JEE Sprint

LIVE

Vedantu JEE

PARABOLA

CONICS SECTIONS

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Best Results Amongst All Online Classes

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43	208	227	290	482
AIR	AIR	AIR	AIR	AIR
Dhruv R	**Madhav G**	**Tanmay G**	**Akshat**	**Pandya P**
Mumbai	Chandigarh	Delhi	Ranchi	Thasra

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Mumbai	Kochi	Durgapur	Noida	Mumbai

JEE ADVANCED RESULTS 2020

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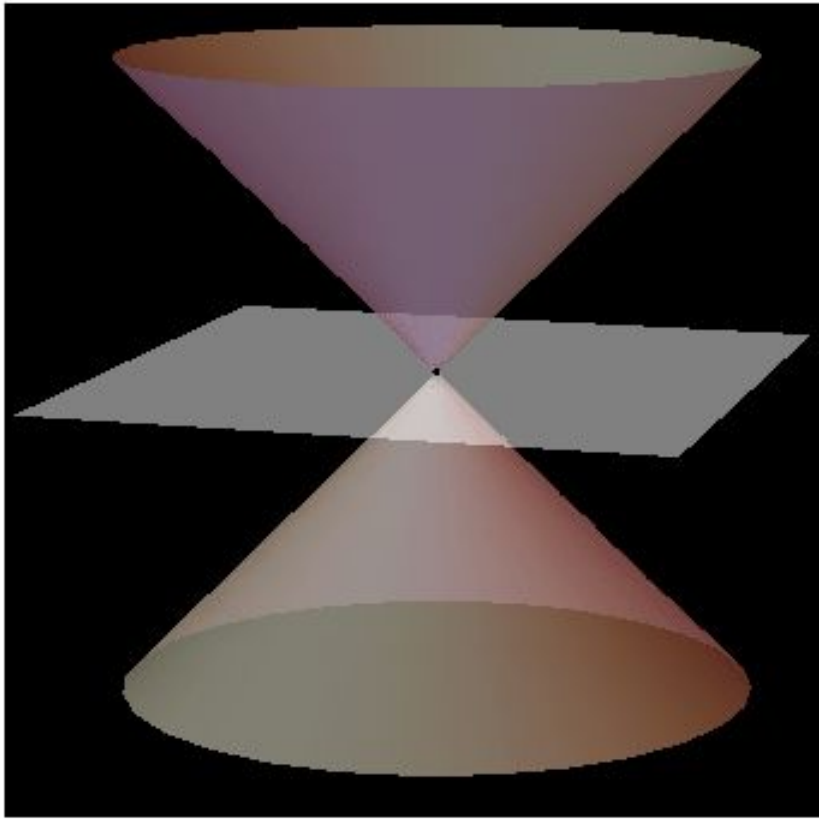
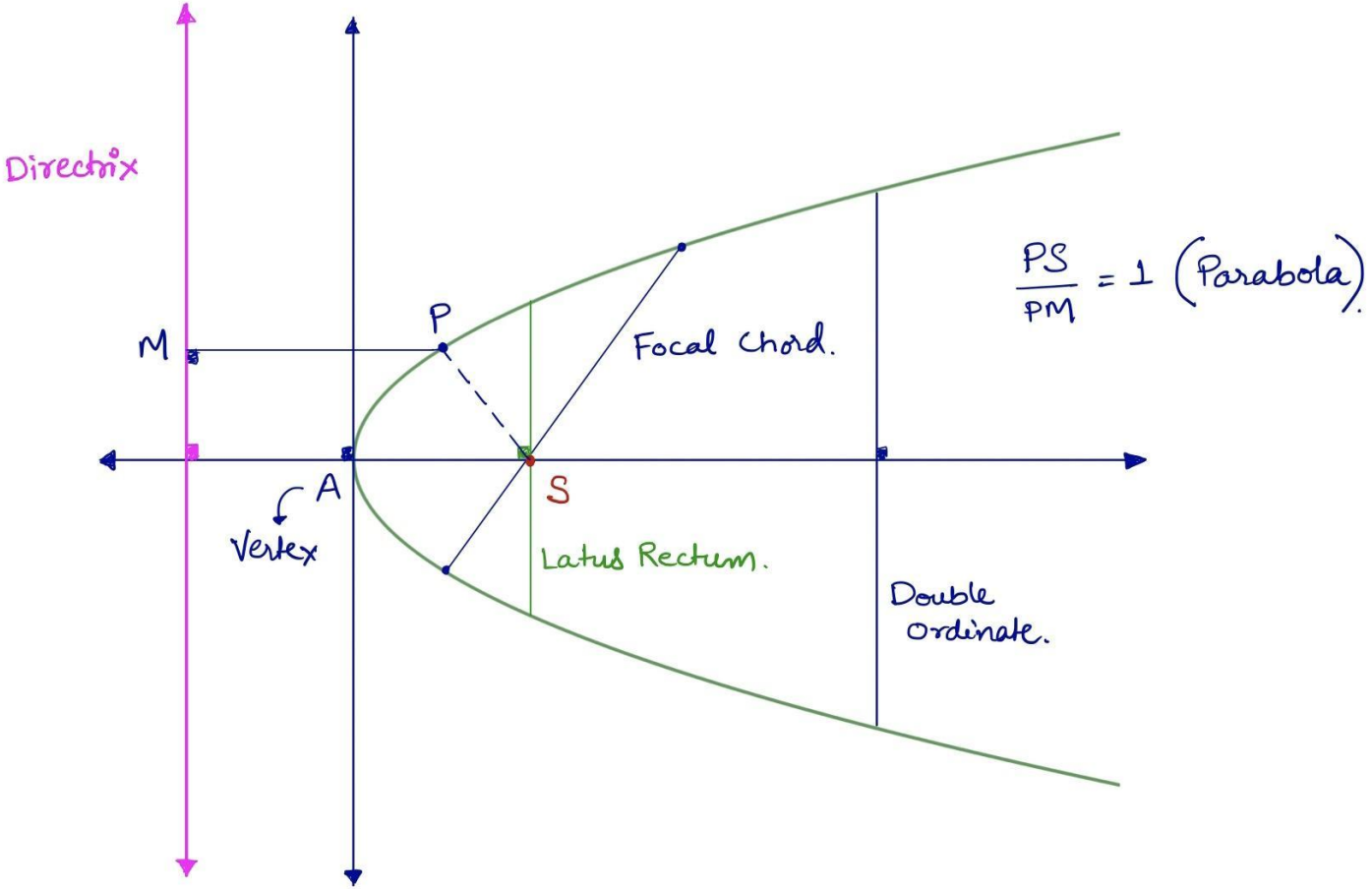


A **circle** with its centre at the focus of the **parabola $y^2 = 8x$** and touching its directrix intersects the parabola at points **A, B**. Then length AB is equal to?

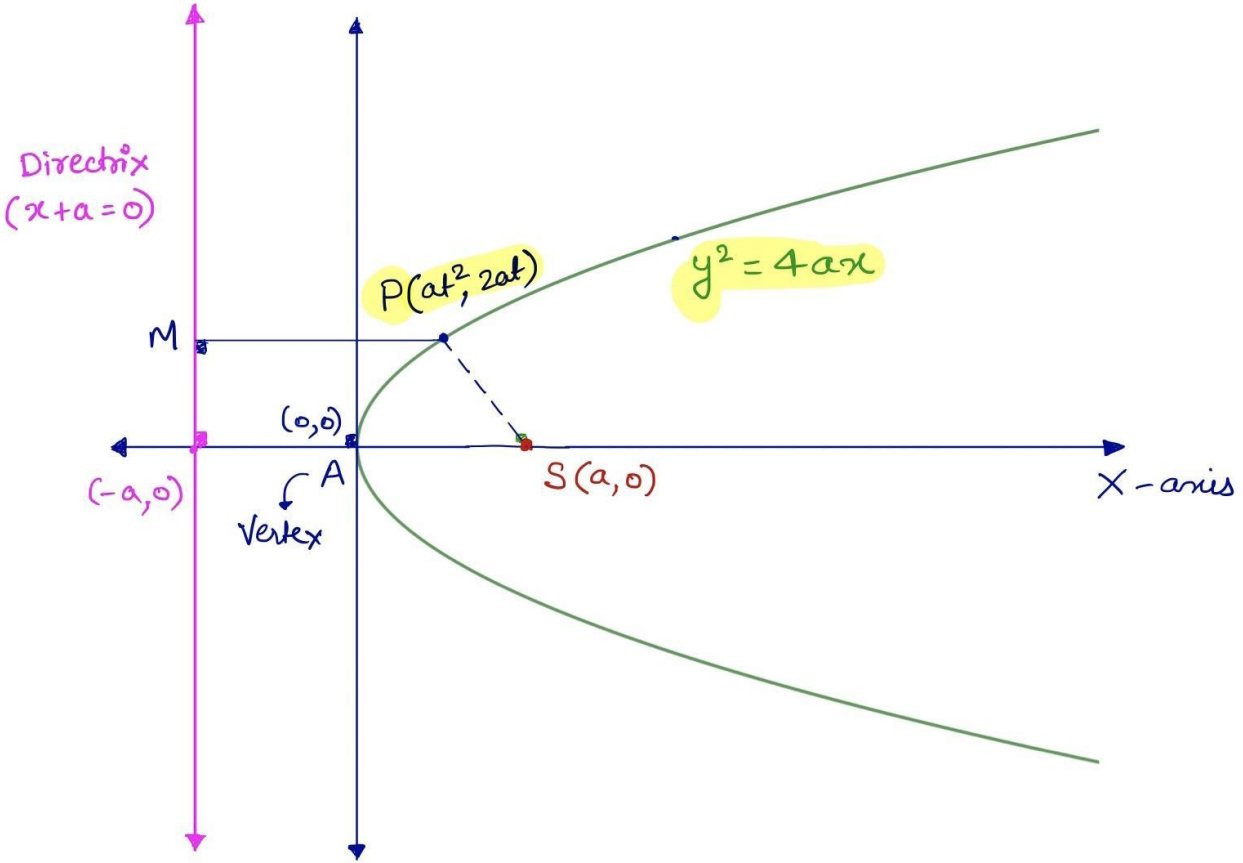
(Numerical type)

JEE-Main Prv. Yr

Parabola


Directrix
M
P
A
Vertex
S
Focal Chord.
Latus Rectum.
Double Ordinate.
$\frac{PS}{PM} = 1$ (Parabola)

Standard parabolas having vertex at origin



Short Cut --- Visualization :)

A **circle** with its centre at the focus of the parabola $y^2 = 8x$ and touching its directrix intersects the parabola at points **A, B**. Then length AB is equal to

(Numerical type)

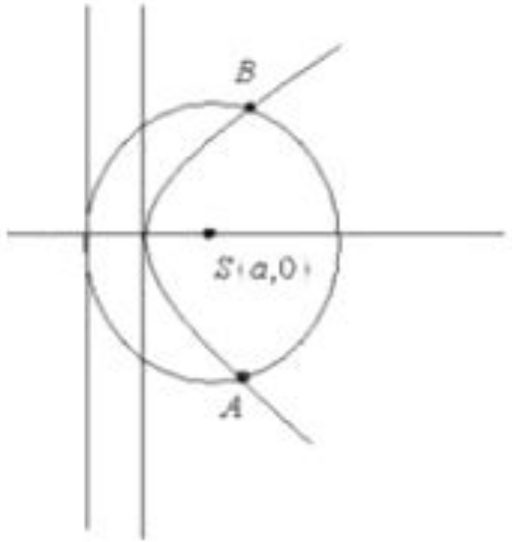
JEE-Main Prv. Yr

Parabola

A circle with its centre at the focus of the parabola $y^2 = 4ax$ and touching its directrix intersects the parabola at points A, B. Then length AB is equal to

Answer: 8

Alternate Solution:



Centre of circle (a, 0) and radius 2a
Equation of circle $(x - a)^2 + y^2 = 4a^2$

$x^2 + y^2 - 2ax - 3a^2 = 0$ and $y^2 = 4ax$

$\mathbf{x^2 + 2ax - 3a^2 = 0}$

$\boldsymbol{x = -3a, a}$ *and* $\boldsymbol{y = \pm 2a}$

$\therefore$ Length of **AB = 4a = 8**

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UNIT-WISE WEIGHTAGE - COORDINATE GEOMETRY

	CHAPTERS	2018	%	2017	%	2016	%	2015	%	2014	%	2013	%
VECTOR-3D	VECTORS	1	3.33	1	3.33	1	3.33	1	3.33	1	3.33	1	3.33
	3-DIMENSIONAL GEOMETRY	2	6.67	2	6.67	2	6.67	2	6.67	2	6.67	2	6.67
CO-ORDINATE	STRAIGHT LINES	2	6.67	1	3.33	1	3.33	2	6.67	1	3.33	2	6.67
	CIRCLES	1	3.33	0	0.00	2	6.67	1	3.33	1	3.33	1	3.33
	PARABOLA	2	6.67	0	0.00	1	3.33	1	3.33	1	3.33	1	3.33
	ELLIPSE	0	0.00	1	3.33	0	0.00	1	3.33	1	3.33	1	3.33
	HYPERBOLA	1	3.33	1	3.33	1	3.33	0	0.00	0	0.00	0	0.00
			20%		10%		17%		17%		13%		17%

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JEE Sprint

1 DEC-29 DEC 2020

EVERY DAY 4PM & 6 PM

Current Session 23/DEC/2020

JEE Sprint 04:00 PM

Parabola (Conic Sections)

Previous Session 22/DEC/2020

JEE Sprint 06:00 PM

Magnetic Effects of Current

Next Session 23/DEC/2020

JEE Sprint 06:00 PM

Atomic Structure

Parabola

- Definition of a Conic
- Parabola- Standard Equations
- Parametric form of Equation of a Parabola
- Equation of Tangent
- Problems based on:
    - Common Tangents + Pt. of Intersection of two curves

      + Angle of Intersection between two curves

Home Assignment Problems

Q1. If the tangent at **(1, 7)** to the curve $x^2 = y - 6$ touches the circle $x^2 + y^2 + 16x + 12y + c = 0$ then the value of c is :

A 95 **B** 195 **C** 185 **D** 85

JEE (Main) 2018

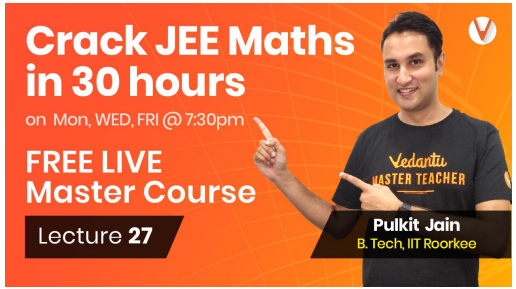
Q2. The slope of the line touching both the parabolas $y^2 = 4x$ and $x^2 = -32y$ is

A $\frac{1}{2}$ B $\frac{3}{2}$ C $\frac{1}{8}$ D $\frac{2}{3}$

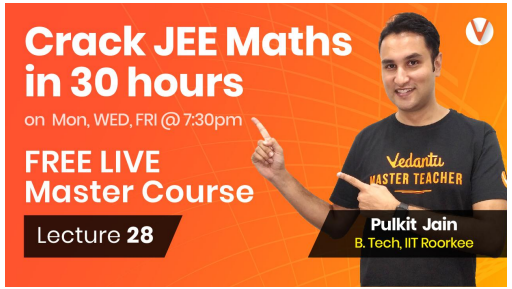
JEE (Main) 2014

Parabola

Previously Taken Detailed Classes on Coordinate Geometry (Lectures 27 - 32)

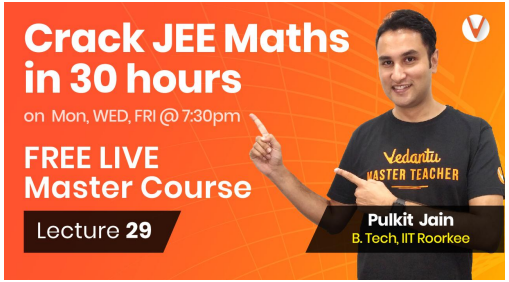


Straight Lines - 1



Straight Lines - 2

Normal to Parabola



Circles and Tangents

Parabola and Tangents

Ellipse and Hyperbola

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https://www.youtube.com/watch?v=C4pO-NnfCcY&list=PLCtUyOrCJbxxkL5dPyLJi9UmUlrP-etG3&index=27

Parabola

Q. Let P be a point on the parabola, $y^2 = 12x$ and N be the foot of the perpendicular drawn from P on the axis of the parabola. A line is now drawn through the mid-point M of PN, parallel to its axis which meets the parabola at Q. If the y-intercept of the line NQ is $\frac{4}{3}$, then:

A $MQ = \frac{1}{4}$ **B** $PN = 3$ **C** $PN = 4$ **D** $MQ = \frac{1}{3}$

JEE-Main 2020

Parabola

Q. Let P be a point on the parabola, $y^2 = 12x$ and N be the foot of the perpendicular drawn from P on the axis of the parabola. A line is now drawn through the mid-point M of PN, parallel to its axis which meets the parabola at Q. If the y-intercept of the line NQ is $\frac{4}{3}$, then:

A $MQ = \frac{1}{4}$ **B** $PN = 3$ **C** $PN = 4$ **D** $MQ = \frac{1}{3}$

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Solution:

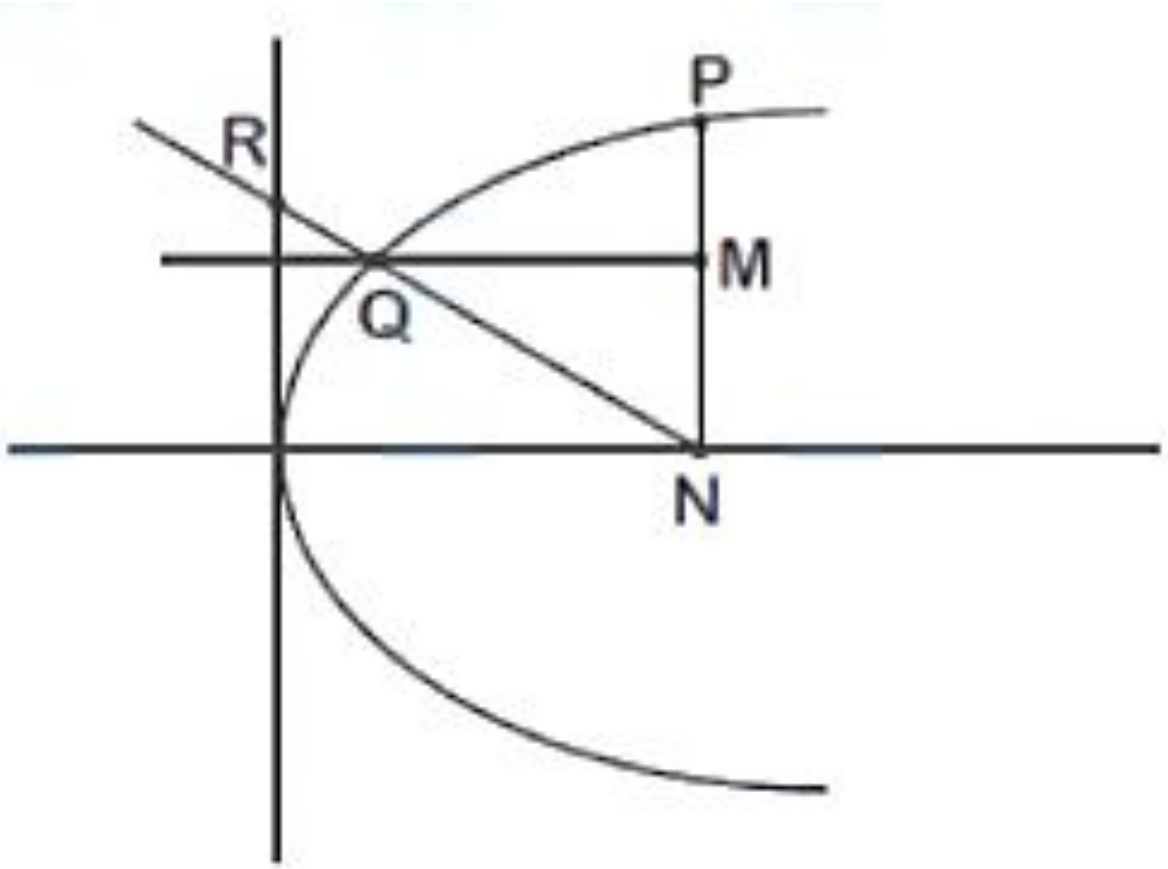
Let $P\left(at^2, 2at\right)$ where $a = 3$

$\Rightarrow N\left(at^2, 0\right) \Rightarrow M\left(at^2, at\right)$

$\because \quad QM \equiv y = at$

So $y^2 = 4ax \Rightarrow x = \dfrac{at^2}{4}$

$\Rightarrow Q\left(\dfrac{at^2}{4}, at\right)$

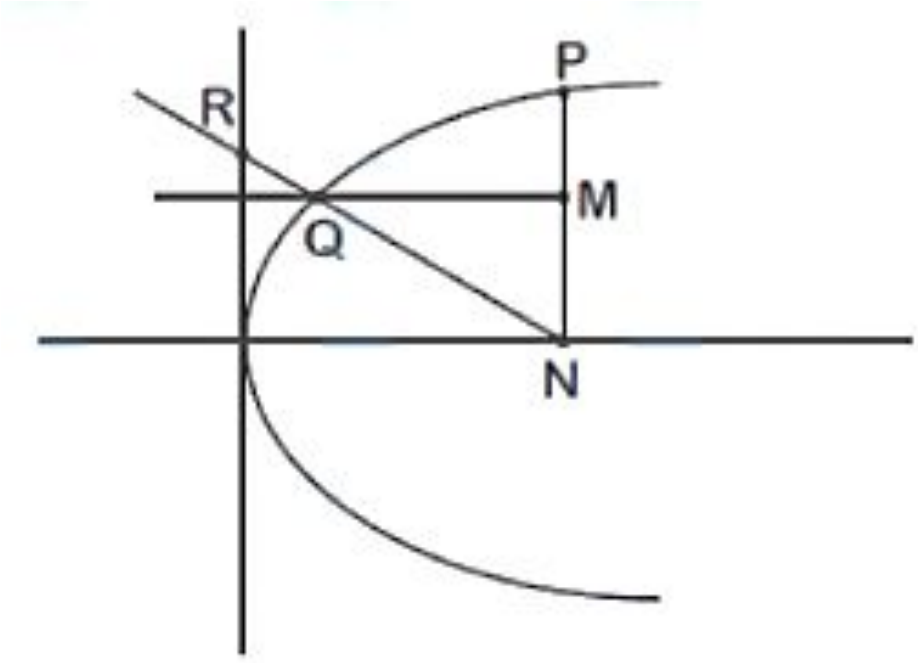


Solution:

QN passes through $\left(0, \frac{4}{3}\right)$, then

$$\frac{4}{3} = -\frac{4}{3t}\left(-at^2\right) \Rightarrow at = 1 \Rightarrow t = \frac{1}{3}$$

Now, $MQ = \frac{3}{4}at^2 = \frac{1}{4}$ and $PN = 2at = 2$



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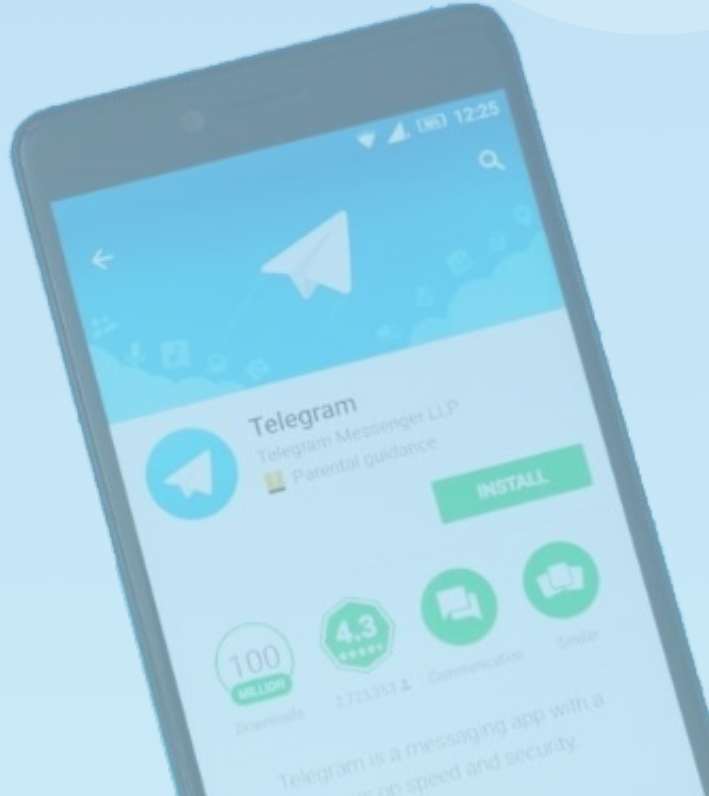
Assignments

Notes

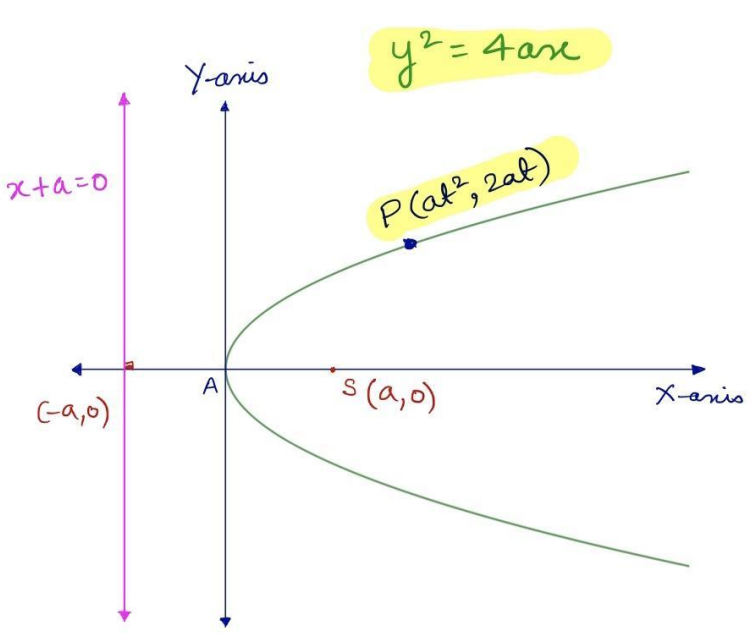
Daily Update

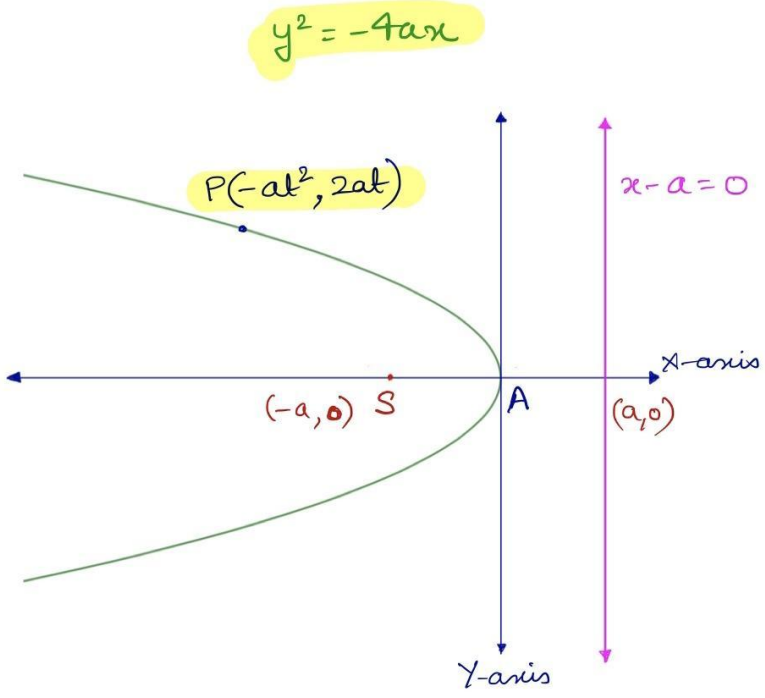


https://vdnt.in/jeepro

Link in Bio

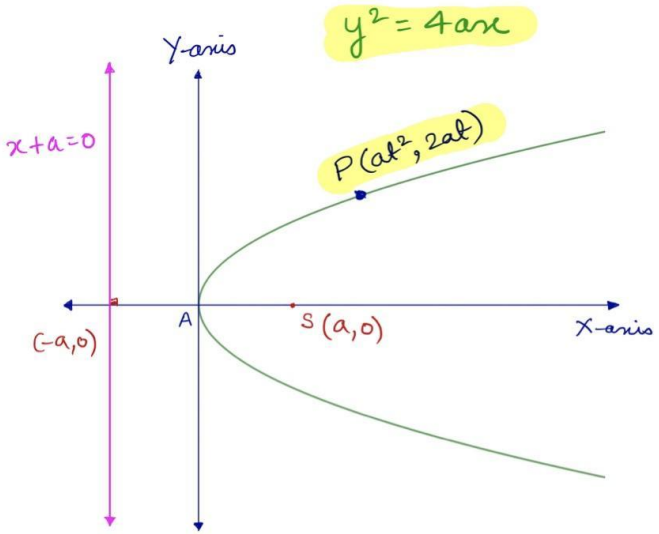
Standard parabolas having vertex at origin

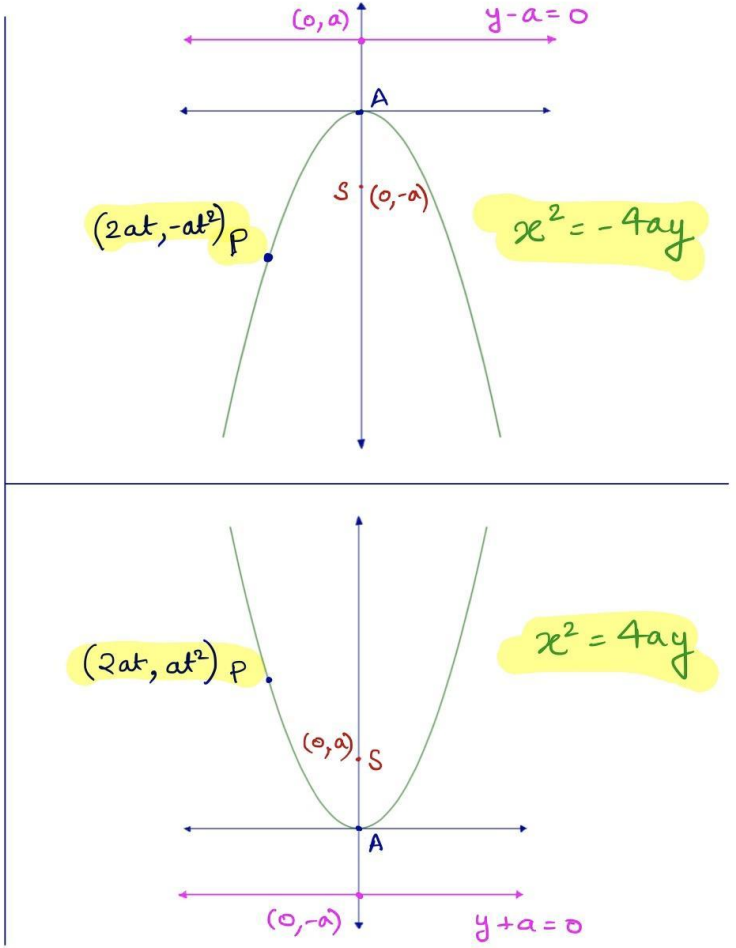




Parabola

Standard parabolas having vertex at origin





Standard parabolas having vertex at any point

Consider the following equations for $a > 0$ and remember their graphs.

(1) $\mathbf{(y-k)^2 = 4a(x-h)}$

Parabola

Q. Axis of a parabola lies along x-axis. If its vertex and focus are at distance 2 and 4 respectively from the origin, on the positive x-axis then which of the following points does not lie on it?

A $(5, 2\sqrt{6})$ **B** $(8, 6)$ **C** $(6, 4\sqrt{2})$ **D** $(4, -4)$

JEE-Main 2019

Parabola

Q. Axis of a parabola lies along x-axis. If its vertex and focus are at distance 2 and 4 respectively from the origin, on the positive x-axis then which of the following points does not lie on it?

A $(5, 2\sqrt{6})$ **B** $(8, 6)$ **C** $(6, 4\sqrt{2})$ **D** $(4, -4)$

JEE-Main 2019

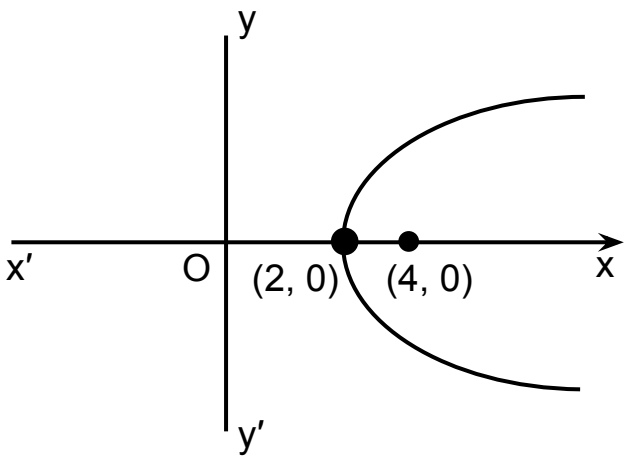
Since, vertex and focus of given parabola is (2, 0) and (4, 0) respectively.

Then, equation of parabola is

$$(y-0)^2 = 4 \times 2\,(x-2)$$

$$\Rightarrow y^2 = 8x - 16$$

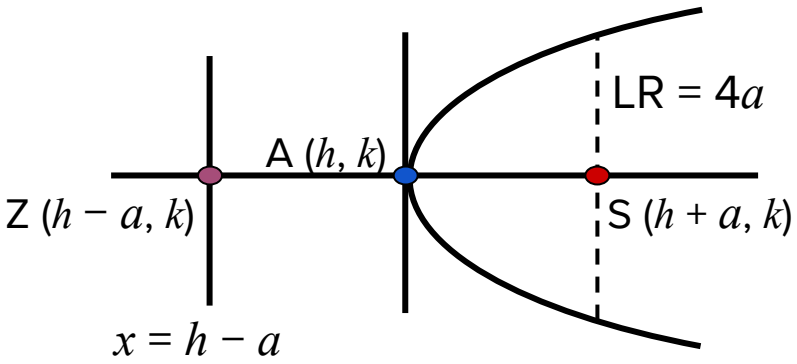
Hence, the point (8, 6) does not lie on given parabola.



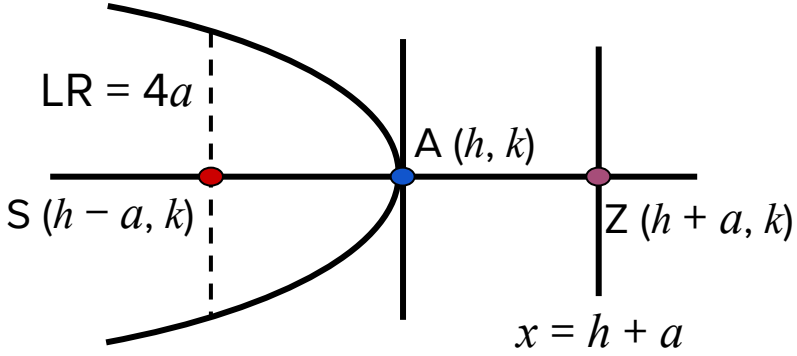
Standard parabolas having vertex at any point

Consider the following equations for $a > 0$ and remember their graphs.

(1) $(y - k)^2 = 4a(x - h)$



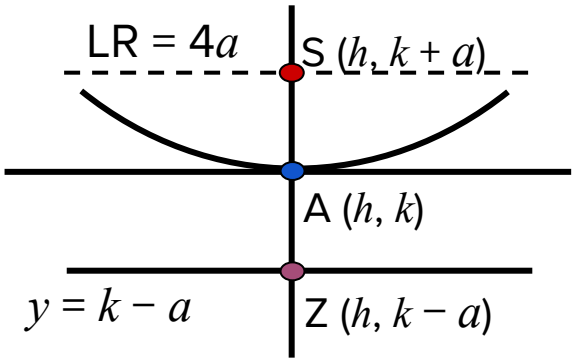
(2) $(y - k)^2 = -4a(x - h)$



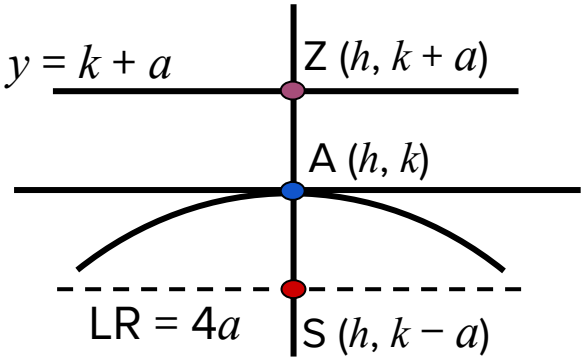
Standard parabolas having vertex at any point

Consider the following equations for $a > 0$ and remember their graphs.

(3) $(x - h)^2 = 4a(y - k)$



(4) $(x - h)^2 = -4a(y - k)$



Parabola

Q. If the area of the triangle whose one vertex is at the vertex of the parabola, $y^2 + 4(x - a^2) = 0$ and the other two vertices are the points of intersection of the parabola and y-axis, is 250 sq. units, then a value of 'a' is_____.

(Numerical type)

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Parabola

Q. If the area of the triangle whose one vertex is at the vertex of the parabola, $y^2 + 4(x - a^2) = 0$ and the other two vertices are the points of intersection of the parabola and y-axis, is 250 sq. units, then a value of 'a' is_____.

(Numerical type)

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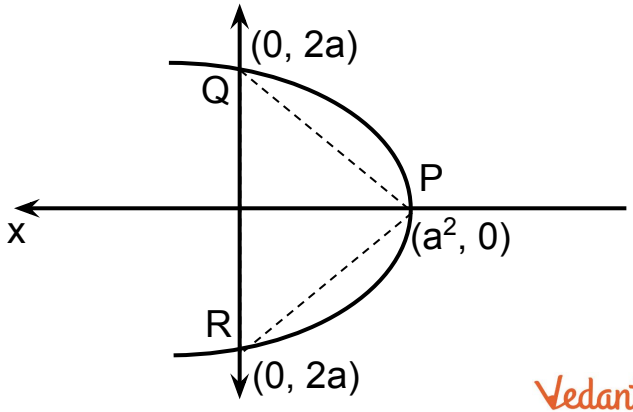
Solution:

$$y^2 = -4\left(x - a^2\right)$$

$$\text{Area} = \frac{1}{2}(4a)\left(a^2\right) = 2a^3$$

$$\text{Since } 2a^3 = 250 \Rightarrow a = 5$$



Parabola

Q. If one end of a focal chord of the parabola, $y^2 = 16x$ is at (1, 4), then the length of this focal chord is:

A 25 **B** 22 **C** 24 **D** 20

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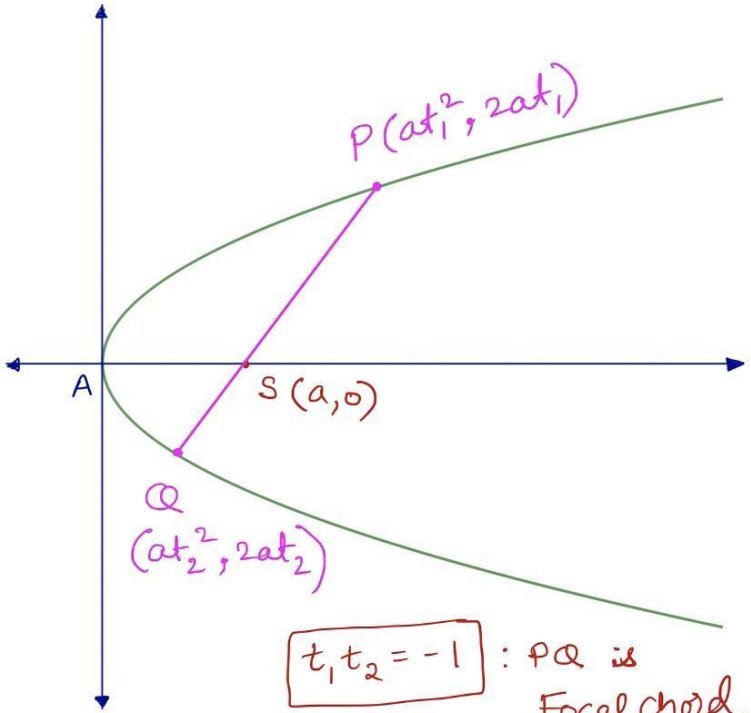
Parabola

Properties of Focal Chord

⊙ If PQ is a Focal chord, then S(a,0) must satisfy Eqn(i)

$\Rightarrow (t_1 + t_2)0 = 2a + 2at_1t_2$

$\Rightarrow \boxed{t_1t_2 = -1}$



$t_1t_2 = -1$: PQ is Focal chord.

or

$t_2 = -\frac{1}{t_1}$

Properties of Focal Chord

Description

If one extremity of a focal chord is $\left(at_1^2, 2at_1\right)$, then the other extremity $\left(at_2^2, 2at_2\right)$ becomes $\left(\frac{a}{t_1^2}, \frac{-2a}{t_1}\right)$ by virtue of relation $t_1\, t_2 = -1$.

If one end of the focal chord of parabola is $(at^2, 2at)$, then other end will be $\left(at^2, \frac{-2a}{t}\right)$ and length of chord $= a\left(t + \frac{1}{t}\right)^2$.

The focal chord of parabola $y^2 = 4ax$ making an angle α with the x-axis is of length $4a\ \text{cosec}^2\ \alpha$ and perpendicular on it from the vertex is $a \sin\alpha$.

Q. If one end of a focal chord of the parabola, $y^2 = 16x$ is at (1, 4), then the length of this focal chord is:

A 25 **B** 22 **C** 24 **D** 20

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$y^2 = 16x$

$\Rightarrow a = 4$

One end of focus of the parabola is at $(1, 4)$

$y -$ coordinate of focal chord is $2at$

$2 \text{ at} = 4$

$\Rightarrow t = \frac{1}{2}$

Hence, the required length of focal chord

$= a\left(t + \frac{1}{t}\right)^2 = 4 \times \left(2 + \frac{1}{2}\right)^2 = 25$

Tangent to a Parabola :

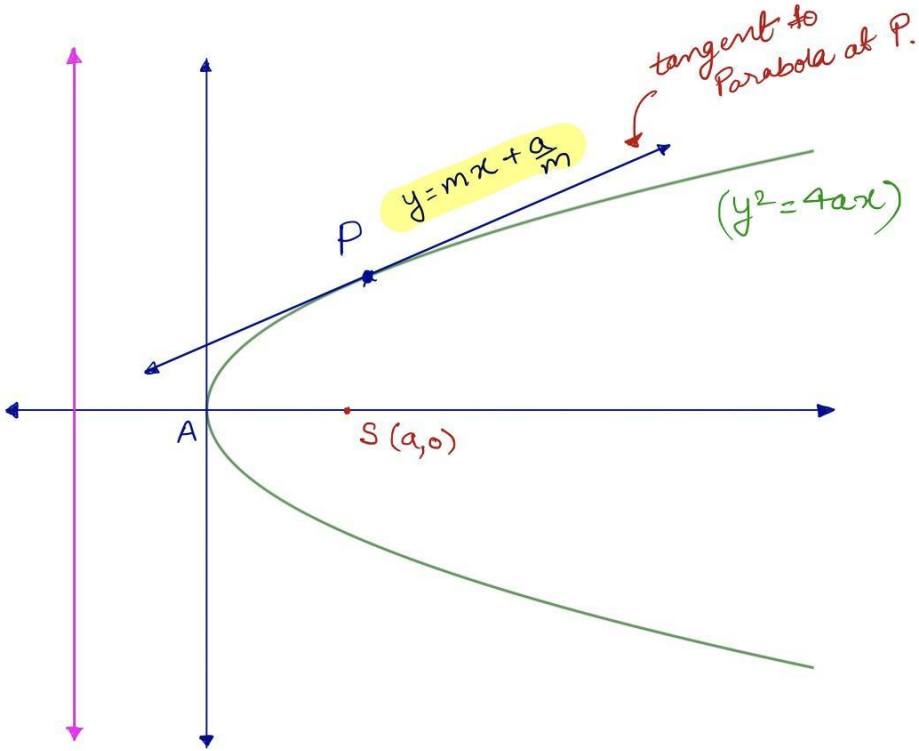
⊙ Condition for a line of slope (m) : $y = mx + c$ to be tangent to the Parabola.

$$c = a/m$$

or,

Tangent of slope (m) to the Parabola :

$$y = mx + \frac{a}{m}$$



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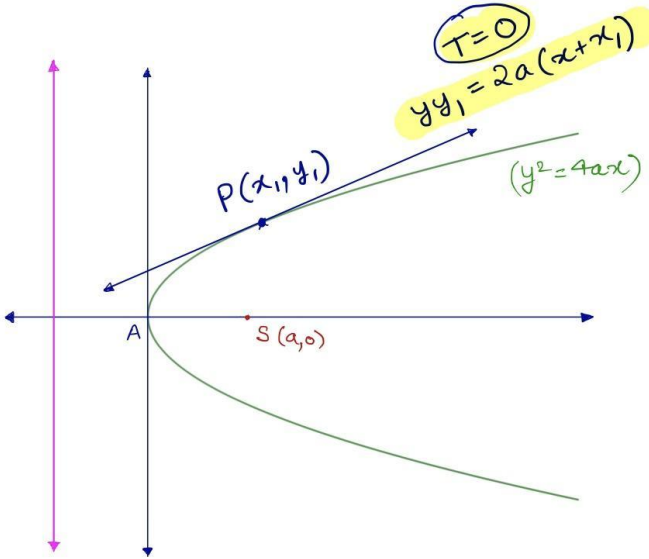
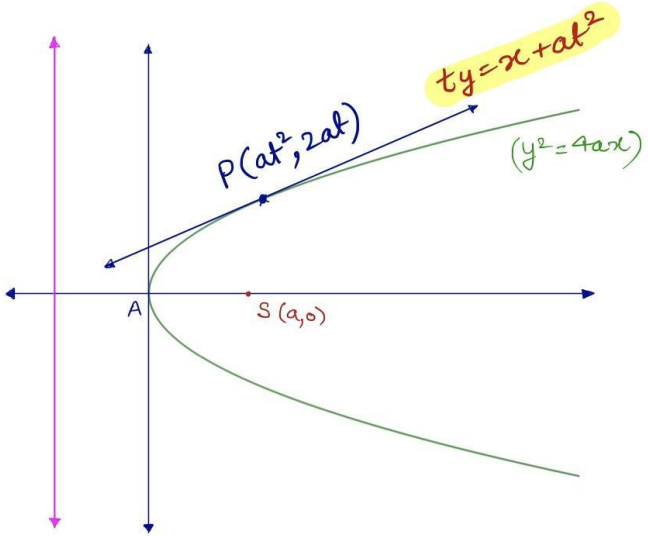
Equation of Tangent to Parabola in Diffurnt Forms :



Eqn. of tangent to Parabola at $P(x_1, y_1)$:

$$yy_1 = 2a(x+x_1)$$



Eqn. of tangent to Parabola at $P(at^2, 2at)$:

$$ty = x + at^2$$

Parabola

Various equations of tangents to $y^2 = 4ax$

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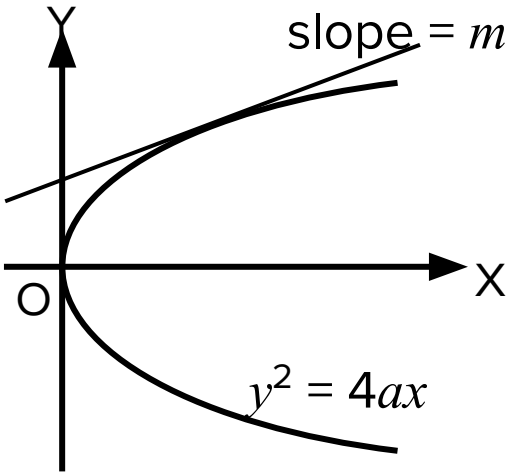
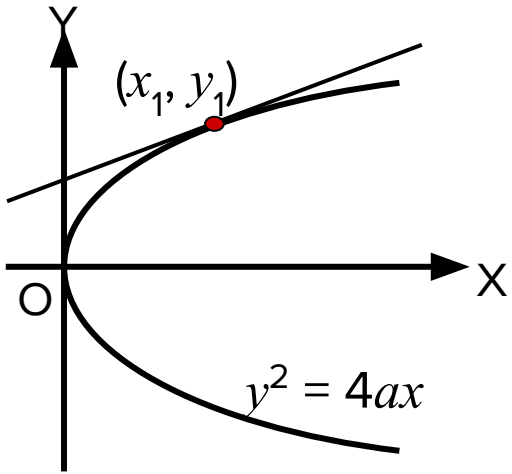
Slope form



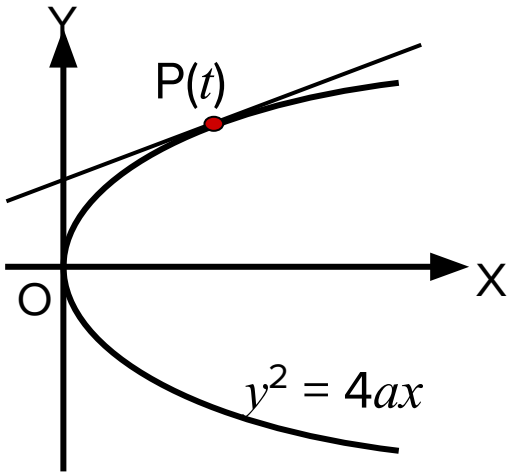
$$y = mx + \frac{a}{m}$$

Tangent at a point on a parabola



T = 0

Parametric form



T = 0 ⇒ $ty = x + at^2$

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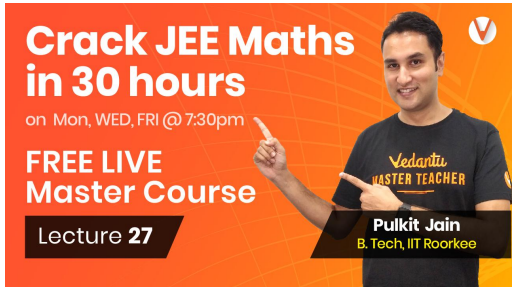
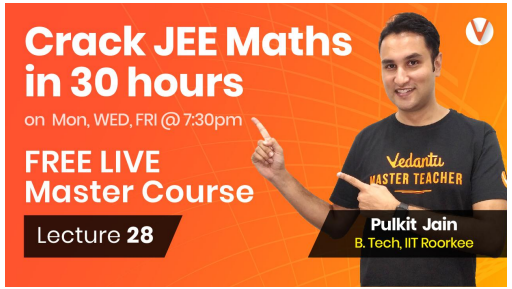
Parabola

Previously Taken Detailed Classes on Coordinate Geometry (Lectures 27 - 32)

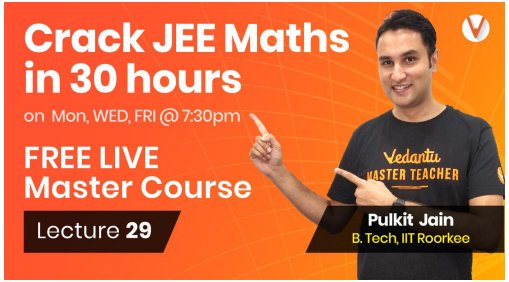


Straight Lines - 1



Straight Lines - 2

Normal to Parabola



Circles and Tangents

Parabola and Tangents

Ellipse and Hyperbola

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https://www.youtube.com/watch?v=C4pO-NnfCcY&list=PLCtUyOrCJbxxkL5dPyLJi9UmUlrP-etG3&index=27

Parabola

Q. If one end of a focal chord AB of the parabola $y^2 = 8x$ is at $A\left(\frac{1}{2}, -2\right)$ then the equation of the tangent to it at B is :

A $x - 2y + 8 = 0$

B $x + 2y + 8 = 0$

C $2x - y - 24 = 0$

D $2x + y - 24 = 0$

JEE-Main 2020

Parabola

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JEE-Main 2020

Parabola

Solution:

Let $\left(\frac{1}{2}, -2\right)$ is $\left(2t^2, 4t\right) \Rightarrow t = \frac{-1}{2}$

Parameter of other end of focal chord is 2

$\Rightarrow$ point is (8, 8)

$\Rightarrow$ Equation of tangent is $8y - 4\left(x + 8\right) = 0$

$\Rightarrow 2y - x = 8$

Parabola

Q. The equation of a tangent to the parabola, $x^2 = 8y$, which makes an angle θ with the positive direction of x-axis, is:

A $y = x\tan\theta + 2\cot\theta$

B $y = x\tan\theta - 2\cot\theta$

C $x = y\cot\theta + 2\tan\theta$

D $x = y\cot\theta - 2\tan\theta$

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Parabola

Q. The equation of a tangent to the parabola, $x^2 = 8y$, which makes an angle θ with the positive direction of x-axis, is:

A y = x tanθ+2cotθ

B y = x tanθ - 2 Cotθ

C x = y cotθ + 2 tanθ

D x = ycotθ - 2 tanθ

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$x^2 = 8y$

Then, equation of tangent at P

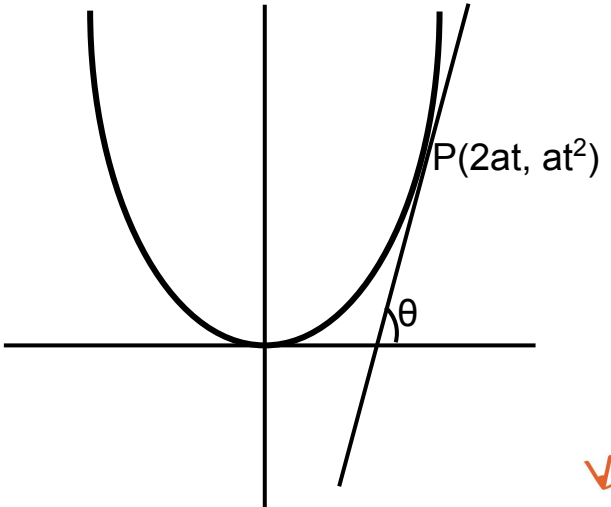
$tx = y + at^2$

$\Rightarrow y = tx - at^2$

Then, slope $t = \tan\theta$

Now, $y = \tan\theta x - 2\tan^2\theta$

$\Rightarrow \cot\theta y = x - 2\tan\theta \Rightarrow x = y\cot\theta + 2\tan\theta$



Q. The tangent to the parabola $y^2 = 4x$ at the point where it intersects the circle $x^2 + y^2 = 5$ in the first quadrant, passes through the point :

A $\left(-\frac{1}{3}, \frac{4}{3}\right)$ **B** $\left(\frac{1}{3}, \frac{3}{4}\right)$ **C** $\left(\frac{3}{4}, \frac{7}{4}\right)$ **D** $\left(-\frac{1}{4}, \frac{1}{2}\right)$

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Solution:

To find intersection point of $x^2 + y^2 = 5$ and $y^2 = 4x$,

substitute $y^2 = 4ax$ in $x^2 + y^2 = 5$, we get

$x^2 + 4x - 5 = 0 \Rightarrow x^2 + 5x - x - 5 = 0$

$\Rightarrow x(x+5) - 1(x+5) = 0$

$x = 1, -5$

Intersection point in 1st quadrant be (1, 2).

Q. The tangent to the parabola $y^2 = 4x$ at the point where it intersects the circle $x^2 + y^2 = 5$ in the first quadrant, passes through the point :

A $\left(-\frac{1}{3}, \frac{4}{3}\right)$ **B** $\left(\frac{1}{3}, \frac{3}{4}\right)$ **C** $\left(\frac{3}{4}, \frac{7}{4}\right)$ **D** $\left(-\frac{1}{4}, \frac{1}{2}\right)$

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Solution:

Intersection point in 1st quadrant be (1, 2).

Now, equation of tangent to $y^2 = 4x$ at (1, 2) is

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

$\Rightarrow x - y + 1 = 0 \ldots\ldots\ldots (i)$

Hence, $\left(\frac{3}{4}, \frac{7}{4}\right)$ lies on (i)

Q. Equation of a common tangent to the circle, $x^2 + y^2 - 6x = 0$ and the parabola, $y^2 = 4x$, is:

A $2\sqrt{3}y = 12x + 1$

B $\sqrt{3}y = x + 3$

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

D $\sqrt{3}y = 3x + 1$

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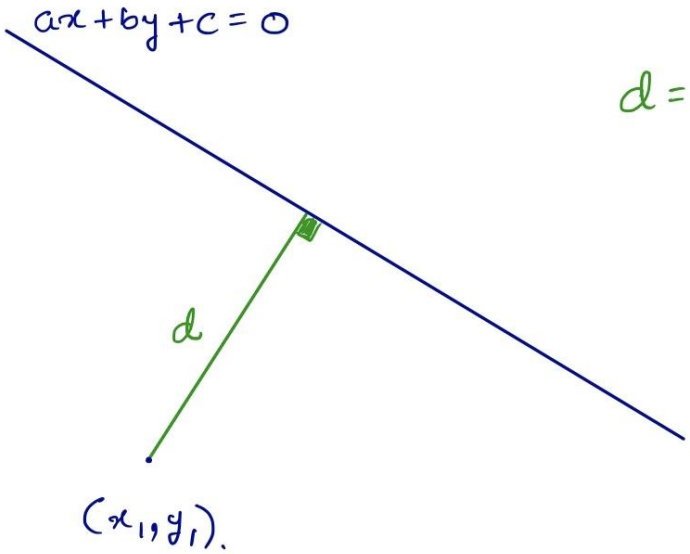
Vedantu

Perpendicular Distance of a line from a point.



$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Vedantu

Q. Equation of a common tangent to the circle, $x^2 + y^2 - 6x = 0$ and the parabola, $y^2 = 4x$, is:

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

D $\sqrt{3}y = 3x + 1$

JEE-Main 2019

Solution:

$$ty = x + t^2$$

$$\left|\frac{3+t^2}{\sqrt{1+t^2}}\right| = 3$$

$$\Rightarrow t = \sqrt{3}$$

$$\Rightarrow \sqrt{3}y = x + 3$$

Q. If the line **ax + y = c**, touches both the curves $x^2 + y^2 = 1$ and $y^2 = 4\sqrt{2}x$, then **|c|** is equal to

A 2

B $\frac{1}{\sqrt{2}}$

C $\frac{1}{2}$

D $\sqrt{2}$

JEE-Main 2019

Q. If the line **ax + y = c**, touches both the curves $x^2 + y^2 = 1$ and $y^2 = 4\sqrt{2}x$, then **|c|** is equal to

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

JEE-Main 2019

Solution:

Equation of tangent on $y^2 = 4\sqrt{2}x$ is $yt = x + \sqrt{2}t^2$

This is also tangent on circle

$$\left|\frac{\sqrt{2}t^2}{\sqrt{1+t^2}}\right| = 1$$

$$\Rightarrow 2t^4 = 1 + t^2$$

$$\Rightarrow t^2 = 1$$

Hence, equation is $\pm y = x + \sqrt{2} \Rightarrow |c| = \sqrt{2}$

Angle of intersection between two curves

Q. If θ denotes the acute angle between the curves, $y = 10 - x^2$ and $y = 2 + x^2$ at the point of their intersection, then $|\tan \theta|$ is equal to:

A $\frac{4}{9}$

B $\frac{8}{15}$

C $\frac{7}{17}$

D $\frac{8}{17}$

JEE-Main 2019

Q. If θ denotes the acute angle between the curves, $y = 10 - x^2$ and $y = 2 + x^2$ at the point of their intersection, then $|\tan \theta|$ is equal to:

Solution:

Since, the equation of curves are

$y = 10 - x^2 \ldots\ldots (1)$

$y = 2 + x^2 \ldots\ldots\ldots (2)$

Adding eqn (1) and (2), we get

$2y = 12 \Rightarrow y = 6$

Then, from eqn (1)

$x = \pm 2$

Q. If θ denotes the acute angle between the curves, $y = 10 - x^2$ and $y = 2 + x^2$ at the point of their intersection, then $|\tan\theta|$ is equal to:

A $\frac{4}{9}$ B $\frac{8}{15}$ C $\frac{7}{17}$ D $\frac{8}{17}$

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Differentiate equation (2) with respect to x

$$\frac{dy}{dx} = 2x \Rightarrow \left(\frac{dy}{dx}\right)_{(2,6)} = 4 \text{ and } \left(\frac{dy}{dx}\right)_{(-2,6)} = -4$$

$$\text{At } (2,6)\ \tan\theta = \left(\frac{(-4)-(4)}{1+(-4)\times(4)}\right) = \frac{-8}{15}$$

$$\text{At } (-2,6)\ \tan\theta = \left(\frac{(4)-(4)}{1+(4)\times(-4)}\right) = \frac{8}{-15}$$

$$\Rightarrow |\tan\theta| = \frac{8}{15}$$

Parabola

Q. Let A (4, -4) and B (9, 6) be points on the parabola, $y^2 = 4x$. Let C be chosen on the arc AOB of the parabola, where O is the origin, such that the area of ΔACB is maximum. Then, the area (in sq. units) of ΔACB, is:

A $31\frac{1}{4}$ **B** $30\frac{1}{2}$ **C** 32 **D** $31\frac{3}{4}$

JEE-Main 2019

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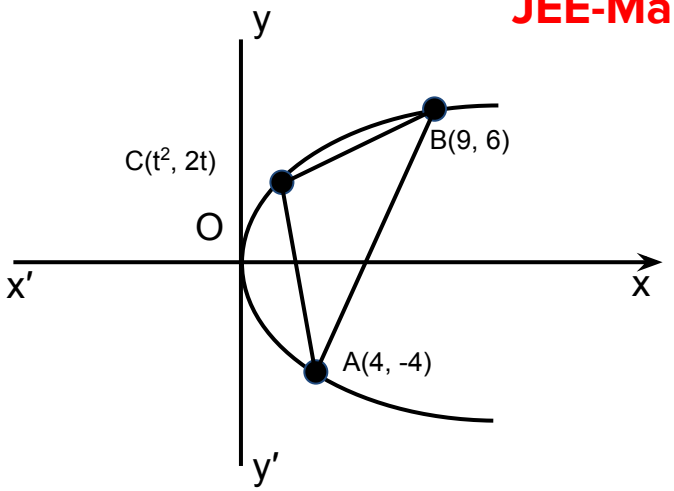
JEE-Main 2019



Solution:

Alternate Approach:

Let the coordinates of C is $(t^2, 2t)$

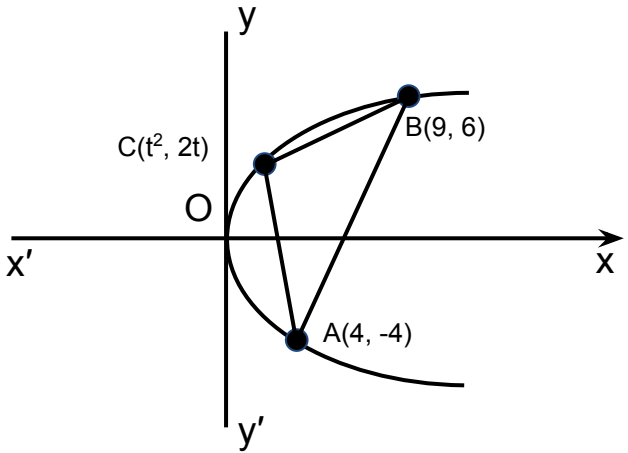
Since, area of ΔACB

$$= \frac{1}{2}\begin{vmatrix} t^2 & 2t & 1 \\ 9 & 6 & 1 \\ 4 & -4 & 1 \end{vmatrix} = \frac{1}{2}\left|t^2(6+4) - 2t(9-4) + 1(-36-24)\right|$$

$$= \frac{1}{2}\left|10t^2 - 10t - 60\right| = 5\left|t^2 - t - 6\right| = 5\left|\left(t - \frac{1}{2}\right)^2 - \frac{25}{4}\right|$$

For maximum area, $t = \frac{1}{2}$

Hence maximum area $= \frac{125}{4} = 31\frac{1}{4}$ sq. units



Home Assignment Problems

Q1. If the tangent at **(1, 7)** to the curve $x^2 = y - 6$ touches the circle $x^2 + y^2 + 16x + 12y + c = 0$ then the value of c is :

A 95 **B** 195 **C** 185 **D** 85

JEE (Main) 2018

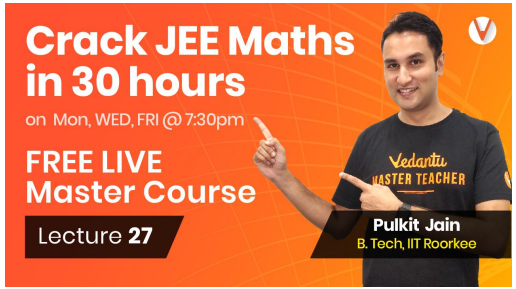
Q2. The slope of the line touching both the parabolas $y^2 = 4x$ and $x^2 = -32y$ is

A $\frac{1}{2}$ B $\frac{3}{2}$ C $\frac{1}{8}$ D $\frac{2}{3}$

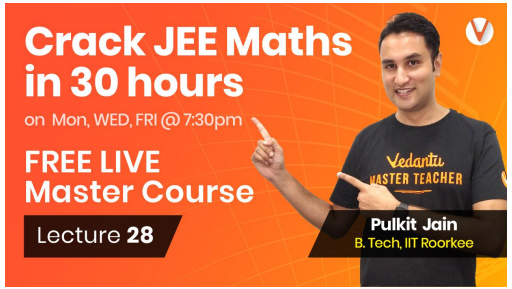
JEE (Main) 2014

Parabola

Previously Taken Detailed Classes on Coordinate Geometry (Lectures 27 - 32)

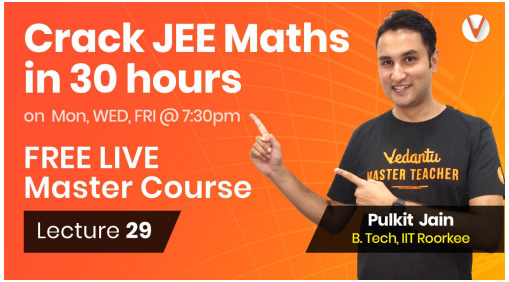


Straight Lines - 1



Straight Lines - 2

Normal to Parabola



Circles and Tangents

Parabola and Tangents

Ellipse and Hyperbola

✔ Crack JEE Maths in 30 Hours - Playlist:-

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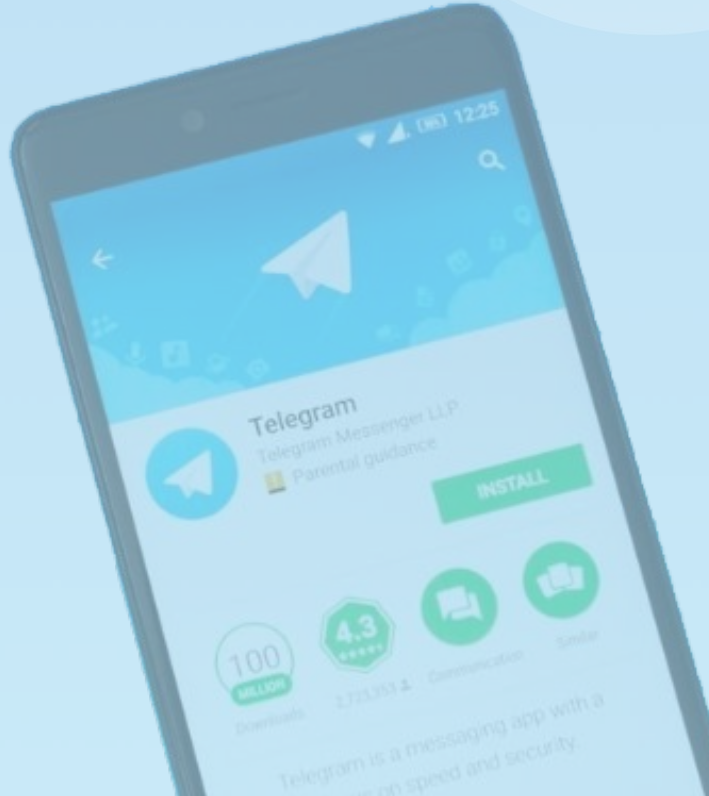

https://vdnt.in/jeepro

Link in Bio

CRACK JEE

#LearningWon'tStop

All the very best :-)

DREAM ON!

Solutions to Home Assignment Problems

Q1. If the tangent at **(1, 7)** to the curve $x^2 = y - 6$ touches the circle $x^2 + y^2 + 16x + 12y + c = 0$ then the value of c is :

A 95 **B** 195 **C** 185 **D** 85

JEE (Main) 2018

Q1. If the tangent at (1, 7) to the curve $x^2 = y - 6$ touches the circle $x^2 + y^2 + 16x + 12y + c = 0$ then the value of c is :

JEE (Main) 2018

A 95

B 195

C 185

D 85

Solution:

Equation tangent at $(1, 7)$

$\Rightarrow 2x - y + 5 = 0$

perpendicular $(-8, -6)$ to line

$= \frac{|2(-8)-(-6)+5|}{\sqrt{5}} = \sqrt{8^2 + 6^2 - c}$

$\Rightarrow \sqrt{5} = \sqrt{8^2 + 6^2 - c}$

$c = 95.$

Q2. The slope of the line touching both the parabolas $y^2 = 4x$ and $x^2 = -32y$ is

A $\frac{1}{2}$ B $\frac{3}{2}$ C $\frac{1}{8}$ D $\frac{2}{3}$

JEE (Main) 2014

Parabola

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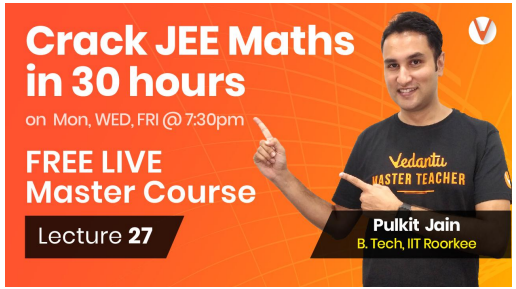

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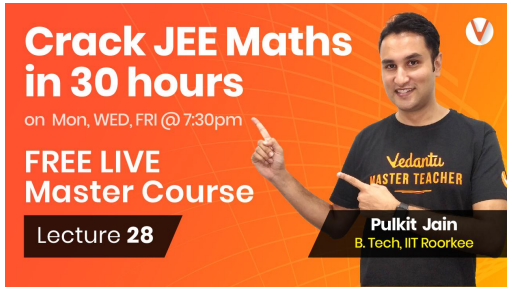
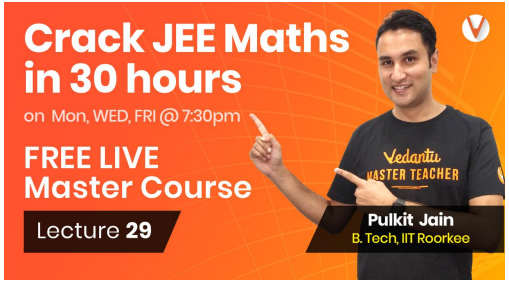


Straight Lines - 2

Normal to Parabola



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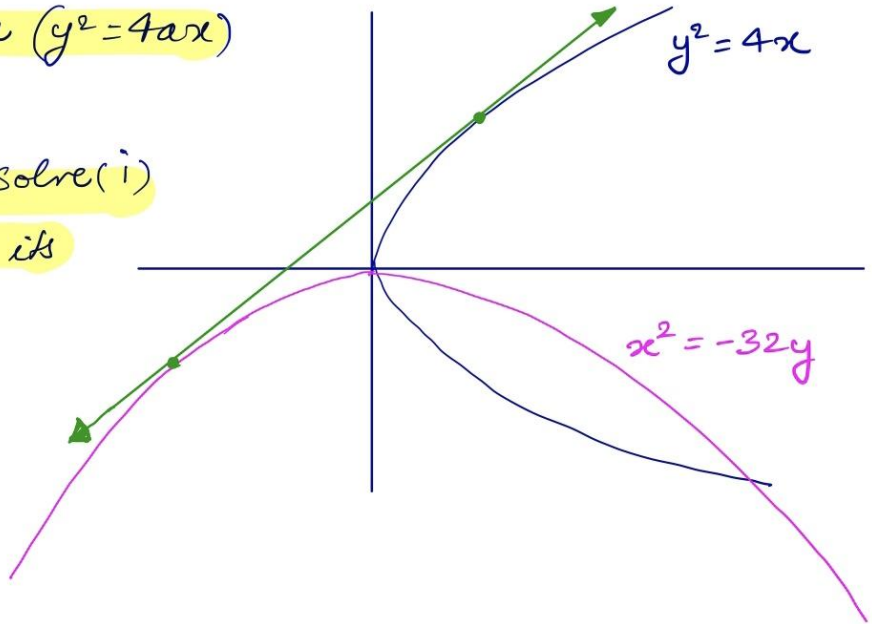
Parabola

Approach : Let the tangent to parabola $(y^2 = 4ax)$ be $\left(y = mx + \frac{a}{m}\right)$ –(i)

If it touches other curve, solve (i) with eqn. of curve & make its $(D = 0)$ to get value of m.

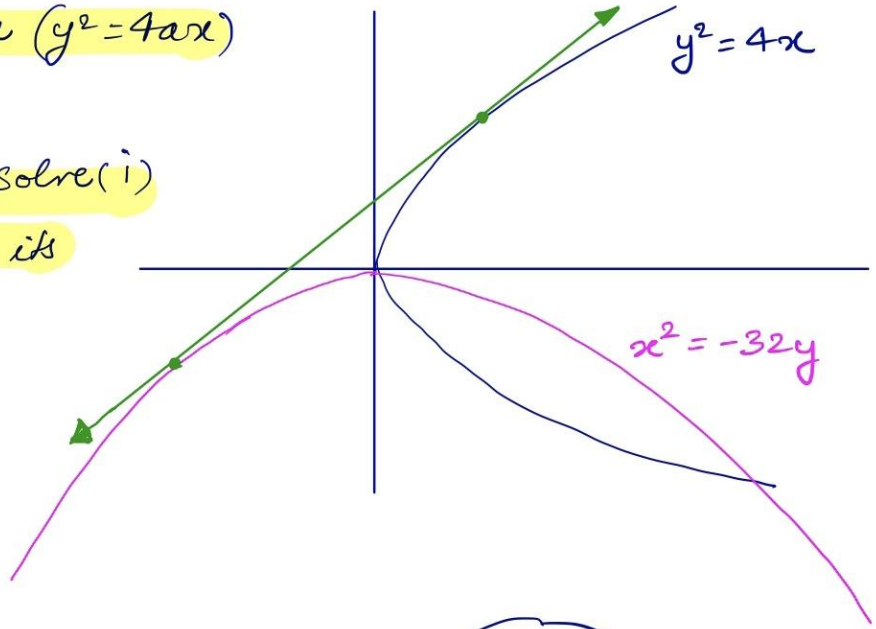


Parabola

Vedantu

Approach : Let the tangent to parabola $(y^2 = 4ax)$ be $\left(y = mx + \frac{a}{m}\right)$ -(i)

If it touches other curve, solve (i) with eqn. of curve & make its $(D = 0)$ to get value of m.



For parabola $y^2 = 4x$,

tangent : $y = mx + \frac{1}{m}$ -(i)

Since, (i) touches $(x^2 = -32y)$

$\Rightarrow$ $x^2 = -32\left(mx + \frac{1}{m}\right)$ → will have only one soln. $\Rightarrow$ $D = 0$

$\Rightarrow$, $x^2 + 32mx + \frac{32}{m} = 0$ → $D = (32m)^2 - 4 \times \left(\frac{32}{m}\right) = 0$

$\Rightarrow$ $m^3 = 1/8$ $\Rightarrow$ $m = 1/2$