$= \boxed{\sin A \cos B - \cos A \sin B}$$



3. $\cos(A+B)$

$$\sin\left(\frac{\pi}{2} - (A+B)\right)$$

$$\sin\left(\left(\frac{\pi}{2} - A\right) - B\right)$$

$$= \sin\left(\frac{\pi}{2} - A\right) \cos B - \cos\left(\frac{\pi}{2} - A\right) \sin B$$

$$= \boxed{\cos A \cos B - \sin A \sin B}$$

$$\begin{cases} \sin\left(\frac{\pi}{2} - \theta\right) = \cos \theta \\ \cos\left(\frac{\pi}{2} - \theta\right) = \sin \theta \end{cases}$$





4. $\cos(A-B)$

$$\cos(A-B)$$

$$= \cos(A + (-B))$$

$$= \cos A \cos(-B) - \sin A \sin(-B)$$

$$= \boxed{\cos A \cos B + \sin A \sin B}$$



5. $\tan(A+B)$



$$\tan(A+B) = \frac{\sin(A+B)}{\cos(A+B)}$$

$$= \frac{\sin A \cos B + \cos A \sin B}{\cos A \cos B - \sin A \sin B}$$

$$= \frac{\tan A + \tan B}{1 - \tan A \tan B}$$





6. $\tan(A-B)$

$$= \tan(A + (-B))$$

$$= \frac{\tan A + \tan(-B)}{1 - \tan A \tan(-B)}$$

$$= \boxed{\frac{\tan A - \tan B}{1 + \tan A \tan B}}$$



T-Ratios for 75°?

$$\begin{aligned}\textcircled{1} \sin(75^\circ) &= \sin(45^\circ + 30^\circ) \\ &= \sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ \\ &= \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \times \frac{1}{2} \\ &= \boxed{\frac{\sqrt{3}+1}{2\sqrt{2}}}\end{aligned}$$

$$\begin{aligned}\textcircled{2} \cos 75^\circ &= \cos(45^\circ + 30^\circ) \\ &= \cos 45^\circ \cos 30^\circ - \sin 45^\circ \sin 30^\circ \\ &= \boxed{\frac{\sqrt{3}-1}{2\sqrt{2}}}\end{aligned}$$

$$\begin{aligned}\textcircled{3} \tan 75^\circ &= \frac{\sqrt{3}+1}{\sqrt{3}-1} \\ &= \textcircled{2 + \sqrt{3}}\end{aligned}$$





T-Ratios for 15° ?


$$\textcircled{1} \sin 15^\circ = \sin(45^\circ - 30^\circ)$$

$$\hookrightarrow \sin(90 - 75^\circ) = \cos 75^\circ = \frac{\sqrt{3} - 1}{2\sqrt{2}}$$

$$\textcircled{2} \cos 15^\circ = \cos(90 - 75^\circ) = \sin 75^\circ = \frac{\sqrt{3} + 1}{2\sqrt{2}}$$

$$\textcircled{3} \tan 15^\circ = \frac{\sin 15^\circ}{\cos 15^\circ} = \frac{\sqrt{3} - 1}{\sqrt{3} + 1}$$




$$\sin(\alpha + \beta) \cos(\alpha - \beta) + \cos(\alpha + \beta) \sin(\alpha - \beta) =$$

A. $\sin 2\beta$

✓ B. $\sin 2\alpha$


C. $\cos 2\beta$

D. $\cos 2\alpha$

$$\begin{cases} \alpha + \beta = A \\ \alpha - \beta = B \end{cases} \rightarrow (A + B) = 2\alpha$$

$$\sin A \cos B + \cos A \sin B$$

$$= \sin(A + B)$$


$$\frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta} =$$

A. $\tan\left(\frac{\pi}{4} + \theta\right)$

B. $\tan\left(\frac{\pi}{4} - \theta\right)$

C. $\cot\left(\frac{\pi}{4} + \theta\right)$

D. $\cot\left(\theta - \frac{\pi}{4}\right)$

$\frac{1 + \tan \theta}{1 - \tan \theta}$

$$\begin{aligned} &= \frac{\tan\left(\frac{\pi}{4}\right) + \tan \theta}{1 - (\tan \theta)\left(\tan \frac{\pi}{4}\right)} \\ &= \tan\left(\frac{\pi}{4} + \theta\right) \end{aligned}$$

If $A + B = \frac{\pi}{4}$, Find the value of $(1 + \tan A)(1 + \tan B)$

A.

1

B.

2

C.

-1

D.

0

$$B = \left(\frac{\pi}{4} - A \right)$$

Now:

$$(1 + \tan A)(1 + \tan B)$$

$$(1 + \tan A) \left(1 + \tan \left(\frac{\pi}{4} - A \right) \right)$$

$$(1 + \tan A) \left(1 + \frac{1 - \tan A}{1 + \tan A} \right)$$

$$\cancel{(1 + \tan A)} \left(\frac{1 + \cancel{\tan A} + 1 - \cancel{\tan A}}{\cancel{(1 + \tan A)}} \right)$$

$$= 2$$

M-2

$$A + B = \frac{\pi}{4}$$

$$\tan(A+B) = 1$$

If $\tan A + \tan B = p$, and $\cot A + \cot B = q$, then $\cot(A + B) =$

A. $\frac{p - q}{pq}$

B. $\frac{p + q}{pq}$

☒ C. $\frac{q - p}{pq}$

D. None of these

$$\begin{aligned}\cot(A+B) &= \frac{1}{\tan(A+B)} \\ &= \frac{1 - \tan A \tan B}{\tan A + \tan B}\end{aligned}$$

Now:

$$\frac{1}{\tan A} + \frac{1}{\tan B} = q$$

$$\frac{(\tan A + \tan B)}{\tan A \tan B} = q$$

$$(\tan A \tan B) = \frac{p}{q}$$

$$\therefore \text{Cov}(A+B) = \frac{1 - P/q}{P}$$
$$= \frac{q-P}{Pq}$$

If $\tan 70^\circ = \tan 20^\circ + K \tan 50^\circ$ then K is equal to:

A. 1

☒ B. 2

C. 3

D. None

$$70 = 20 + 50$$

$$\tan 70^\circ = \tan(20^\circ + 50^\circ)$$

$$\tan 70^\circ = \frac{\tan 20 + \tan 50}{1 - \tan 20 \tan 50}$$

$$\begin{aligned} \tan 70^\circ &= \cancel{\tan 20^\circ} + \cancel{\tan 50^\circ} \tan 70^\circ \\ &= \tan 20 + \tan 50^\circ \end{aligned}$$

$$\begin{aligned} \tan 70^\circ &= \tan 20^\circ + 2 \tan 50^\circ \end{aligned}$$



If $0 < \alpha, \beta < \frac{\pi}{4}$ such that $\cos(\alpha + \beta) = \frac{4}{5}$ and

$\sin(\alpha - \beta) = \frac{5}{13}$, then the value of $\tan 2\alpha = \tan(A + B)$

A. $\frac{56}{35}$

B. $\frac{35}{56}$

✓ C. $\frac{56}{33}$

D. $\frac{65}{33}$

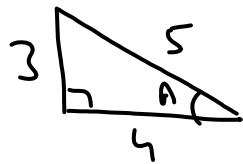
$$\alpha + \beta = A$$

$$\alpha - \beta = B$$

Add: $2\alpha = A + B$

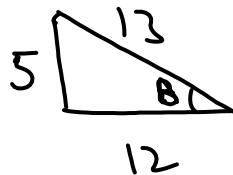
$$\cos A = \frac{4}{5}$$

$$\sin B = \frac{5}{13}$$



$$\therefore \sin A = \frac{3}{5}$$

$$\tan A = \frac{3}{4}$$



$$\therefore \cos B = \frac{12}{13}$$

$$\tan B = \frac{5}{12}$$

$$\begin{aligned}\tan 2\alpha &= \tan(A+B) \\&= \frac{\tan A + \tan B}{1 - \tan A \tan B} \\&= \frac{3/4 + 5/12}{1 - \left(\frac{3}{4}\right)\left(\frac{5}{12}\right)}\end{aligned} \quad \begin{aligned}&= \frac{36 + 20}{\cancel{48}} \\&\quad \frac{48 - 15}{\cancel{48}} \\&= \left(\frac{56}{33}\right)\end{aligned}$$



In a triangle ABC, angle A is an obtuse angle such

$$\sin A = \frac{3}{5} \text{ and } \sin B = \frac{5}{13} \text{ then } \underline{\underline{\sin C =}}$$

Ans



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7:30 - 9:00 PM



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Jayant Sir | Physics

1:30 - 3:00 PM



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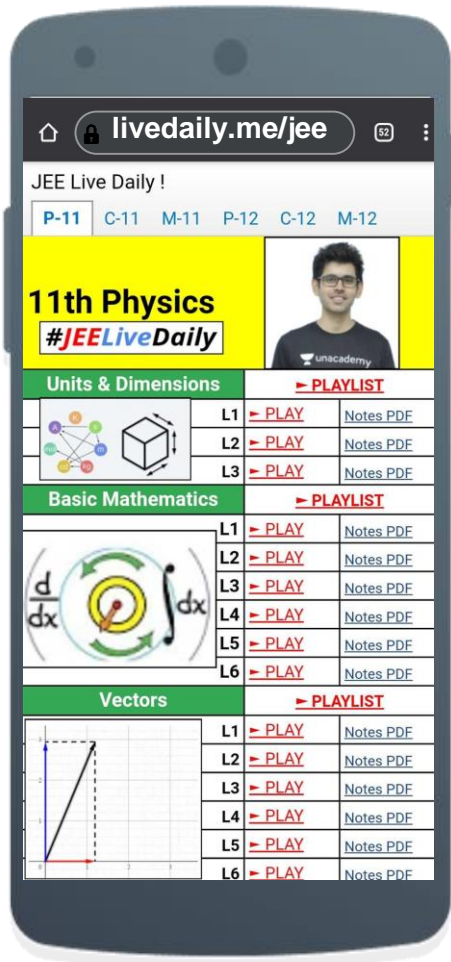
3:00 - 4:30 PM



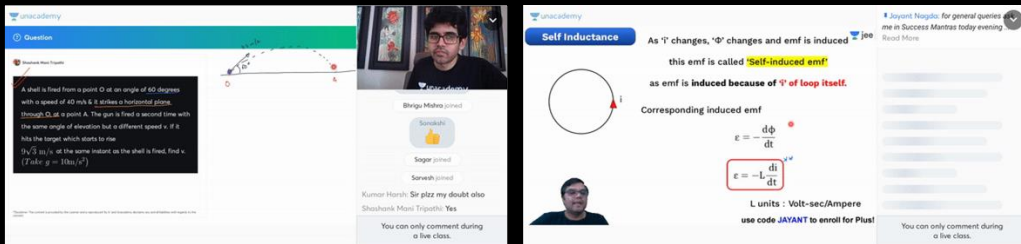
Nishant Sir | Maths

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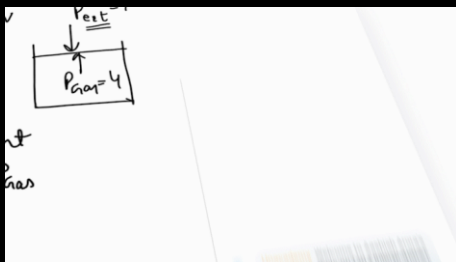
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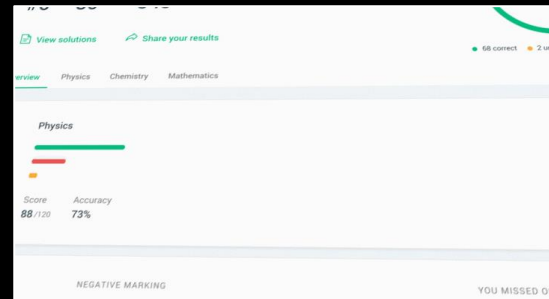
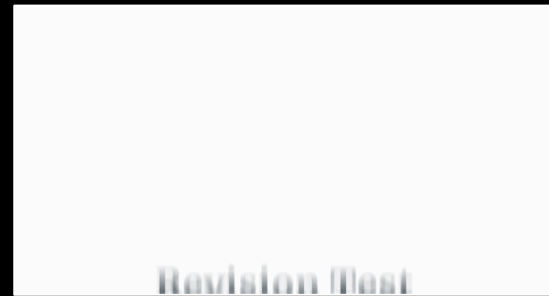


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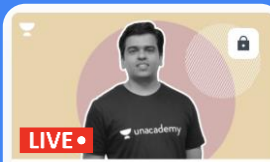


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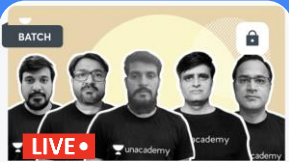
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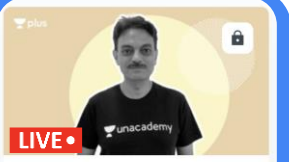
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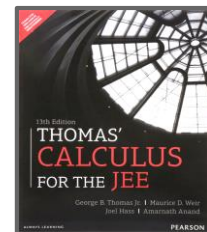
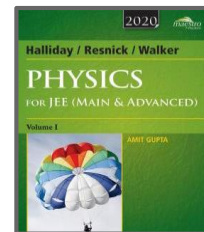
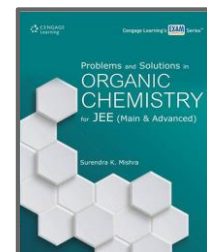
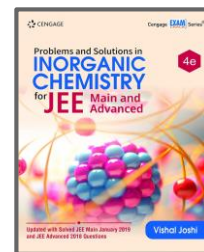
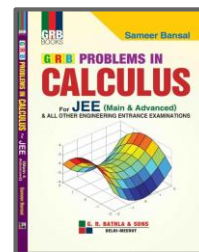
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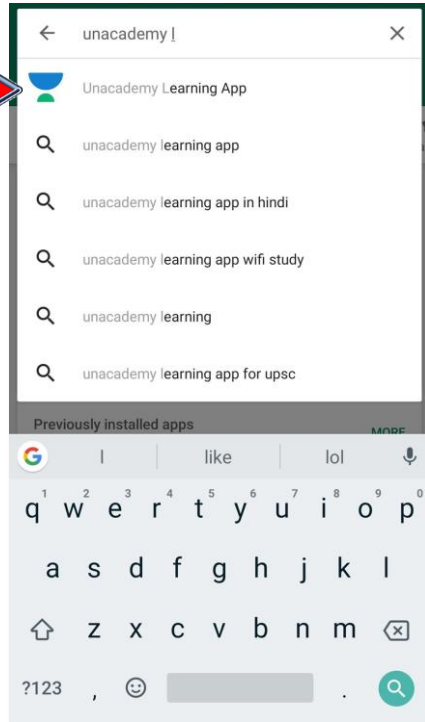


Naman Goyal
98.48

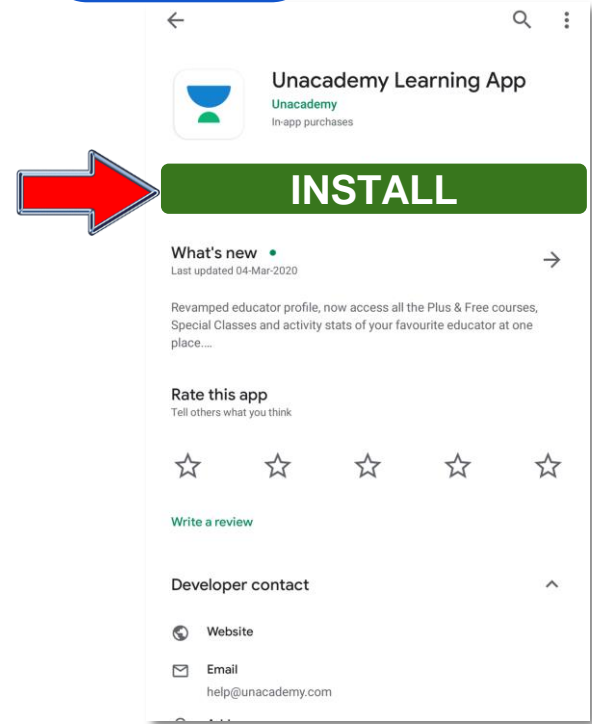


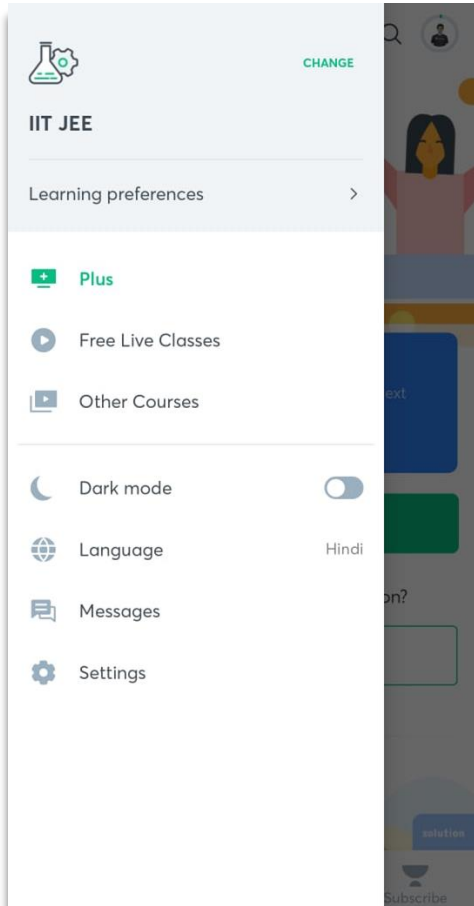
MIHIR PRAJAPATI
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