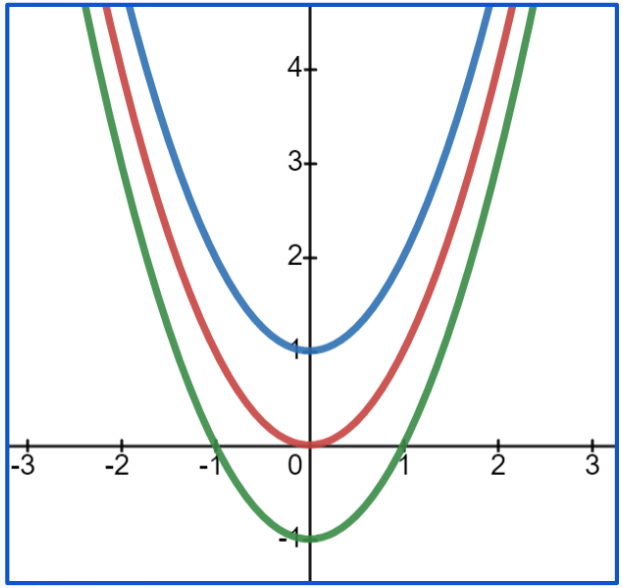
Graph of Quadratic Function

Quadratic Equations

5



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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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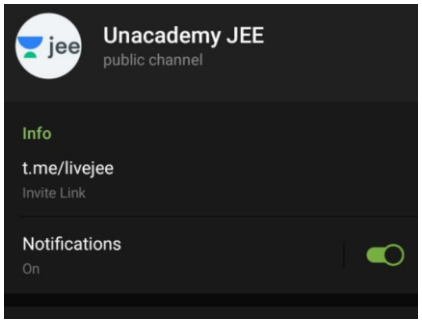

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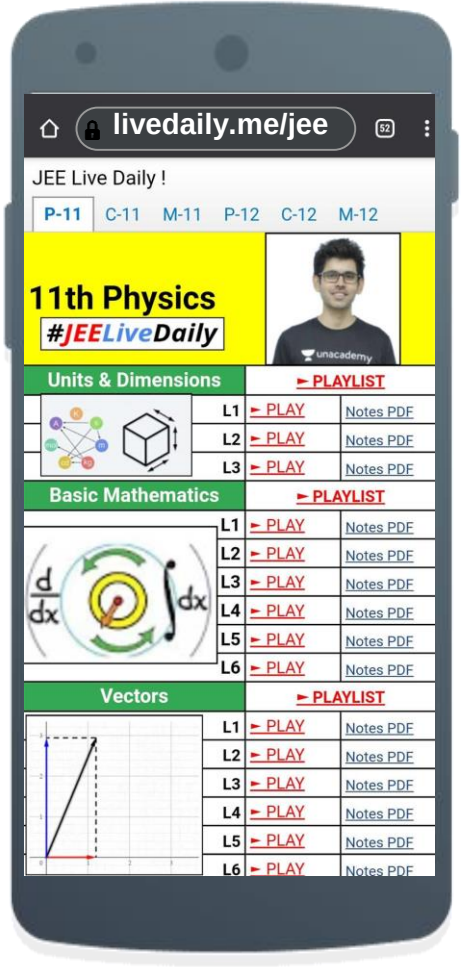

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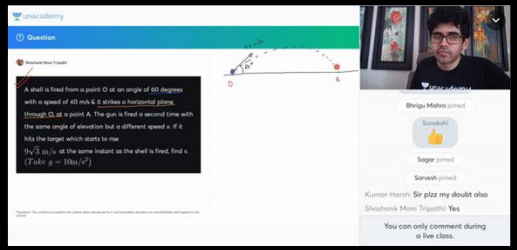

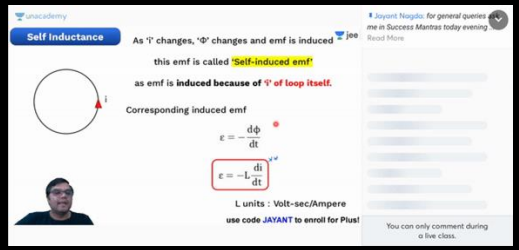

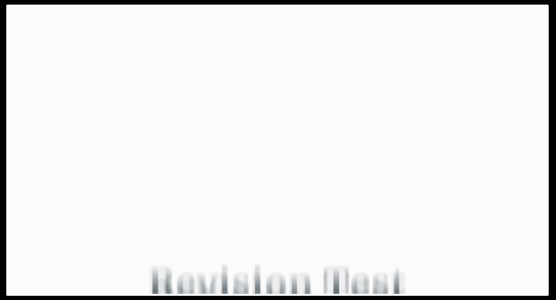

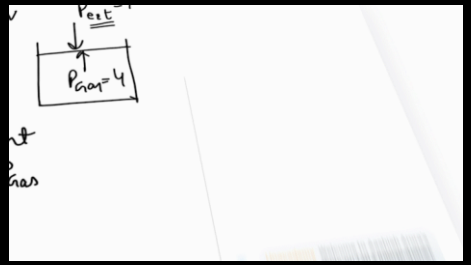

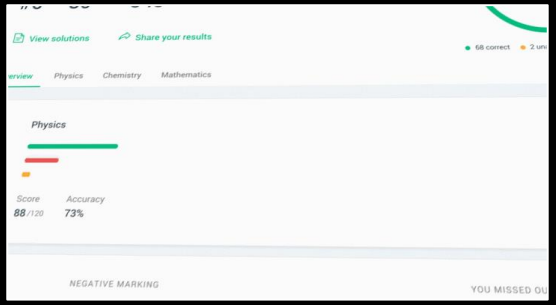

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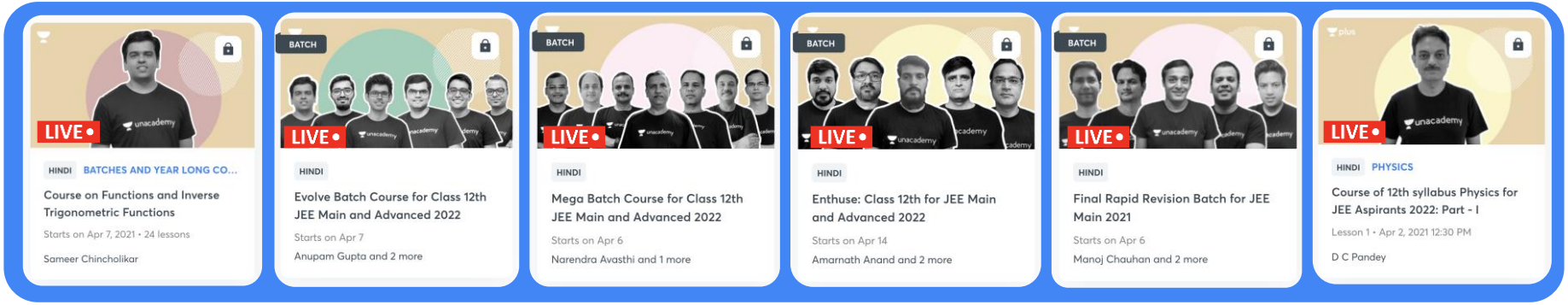

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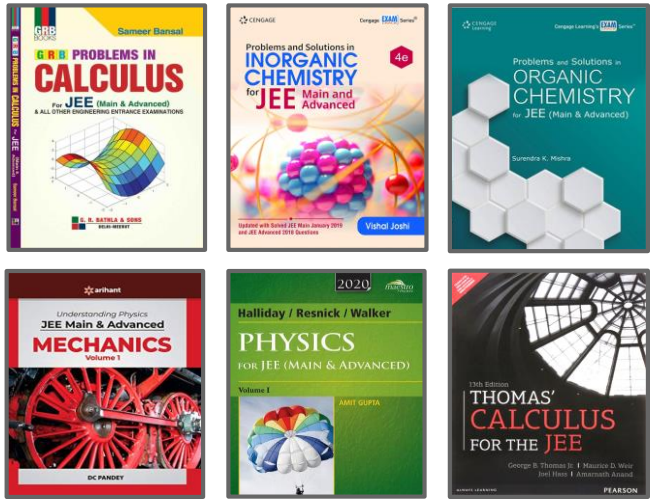

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99.86

Kunal Lalwani
99.81

Utsav Dhanuka
99.75

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
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Yash Bhaskar
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Subhash Patel
99.02

Ayush Kale
98.85

Ayush Gupta
98.67

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98.59

Naman Goyal
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MIHIR PRAJAPATI
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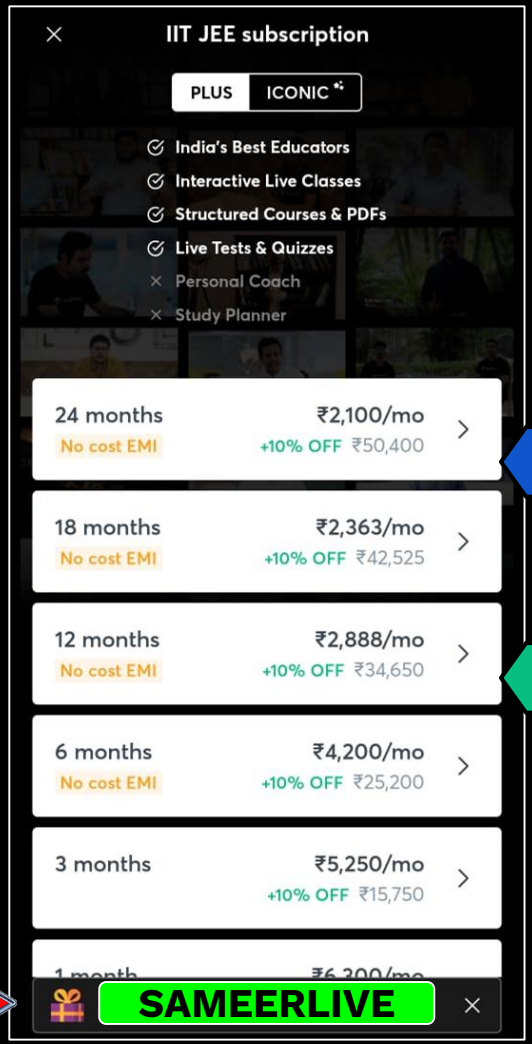

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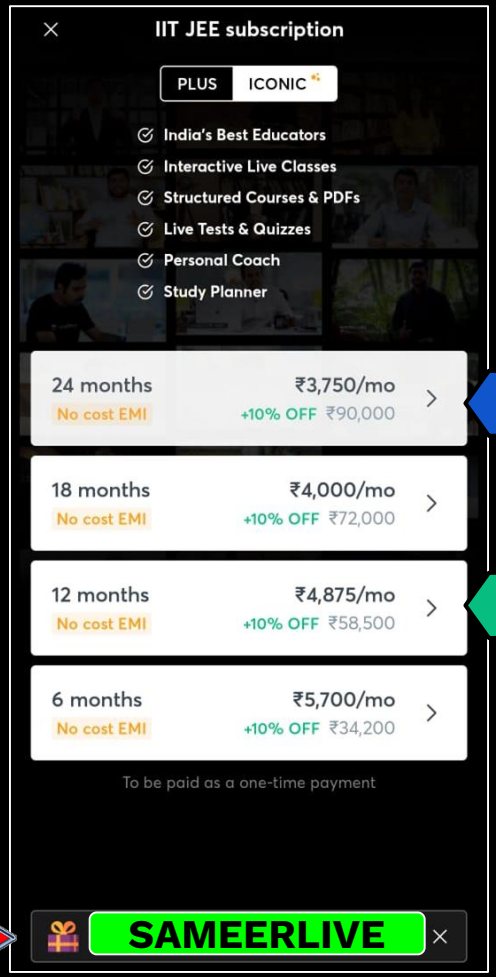
11th / 9, 10

12th / Drop



11th / 9, 10

12th / Drop

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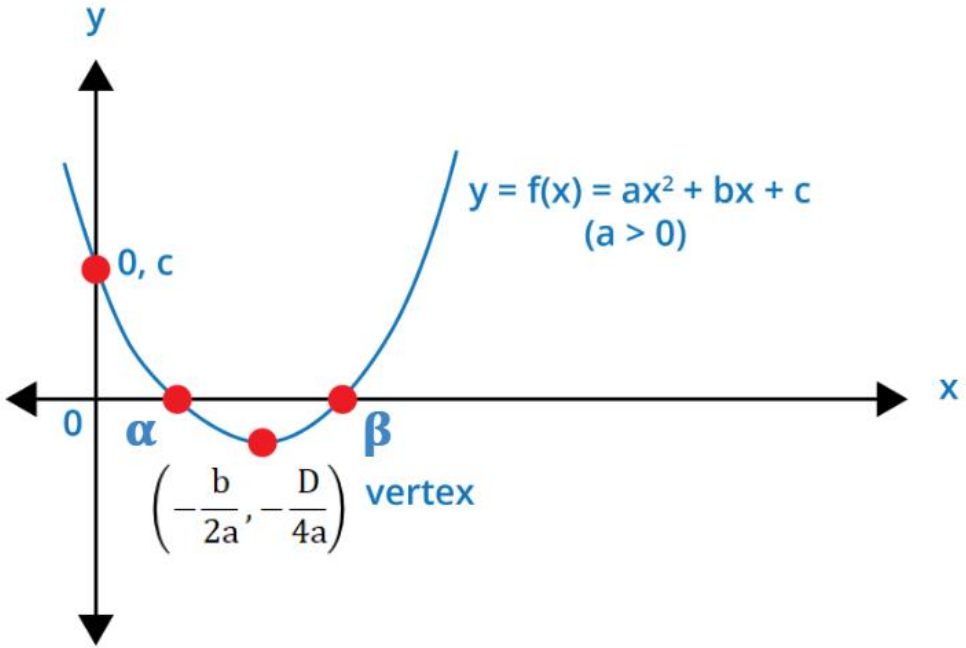
LET'S BEGIN!!

Graph of Quadratic Functions

Graph of Quadratic Function

$$y = f(x) = ax^2 + bx + c$$

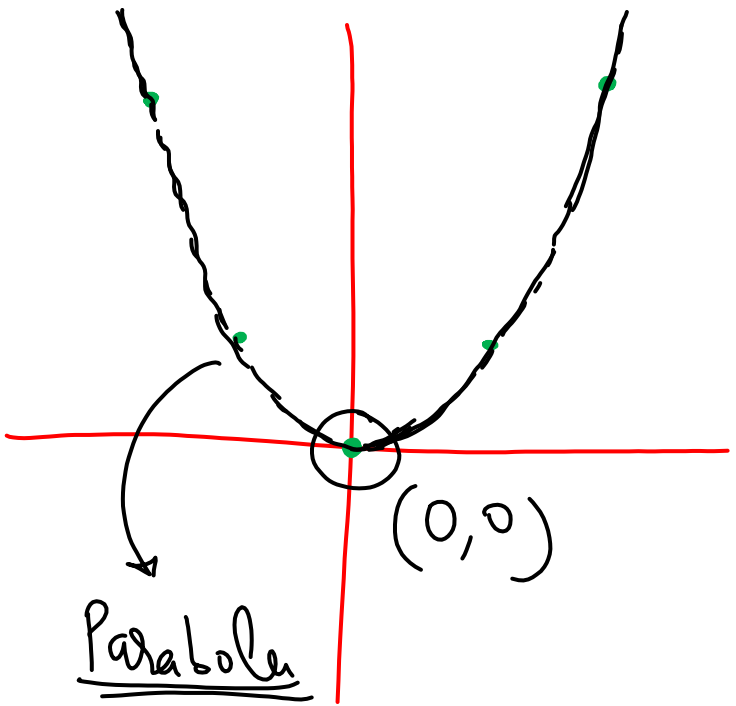
$$\left(y + \frac{D}{4a}\right) = a\left(x + \frac{b}{2a}\right)^2$$



Graph of x^2

$y = x^2$

x :	0	1	-1	2	-2
y :	0	1	1	4	4



Location of Vertex

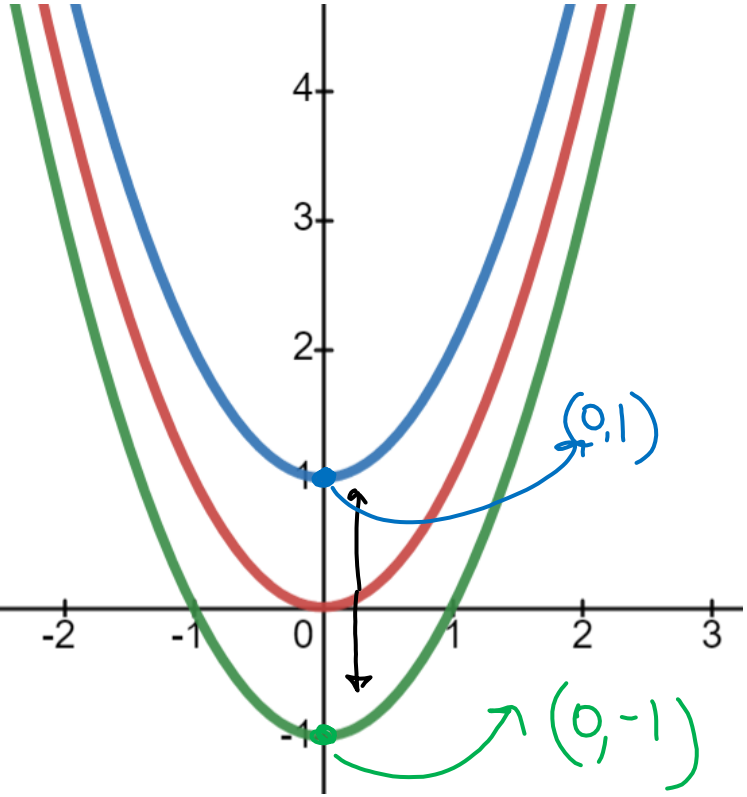
$y = x^2 + 1$ $\Rightarrow (y-1) = (x)^2$

$y - 1 = 0$ $\quad x = 0$

$y = x^2$

$y = x^2 - 1$ $\Rightarrow (y+1) = (x)^2$

$y + 1 = 0$ $\quad x = 0$



Location of Vertex

$(y) = (x+1)^2$

$y = 0$ $\quad x = -1$

$(y) = (x^2)$

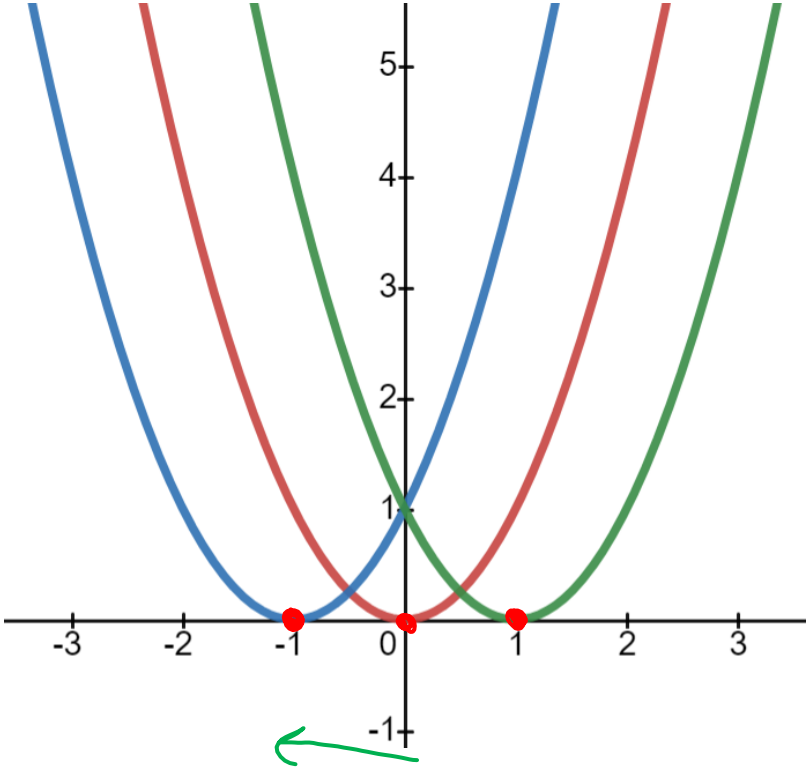
$y = f(x+a)$

$y = f(x)$

$(y) = (x-1)^2$

$y = 0$ $\quad x = 1$

$y = f(x-a)$

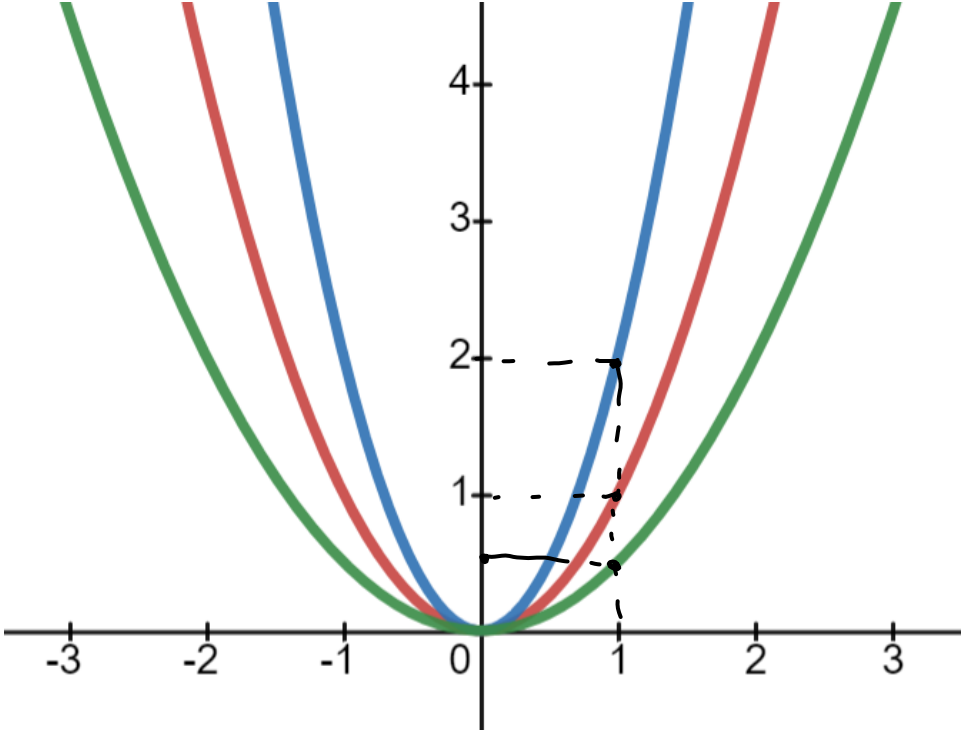


Width of Graph

$y = 2x^2$

$y = x^2$

$y = (1/2)x^2$



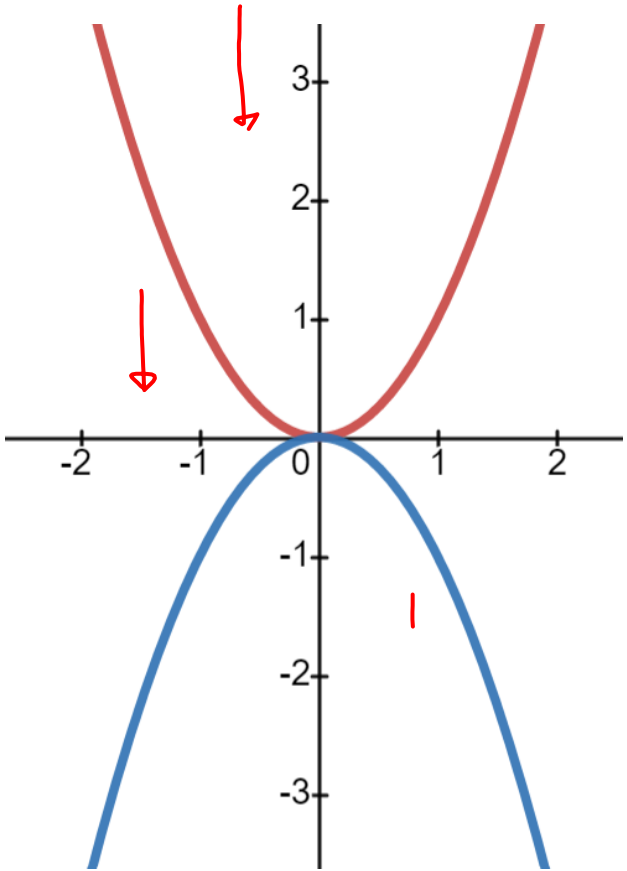
Orientation of Graph

$y = x^2$

$y = -x^2$

$y = f(x)$

$y = -f(x)$

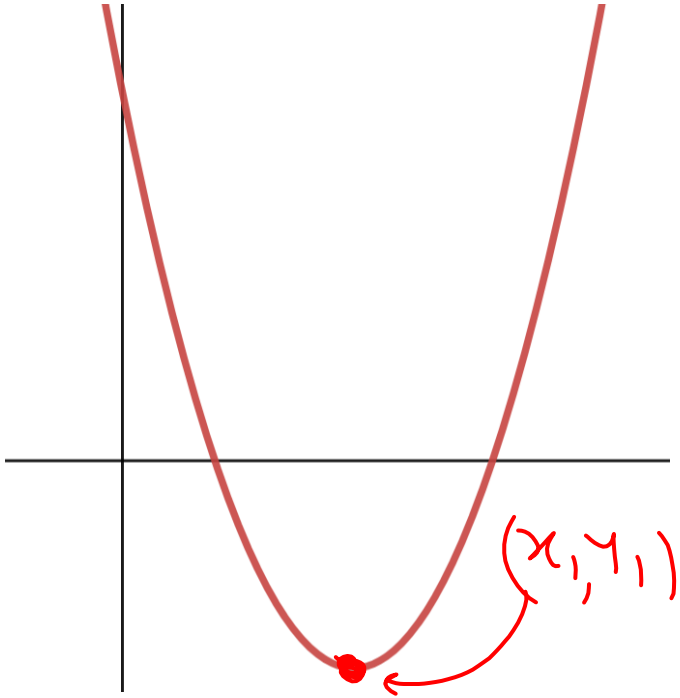


Graph of Quadratic Function

$$(y - y_1) = K (x - x_1)^2$$

$y = y_1$

$x = x_1$



Graph of Quadratic Function

$y = f(x) = ax^2 + bx + c$

$$y = ax^2 + bx + c$$

$$y = a\left(x^2 + \frac{b}{a}x\right) + c$$

$$y = a\left(\left(x + \frac{b}{2a}\right)^2 - \frac{b^2}{4a^2}\right) + c$$

$$y = a\left(x + \frac{b}{2a}\right)^2 - \frac{b^2}{4a} + c$$

$$\left(y + \frac{b^2}{4a} - c\right) = a\left(x + \frac{b}{2a}\right)^2$$

$$\boxed{\left(y + \frac{D}{4a}\right) = a\left(x + \frac{b}{2a}\right)^2}$$

$$\therefore V \equiv \left(\frac{-b}{2a}, \frac{-D}{4a} \right)$$

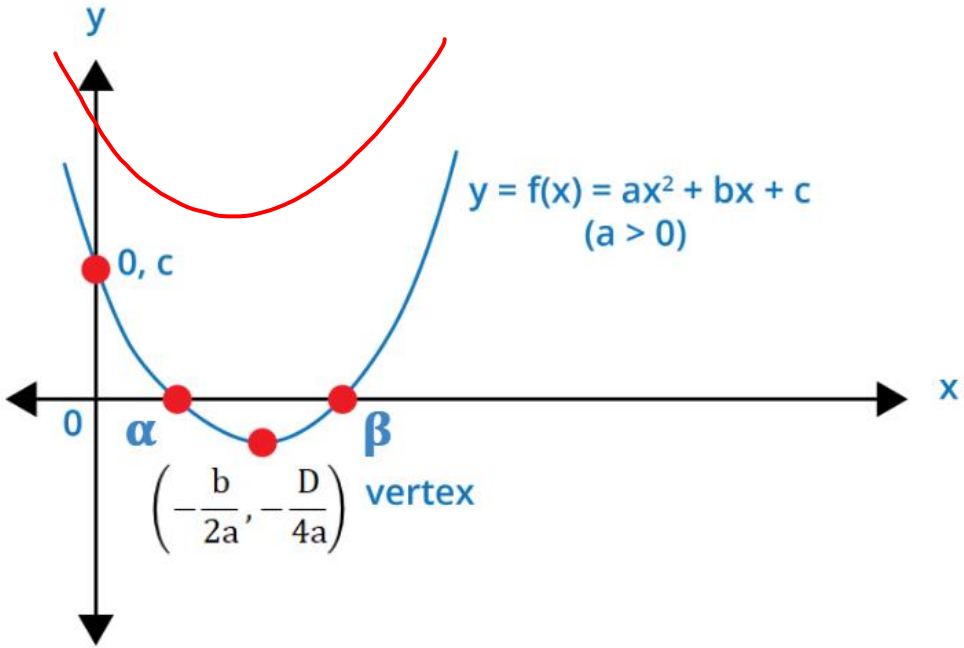
Graph of Quadratic Function

$$y = f(x) = ax^2 + bx + c$$

$$\left(y + \frac{D}{4a}\right) = a\left(x + \frac{b}{2a}\right)^2$$

$y = 0$

$ax^2 + bx + c = 0$



Important Results

For $y = f(x) = ax^2 + bx + c$

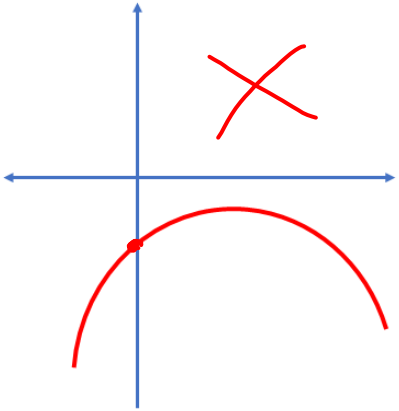
- The graph between x- y is always a parabola.
- The coordinate of vertex are $\left(-\frac{b}{2a}, -\frac{D}{4a}\right)$
- If $a > 0$ then the shape of the parabola is concave upwards &
  if $a < 0$ then the shape of the parabola is concave downwards.

Important Results

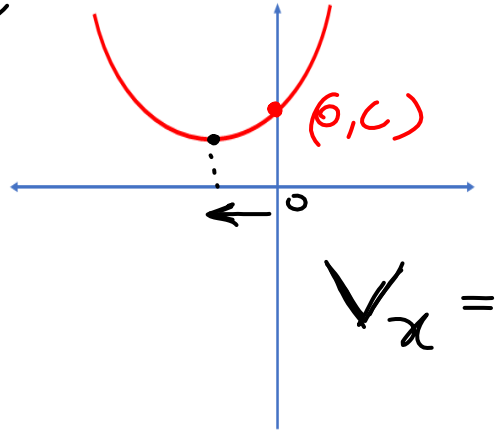
- The parabola intersect the y-axis at point (0, c).
- The x-coordinate of point of intersection of parabola with x-axis are the real roots of the quadratic equation f (x) = 0.
  Hence the parabola may or may not intersect the x-axis at real points.

If $ax^2+bx+c = 0$ has imaginary roots and $a, b, c > 0$
Then possible graph of $y = ax^2+bx+c$ is:

A.

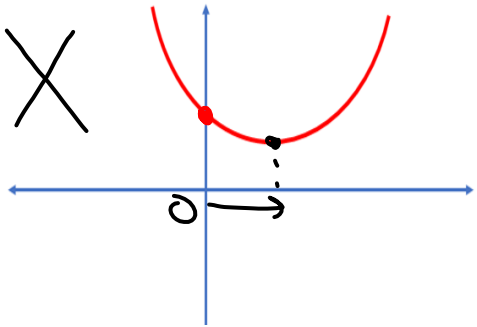


B.

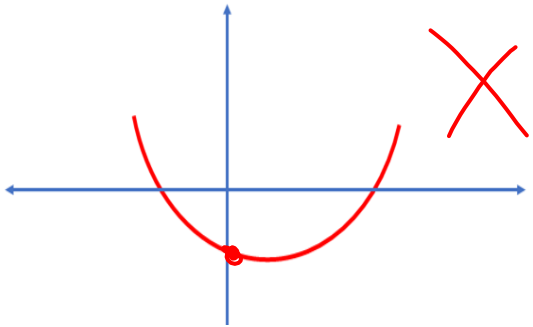


$$V_x = \frac{-b}{2a}$$

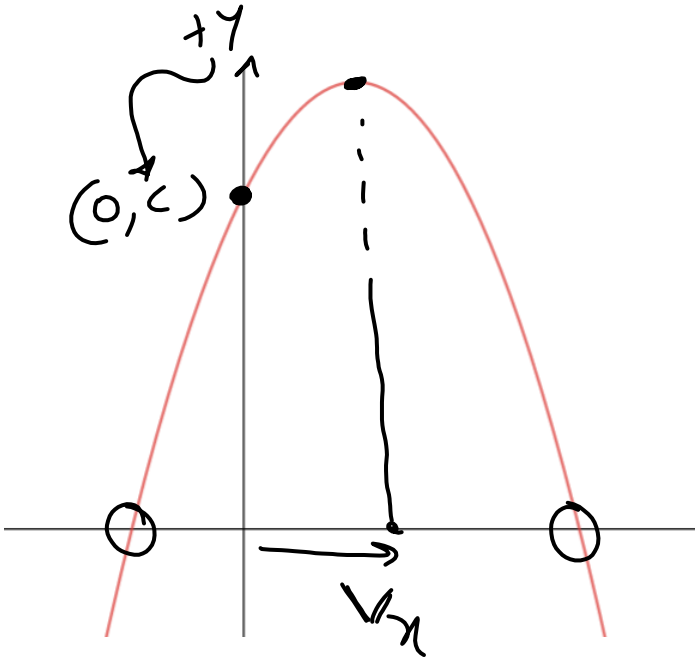
C.



D.



If the graph of $y = ax^2 + bx + c$ is given then identify sign of a, b, c and D.



$a < 0$

$b > 0$

$c > 0$

$D > 0$

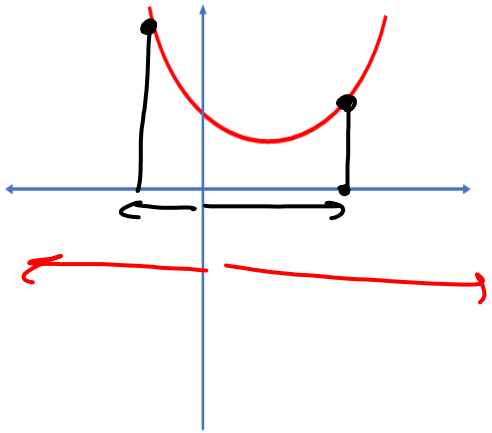
$V_x = -\frac{b}{2a}$

$\oplus = \frac{-(b)}{2(-)}$

Sign of Quadratic Expression

Sign of Quadratic Expression

1



$y = ax^2 + bx + c$

Always +ve

$\begin{cases} a > 0 \\ D < 0 \end{cases}$

Eg: $x^2 + 1$

$x^2 + x + 1$

For all **'x', $x^2 + 2ax + 10 - 3a > 0$,** then the interval in which 'a' lies is

A. $a < -5$

B. $-5 < a < 2$

C. $a > 5$

D. $2 < a < 5$

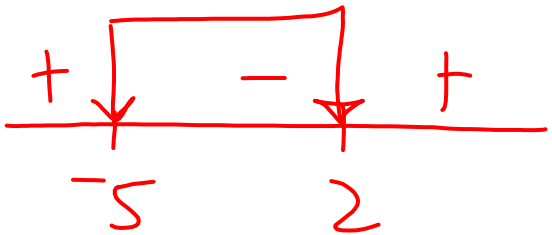
$x^2 + 2ax + (10 - 3a) > 0$

$D < 0$

$4a^2 - 4(10 - 3a) < 0$

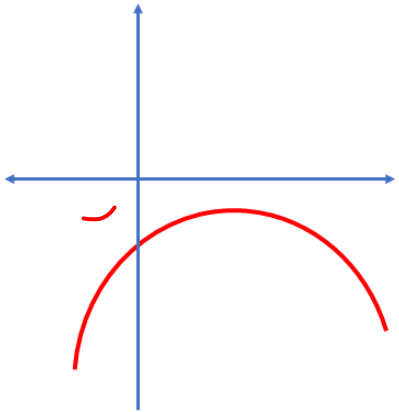
$a^2 + 3a - 10 < 0$

$(a+5)(a-2) < 0$



Sign of Quadratic Expression

2



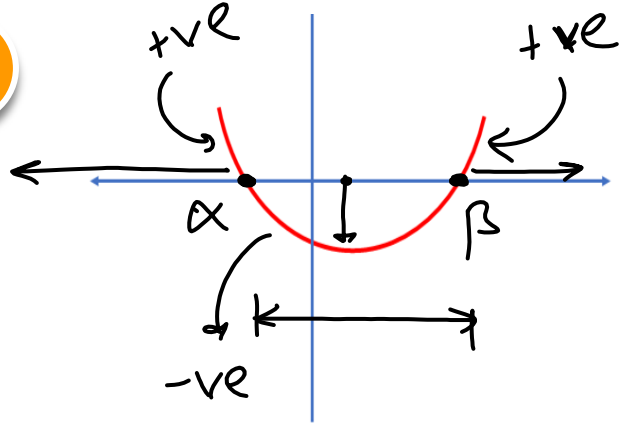
always -ve

$$\begin{cases} a < 0 \\ D < 0 \end{cases}$$

Sign of Quadratic Expression

$a > 0$

3

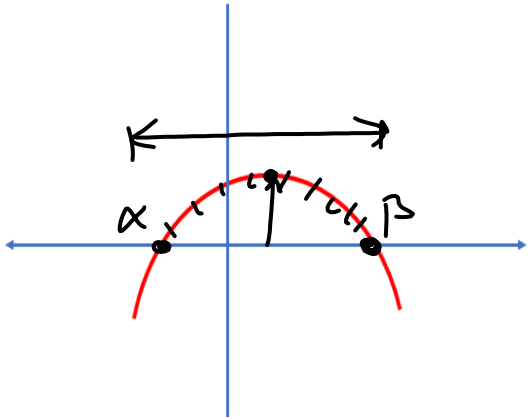


+ve : (outside the roots)

- ve : (between the roots)

Sign of Quadratic Expression

4



$a < 0$

+ve : (Betⁿ the roots)

-ve : (outside the roots)

If the quadratic $ax^2 + bx + c = 0$ has imaginary roots & $4a - 2b + c < 0$ then

A. $4a+2b+c > 0$

B. $a+b+c = 0$

C. $a-2b+4c < 0$

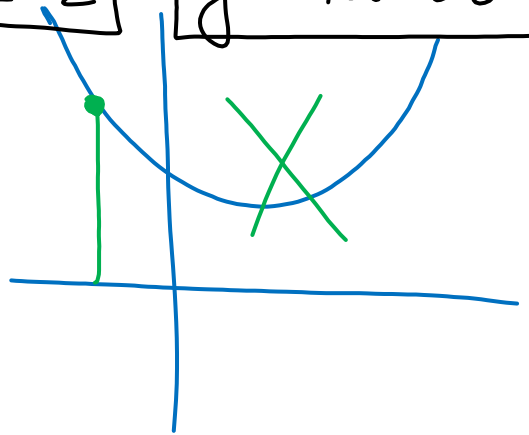
D. $a-b+c > 0$

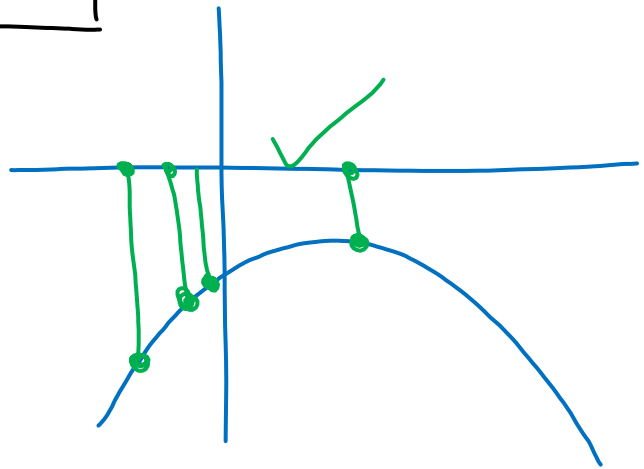
$y = ax^2 + bx + c$

$x = -2 \Rightarrow y = 4a - 2b + c < 0$

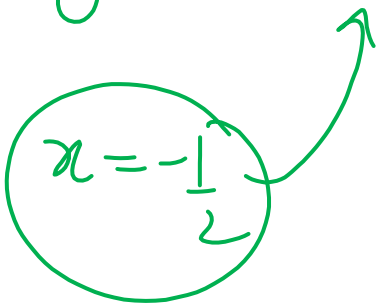
$D < 0$

(A) $4a+2b+c>0$ ✗





$$y = ax^2 + bx + c$$



$$y = \frac{a}{4} - \frac{b}{2} + c = \frac{1}{4}(a - 2b + 4a) < 0$$

Find all values of 'a' for which the inequality
$(a - 4)\,x^2 - 2ax + (2a - 6) < 0$ is satisfying for all real values of x.

$(a-4) < 0$

$a < 4$

$D < 0$

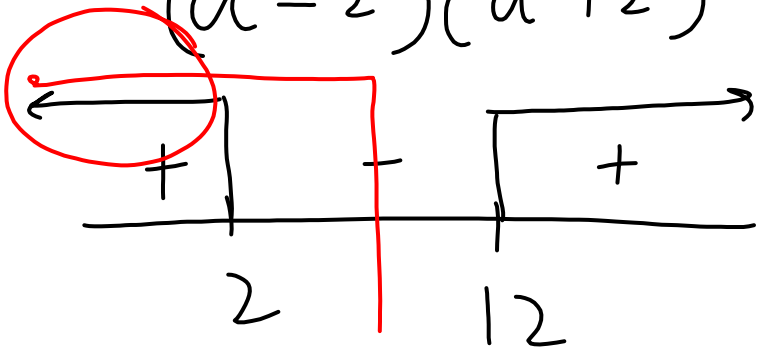
$4a^2 - 4(a-4)(2a-6) < 0$

$a^2 - (2a^2 - 6a - 8a + 24) < 0$

$-a^2 + 14a - 24 < 0$

$$a^2 - 14a + 24 > 0$$

$$(a-2)(a-12) > 0$$



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$$(-\infty, 2)$$

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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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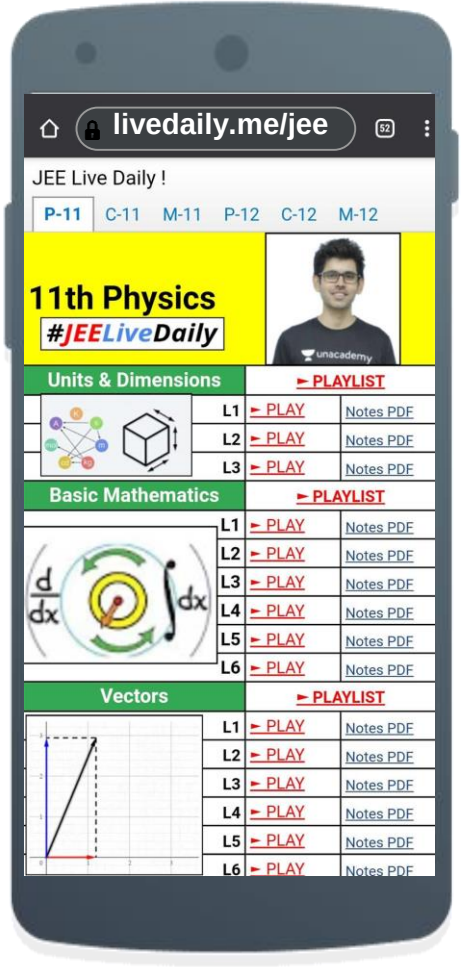

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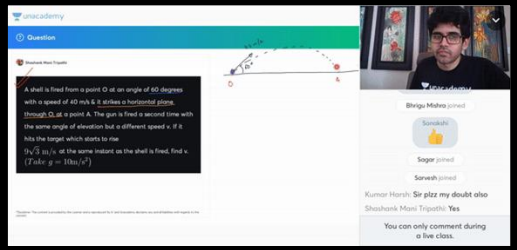

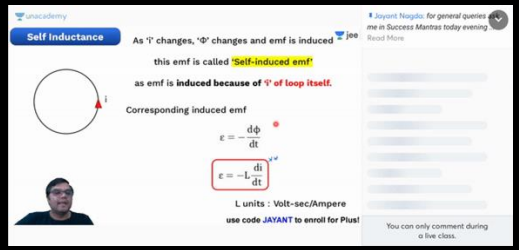

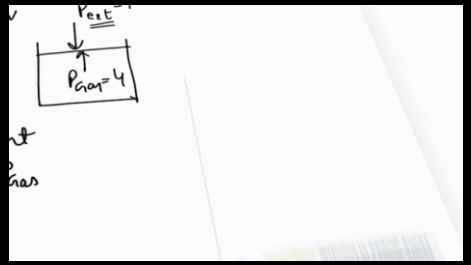

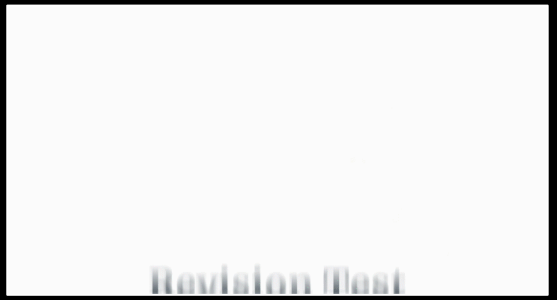

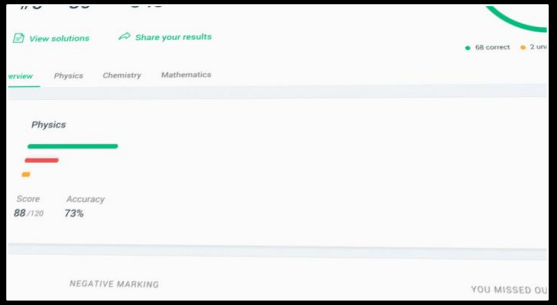

+ **LIVE** Class Environment
  - + **LIVE Polls** & **Leaderboard**
  - + **LIVE Doubt** Solving
  - + **LIVE** Interaction

+ **Performance** Analysis
  - + **Weekly Test Series**
  - + **DPPs** & **Quizzes**

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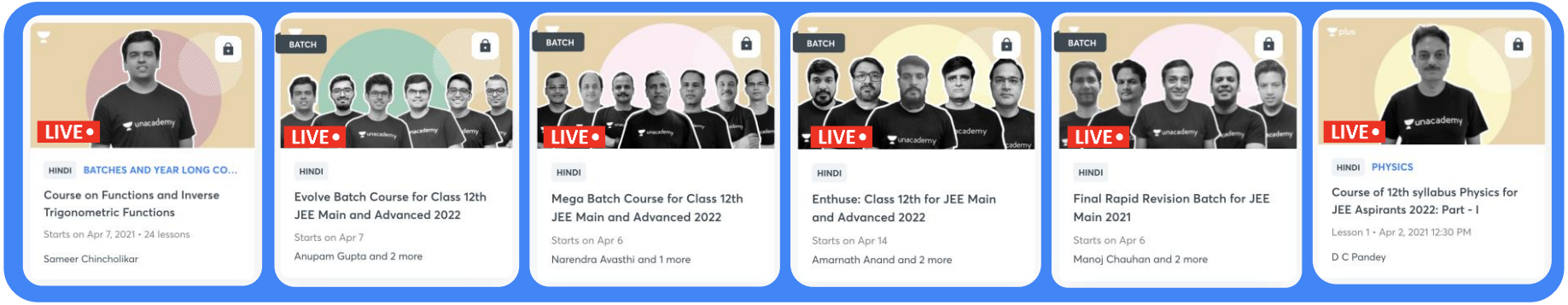
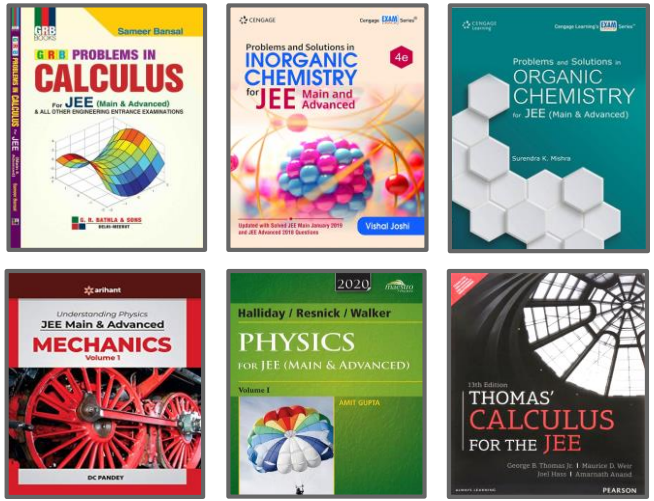


If you want to be the **BEST**
"Learn" from the **BEST**



jee

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Bratin Mondal

100 %ile

Amaiya Singhal
99.97

Adnan
99.95

Ashwin Prasanth
99.94

Tanmay Jain
99.86

Kunal Lalwani
99.81

Utsav Dhanuka
99.75

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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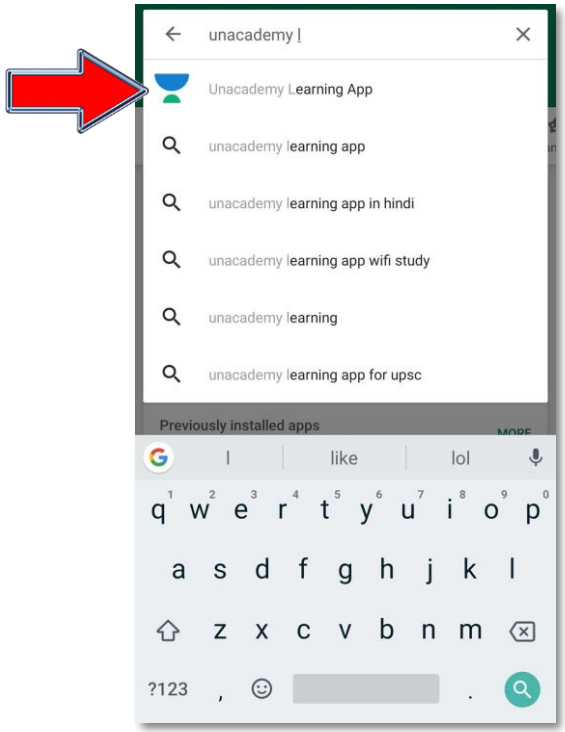
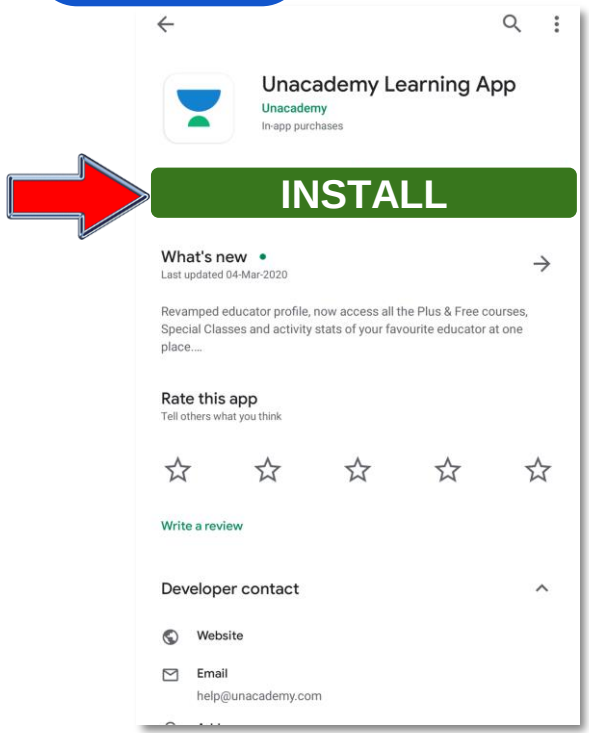
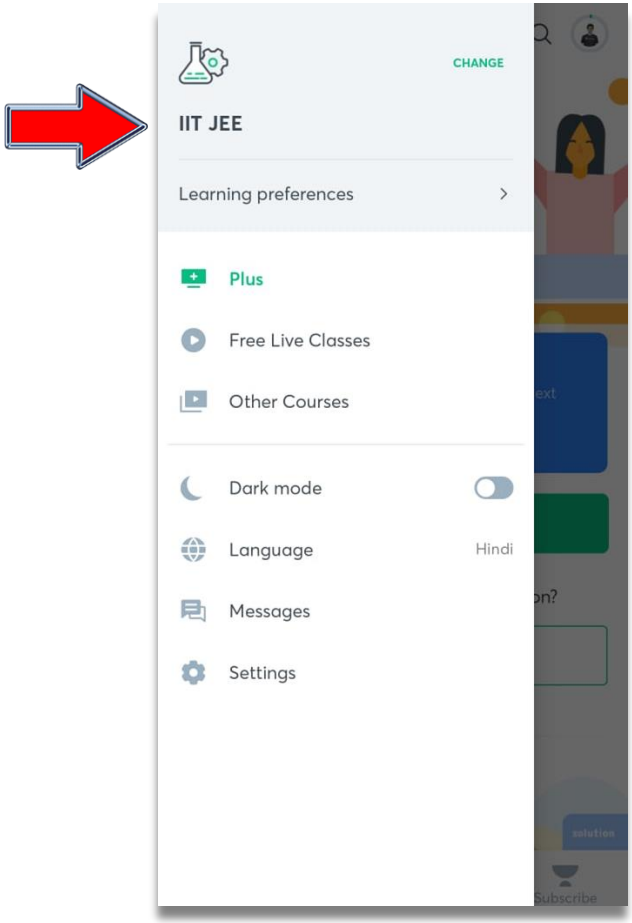
Step 1



Step 2

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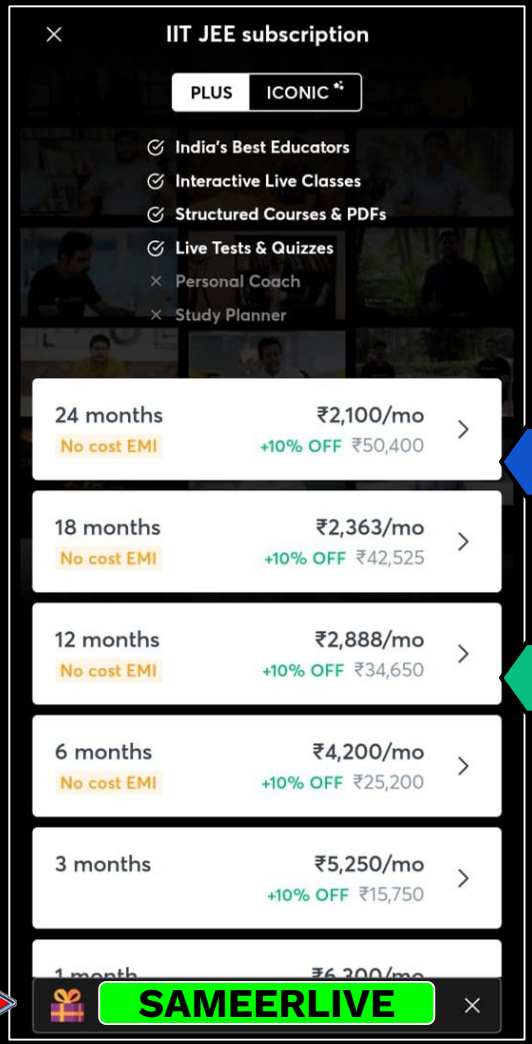

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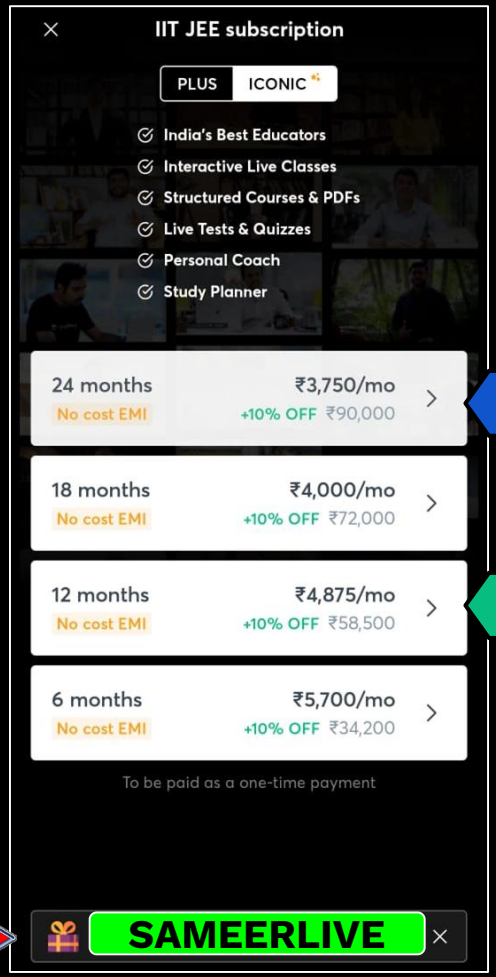
11th / 9, 10

12th / Drop



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