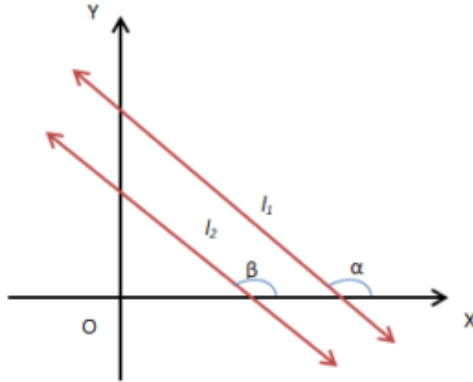


Area of Triangle and Polygon

Straight Lines

4

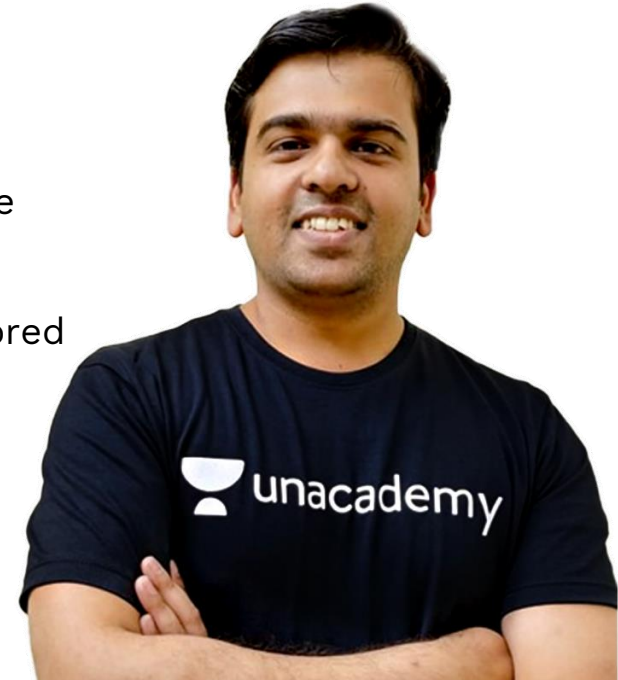


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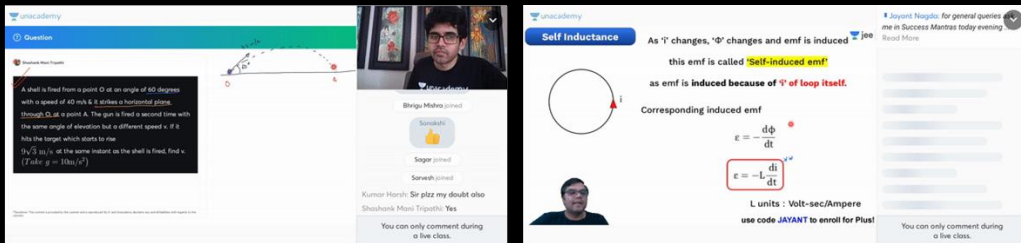
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Questions

A shell is fired from a point O at an angle of 60 degrees with a speed of 40 m/s & it strikes a horizontal plane through O at a point A. The gun is fired a second time with the same angle of elevation but a different speed v . If it hits the target which starts to rise $(\sqrt{3}/2) \sin t$ at the same instant as the shell is fired, find v . (Take $g = 10 \text{ m/s}^2$)

Shruti Mishra joined

Sagar joined

Saravali joined

Kumar Harsh: Sir plz my doubt also

Shashank Masi Tripathi: Yes

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Self Inductance

As Φ changes, $\frac{d\Phi}{dt}$ changes and emf is induced

this emf is called **Self-induced emf**

as emf is induced because of Φ of loop itself.

Corresponding induced emf

$$\mathcal{E} = -\frac{d\Phi}{dt}$$

$$\mathcal{E} = -L \frac{di}{dt}$$

Units: Volt-sec/Ampere

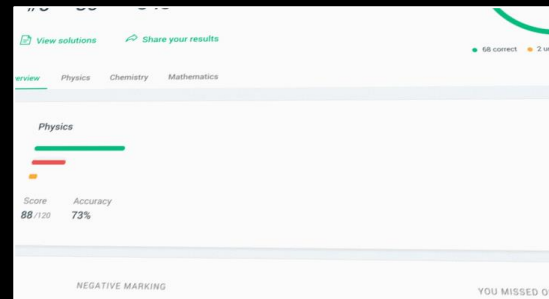
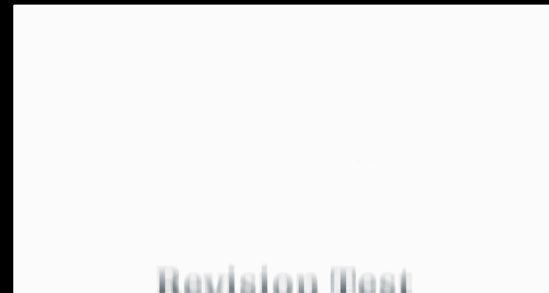
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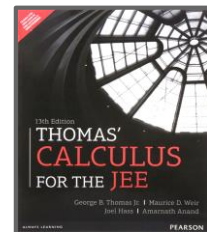
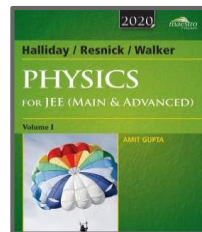
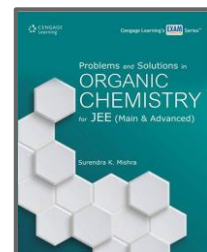
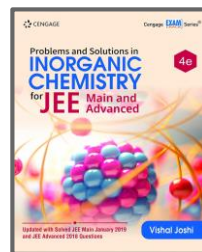
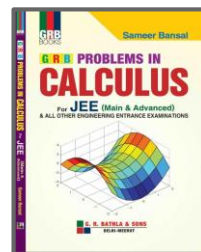
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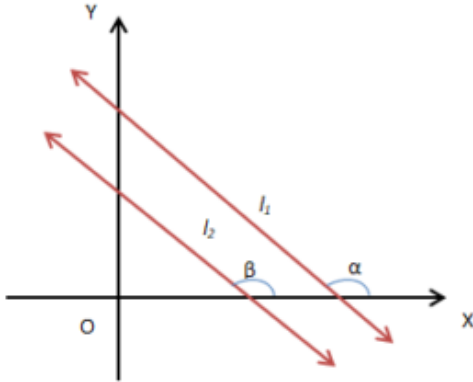
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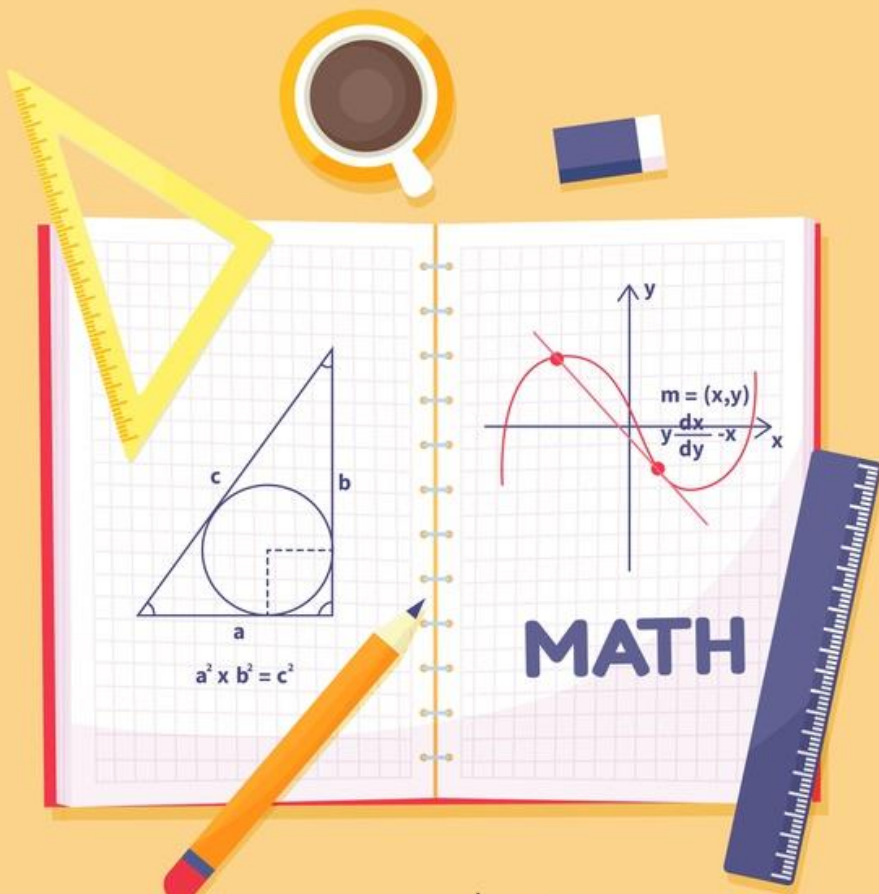


Area of Triangle and Polygon

Straight Lines

4



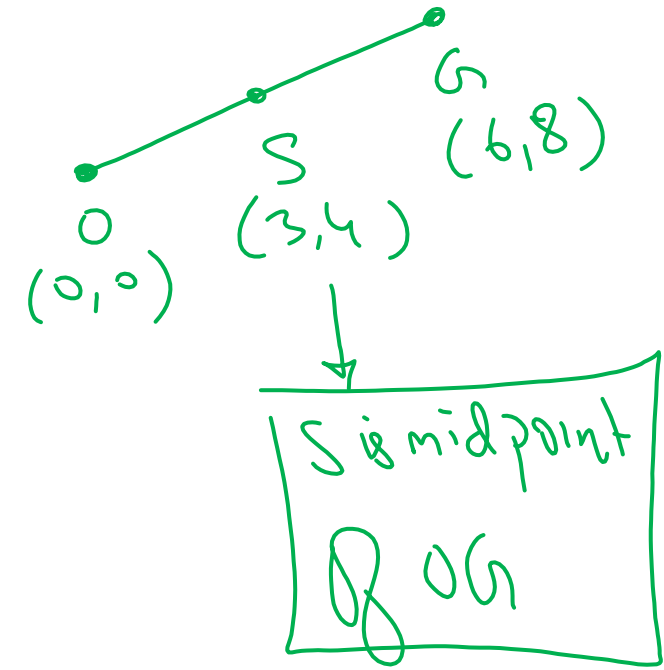
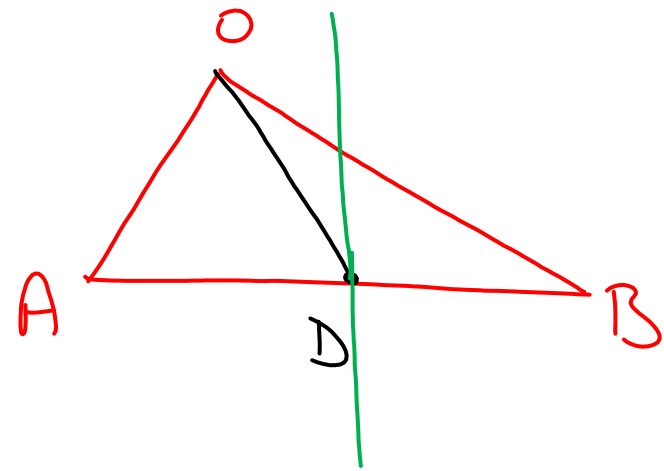


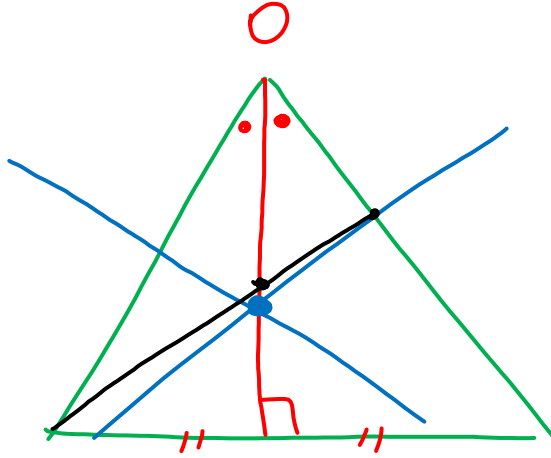
Homework Questions



$O(0, 0)$ is one of the vertices of triangle whose circumcentre is $S(3, 4)$ and centroid $G(6, 8)$. Then, the triangle

- A.** Is right angled
- B.** Must be equilateral
- C.** Must be right-angled isosceles
- ✓ D.** Is isosceles







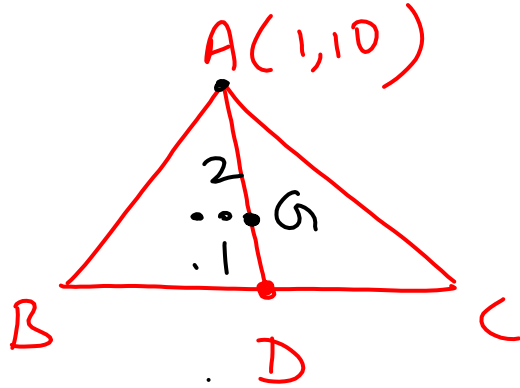
If in a triangle ABC, A (1, 10), Circumcentre $(-\frac{1}{3}, \frac{2}{3})$ and Orthocentre $(\frac{11}{3}, \frac{4}{3})$ are given. Then find the coordinate of midpoint of side opposite to A.

A. (1, 6)

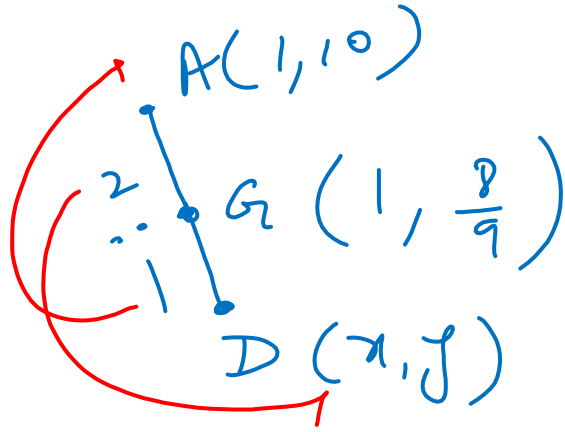
B. (1, 5)

C. (1, -3)

✓ D. (1, -11/3)



$$G \equiv \left(\frac{-\frac{2}{3} + \frac{11}{3}}{3}, \frac{\frac{4}{3} + \frac{4}{3}}{3} \right)$$



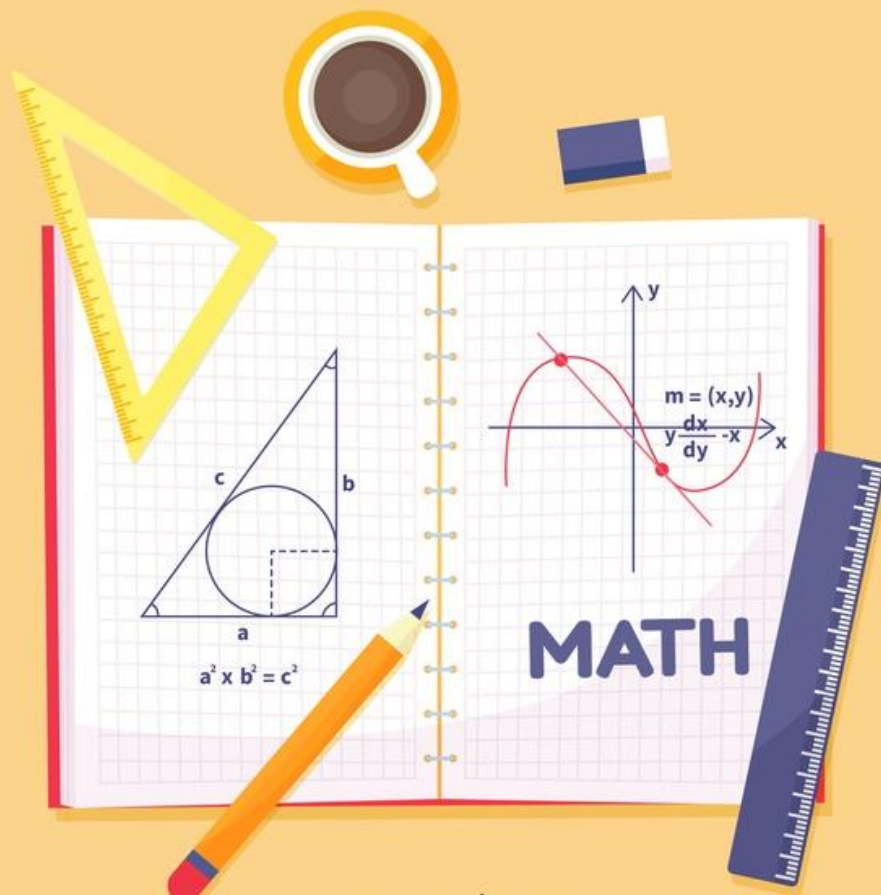
$$1 = \frac{2x + 1}{3}$$

$$\boxed{x=1}$$

$$\frac{8}{3} = \frac{27 + 10}{3}$$

$$\frac{8}{3} - 10 = 27$$

$$\boxed{7 = -\frac{11}{3}}$$



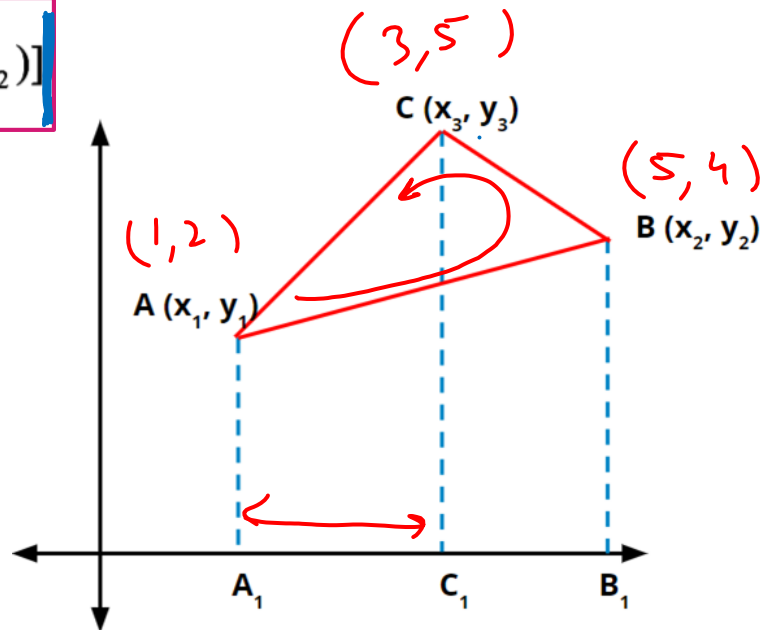
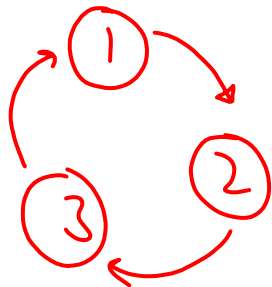
Area of Triangle



Area of Triangle

If **A** (x_1, y_1), **B** (x_2, y_2), **C** (x_3, y_3) are the vertices of triangle ABC,

$$\Delta = \frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$



$$\text{ar}(\Delta ABC) = \text{trap}(ACC, A_1) + \text{trap}(CBB, C_1) \\ - \text{trap}(ABB, A_1)$$

$$= \frac{1}{2}((y_1 + y_3)(x_3 - x_1) + \frac{1}{2}(y_3 + y_2)(x_2 - x_3) \\ - \frac{1}{2}(y_1 + y_2)(x_2 - x_1))$$

$$= \frac{1}{2} \left[x_3(y_1 + y_3) - x_1(\underline{y_1 + y_3}) + x_2(y_3 + y_2) - x_3(y_2 + y_3) \right. \\ \left. - x_2(y_1 + y_2) + x_1(\underline{y_1 + y_2}) \right]$$

$$= \frac{1}{2} \left[x_1 (y_2 - y_3) + x_2 (y_3 - y_1) + x_3 (y_1 - y_2) \right]$$



Area of Triangle : Stair Method

$$A \equiv (x_1, y_1)$$

$$B \equiv (x_2, y_2)$$

$$C \equiv (x_3, y_3)$$

$$= \frac{1}{2} \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

Diagram illustrating the Stair Method for calculating the area of a triangle. The diagram shows a triangle with vertices (x_1, y_1) , (x_2, y_2) , and (x_3, y_3) . The area is calculated as half the absolute value of the determinant of the matrix formed by the coordinates and ones. The diagram also shows the expansion of the determinant using the Stair Method, which involves summing the products of the elements along the main diagonal (downward arrows) and subtracting the sum of the products of the elements along the anti-diagonal (upward arrows).

$$= \frac{1}{2} \left| (x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_1 y_3 + x_2 y_1 + x_3 y_2) \right|$$



Determinant



Area of Triangle : ~~Stair~~ Method

If $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$ are the vertices of triangle ABC, then its area is equal to

$$\Delta ABC = \frac{1}{2} \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix},$$

Eg:

$$\vec{a} = a_1 \hat{i} + a_2 \hat{j} + a_3 \hat{k}$$

$$\vec{b} = b_1 \hat{i} + b_2 \hat{j} + b_3 \hat{k}$$

$$\vec{a} \times \vec{b} = ?$$

$$\begin{vmatrix} + & - & + \\ \boxed{\hat{i}} & \hat{j} & \hat{k} \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix}$$

$$= \hat{i}(a_2 b_3 - b_2 a_3) - \hat{j}(a_1 b_3 - b_1 a_3) + \hat{k}(a_1 b_2 - a_2 b_1)$$



Find the area of a triangle whose vertices are A(3, 2); B(11, 8) and C(8, 12)

$$\Delta = \frac{1}{2} \begin{vmatrix} 3 & 2 \\ 11 & 8 \\ 8 & 12 \\ 3 & 2 \end{vmatrix}$$

$$= \frac{1}{2} \left| (24 + 132 + 16) - (36 + 64 + 22) \right|$$
$$= \frac{1}{2} |50| = 25$$



Find the area of the triangle formed by the points A (x, x-2) , B (x+3, x) and C (x+2, x+2)

A. 4

B. x+4

C. $x^2 + 4$

D. None

$$\Delta = \left| \frac{1}{2} \begin{vmatrix} x & x-2 & 1 \\ x+3 & x & 1 \\ x+2 & x+2 & 1 \end{vmatrix} \right|$$

$$= \frac{1}{2} \left| -2x - x + 2 + 3x + 6 \right|$$

$$= \frac{1}{2} |8|$$

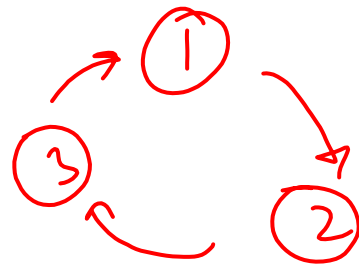
$$= 4$$

$$= \frac{1}{2} \left| x(x-x-2) - (x-2)(x+3-x-2) + 1(x^2+5x+6-x^2-2x) \right|$$



If the area of triangle formed by the points (5, 2), (0, 3) and (a, 4) is 8 square units. Then

- A. Sum of all possible value(s) of 'a' to 5
- ☒ B. Sum of all possible value(s) of 'a' to -10
- C. Product of all possible value(s) of 'a' to 125
- D. Product of all possible value(s) of 'a' to -210



$$\Delta = \frac{1}{2} | 5(3-4) + 0(4-2) + a(2-3) | = 8$$
$$= |-5 - a| = 16$$

$$-5 - a = \pm 16$$

$$\begin{array}{l} \textcircled{+} \\ \swarrow \\ a \end{array} \quad \begin{array}{l} \searrow \\ \textcircled{-} \\ a \end{array}$$

$$-5 - a = 16$$

$$\boxed{a = -21}$$

$$-5 - a = -16$$

$$\boxed{a = 11}$$



Find the area of the triangle having midpoints of its sides at $(2, 1)$, $(-1, -3)$ and $(4, 5)$.

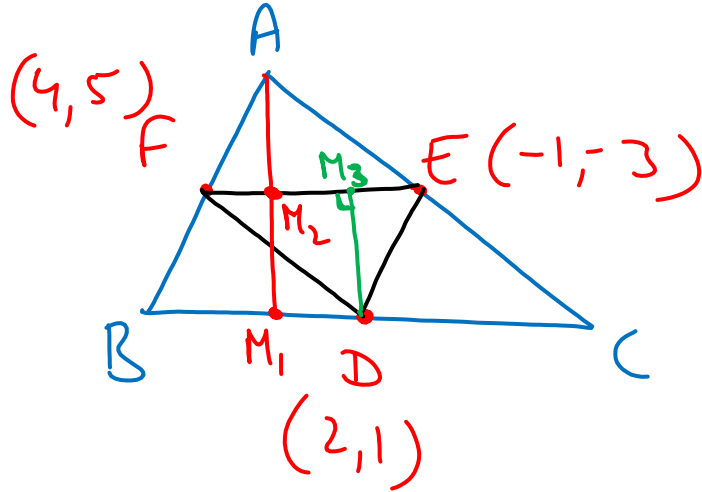
*

A. 2

B. 6

C. 8

D. None



$$\triangle AFE \sim \triangle ABC$$

$$\frac{AM_2}{AM_1} = \frac{FE}{BC} = \frac{1}{2}$$

$$A(\triangle DEF) = \frac{1}{2} (FE \times DM_3)$$

$$A(\triangle DEF) = \frac{1}{2} \left(\frac{BC}{2} \times \frac{AM_1}{2} \right)$$

$$ar(\triangle ABC) = 4 ar(\triangle DEF)$$

$$ar(\triangle DEF) = \left| \frac{1}{2} \begin{vmatrix} 2 & 1 & 1 \\ -1 & -3 & 1 \\ 4 & 5 & 1 \end{vmatrix} \right|$$

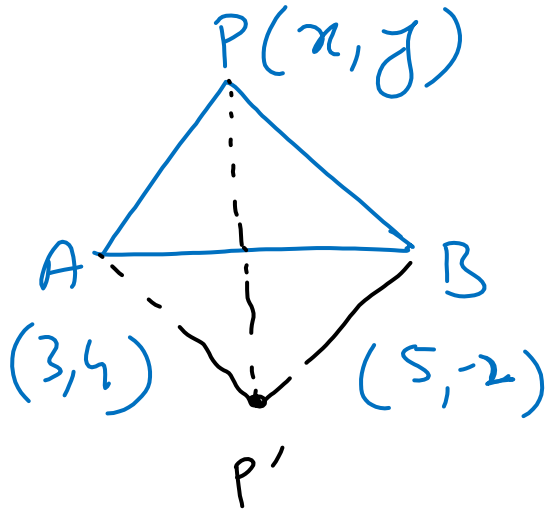
$$= \frac{1}{2} | 2(-8) - 1(-5) + 1(7) |$$

$$= \frac{1}{2} | -16 + 5 + 7 | = \boxed{2}$$





If the coordinates of two points A and B are (3, 4) and (5, -2) respectively. Find the coordinates of point P if **$PA = PB$** and **Area of $PAB = 10$** .



$$(PA)^2 = (PB)^2$$

$$(x-3)^2 + (y-4)^2 = (x-5)^2 + (y+2)^2$$

$$\left(\cancel{x^2} - 6x + 9 + \cancel{y^2} - 8y + 16 \right) = \left(\cancel{x^2} - 10x + 25 + \cancel{y^2} + 4y + 4 \right)$$

$$4x - 12y - 4 = 0 \Rightarrow \boxed{x = 3y + 1} \text{--- (1)}$$

$$\Delta = \left| \begin{array}{cc|cc} \frac{1}{2} & x & y & 1 \\ 3 & 4 & 1 & 1 \\ 5 & -2 & 1 & 1 \end{array} \right|$$

$$10 = \frac{1}{2} \left| \begin{array}{c} x(6) - y(-2) \\ + 1(-26) \end{array} \right|$$

$$20 = |6x + 2y - 26|$$

$$\boxed{10 = |3x + y - 13|} \quad \text{--- (2)}$$

from eqⁿ (1):

$$10 = |3(3y+1) + y - 13|$$

$$10 = |10y - 10|$$

$$1 = |y - 1|$$

$$\begin{array}{c} y = 2 \\ \downarrow \\ x = 7 \end{array}$$

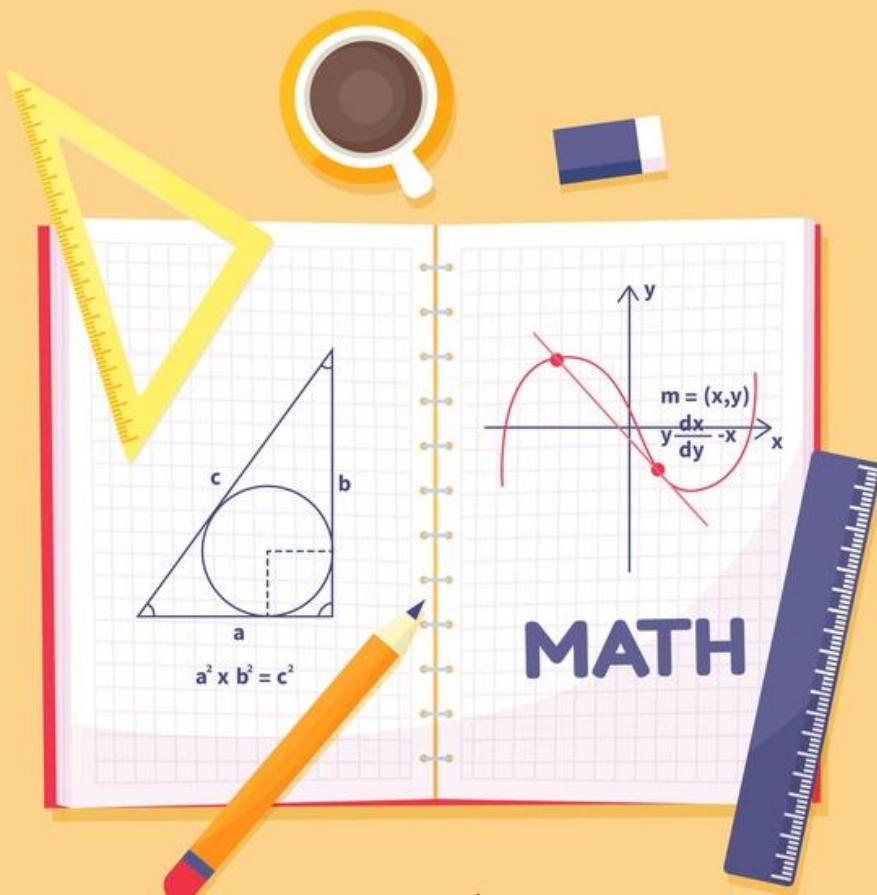
$$\begin{array}{c} y = 0 \\ \downarrow \\ x = 1 \end{array}$$

$$\left. \begin{array}{l} P = (7, 2) \\ \equiv (1, 0) \end{array} \right\}$$



If $A(6, 3)$, $B(-3, 5)$, $C(4, -2)$ and $D(x, 3x)$ are four points such that $\text{ar}(\triangle DBC)/\text{ar}(\triangle ABC) = 1 : 2$, then what is value of x ?

HW-1



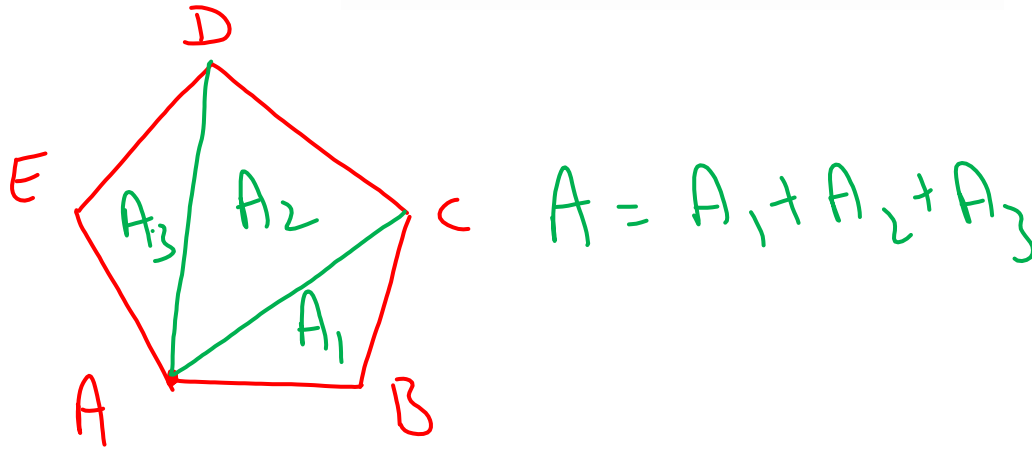
Area of Polygon

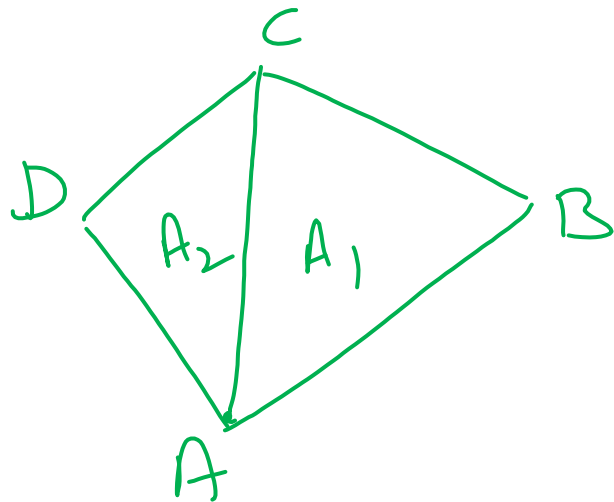


Area of Polygon

Let (x_1, y_1) , (x_2, y_2) , (x_3, y_3) , ..., (x_n, y_n) be the coordinates of the vertices of a n -sided polygon. Then.

$$\text{Area of polygon} = \frac{1}{2} \left\{ \begin{vmatrix} x_1 & x_2 \\ y_1 & y_2 \end{vmatrix} + \begin{vmatrix} x_2 & x_3 \\ y_2 & y_3 \end{vmatrix} + \cdots + \begin{vmatrix} x_n & x_1 \\ y_n & y_1 \end{vmatrix} \right\}$$







Area of Polygon : Stair Method

A : (x_1, y_1)

B : (x_2, y_2)

C : (x_3, y_3)

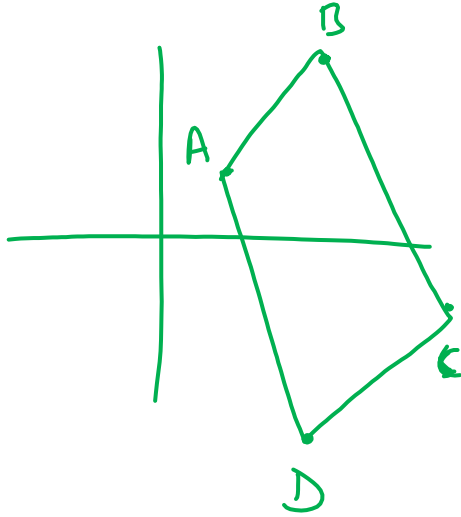
D : (x_4, y_4)

E : (x_5, y_5)

$$= \frac{1}{2} \begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \\ x_3 & y_3 \\ x_4 & y_4 \\ x_5 & y_5 \\ x_1 & y_1 \end{vmatrix}$$



Find the area of quadrilateral whose vertices are A(1,1), B(3,4), C(5,-2) and D(4,-7)



$$= \frac{1}{2} \begin{vmatrix} 1 & 3 & 5 & 4 & 1 \\ 1 & 4 & -2 & -7 & 1 \end{vmatrix}$$

$$= \frac{1}{2} |(4 - 6 - 35 + 4) - (-7 - 8 + 20 + 3)|$$

$$= \frac{1}{2} |(-33) - (8)| = \boxed{\frac{41}{2}}$$



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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

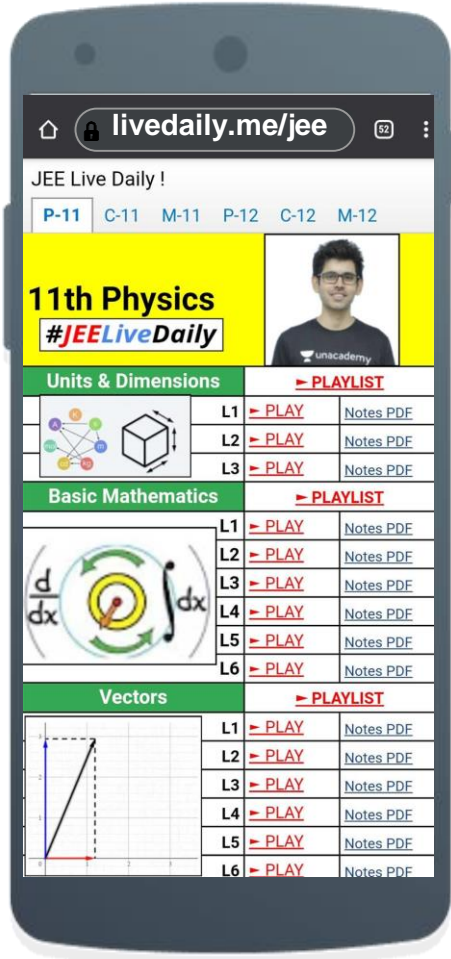
3:00 - 4:30 PM



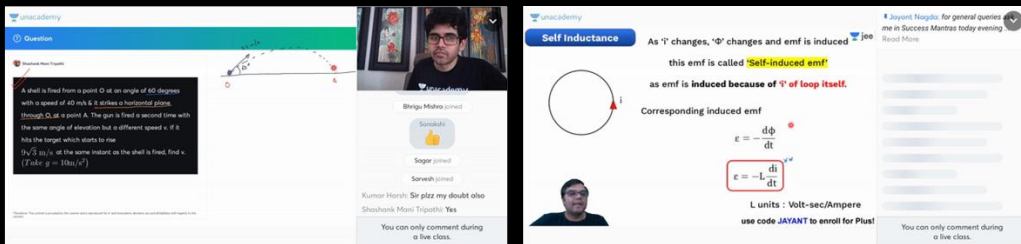
Nishant Sir | Maths

4:30 - 6:00 PM

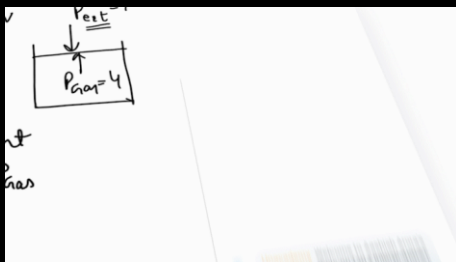
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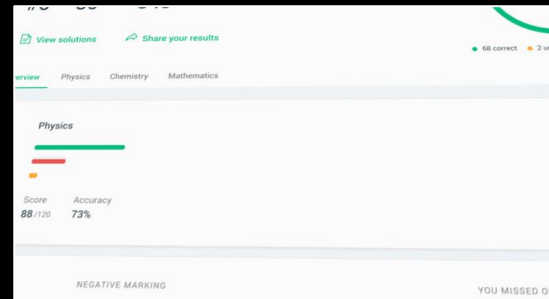
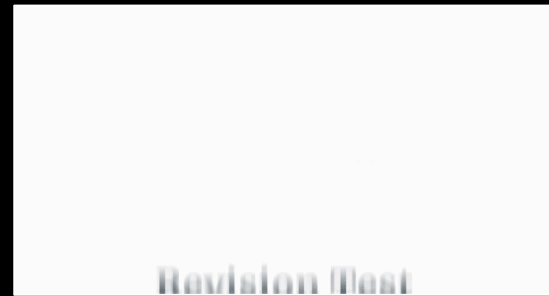


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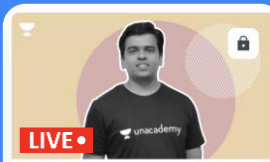


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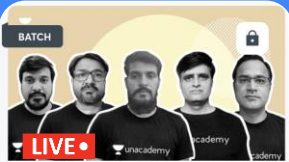
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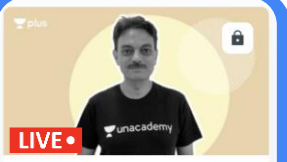
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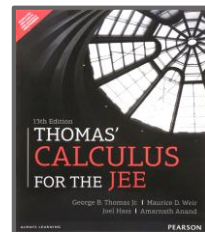
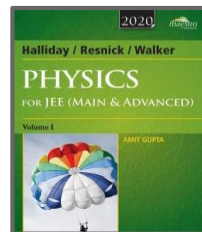
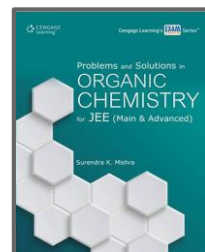
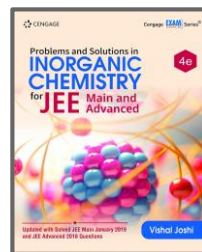
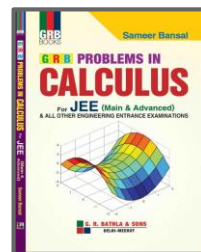
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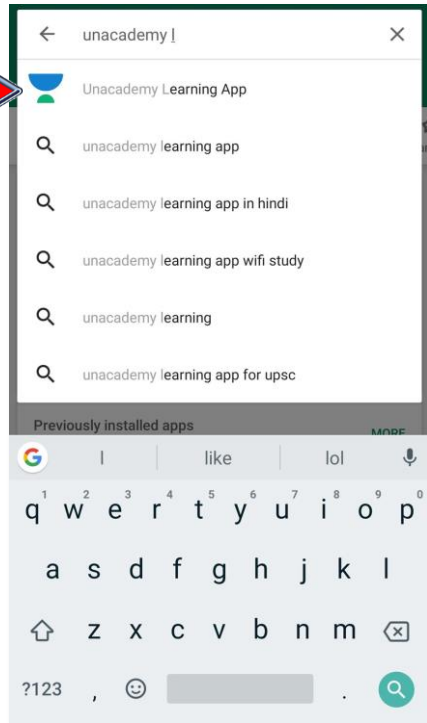


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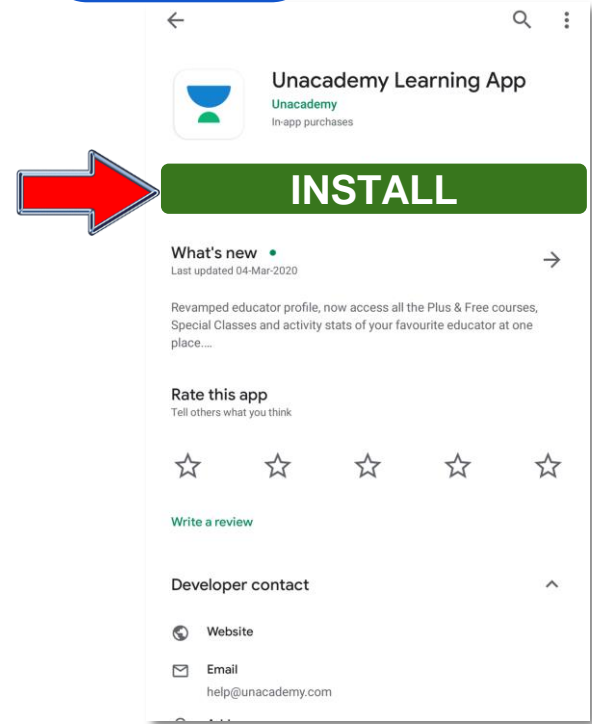


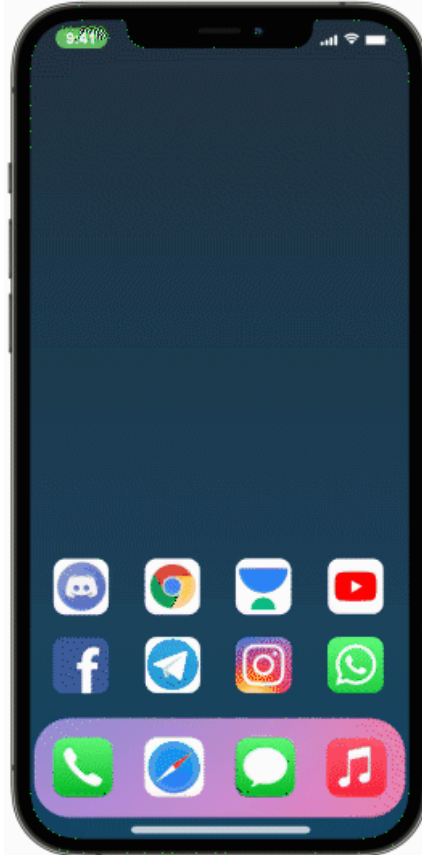
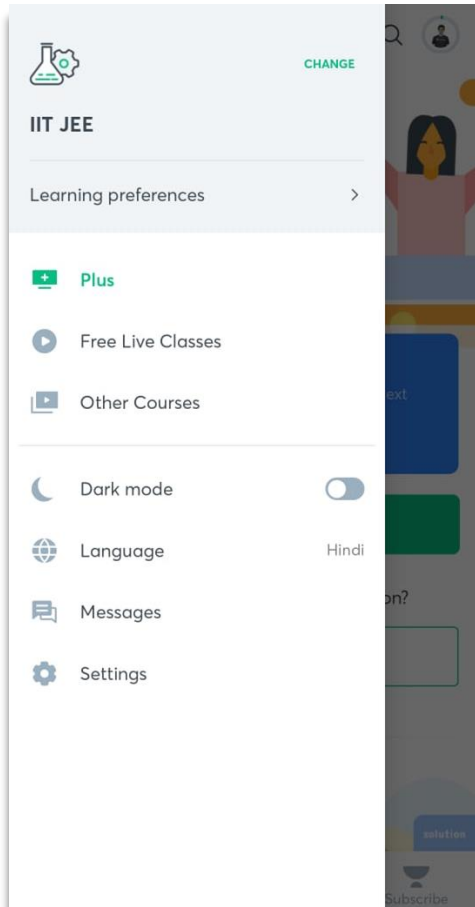
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