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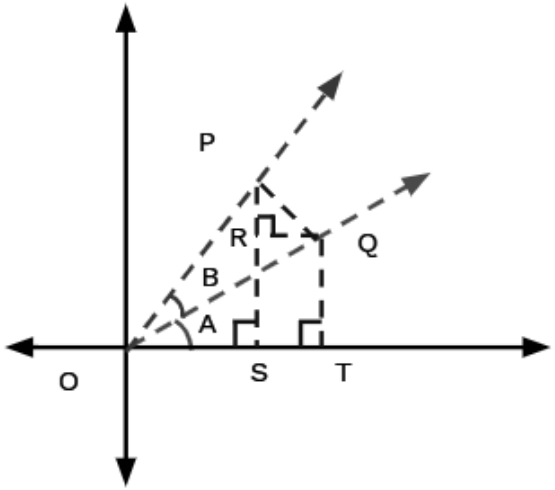
# Transformation Formulas

## Trigonometry 9

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## Sameer Chincholikar

**B.Tech, M.Tech - IIT-Roorkee**

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

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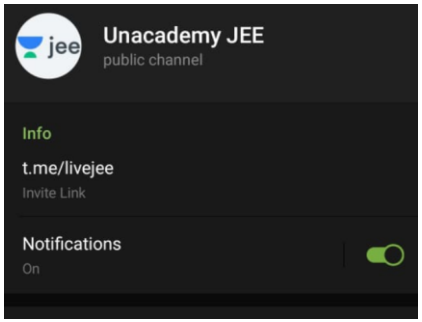


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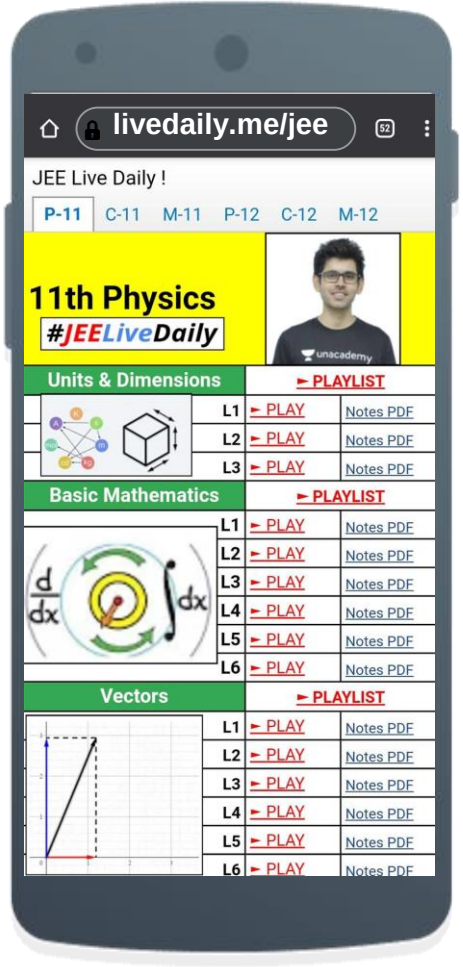


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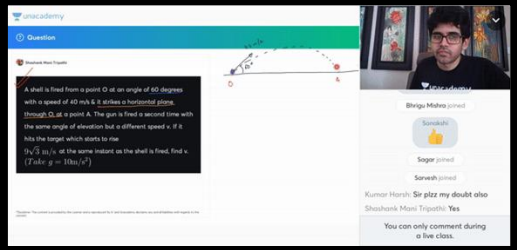


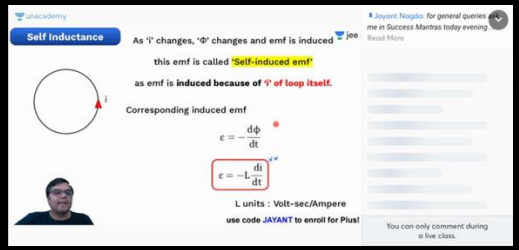



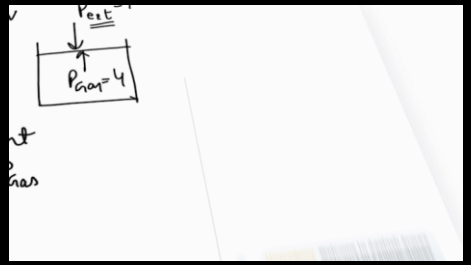


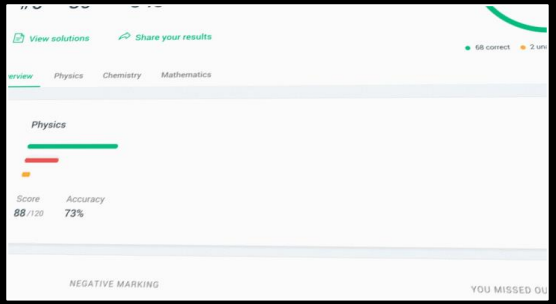


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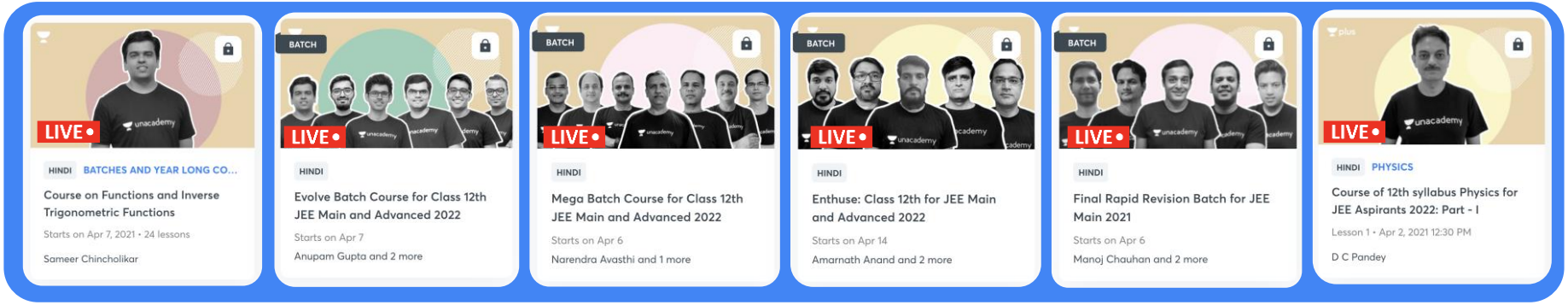


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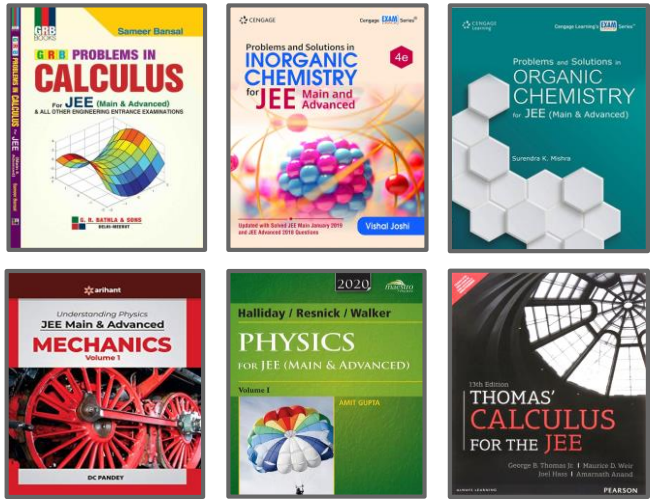

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# Top Results

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**100 %ile**


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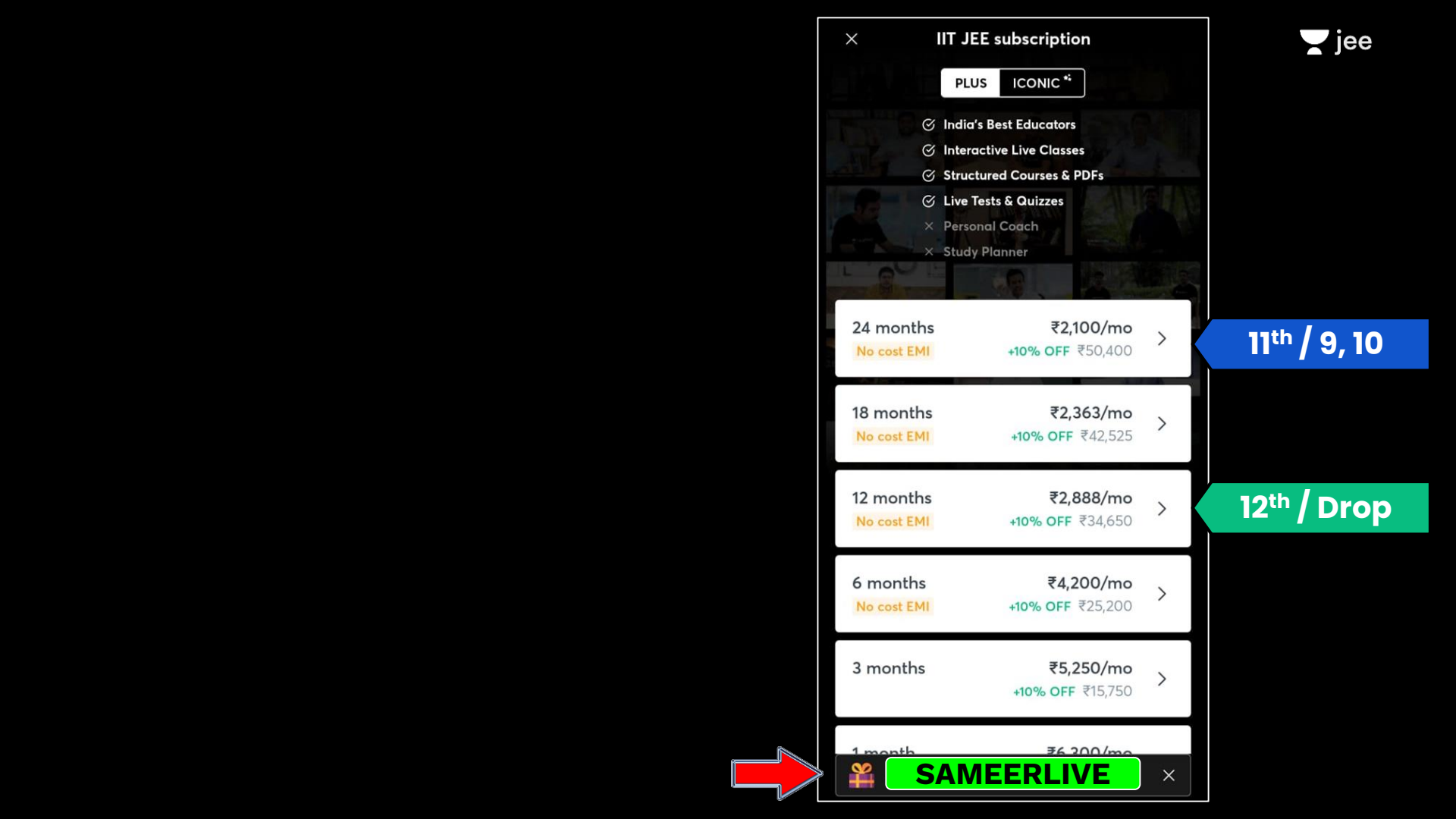
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₹2,888/mo
+10% OFF ₹34,650
6 months
No cost EMI
₹4,200/mo
+10% OFF ₹25,200
3 months
₹5,250/mo
+10% OFF ₹15,750
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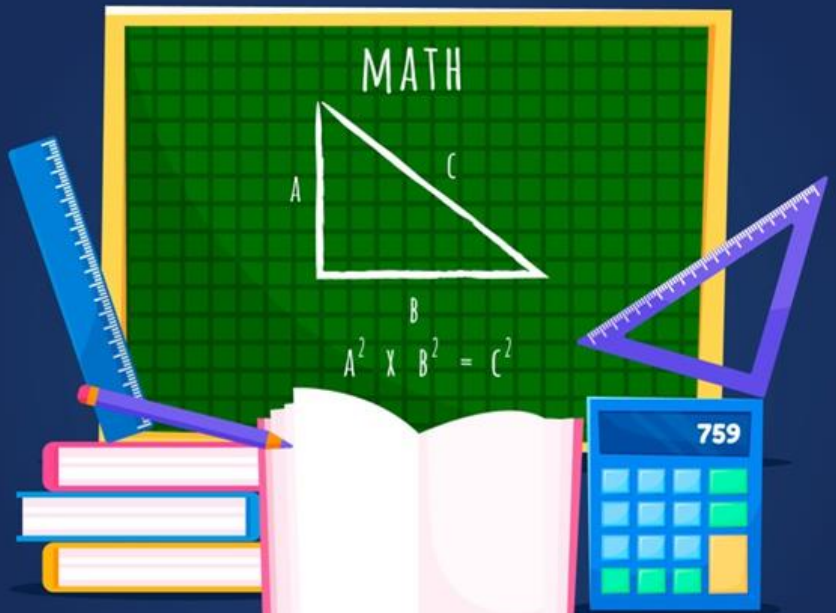
# LET'S BEGIN!!

# Transformation Formulae

## PART - 1



# Transformation Formulae Part - 1

1. $\sin(A + B) + \sin(A - B) = 2 \sin A \cos B$

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

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

# Transformation Formulae Part - 1

2

$$\sin(A + B) - \sin(A - B) = 2\cos A \sin B$$

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

# Transformation Formulae Part - 1

3

$$\cos(A + B) + \cos(A - B) = 2 \cos A \cos B$$

# Transformation Formulae Part - 1

4

$\cos(A - B) - \cos(A + B) = 2 \sin A \sin B$

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

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

Value of $\sin 21^\circ \cos 9^\circ - \cos 84^\circ \cos 6^\circ$ is equal to:

**A.** $1$ **B.** $\frac{3}{2}$ **C.** $\frac{1}{4}$ **D.** $\frac{1}{2}$

$$\sin 21^\circ \cos 9^\circ - \cos 84^\circ \cos 6^\circ$$

$$= \frac{1}{2}\left[\left(2\sin 21^\circ \cdot \cos 9^\circ\right) - \left(2\cos 84^\circ \cos 6^\circ\right)\right]$$

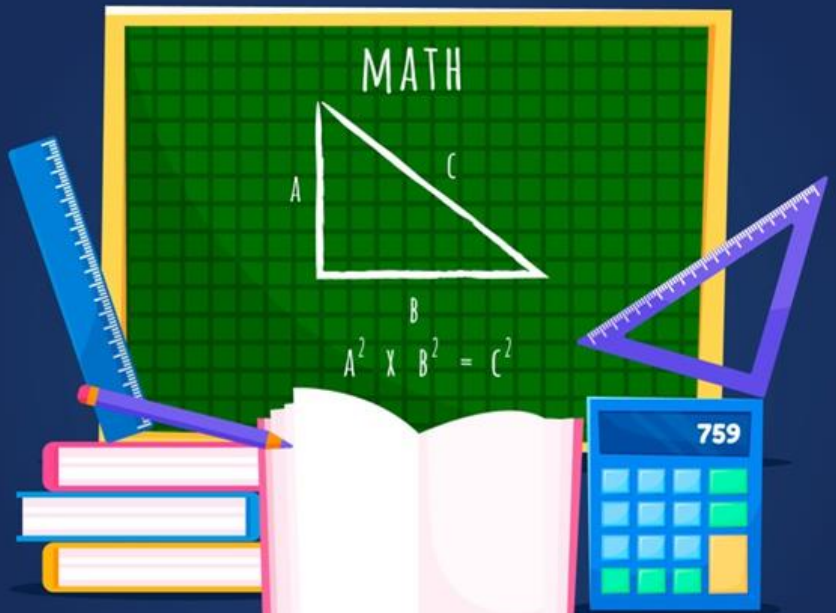
$$= \frac{1}{2}\left[\left(\sin(30^\circ) + \sin(12^\circ)\right) - \left(\cos(90^\circ) + \cos(78^\circ)\right)\right]$$

$\therefore \cos 78^\circ = \cos(90^\circ - 12^\circ)$

$= \sin 12^\circ$

# Transformation Formulae

## PART - 2



# Transformation Formulae Part - 2

1

$$\sin C + \sin D = 2 \sin \frac{C+D}{2} \cos \frac{C-D}{2}$$

$$\sin(A+B) + \sin(A-B) = 2 \sin A \cos B$$

Let: $A+B = C$, $A-B = D$

$(+) \Rightarrow 2A = C+D$

$$\sin C + \sin D = 2 \sin\left(\frac{C+D}{2}\right) \cos\left(\frac{C-D}{2}\right)$$

# Transformation Formulae Part - 2

**2**

$$\sin C - \sin D = 2\cos\frac{C+D}{2}\sin\frac{C-D}{2}$$

$\sin(A+B) - \sin(A-B) = 2\cos A \sin B$

# Transformation Formulae Part - 2

**3**

$$\cos C + \cos D = 2\cos\frac{C+D}{2}\cos\frac{C-D}{2}$$

$\cos(A+B)+\cos(A-B) = 2\cos A\cos B$

# Transformation Formulae Part - 2

$\sin(-\theta) = -\sin\theta$

**4**

$$\cos C - \cos D = 2 \sin \frac{C+D}{2} \sin \frac{D-C}{2}$$

$\cos(A-B) - \cos(A+B) = 2 \sin A \sin B$

$\Rightarrow \cos(D) - \cos(C) = 2 \sin\left(\frac{C+D}{2}\right) \sin\left(\frac{C-D}{2}\right)$

$\Rightarrow \cos C - \cos D = -2 \sin\left(\frac{C+D}{2}\right) \sin\left(\frac{C-D}{2}\right)$

*

(1) $\sin C + \sin D = 2 \sin\left(\frac{C+D}{2}\right) \cos\left(\frac{C-D}{2}\right)$

(2) $\sin C - \sin D = 2 \sin\left(\frac{C-D}{2}\right) \cos\left(\frac{C+D}{2}\right)$

(3) $\cos C + \cos D = 2 \cos\left(\frac{C+D}{2}\right) \cos\left(\frac{C-D}{2}\right)$

(4) $\cos C - \cos D = -2 \sin\left(\frac{C+D}{2}\right) \sin\left(\frac{C-D}{2}\right)$

Value of $\frac{\sin 70^0 + \cos 40^0}{\cos 70^0 + \sin 40^0}$,

A. $\frac{1}{2}$ B. $\frac{1}{\sqrt{3}}$ C. $\sqrt{3}$ D. 2

$$\frac{\sin 70^\circ + \sin 50^\circ}{\cos 70^\circ + \cos 50^\circ}$$

$$= \frac{2\sin\left(\frac{120^\circ}{2}\right)\cos\left(\frac{20^\circ}{2}\right)}{2\cos\left(\frac{120^\circ}{2}\right)\cos\left(\frac{20^\circ}{2}\right)}$$

$\tan 60^\circ$

$= \sqrt{3}$

$$\frac{\sin A+\sin 3A+\sin 5A+\sin 7A}{\cos A+\cos 3A+\cos 5A+\cos 7A}=$$

**A.** 1 **B.** tan 4A **C.** cot 4A **D.** cot 2A

$$= \frac{(\sin A+\sin 7A)+(\sin 3A+\sin 5A)}{(\cos A+\cos 7A)+(\cos 3A+\cos 5A)}$$

$$= \frac{2\sin(4A)\cos(-3A)+2\sin(4A)\cos(-A)}{2\cos(4A)\cos(-3A)+2\cos(4A)\cos(-A)}$$

$$= \frac{(2\sin 4A)(\cos 3A + \cos A)}{(2\cos 4A)(\cos 3A + \cos A)}$$

$$= \tan 4A$$

Value of $\cos 2x + \cos 4x + \cos 6x - 4\cos x \cos 2x \cos 3x$ is equal to:

**A.** 2 **B.** 3 **C.** 4 **D.** -1

$$(\cos 2x + \cos 6x) + \cos 4x - 4\cos x \cos 2x \cos 3x$$

$$= 2\cos(4x)\cos(-2x) + \cos 4x - 4\cos x \cos 2x \cos 3x$$

$$= 2\cos^2 4x \cos 2x + 2\cos^2 2x - 1 - 4\cos x \cos 2x \cos 3x$$

$$= (2\cos 2x)[\cos 4x + \cos 2x] - 1 - 4\cos x \cos 2x \cos 3x$$

$$= (2\cos 2x)(2\cos(3x)\cos(x))$$

$$= -1 - 4\cos x \cos 2x \cos 3x$$

$$= -1$$

If $\sin\theta+\sin 2\theta+\sin 3\theta=\sin\alpha$ and $\cos\theta+\cos 2\theta+\cos 3\theta=\cos\alpha$, then $\theta$ is equal to

**A.** $\alpha/2$ **B.** $\alpha$ **C.** $2\alpha$ **D.** $\alpha/6$

$$\begin{cases} 2\sin(2\theta)\cos(-\theta)+\sin 2\theta=\sin\alpha \\ (\sin 2\theta)(2\cos\theta+1)=\sin\alpha \quad -(1) \end{cases}$$

$$\begin{cases} 2\cos(2\theta)\cos(-\theta)+\cos 2\theta=\cos\alpha \\ \cos 2\theta(2\cos\theta+1)=\cos\alpha \quad -(2) \end{cases}$$

(1) ÷ (2)

$$\frac{\sin 2\theta (2\cos\theta + 1)}{\cos 2\theta (2\cos\theta + 1)} = \tan\alpha$$

$$\tan 2\theta = \tan\alpha$$

$$2\theta = \alpha$$

If **sin α + sin β = 1/3** and **cos α + cos β = 1/4**. The value of sin (α + β) is

**A.** 24/25 **B.** 13/25 **C.** 12/13 **D.** None of these

$$\begin{cases} 2\sin\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right) = \frac{1}{3} \\ 2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right) = \frac{1}{4} \end{cases}$$

Divide : $\tan\left(\frac{\alpha+\beta}{2}\right) = \frac{1/3}{1/4} = \frac{4}{3}$

$$\sin 2\theta = \frac{2\tan\theta}{1+\tan^2\theta}$$

$$\sin\theta = \frac{2\tan(\theta/2)}{1+\tan^2(\theta/2)}$$

$$\Rightarrow \sin(A+B) = \frac{2\tan\left(\frac{A+B}{2}\right)}{1+\tan^2\left(\frac{A+B}{2}\right)}$$

$$= \frac{2\left(4/3\right)}{1+\left(\frac{16}{9}\right)}$$

$$= \frac{24}{25}$$

If $\sin 2\theta + \sin 2\phi = 1/2$ and $\cos 2\theta + \cos 2\phi = 3/2$, then $\cos^2(\theta - \phi) =$

**A.** 3/8 **B.** 5/8 **C.** 3/4 **D.** 5/4

Square

$$\sin^2 2\theta + \sin^2 2\phi + 2\sin 2\theta \sin 2\phi = \frac{1}{4}$$

Square

$$\cos^2 2\theta + \cos^2 2\phi + 2\cos 2\theta \cos 2\phi = \frac{9}{4}$$

---

Add: $1 + 1 + 2(\cos 2\theta \cos 2\phi + \sin 2\theta \sin 2\phi) = \frac{5}{2}$

$$2\cos(2\theta - 2\phi) = \frac{1}{2}$$

$$\cos(2(\theta - \phi)) = \frac{1}{4}$$

$$2\cos^2(\theta - \phi) - 1 = \frac{1}{4}$$

$$\cos^2(\theta - \phi) = 5/8$$

$\sin^2 A + \sin^2 (A - B) + 2 \sin A \cos B \sin (B - A)$ is equal to -

**A.** $\sin^2 A$ **B.** $\sin^2 B$ **C.** $\cos^2 A$ **D.** $\cos^2 B$

$$\sin^2 A + \sin^2(A-B) + \left(\sin(A+B) + \sin(A-B)\right)\sin(B-A)$$

$$= \sin^2 A + \sin^2(A-B) - \left(\sin(A+B) + \sin(A-B)\right)\sin(A-B)$$

$$= \sin^2 A + \sin^2(A-B) - \sin(A+B)\sin(A-B)$$

$$- \sin^2(A-B)$$

$$= \sin^2 A - \sin(A+B)\sin(A-B)$$

$$= \sin^2 A - (\sin^2 A - \sin^2 B)$$

$$= \sin^2 B$$

If $\cos^3 x \sin 2x = \sum_{r=0}^{n} a_r \sin(rx)$, $\forall x \in R$ then find $a_3/a_1$ :

H.W

$a_1 \sin x + a_2 \sin 2x$

$+ - - - + a_n \sin nx$

multiplication to addition

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## 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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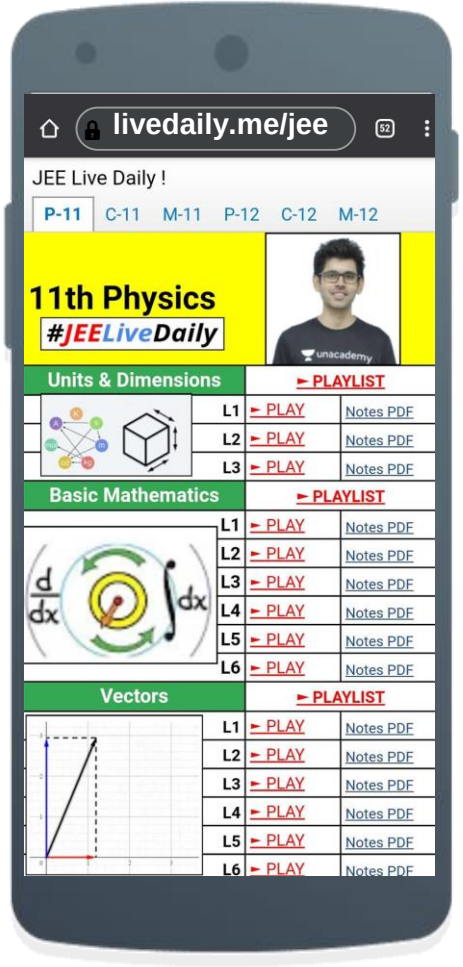


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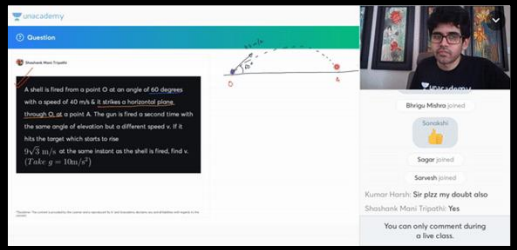


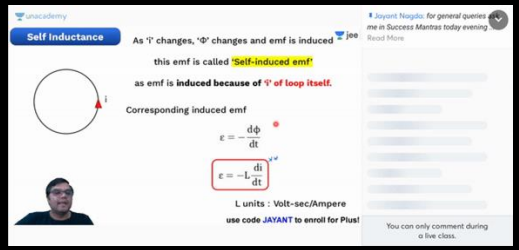


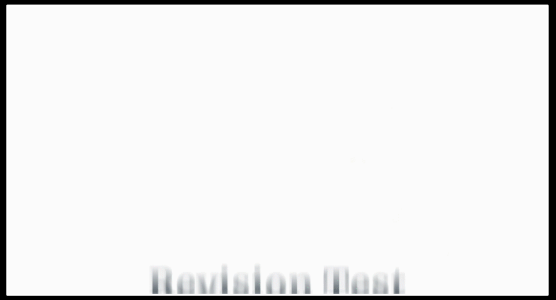


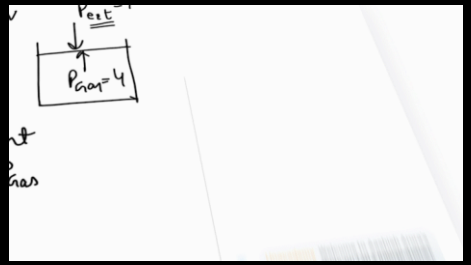


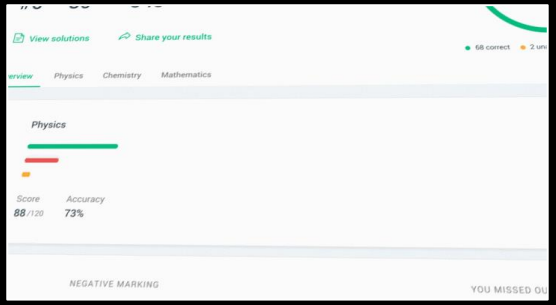


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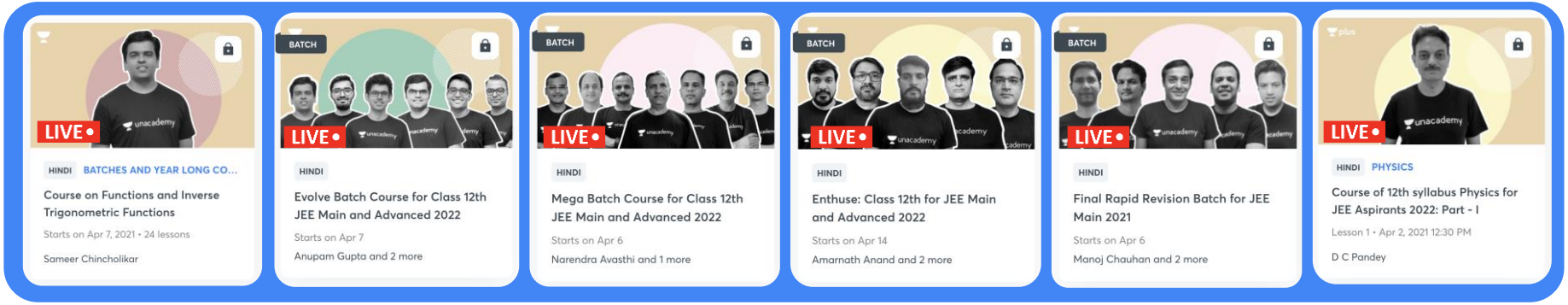


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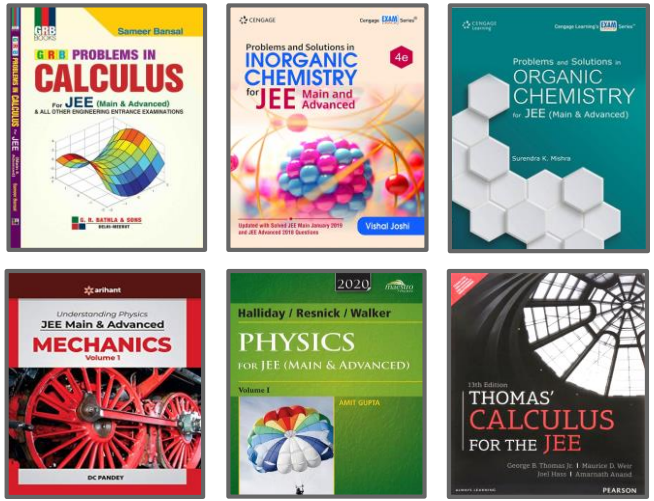

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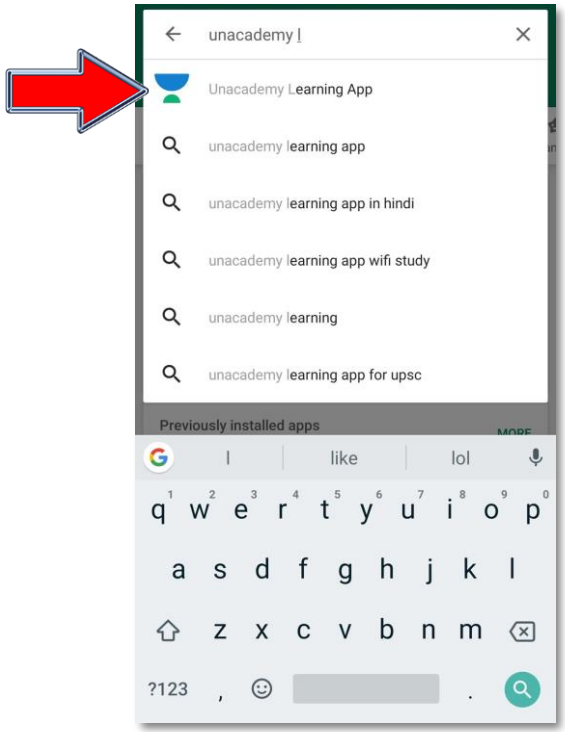
## Step 1

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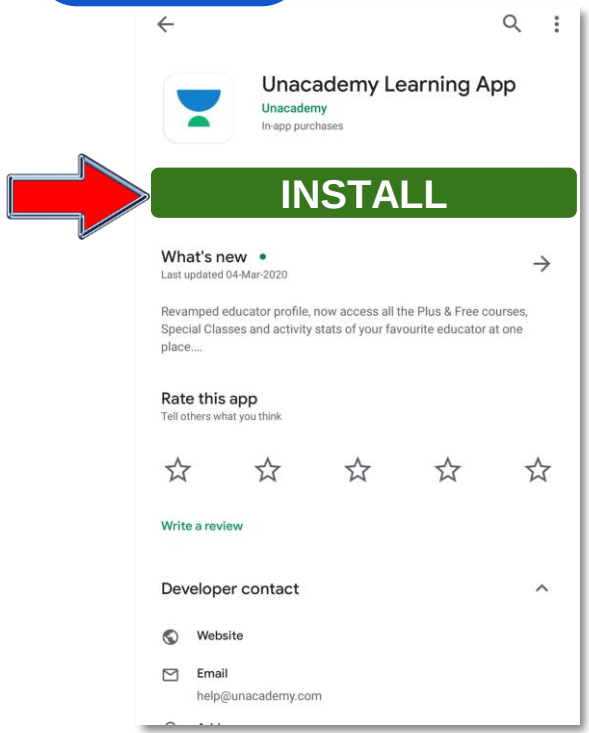

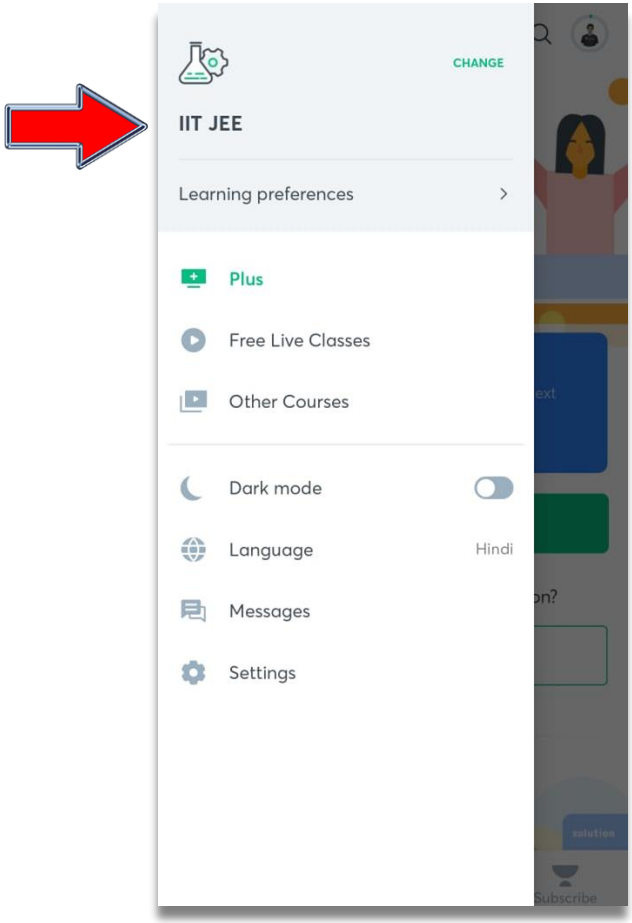
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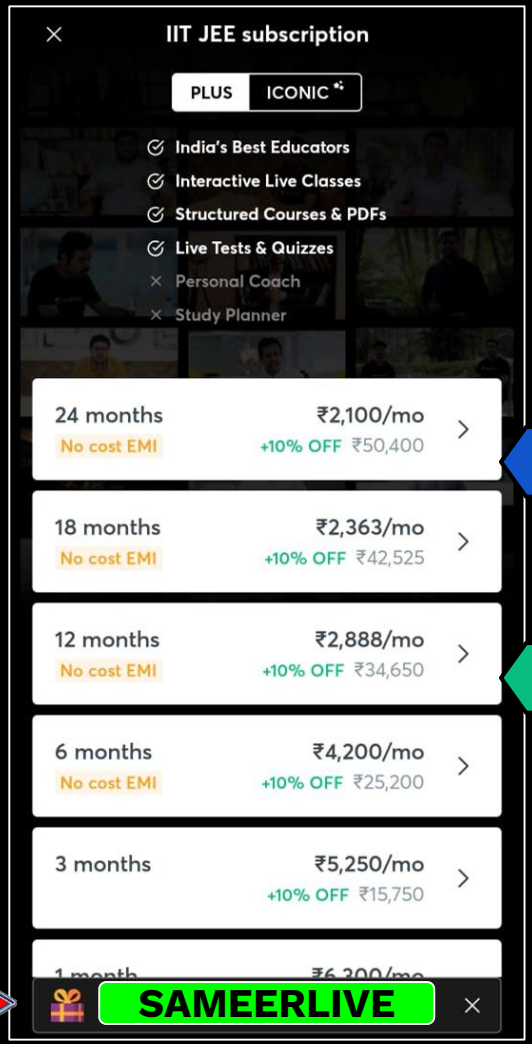


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