NDA 1 2025

LIVE

MATHS

ANALYTICAL GEOMETRY 2D - 2

MCQS

NAVJYOTI SIR

Crack
EXAMS

29 Jan 2025 Live Classes Schedule

9:00AM	29 JANUARY 2025 DAILY DEFENCE UPDATES	DIVYANSHU SIR
10:00AM	29 JANUARY 2025 DAILY CURRENT AFFAIRS	RUBY MA'AM

AFCAT 1 2025 LIVE CLASSES

12:30PM	REASONING - BLOOD RELATIONS	RUBY MA'AM
3:00PM	STATIC GK - GI TAGS	DIVYANSHU SIR
4:30PM	ENGLISH - ANTONYMS - CLASS 1	ANURADHA MA'AM
5:30PM	MATHS - SPEED DISTANCE TIME	NAVJYOTI SIR

NDA 1 2025 LIVE CLASSES

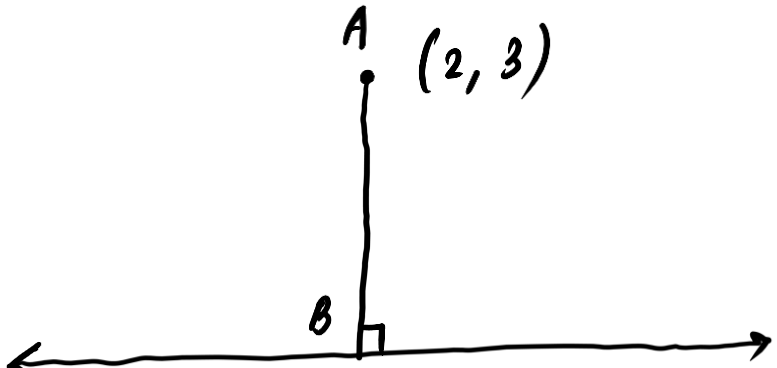
10:00AM	MATHS - ANALYTICAL GEOMETRY 2D - CLASS 2	NAVJYOTI SIR
11:30AM	MODERN HISTORY - CLASS 1	RUBY MA'AM
1:00PM	PHYSICS - FORCE & LAWS OF MOTION	NAVJYOTI SIR
4:30PM	ENGLISH - ANTONYMS - CLASS 1	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	MODERN HISTORY - CLASS 1	RUBY MA'AM
1:00PM	PHYSICS - FORCE & LAWS OF MOTION	NAVJYOTI SIR
4:30PM	ENGLISH - ANTONYMS - CLASS 1	ANURADHA MA'AM
5:30PM	MATHS - SPEED DISTANCE TIME	NAVJYOTI SIR

What are the coordinates of the foot of the perpendicular from the point (2, 3) on the line $x + y - 11 = 0$?

(a) (2, 9) (b) (5, 6) (c) (– 5, 6) (d) (6, 5)



$x + y - 11 = 0$

slope $m_1 = \frac{-1}{1} = -1$

slope of AB $= -\left(\frac{1}{-1}\right) = 1$

eqn of AB

$y - 3 = 1(x - 2)$

$y - 3 = x - 2$

option should satisfy this,

(b) (5, 6)

What is the locus of the point of intersection of the straight lines $(x/a) + (y/b) = m$ and $(x/a) - (y/b) = 1/m$?

(a) Circle (b) Parabola

(c) Ellipse (d) Hyperbola

$$\frac{x}{a} + \frac{y}{b} = m$$

$$\frac{x}{a} - \frac{y}{b} = \frac{1}{m}$$

Squaring and subtracting

$$\frac{2x}{a} = m + \frac{1}{m} \quad \Big| \quad \frac{2y}{b} = m - \frac{1}{m}$$

$$\frac{4x^2}{a^2} - \frac{4y^2}{b^2} = \left(m + \frac{1}{m}\right)^2 - \left(m - \frac{1}{m}\right)^2$$

$$\frac{4x^2}{a^2} - \frac{4y^2}{b^2} = 4$$

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

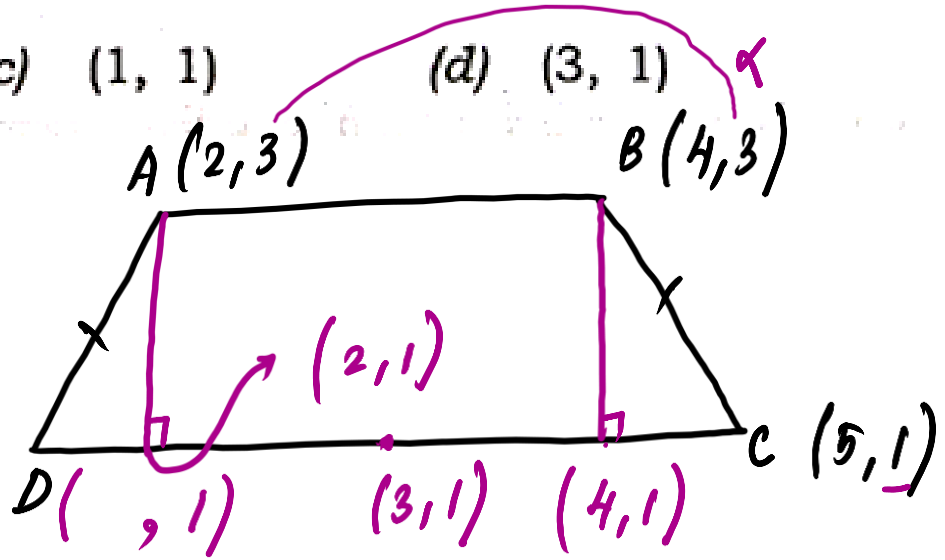
Hyperbola

$ABCD$ is an isosceles trapezium and AB is parallel to DC. Let $A(2, 3)$, $B(4, 3)$, $C(5, 1)$ be the vertices.

What are the coordinates of vertex D?

(a) (2, 1) ✗ (b) (1, 2)

(c) (1, 1) (d) (3, 1) ✗



(AD = BC)

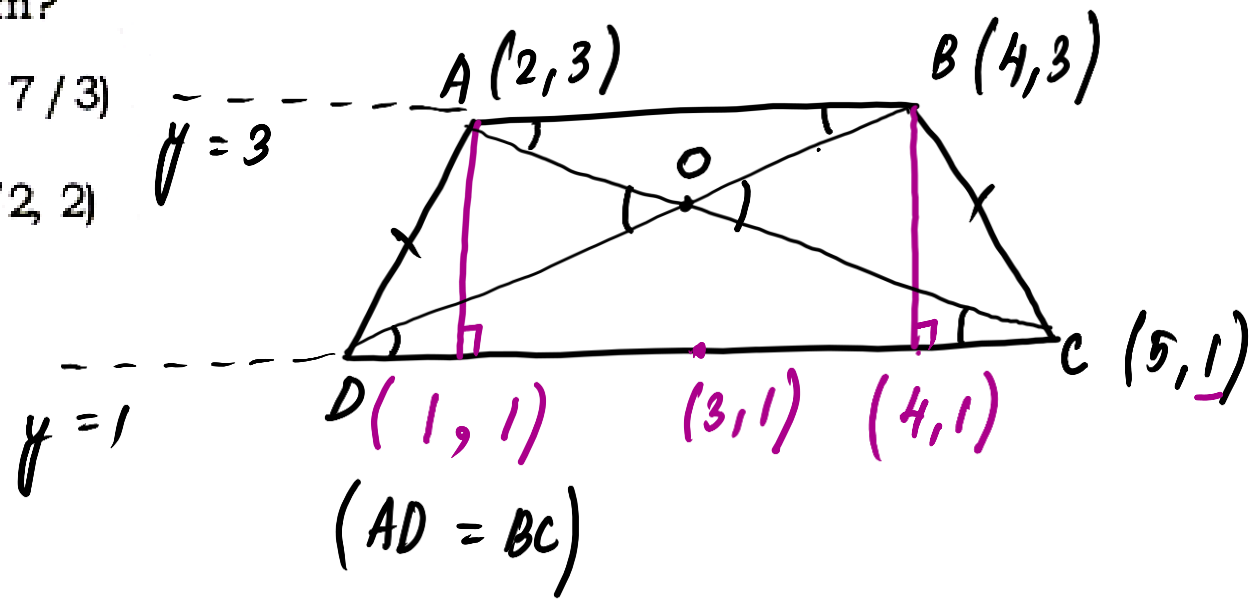
Ans. (c) (1, 1)

ABCD is an isosceles trapezium and *AB* is parallel to *DC*. Let *A*(2, 3), *B*(4, 3), *C*(5, 1) be the vertices.

What is the point of intersection of the diagonals of the trapezium?

(a) (3, 7/2) (b) (3, 7/3)

(c) (7/2, 2) (d) (5/2, 2)



. If (a, b) is the centre and c is the radius of the circle $x^2 + y^2 + 2x + 6y + 1 = 0$, then what is the value of $a^2 + b^2 + c^2$?

(a) 19

(b) 18

(c) 17

(d) 11

$x^2 + y^2 + 2gx + 2fy + c = 0$

$(a, b) \Rightarrow (-g, -f)$ (centre)

$2g = 2$ $\quad 2f = 6$

$g = 1$ $\quad f = 3$

$a = -g$ $\quad b = -f$

$a = -1$ $\quad b = -3$

radius $= \sqrt{g^2 + f^2 - c} = \sqrt{1^2 + 3^2 - 1} = 3 =$ (c) (from question)

$a = -1$

$b = -3$

$c = 3$

$a^2 + b^2 + c^2 = 1 + 9 + 9$

$= 19$

The equation of a circle is

$$(x^2 - 4x + 3) + (y^2 - 6y + 8) = 0$$

Which of the following statements are correct?

I. The end points of a diameter of the circle are at (1, 2) and (3, 4).

II. The end points of a diameter of the circle are at (1, 4) and (3, 2).

III. The end points of a diameter of the circle are at (2, 4) and (4, 2).

Select the answer using the code given below.

(a) I and II only

(b) II and III only

(c) I and III only

(d) I, II and III

If end points of diameter are (x_1, y_1) and (x_2, y_2), then

$$(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0 \quad (\text{eqn of circle})$$

$$(x^2 - 4x + 3) + (y^2 - 6y + 8) = 0$$

$$(x - 3)(x - 1) + (y - 2)(y - 4) = 0$$

$$(x-3)(x-1)+(y-2)(y-4)=0$$

i) (3, 2) and (1, 4)

ii) (3, 4) and (1, 2)

] centre ⇒ (2, 3)

(2, 4) and (4, 2)

midpoint = (3, 3)

(not same) ⇒ (2, 4) and (3, 2) are not end points of diameter.

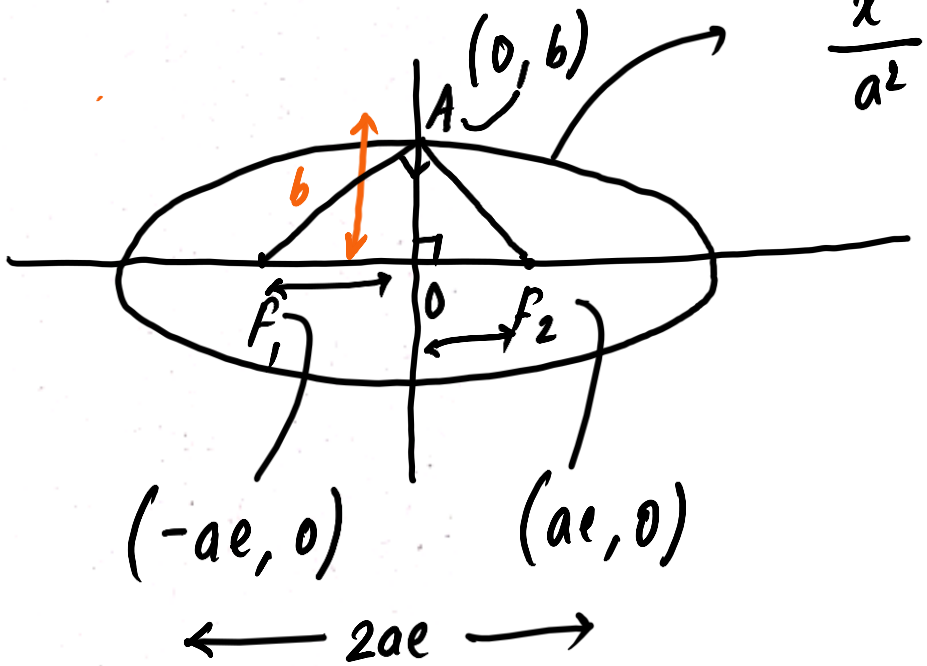
What is the eccentricity of the ellipse if the angle between the straight lines joining the foci to an extremity of the minor axis is 90° ?

(a) $\frac{1}{3}$

(b) $\frac{1}{2}$

(c) $\frac{1}{\sqrt{3}}$

(d) $\frac{1}{\sqrt{2}}$



$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

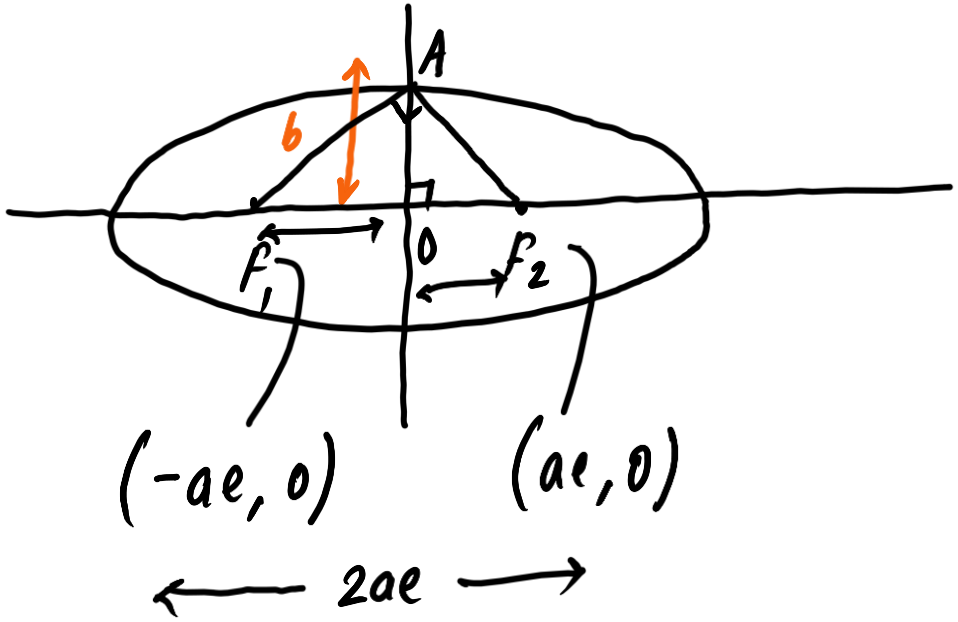
slope of AF_1,

$m_1 = \frac{b-0}{0-(-ae)} = \left(\frac{b}{ae}\right)$

e → eccentricity

slope of AF_2,

$m_2 = \frac{b-0}{0-ae} = -\left(\frac{b}{ae}\right)$



As $AF_1 \perp AF_2$

$$m_1 \cdot m_2 = -1$$

$$\left(\frac{b}{ae}\right)\left(\frac{-b}{ae}\right) = -1$$

$$\frac{b^2}{a^2e^2} = 1$$

$$a^2e^2 = b^2$$

$$e = \sqrt{1 - \frac{b^2}{a^2}} \Rightarrow \sqrt{1 - \frac{a^2e^2}{a^2}} = e$$

$$e = \sqrt{1 - e^2} \Rightarrow e^2 = 1 - e^2$$

$$2e^2 = 1 \Rightarrow e = \left(\frac{1}{\sqrt{2}}\right)$$

If the equation of the hyperbola is $9y^2 - 4x^2 = 36$, then

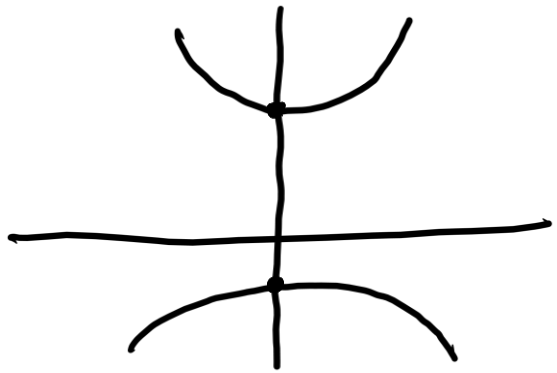
I. the coordinates of foci are $(0, \pm\sqrt{13})$ ✓

II. the eccentricity is $\frac{2}{\sqrt{13}}$. ($e < 1$ — x) for hyperbola $e > 1$,

III. the length of the latus rectum is 8. — x

$$\frac{y^2}{\left(\frac{36}{9}\right)} - \frac{x^2}{\left(\frac{36}{4}\right)} = 1$$

$$\frac{y^2}{4} - \frac{x^2}{9} = 1$$ (transverse axis → y-axis)



$$\frac{y^2}{4} - \frac{x^2}{9} = 1$$

$a = 3$

$b = 2$

ellipse $\Rightarrow$ $b^2 = a^2(1 - e^2)$

hyperbola $\Rightarrow$ $b^2 = a^2(e^2 - 1)$

$$e^2 = 1 + \frac{b^2}{a^2} = 1 + \frac{2^2}{3^2} = 1 + \frac{4}{9} \Rightarrow \left(e = \frac{\sqrt{13}}{3}\right)$$

foci $\Rightarrow (0, \pm ae)$

$$\left(0, \pm 3\left(\frac{\sqrt{13}}{3}\right)\right)$$

$$= (0, \pm\sqrt{13})$$

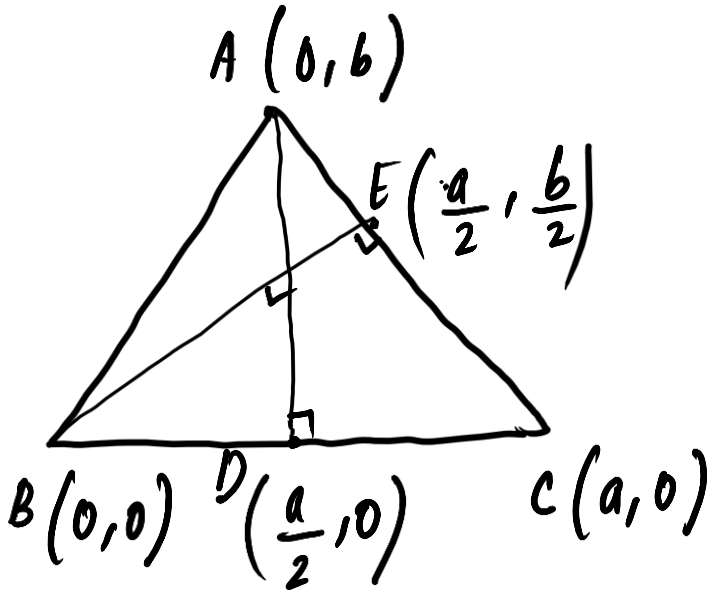
Length of latus rectum $= \frac{2b^2}{a}$

$= \frac{2(2)^2}{3} = \left(\frac{8}{3}\right)$

If the medians from A and B of the triangle with vertices A (0, b), B (0, 0) and C (a, 0) are mutually perpendicular then

(a) $a^2 = b^2$ (b) $a^2 = 2b^2$

(c) $a^2 = 4b^2$ (d) $2a^2 = b^2$



The triangle is equilateral, medians acting as altitudes.

AC (slope) = $-\frac{b}{a}$

BE (slope) = $\frac{\frac{b}{2}}{\frac{a}{2}} = \frac{b}{a}$

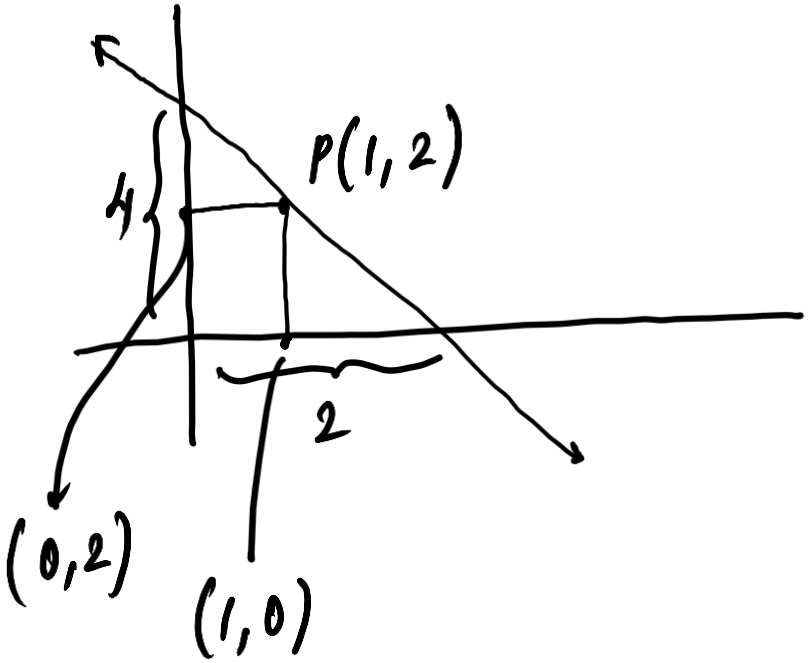
$\left(\frac{-b}{a}\right)\left(\frac{b}{a}\right) = -1$

$b^2 = a^2$

A line passes through $P(1, 2)$ such that its intercept between the axes is bisected at P. The equation of the line is

(a) $x+2y=5$ (b) $x-y+1=0$

(c) $x+y-3=0$ (d) $2x+y-4=0$



$$\frac{x}{2}+\frac{y}{4}=1$$

$$2x+y=4$$

$$2x+y-4=0$$

If the coordinates of the points A and B be (3, 3) and (7, 6), then the length of the portion of the line AB intercepted between the axes is

(a) $\frac{5}{4}$

(b) $\frac{\sqrt{10}}{4}$

(c) $\frac{\sqrt{13}}{3}$

(d) None of these

From (3,3) and (7,6) ⇒ eqn of line ⇒ convert this into intercept form

Distance between (0,b) and (a,0) = $\sqrt{a^2+b^2}$

Q) The perpendicular bisector of the line segment joining P (1, 4) and Q(k, 3) has y-intercept –4. Then a possible value of k is

(a) 1 (b) 2 (c) –2 (d) – 4

Q) If $(-5, 4)$ divides the line segment between the coordinate axes in the ratio $1:2$, then what is its equation?

(a) $8x + 5y + 20 = 0$

(b) $5x + 8y - 7 = 0$

(c) $8x - 5y + 60 = 0$

(d) $5x - 8y + 57 = 0$

Q) What does the equation $x^3y + xy^3 - xy = 0$ represent?

(a) A pair of straight lines only
(b) A pair of straight lines and a circle
(c) A rectangular hyperbola only
(d) A rectangular hyperbola and a circle

Q) If the image of the point $(-4, 2)$ by a line mirror is $(4, -2)$, then what is the equation of the line mirror?

(a) $y = x$ (b) $y = 2x$

(c) $4y = x$ (d) $y = 4x$

Q) The difference of focal distances of any point on a hyperbola is equal to

(a) latus rectum

(b) semi-transverse axis

(c) transverse axis

(d) semi-latus rectum

Q) The two parabolas $y^2 = 4ax$ and $x^2 = 4ay$ intersect

(a) at two points on the line $y = x$
(b) only at the origin
(c) at three points one of which lies on $y + x = 0$
(d) only at $(4a, 4a)$

Q) If A, B and C are in AP, then the straight line $Ax + 2By + C = 0$ will always pass through a fixed point. The fixed point is

(a) (0, 0) (b) (– 1, 1)

(c) (1, – 2) (d) (1, – 1)

Q) What is the locus of the point of intersection of the straight line $x\ \cos\theta + y\ \sin\theta = a$ and the straight line $x\ \sin\theta - y\ \cos\theta = b$?

(a) A circle
(b) An ellipse
(c) A hyperbola
(d) A parabola

Q) What is the acute angle between the lines $Ax + By = A + B$ and $A(x - y) + B(x + y) = 2B$?

(a) $45°$

(b) $\tan^{-1}\left(\frac{A}{\sqrt{A^2 + B^2}}\right)$

(c) $\tan^{-1}\left(\frac{B}{\sqrt{A^2 + B^2}}\right)$

(d) $60°$

Q) The centres of those circles which touch the circle, $x^2 + y^2 - 8x - 8y - 4 = 0$, externally and also touch the x-axis, lie on:

(a) a hyperbola

(b) a parabola

(c) a circle

(d) an ellipse which is not a circle

The focal distance of a point on the parabola $y^2 = 8x$ is 4.

Its ordinates are:

(a) ± 1 (b) ± 2 (c) ± 3 (d) ± 4

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