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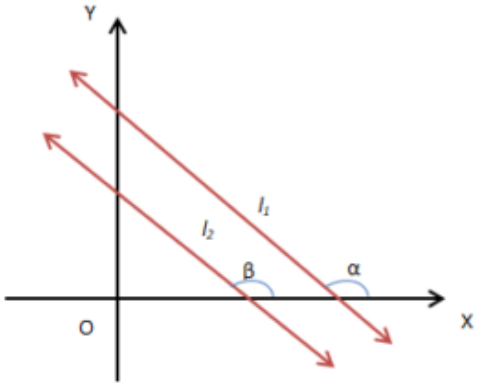
1. Coordinate Systems
2. Distance Formula

Straight Lines 1



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Sameer Chincholikar

B.Tech, M.Tech - IIT-Roorkee

- **10+** years Teaching experience
- Taught **1 Million+** Students
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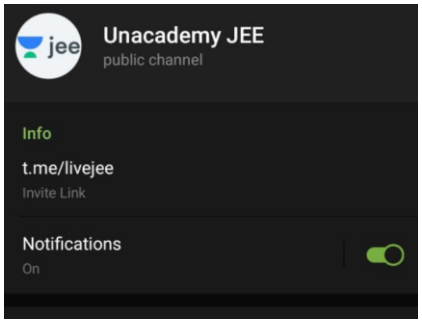

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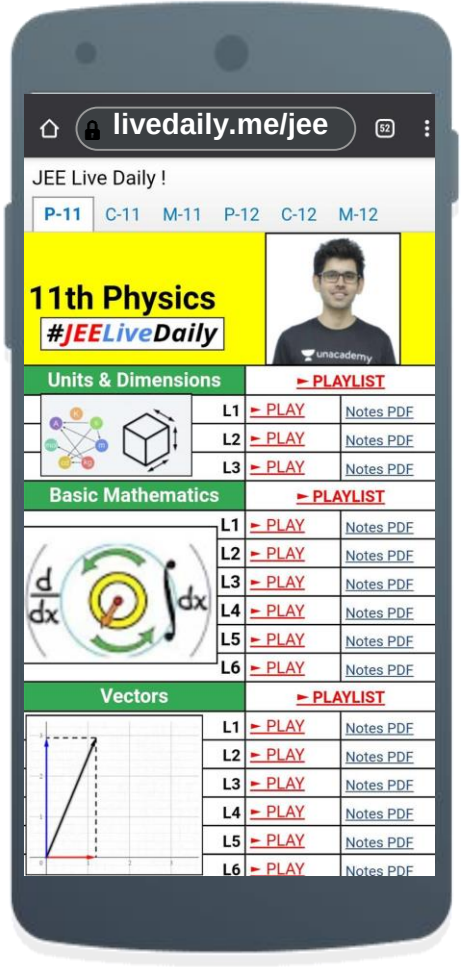

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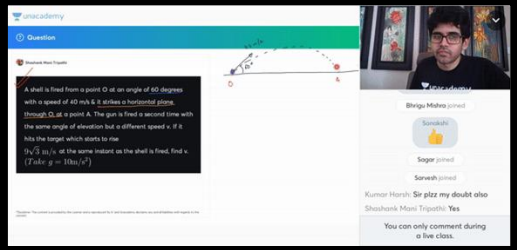

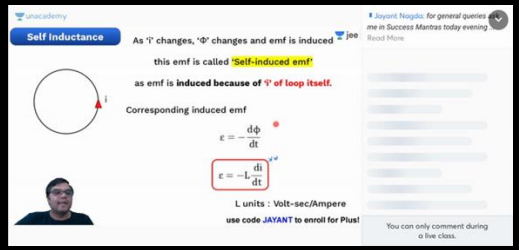

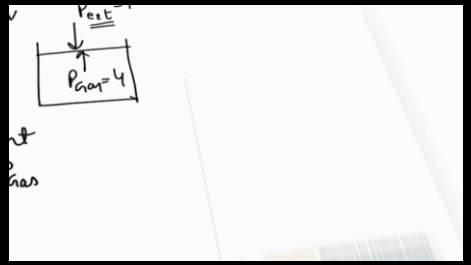

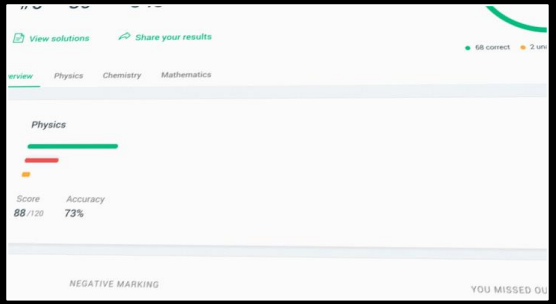

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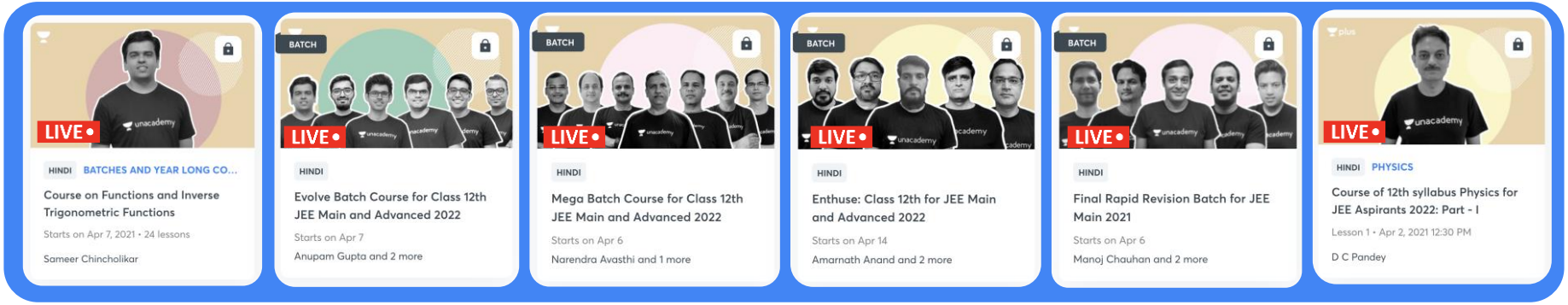

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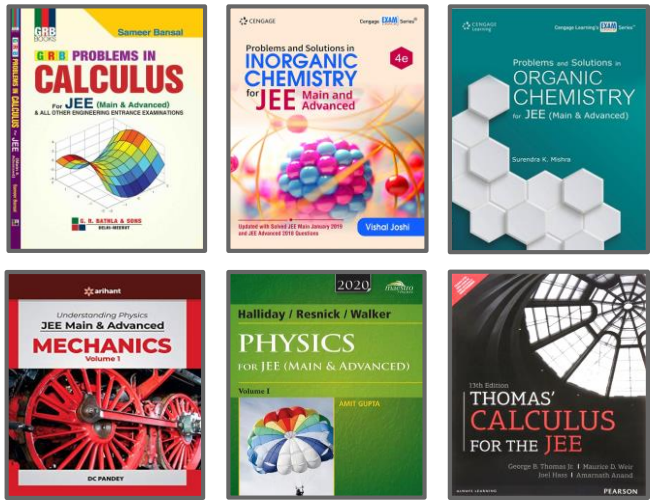

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Amaiya Singhal
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Adnan
99.95

Ashwin Prasanth
99.94

Tanmay Jain
99.86

Kunal Lalwani
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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

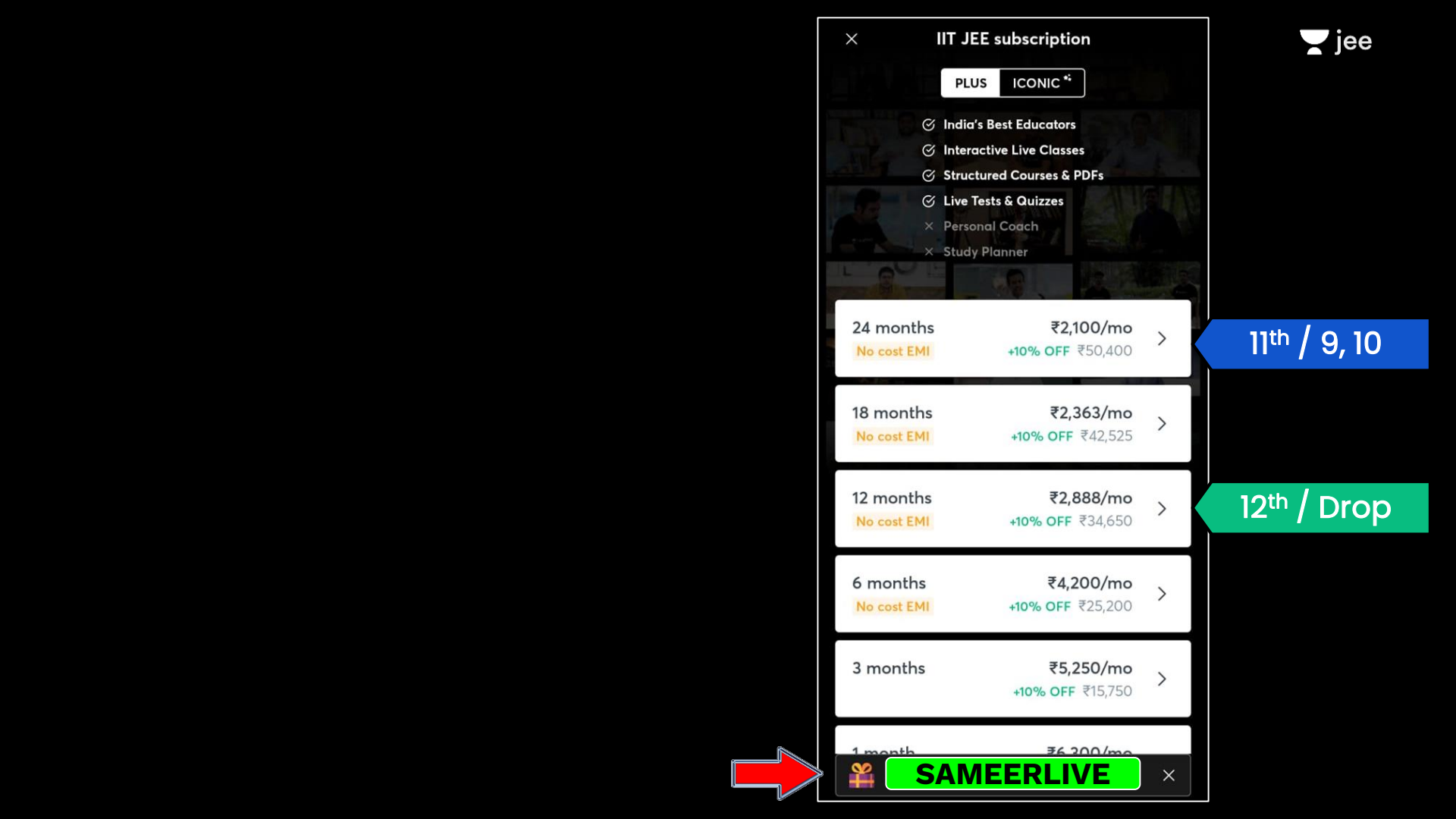
Ayush Kale
98.85

Ayush Gupta
98.67

Megh Gupta
98.59

Naman Goyal
98.48

MIHIR PRAJAPATI
98.16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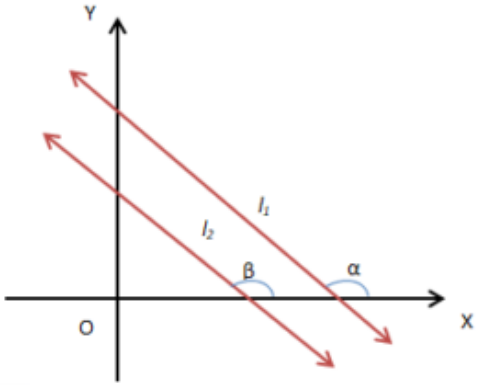
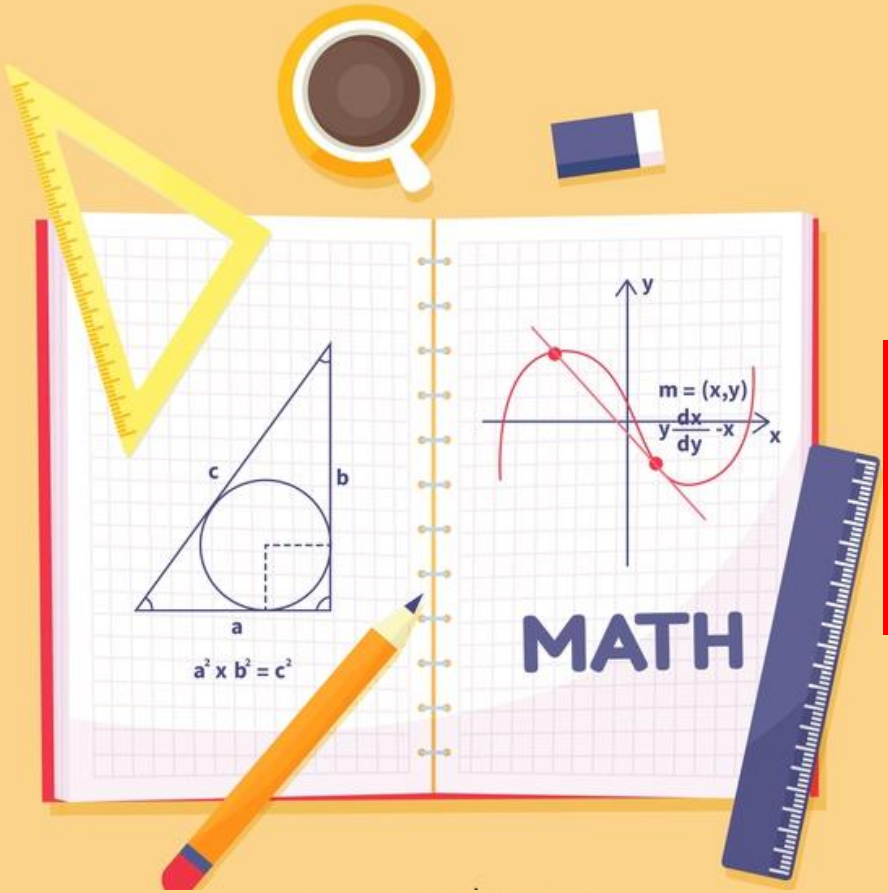
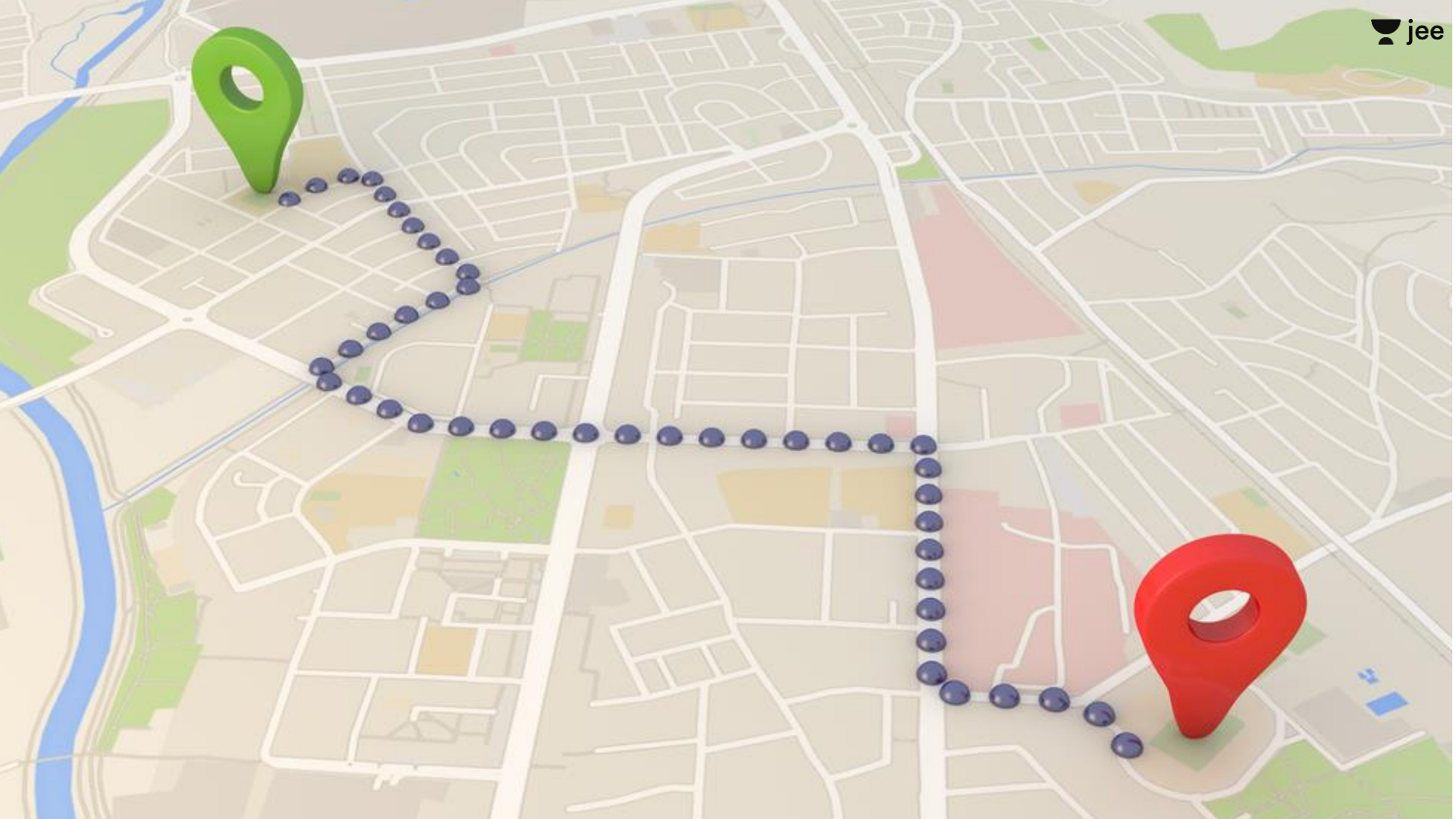
1. Coordinate Systems
2. Distance Formula

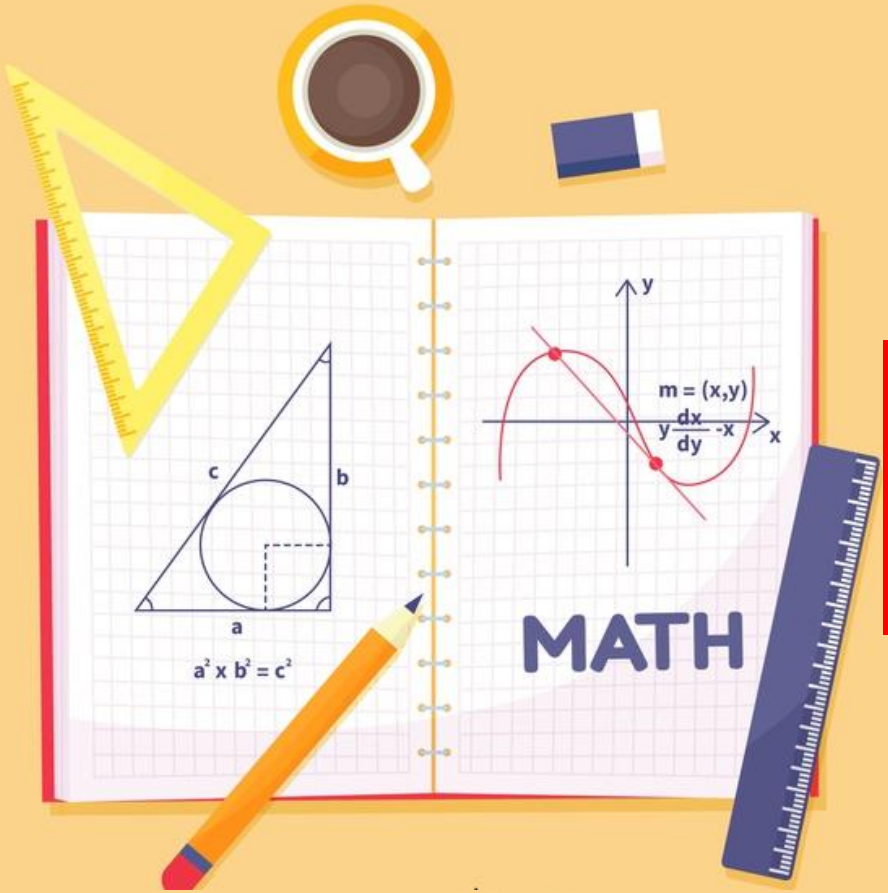
Straight Lines 1





Coordinate Geometry





Cartesian Coordinate System

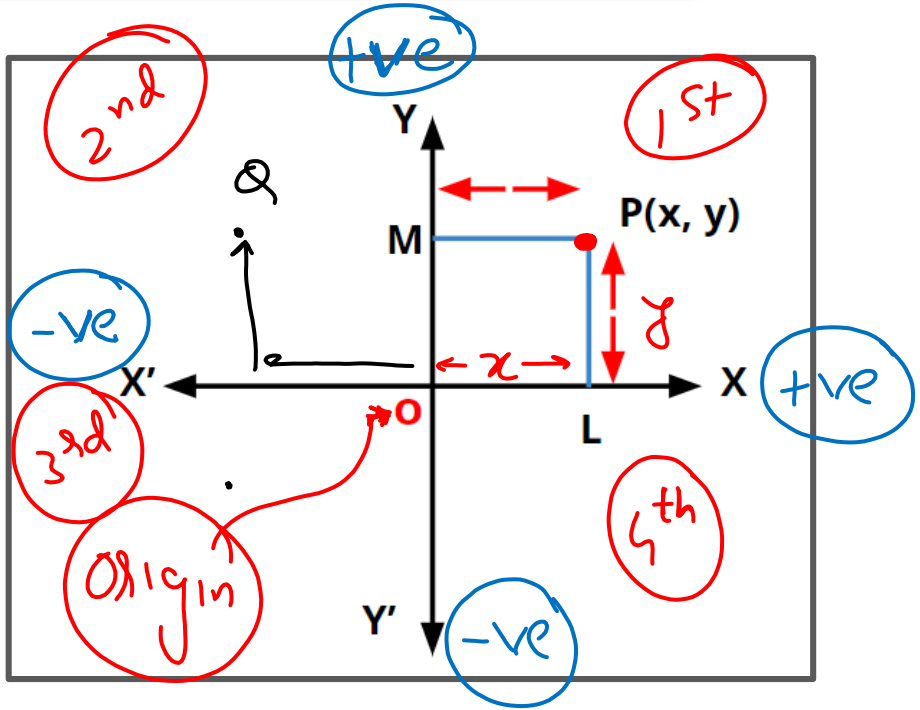
Cartesian Coordinates of a Point

1^{st} : (+, +)

2^{nd} : (−, +)

3^{rd} : (−, −)

4^{th} : (+, −)

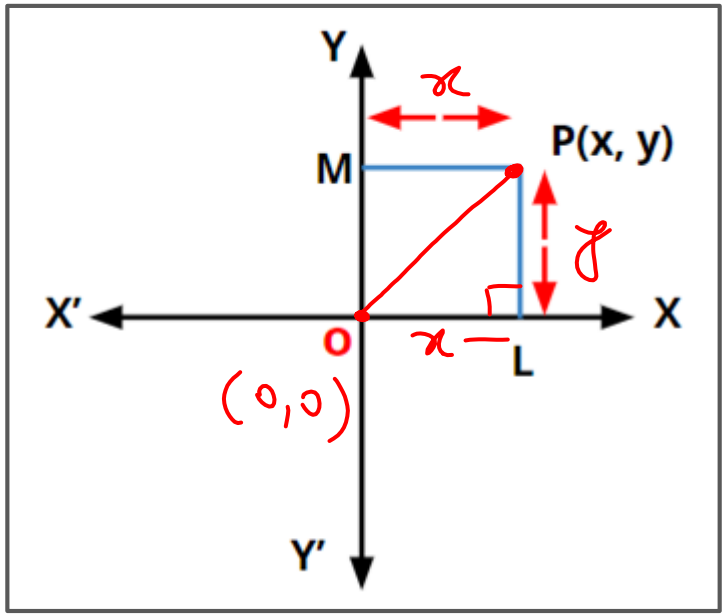


Cartesian Coordinates of a Point

→ Distance from X-axis: y

→ Distance from Y-axis: x

→ Distance from Origin: $\sqrt{x^2+y^2}$



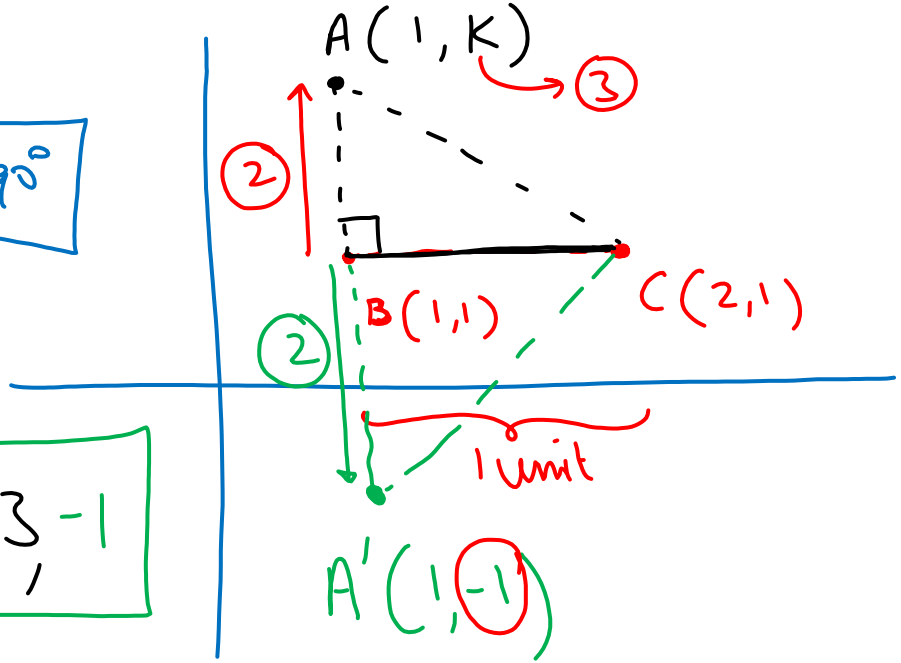
$A = \{1, 2, 3\}$

$B = \{1, 2\}$

Let A (h, k), B (1, 1) and C (2, 1) be the vertices of a right angled triangle with AC as its hypotenuse. If the area of the triangle is 1 square unit, then the set of values which 'k' can take is given by

A. {-1, 3} **B.** {-3, -2} **C.** {1, 3} **D.** {0, 3}

$\angle B = 90^\circ$



$K = 3 - 1$

$\Delta = \frac{1}{2}(BC)(AB)$

$1 = \frac{1}{2}(1)(AB)$

$AB = 2$

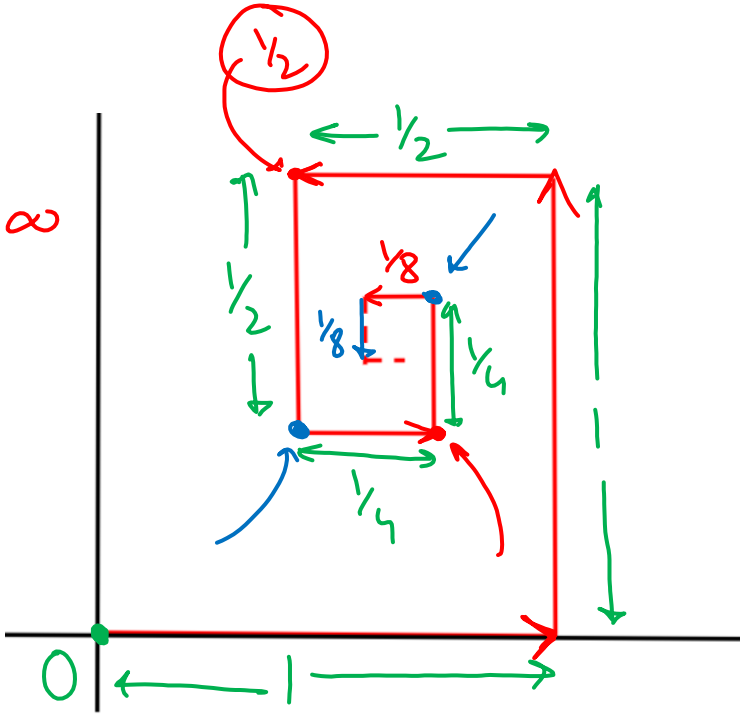
A particle starts from origin and moves in following pattern. 1 unit right then 1 unit up. 1/2 units left and 1/2 units down. 1/4 units right and 1/4 units up and so on. The length of each move becomes half after two steps and movement continuous indefinitely. The coordinate of the point where it ultimately converges to is :

$$x = 1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \cdots \infty$$

$$= \frac{1}{1-\left(-\frac{1}{2}\right)} = \frac{1}{1+\frac{1}{2}} = \frac{2}{3}$$

$$y = 1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \cdots \infty$$

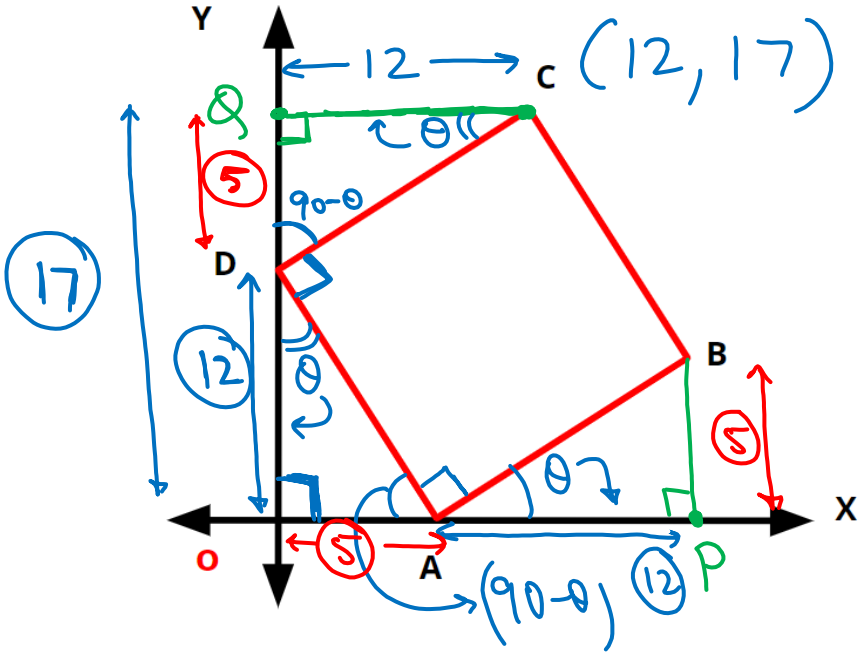
$$= 2/3$$

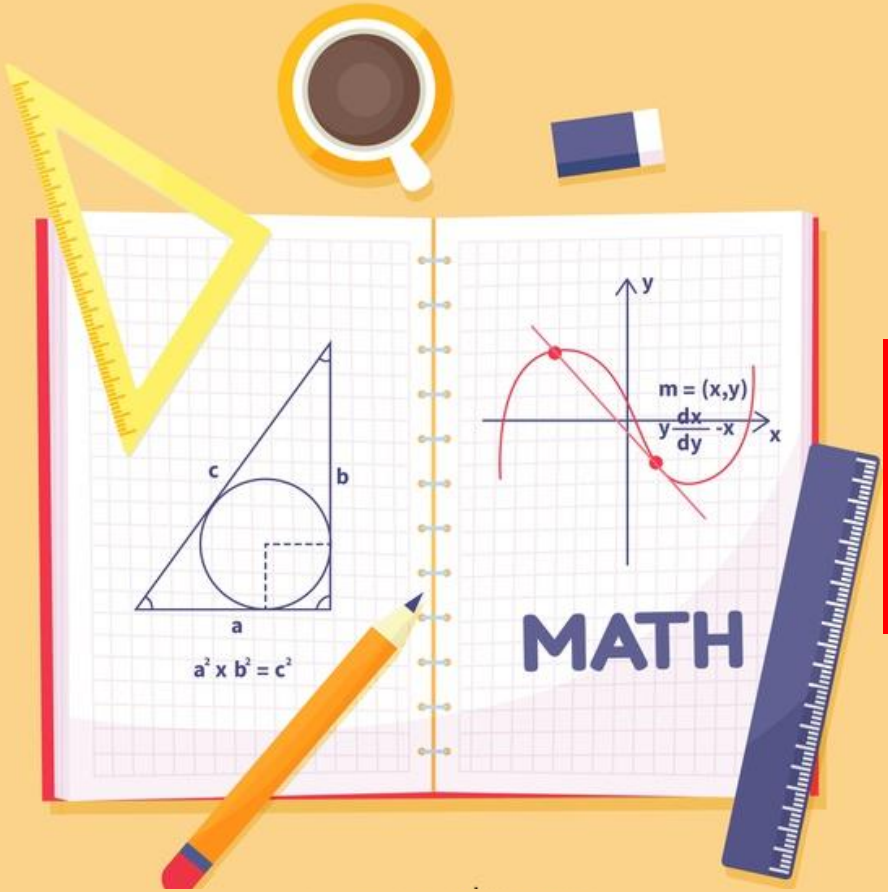


The vertices A and D of square ABCD lie on positive side of x and y-axis respectively. If the vertex C is the point (12, 17), then the coordinate of vertex B are

A. (14, 16) **B.** (15, 3) **C.** (17, 5) **D.** (17, 12)

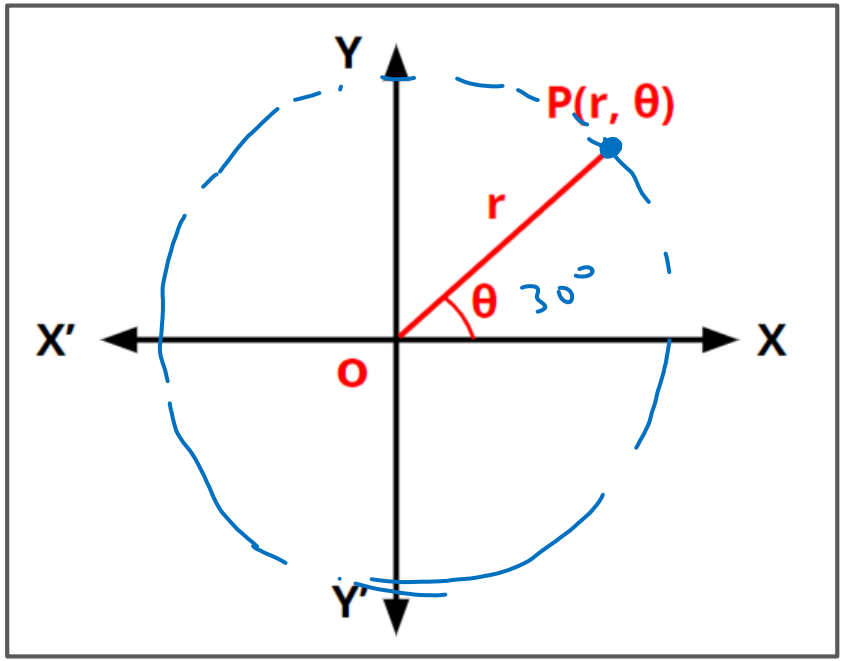
(17, 5)

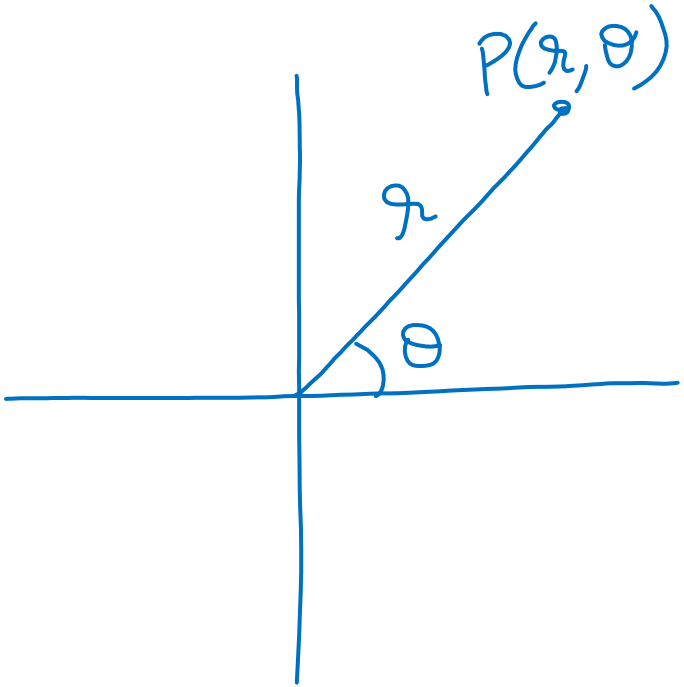




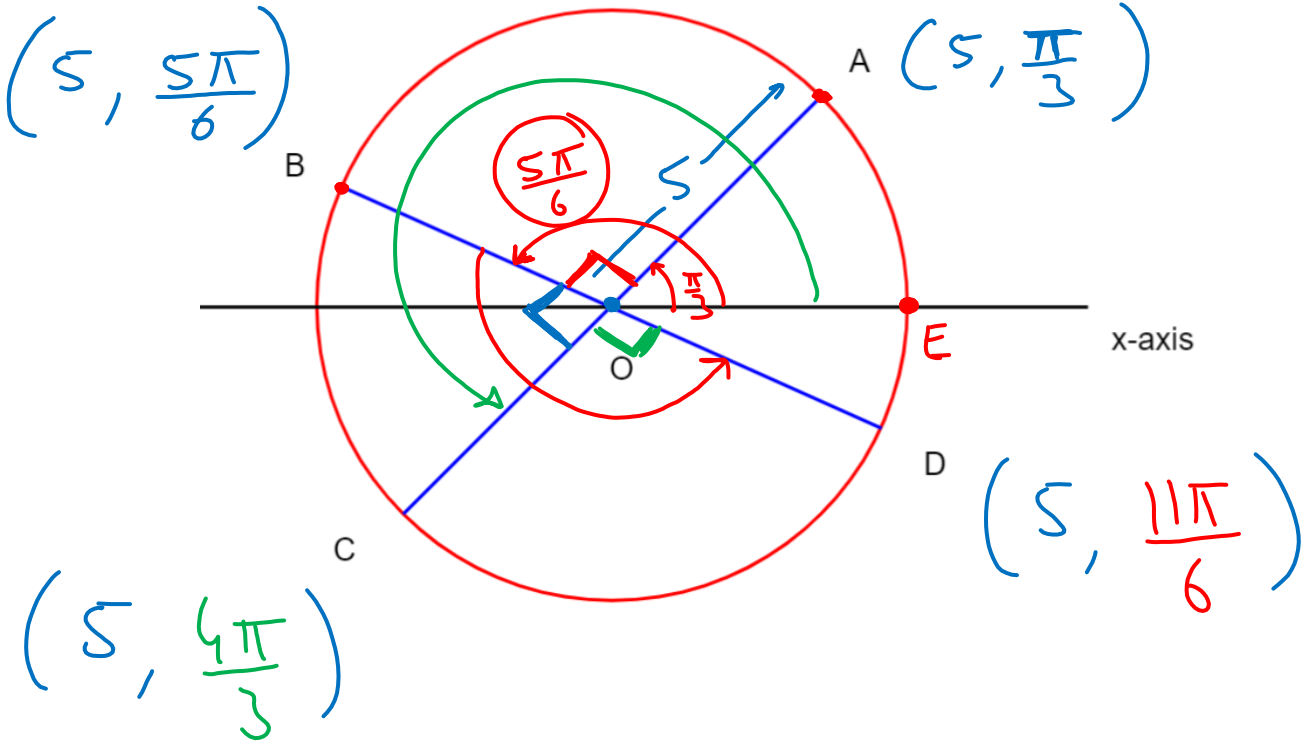
Polar Coordinate System

Polar Coordinates of a point





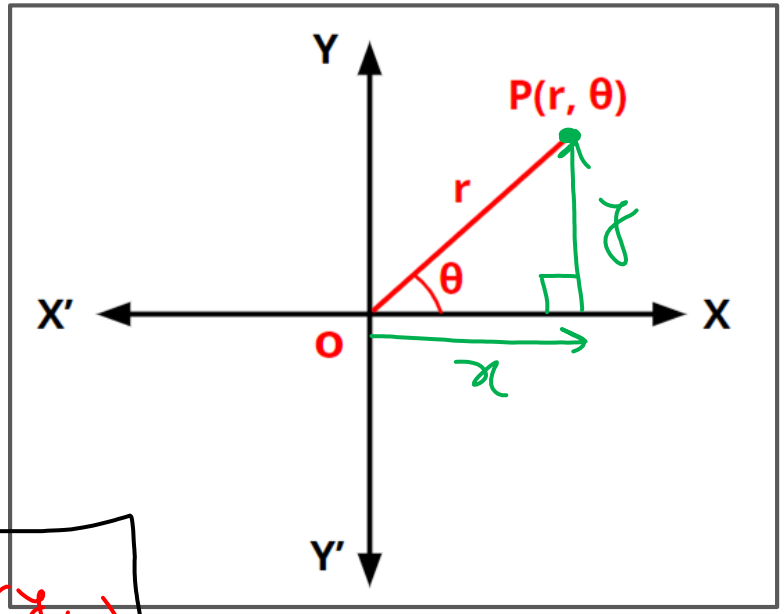
AC and BD are chords of a circle intersecting at origin. If coordinate of A is $(5, \pi/3)$ and $\angle BOC = \pi/2$. Then find coordinates of B, C and D in polar form.



Interconversion of Cartesian & Polar Coordinates

$$x = r\cos\theta$$

$$y = r\sin\theta$$



$$x^2 + y^2 = r^2 \; ; \; \tan\theta = \frac{y}{x}$$

$$r = \sqrt{x^2 + y^2} \; ; \; \theta = \tan^{-1}\left(y/x\right)$$

If a point P(√3, 1) is rotated by 45^0 about origin in anticlockwise direction and then reflected about x-axis. Then the coordinates of the new point are:

A. $\left(\frac{\sqrt{3}-1}{\sqrt{2}}, \frac{-\sqrt{3}+1}{\sqrt{2}}\right)$

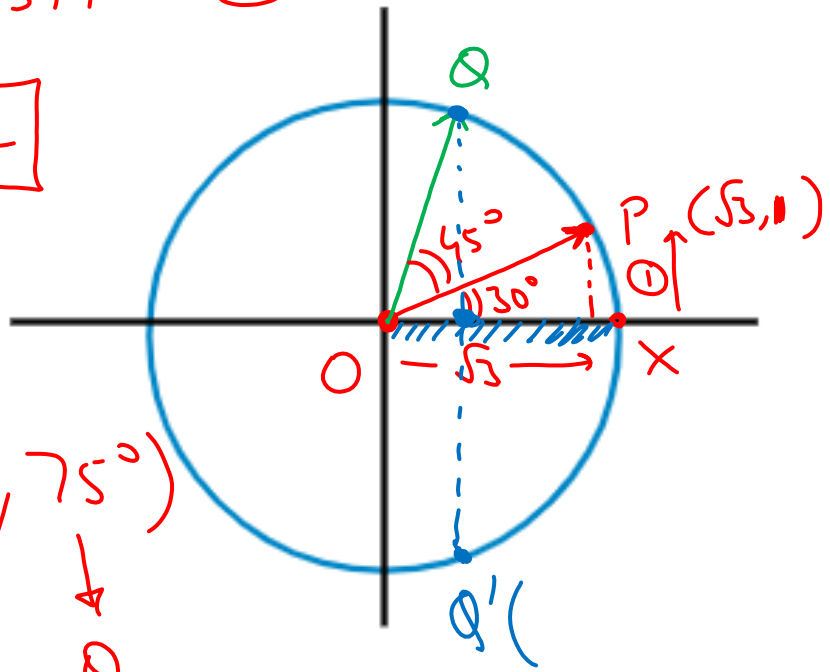
B. $\left(\frac{\sqrt{3}-1}{\sqrt{2}}, \frac{-\sqrt{3}-1}{\sqrt{2}}\right)$

C. $\left(\frac{-\sqrt{3}-1}{\sqrt{2}}, \frac{-\sqrt{3}-1}{\sqrt{2}}\right)$

D. None

$OP = \sqrt{3+1} = 2$

$OQ = 2$



$Q \equiv (2, 75^\circ)$

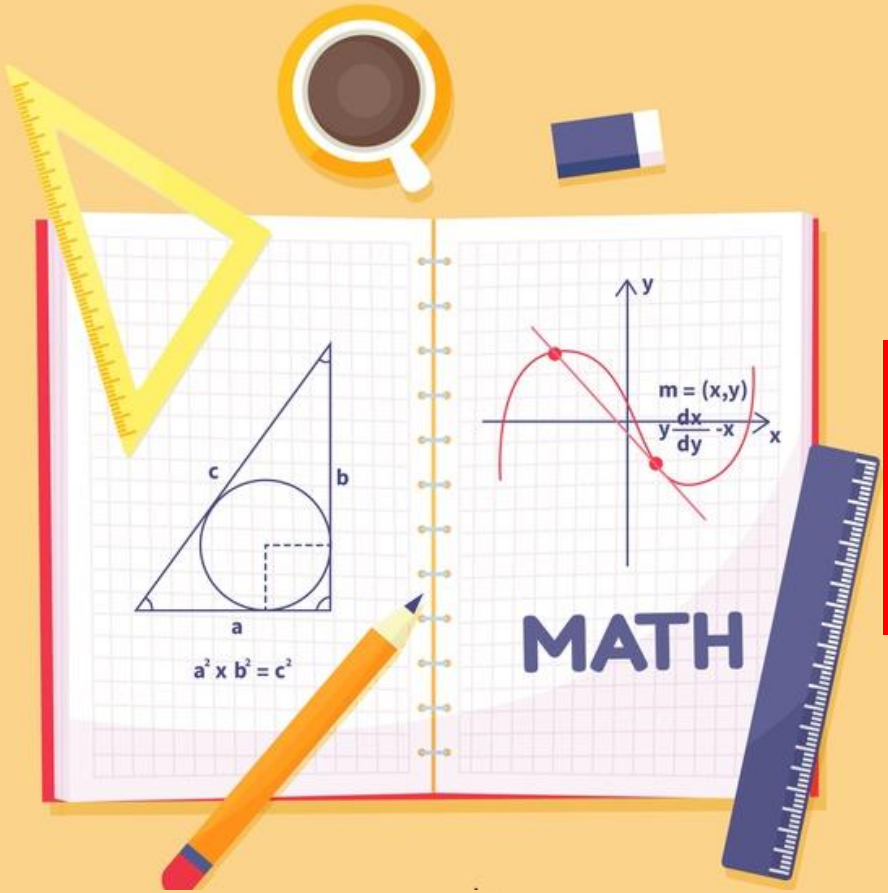
r θ

$$Q \equiv (2\cos 75^\circ, 2\sin 75^\circ)$$

$$\equiv \left(2\left(\frac{\sqrt{3}-1}{2\sqrt{2}}\right), 2\left(\frac{\sqrt{3}+1}{2\sqrt{2}}\right)\right)$$

$$\equiv \left(\frac{\sqrt{3}-1}{\sqrt{2}}, \frac{\sqrt{3}+1}{\sqrt{2}}\right)$$

$$Q' \equiv \left(\frac{\sqrt{3}-1}{\sqrt{2}}, \frac{-\sqrt{3}-1}{\sqrt{2}}\right)$$



Distance Formula

Distance Formula

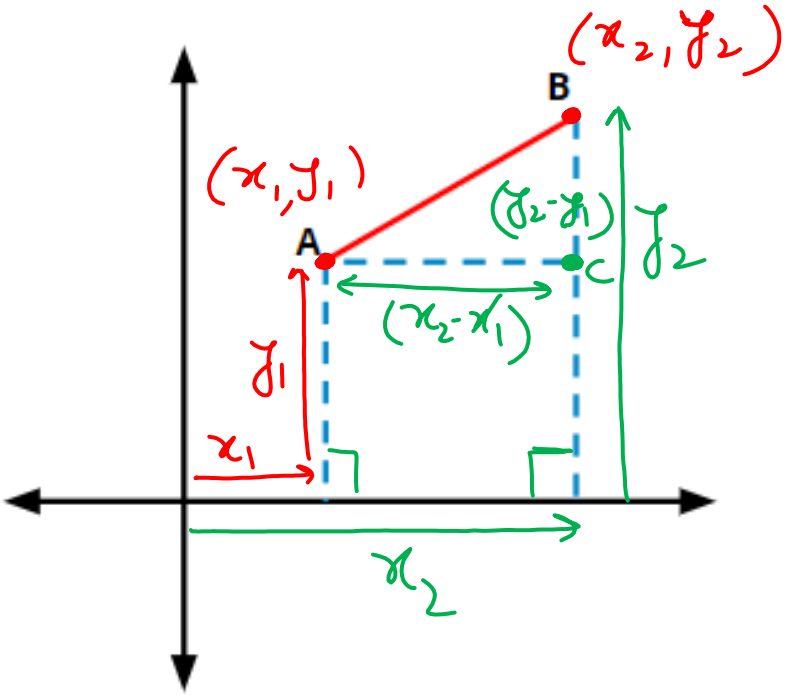
The distance between the points $A(x_1,y_1)$ and $B(x_2,y_2)$ is

$$\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$$

$AC = (x_2 - x_1)$

$CB = (y - y_1)$

$AB = \sqrt{(AC)^2 + (BC)^2}$



$$AC = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

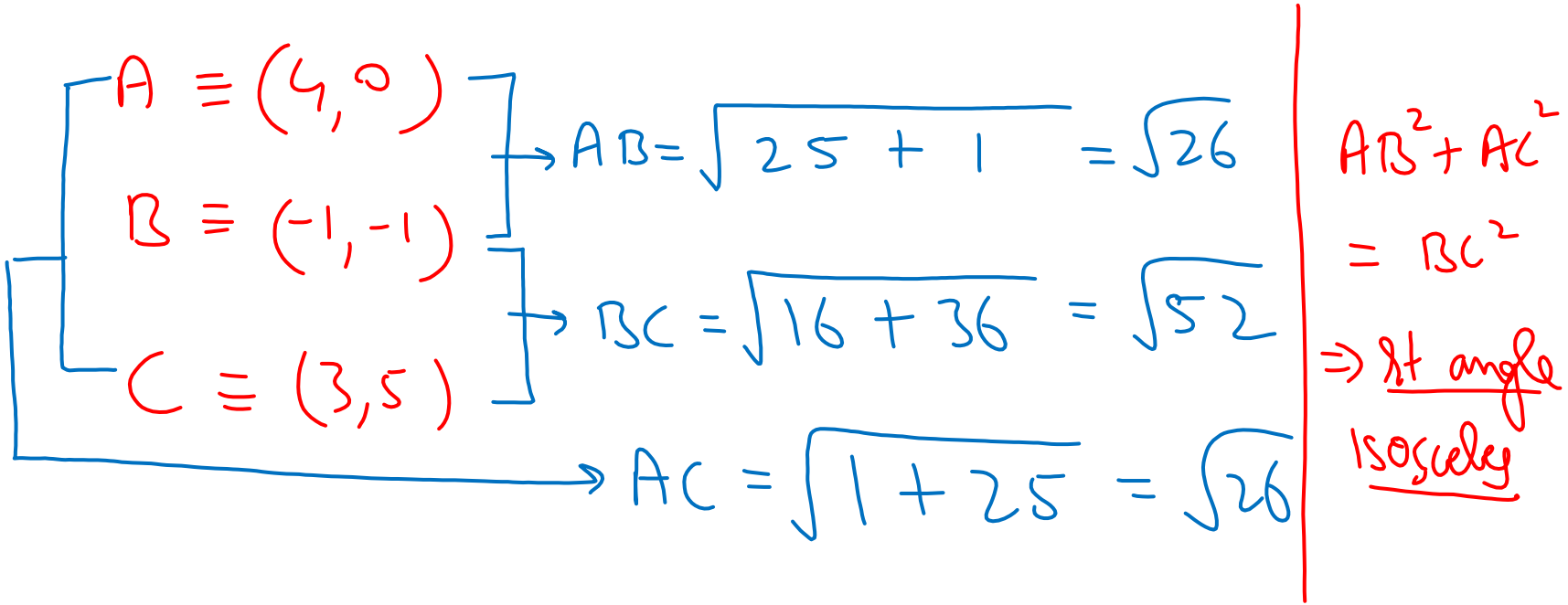
A triangle with vertices A(4, 0); B(-1, -1); C(3, 5) is

A. Isosceles and right angled

B. Right angled but not isosceles

C. Isosceles but not right angled

D. Neither right angled nor isosceles



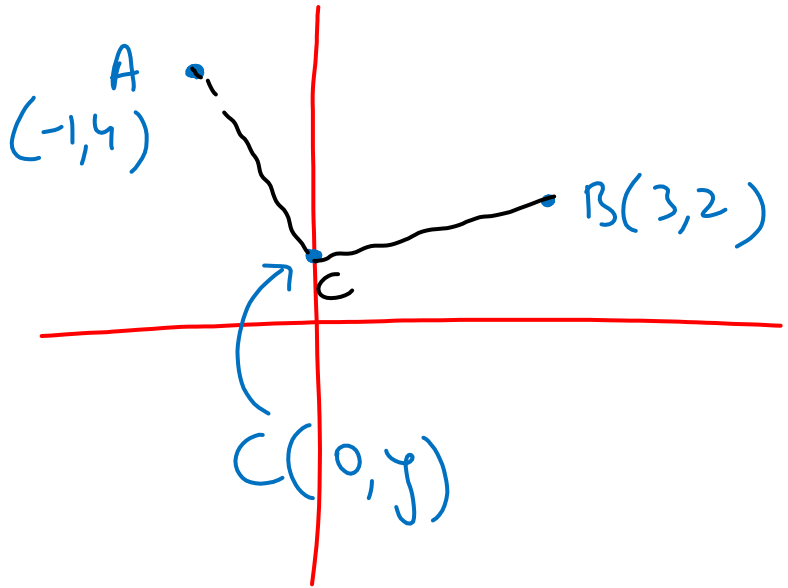
The points equidistant from A (-1, 4) and B (3, 2) lying on y-axis are:

A. (0, 1)

B. (0, -1)

C. (0, 2)

D. (0, 3)



$$AC = BC$$

$$(AC)^2 = (BC)^2$$

$$1 + (4-y)^2 = 9 + (2-y)^2$$

$$1 + 16 - 8y + y^2 = 9 + 4 - 4y + y^2$$

$$17 - 13 = 4y$$

$$4 = 4y$$

$$y = 1$$

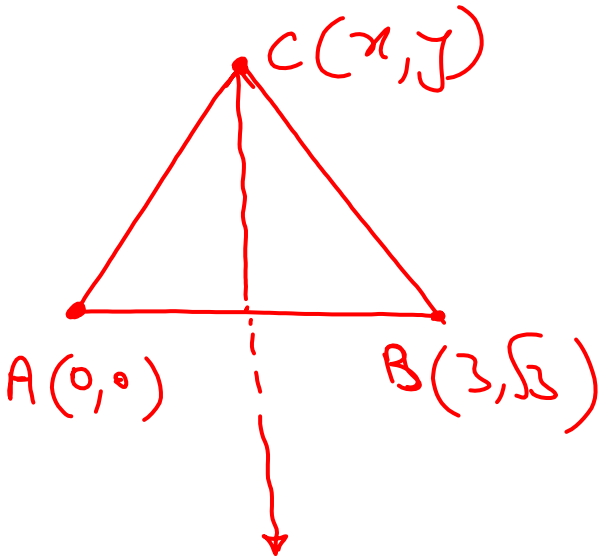
If ABC is an equilateral triangle with A(0, 0) and B(3, √3). Then find the coordinates of point C.

A. (0, 1)

B. (0, 2√3)

C. (3, -√3)

D. (√3, 3)



$$AB = \sqrt{9 + 3} = \sqrt{12}$$

$$AC = \sqrt{x^2 + y^2}$$

$$BC = \sqrt{(x-3)^2 + (y-\sqrt{3})^2}$$

$\Rightarrow x^2 + y^2 = 12$ — (1)

&

$(x-3)^2 + (y-\sqrt{3})^2 = 12$

$\Rightarrow x^2 + y^2 - 6x - 2\sqrt{3}y = 0$ — (2)

Using (1) & (2).

$12 - 6x - 2\sqrt{3}y = 0$

$\Rightarrow 2\sqrt{3}y = 12 - 6x$

$\Rightarrow \sqrt{3}y = 6 - 3x$

$\Rightarrow \sqrt{3}y = 3(2-x)$

$\Rightarrow y = \sqrt{3}(2-x)$ — (3)

$$\Rightarrow x^2 + 3(2-x)^2 = 12$$

$$\Rightarrow x^2 + 3(4 - 4x + x^2) = 12$$

$$\Rightarrow 4x^2 - 12x = 0$$

$$\Rightarrow 4x(x-3) = 0$$

$$\boxed{x=0}, \boxed{x=3}$$

using eq (3):

$$y = \sqrt{3}(2-x)$$

$x = 0$ | $x = 3$

$y = 2\sqrt{3}$ | $y = -\sqrt{3}$

If A(a, b), B(a + r cos α, b + r sin α) and C(a + r cos β, b + r sin β) are the vertices of an equilateral triangle, then

A. $|\alpha - \beta| = \pi/4$

B. $|\alpha - \beta| = \pi/2$

C. $|\alpha - \beta| = \pi/6$

D. $|\alpha - \beta| = \pi/3$

$A \equiv (a, b)$

$B \equiv (a + r\cos\alpha, b + r\sin\alpha)$

$C \equiv (a + r\cos\beta, b + r\sin\beta)$

$AB = \sqrt{r^2\cos^2\alpha + r^2\sin^2\alpha} = r$

$BC = \sqrt{r^2(\cos\alpha - \cos\beta)^2 + r^2(\sin\alpha - \sin\beta)^2}$

$AC = r$

Now:

$AB = BC$

$(AB)^2 = (BC)^2$

$1 \cancel{x^2} = \cancel{x^2}(\cos\alpha - \cos\beta)^2 + \cancel{x^2}(\sin\alpha - \sin\beta)^2$

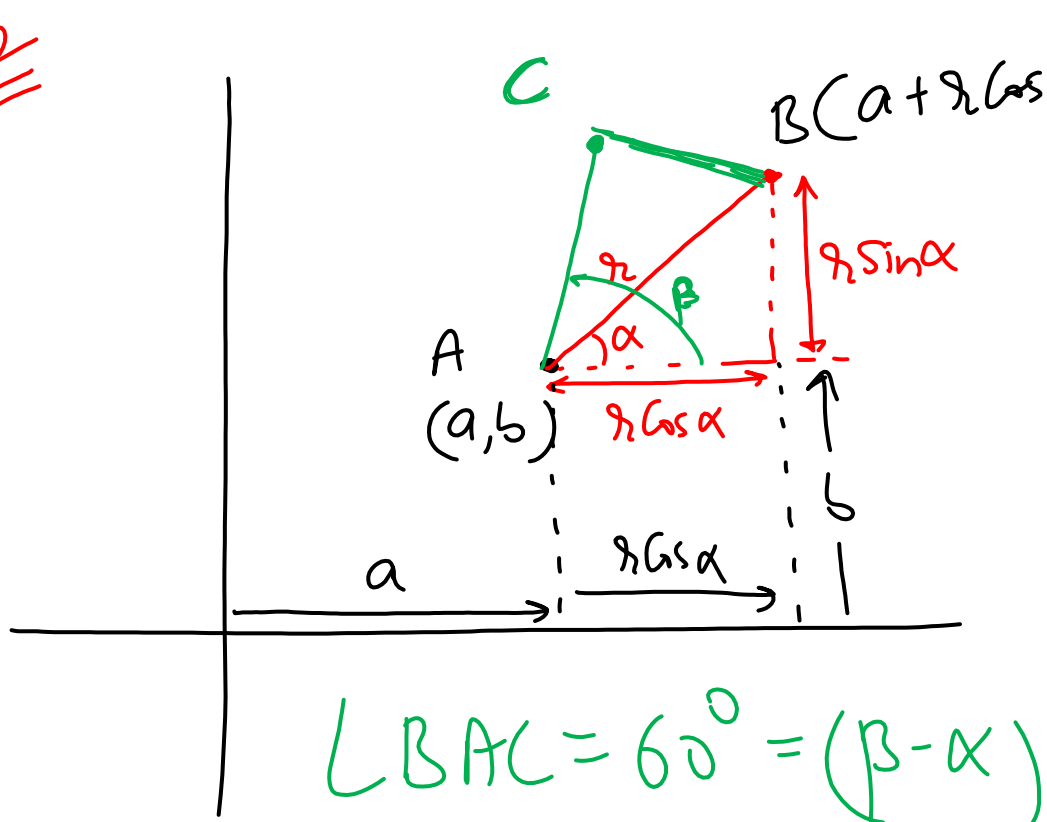
$\Rightarrow \cos^2\alpha + \cos^2\beta - 2\cos\alpha\cos\beta + \sin^2\alpha + \sin^2\beta - 2\sin\alpha\sin\beta = 1$

$\Rightarrow 2 - 2(\cos\alpha\cos\beta + \sin\alpha\sin\beta) = 1$

$\Rightarrow 2 - 2\cos(\alpha - \beta) = 1$

$\Rightarrow \boxed{\cos(\alpha - \beta) = \frac{1}{2}}$

M-2



$\angle BAC = 60^\circ = (\beta - \alpha)$

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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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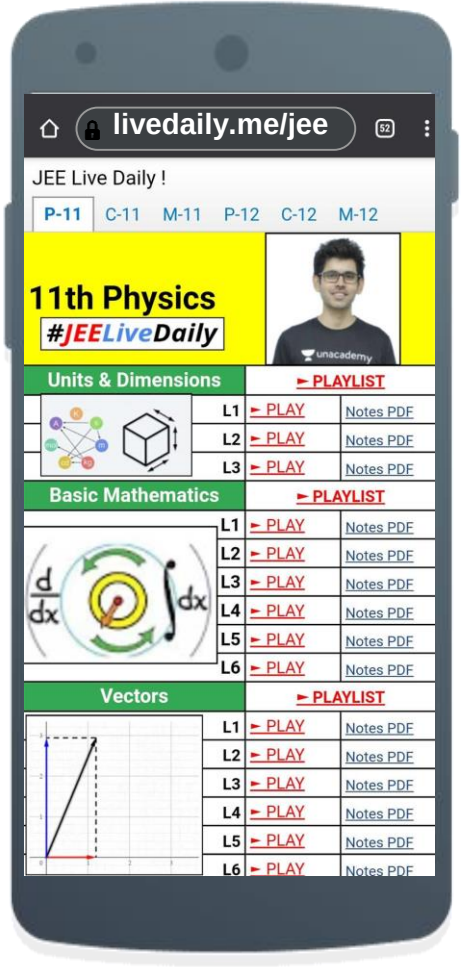

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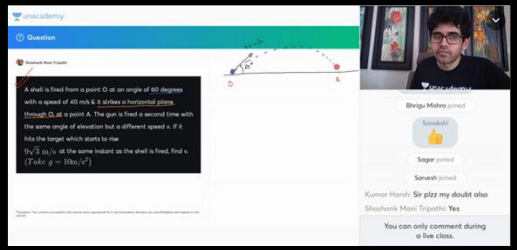

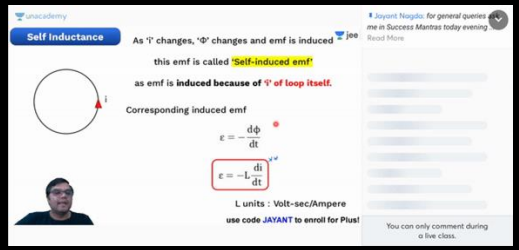

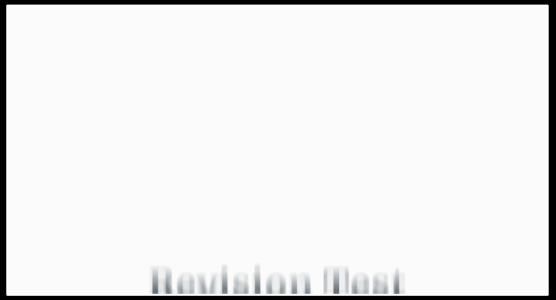

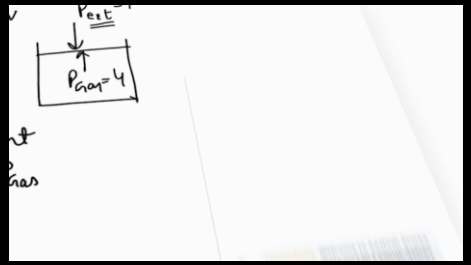

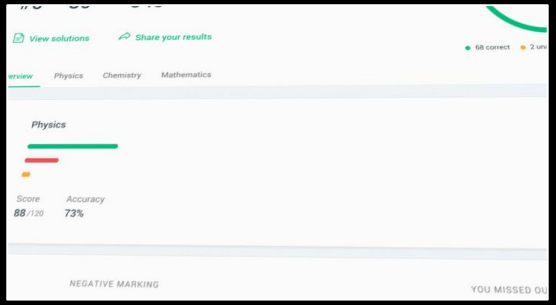

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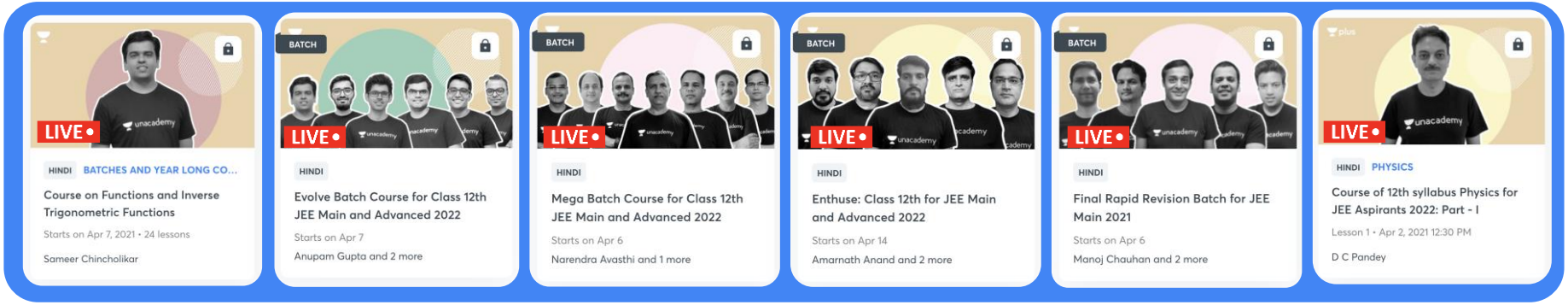

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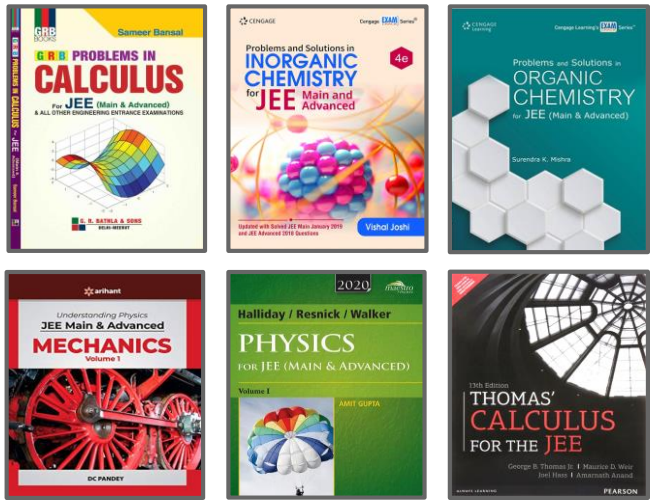

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Adnan
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Manas Pandey
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Devashish Tripathi
99.52

Maroof
99.50

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99.50

Siddharth Kaushik
99.48

Mihir Kothari
99.39

Sahil
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Vaibhav Dhanuka
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99.29

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Shrish
99.28

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Ayush Kale
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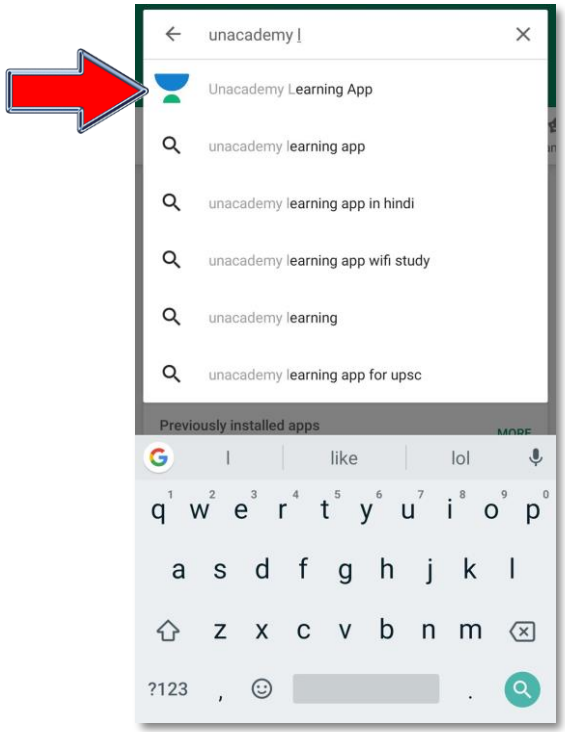
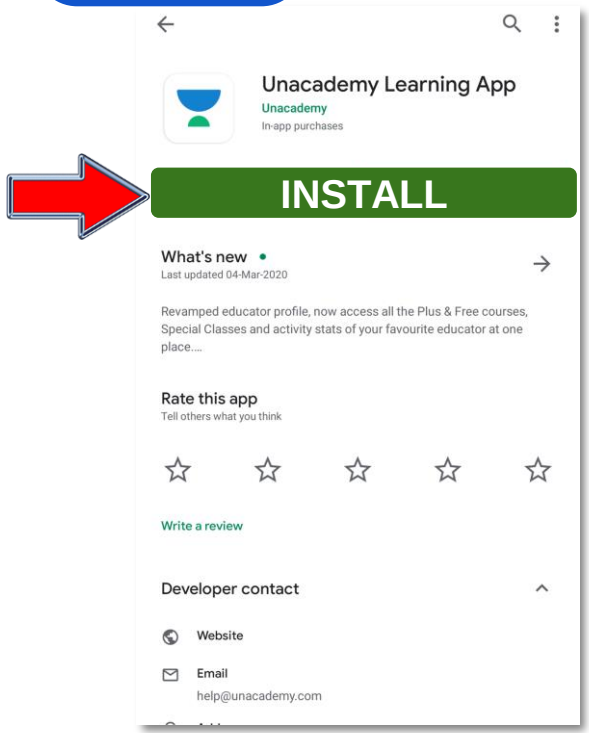
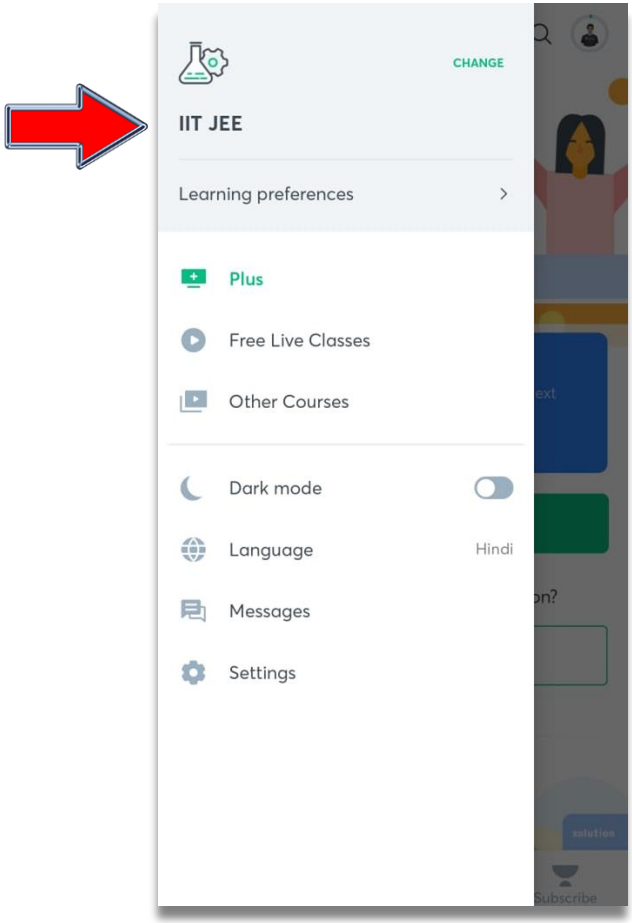


Step 2

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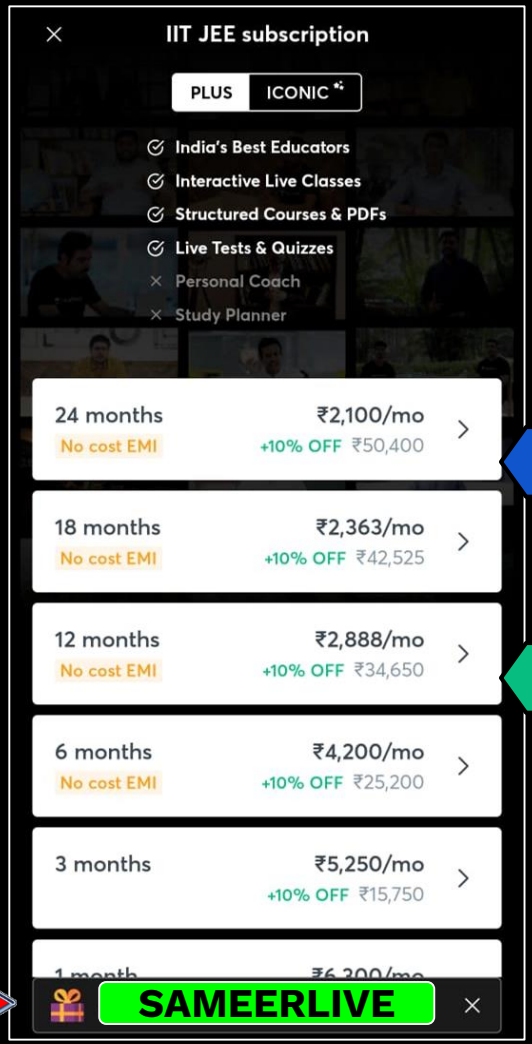

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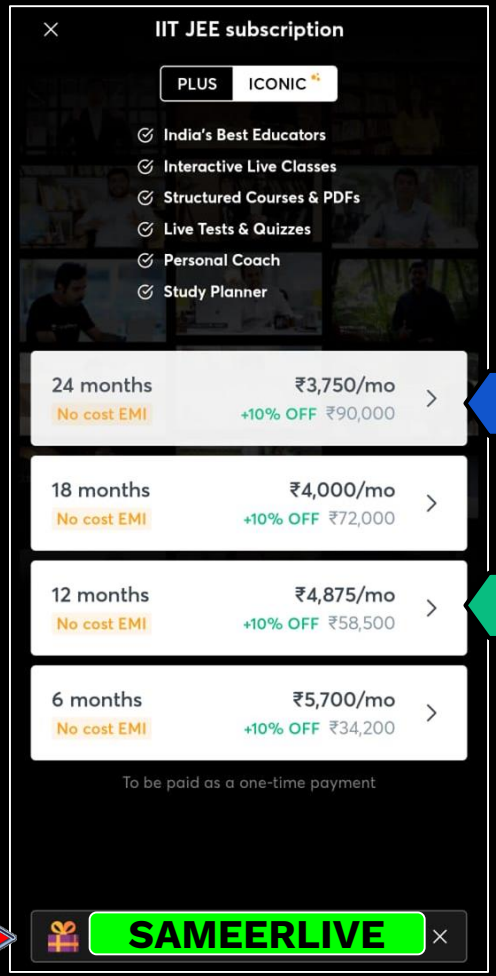

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