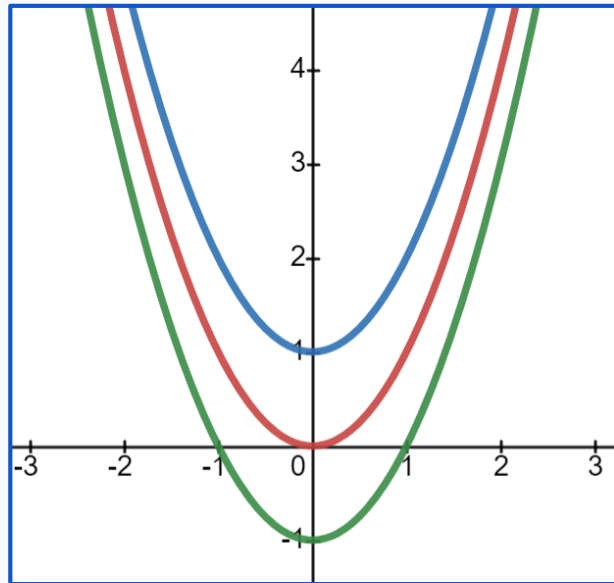


Graph of Quadratic Function

Quadratic Equations

5



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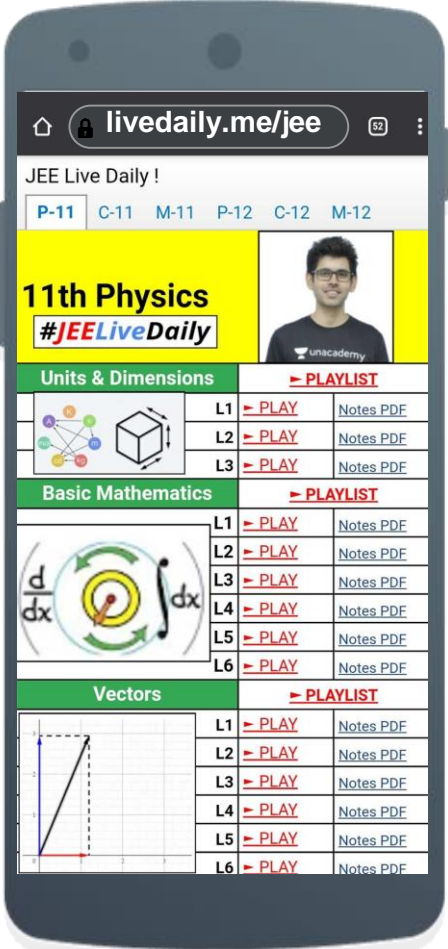
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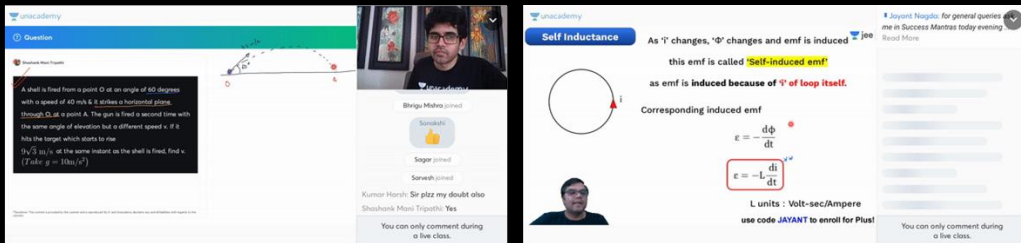
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Questions

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 $g = 10 \text{ m/s}^2$)

Shreyas Mishra joined

Sagar joined

Saravali joined

Kumar Harsh: Sir plz my doubt also

Shashank Masi Tripathi: Yes

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Self Inductance

As \vec{I} changes, $\vec{\Phi}$ changes and emf is induced

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

as emf is induced because of \vec{I} of loop itself.

Corresponding induced emf

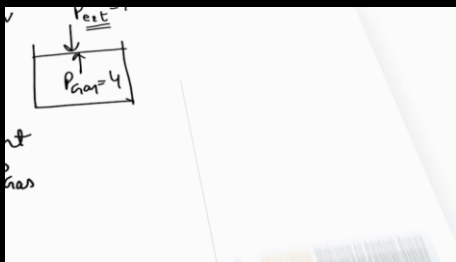
$$\mathcal{E} = -\frac{d\Phi}{dt}$$

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

L units: Volt-sec/Ampere

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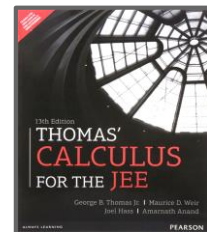
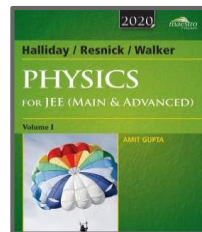
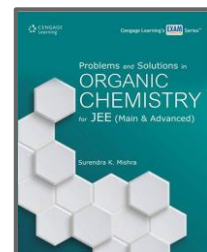
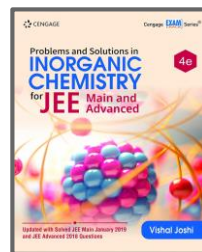
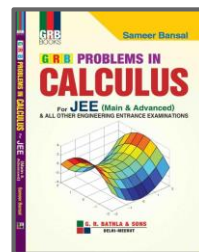
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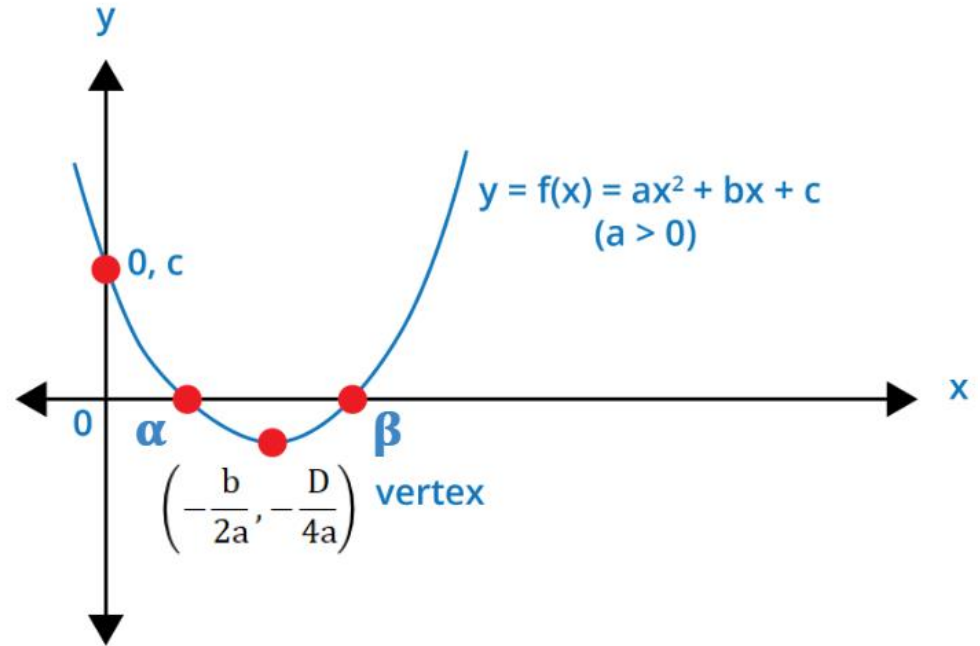




Graph of Quadratic Function

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

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

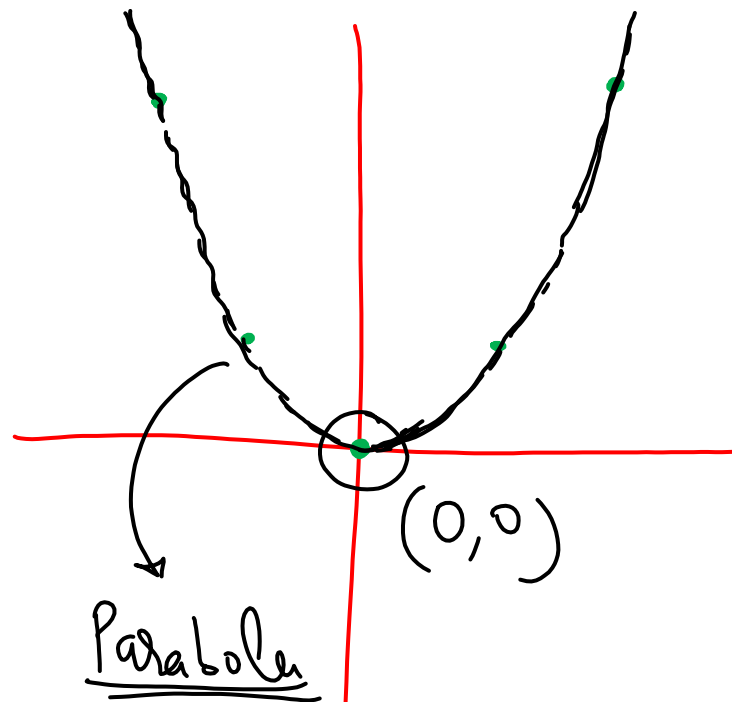




Graph of x^2

$$f = x^2$$

$x :$	0	1	-1	2	-2
$f :$	0	1	1	4	4





Location of Vertex

$$y = x^2 + 1$$

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

\downarrow \downarrow

$y=1$

$x=0$

$$y = x^2$$

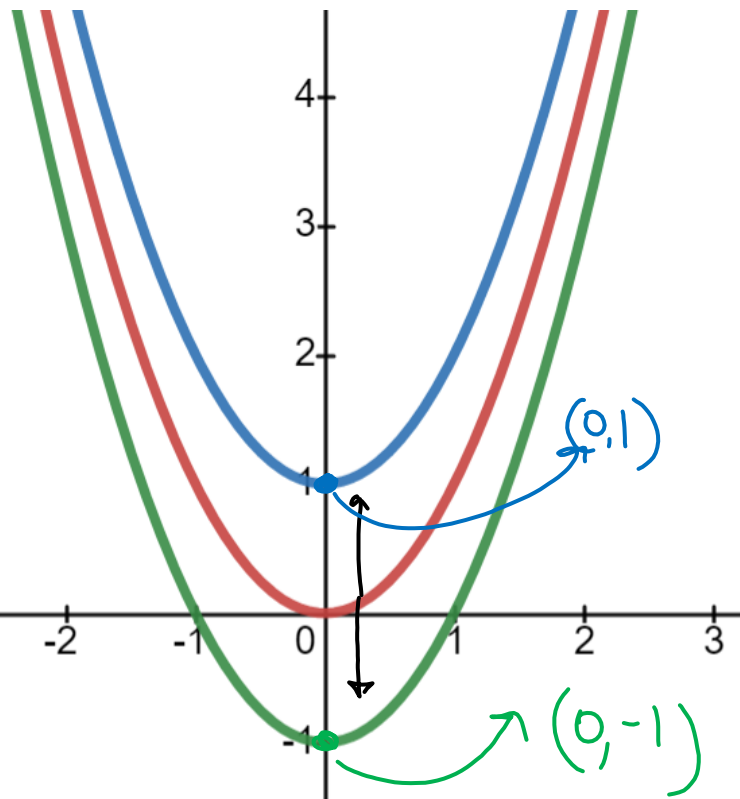
$$y = x^2 - 1$$

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

\downarrow \downarrow

$y=-1$

$x=0$





Location of Vertex

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

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

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

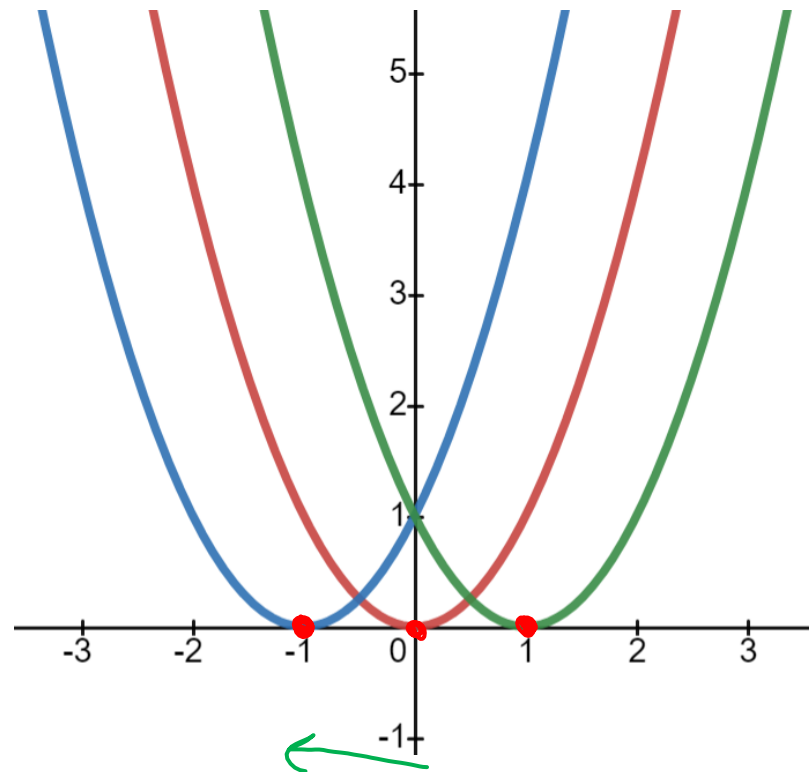
$$(y) = (x-1)^2$$

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

$$y = f(x+a)$$

$$y = f(x)$$

$$y = f(x-a)$$



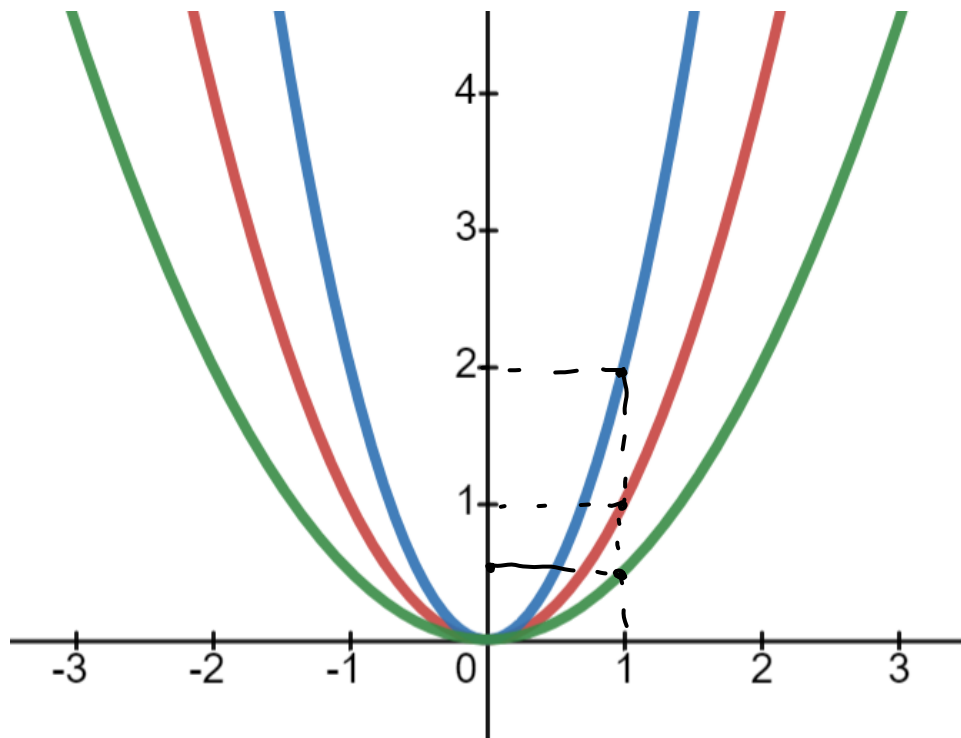


Width of Graph

$$y = 2x^2$$

$$y = x^2$$

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





Orientation of Graph

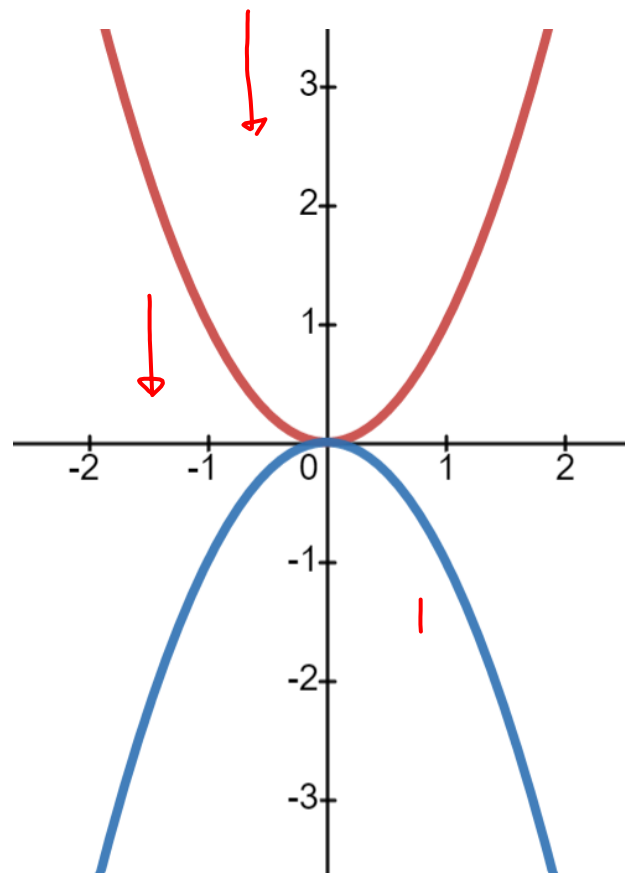
$$y = x^2$$

$$y = -x^2$$

$$f = f(x)$$

↓

$$f = -f(x)$$



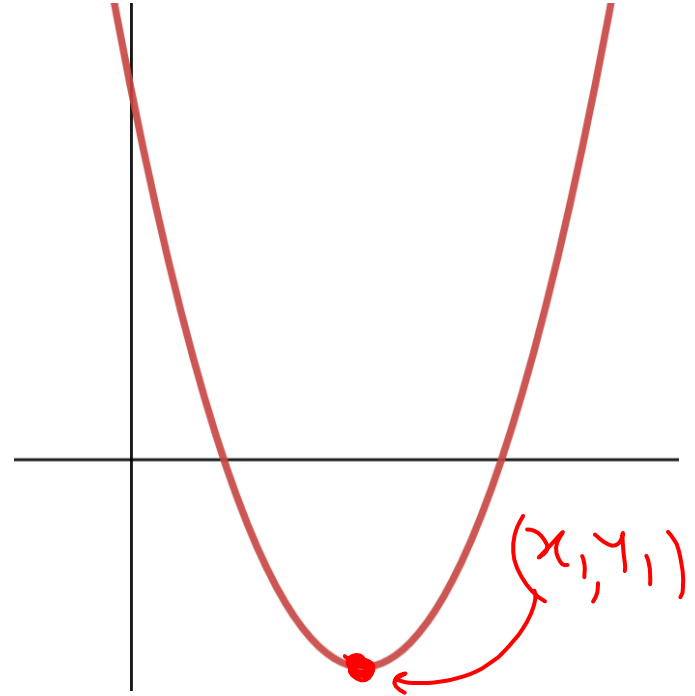


Graph of Quadratic Function

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

$$y = y_1$$

$$x = x_1$$





Graph of Quadratic Function

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

$$y = \underline{ax^2 + bx} + c$$

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

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

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

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

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

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



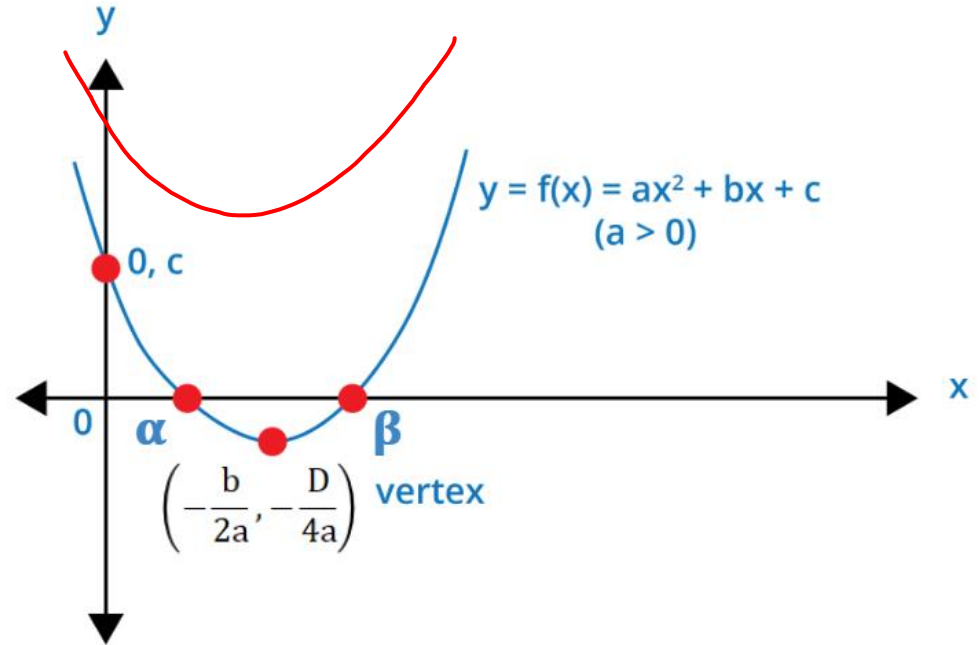
Graph of Quadratic Function

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

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

$$f = 0$$

$$ax^2 + bx + c = 0$$





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.

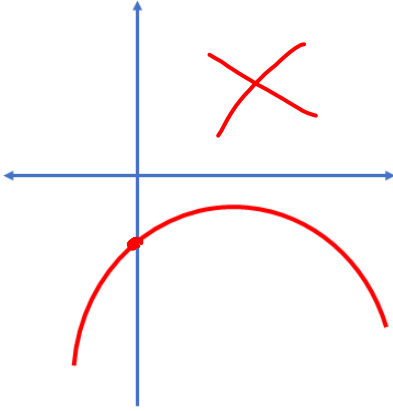


Important Results

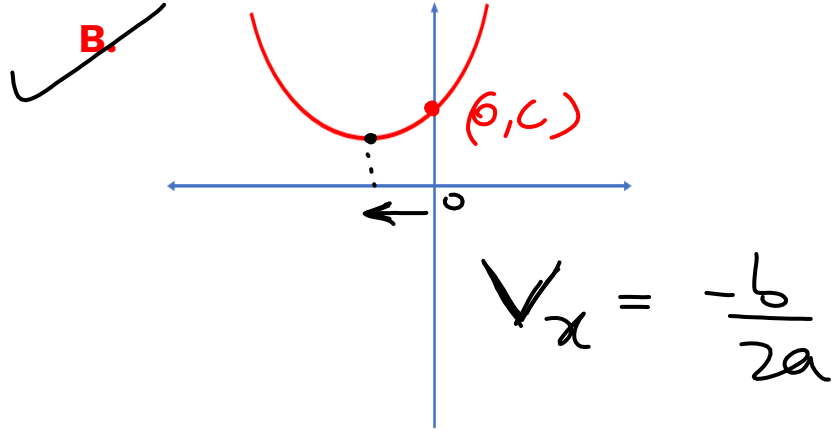
- ➔ The parabola intersect the y-axis at point $(0, c)$.
- ➔ The x-coordinate of point of intersection of parabola with x-axis are the real roots of the quadratic equation $f(x) = 0$.
Hence the parabola may or may not intersect the x-axis at real points.

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

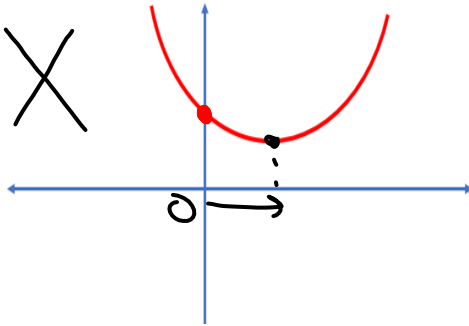
A.



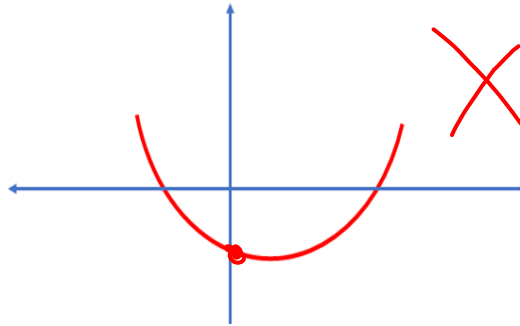
B.



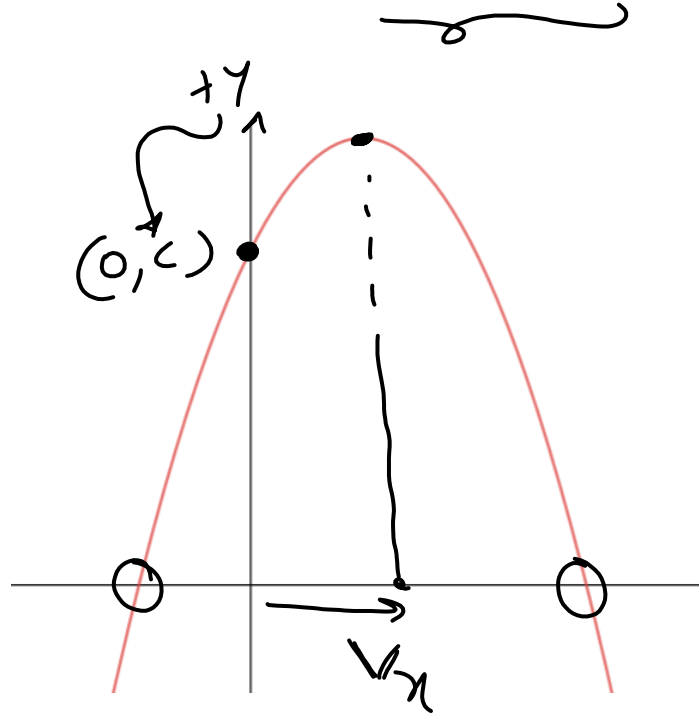
C.



D.



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



$$a < 0$$

$$b > 0$$

$$c > 0$$

$$D > 0$$

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

$$\downarrow$$

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

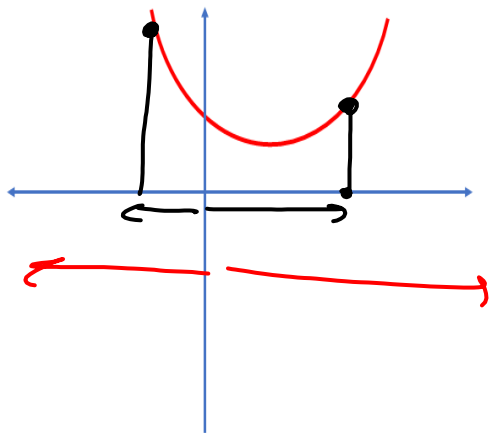
Sign of Quadratic Expression





Sign of Quadratic Expression

1



$$y = \underbrace{ax^2 + bx + c}$$

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. $2 < a < 5$

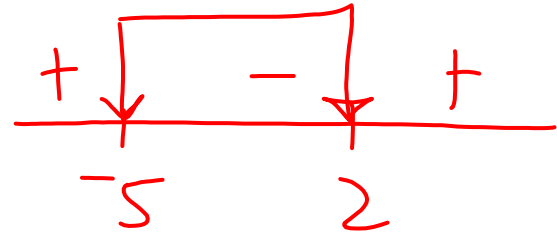
$$x^2 + 2ax + (10 - 3a) > 0$$

$$D < 0$$

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

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

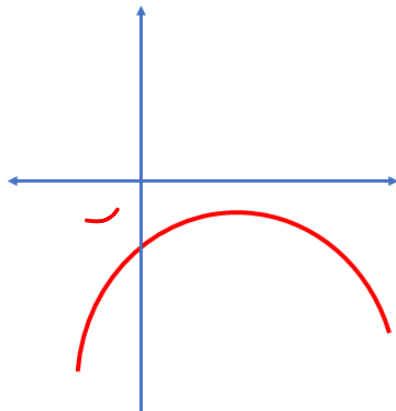
$$(a+5)(a-2) < 0$$





Sign of Quadratic Expression

2



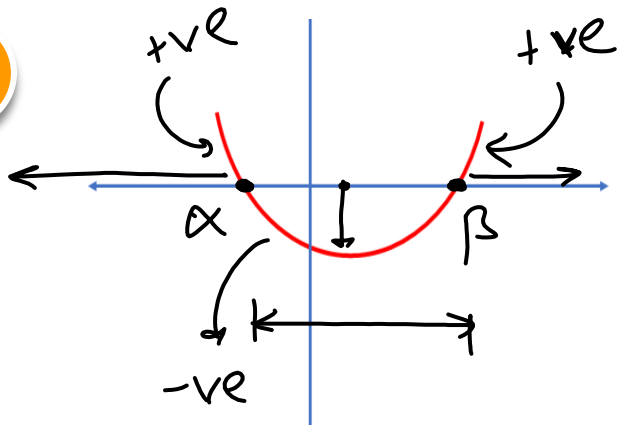
always -ve

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



Sign of Quadratic Expression

3



$$a > 0$$

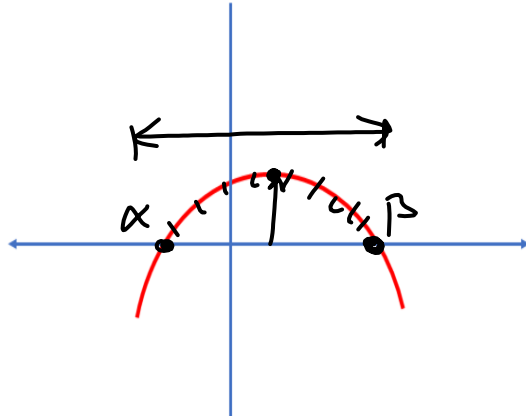
+ve \equiv (outside the roots)

-ve \equiv (between the roots)



Sign of Quadratic Expression

4



$$a < 0$$

+ve \because (betⁿ the roots)

-ve \because (outside the roots)

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

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

✓ **C.** $a - 2b + 4c < 0$

~~B.~~ $a + b + c = 0$

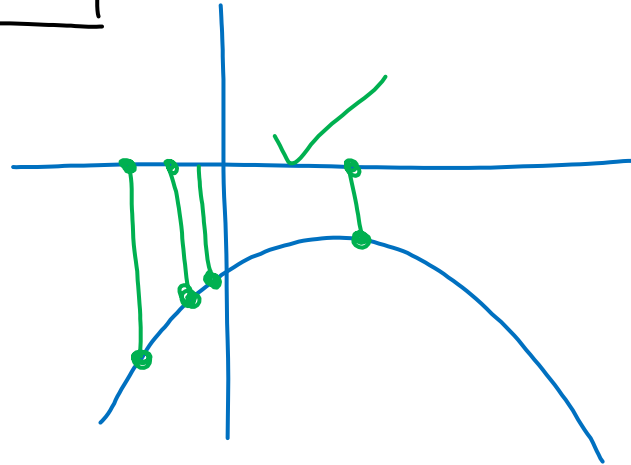
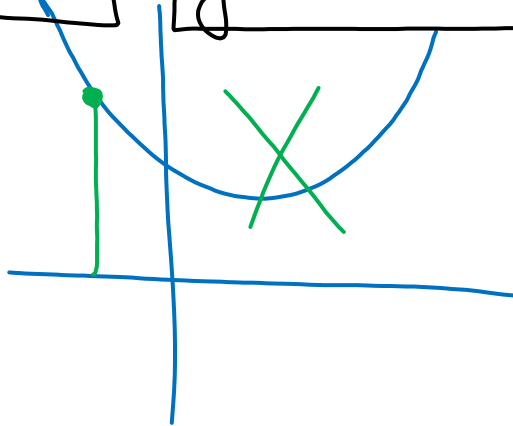
~~D.~~ $a - b + c > 0$

$D < 0$

Ⓐ $4a + 2b + c > 0$
X

$y = ax^2 + bx + c$

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



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

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

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

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.

$$(a - 4) < 0$$

$$a < 4$$

$$D < 0$$

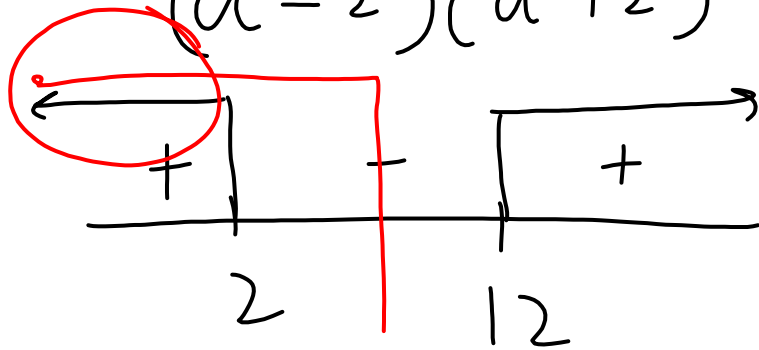
$$4a^2 - 4(a - 4)(2a - 6) < 0$$

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

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

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

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



$$(-\infty, 2)$$



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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

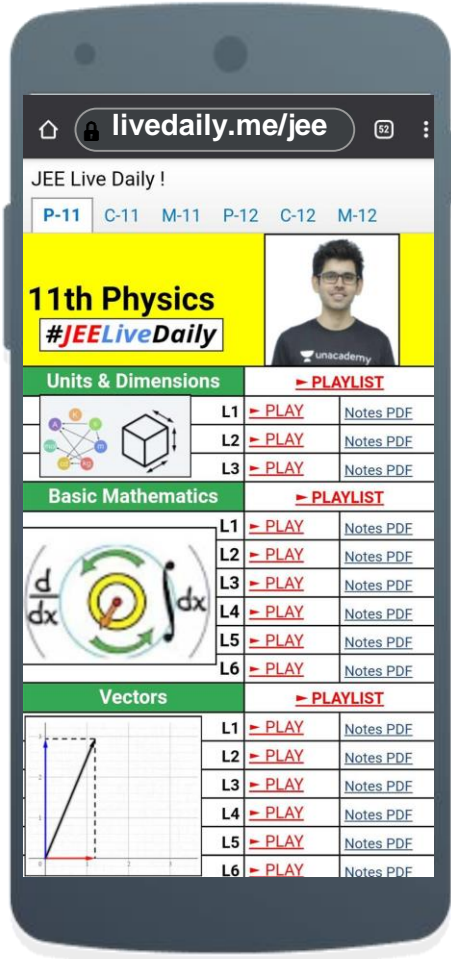
3:00 - 4:30 PM



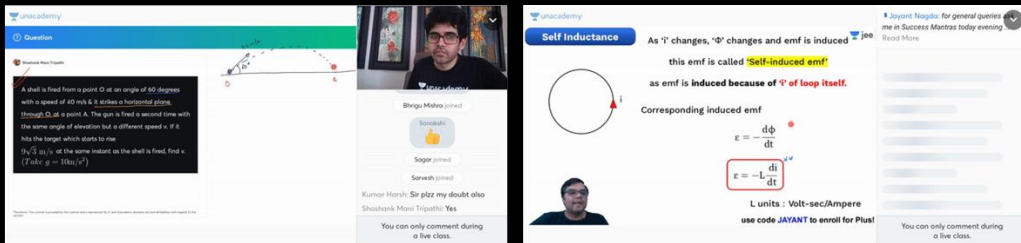
Nishant Sir | Maths

4:30 - 6:00 PM

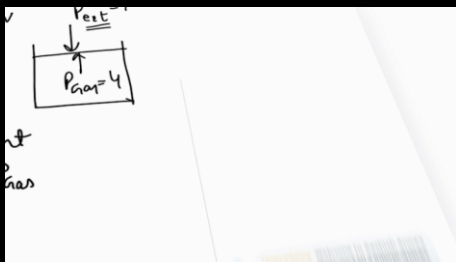
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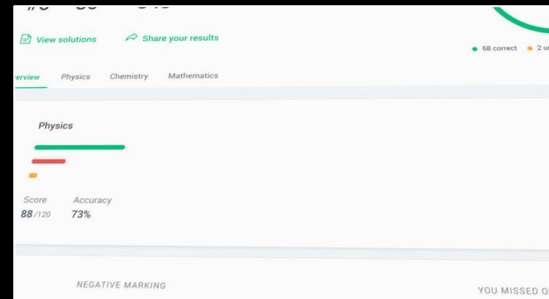
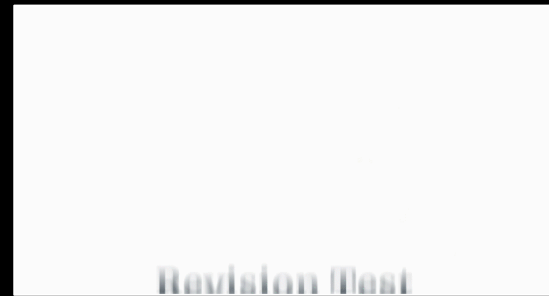


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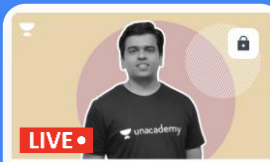


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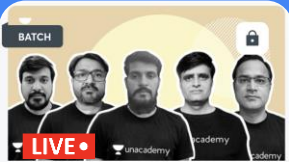
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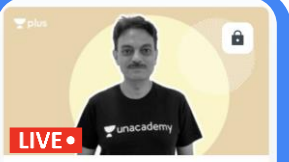
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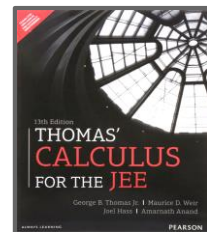
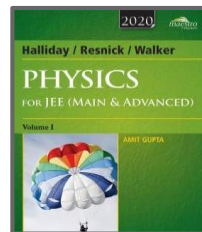
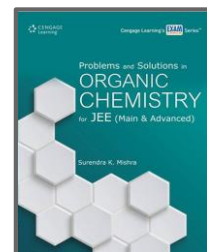
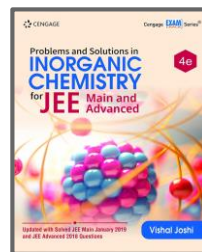
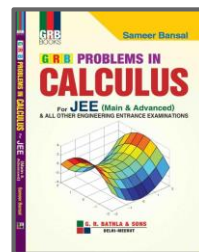
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Ayush Kale
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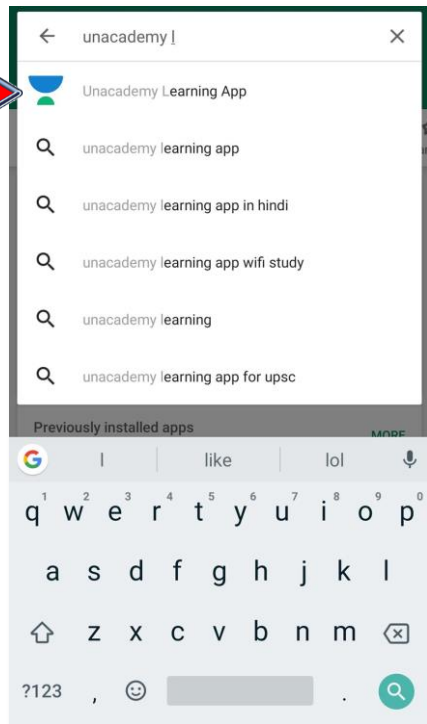


Naman Goyal
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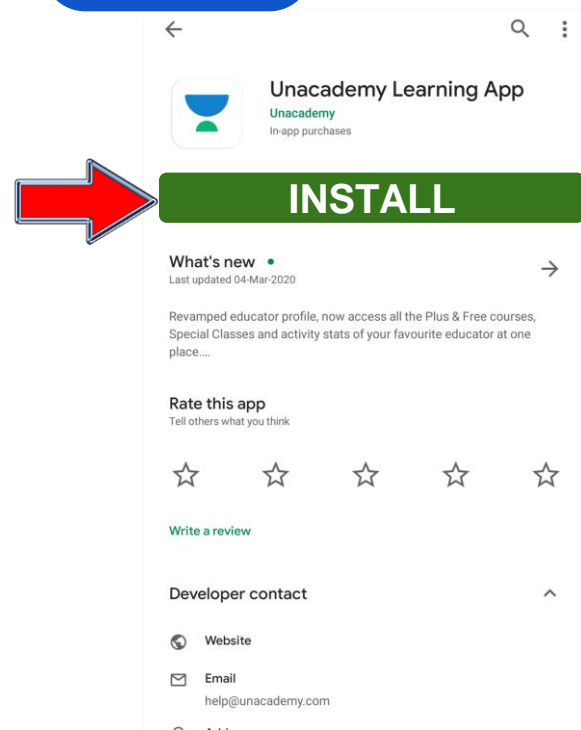


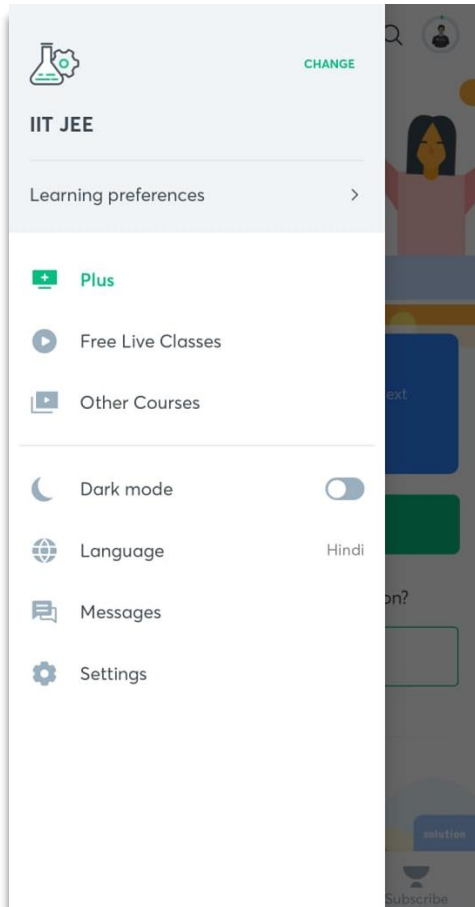
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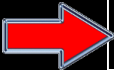
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