ULTIMATE KCET

CRASH COURSE 2026

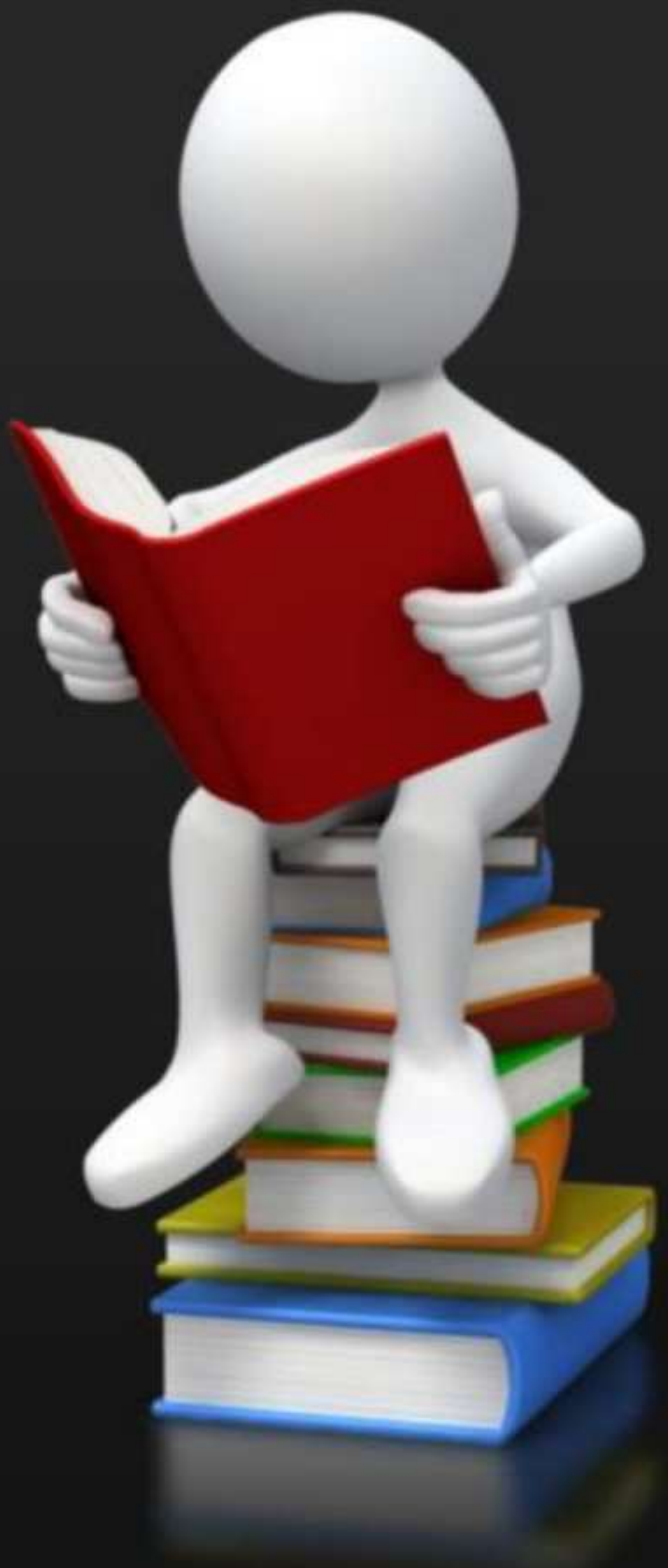
Mathematics | LEC - 01

Straight lines || conic sections || Permutations and Combinations || Statistics

By – Guru sir

Topics *to be covered*

1. Straight lines
2. Statistics
3. Conic section
4. P & C
5. LPP
6. Baye's Theorem



⊛ Straight lines

① Slope ⇒ ① $m = \tan\theta$ ② $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

θ = inclination = Angle made by the straight line wrt $\boxed{\text{+ve x-axis}}$ measured in $\boxed{\text{Anticlockwise}}$ direction.

② condition for perpendicularity & Parallelism

① Perpendicular

⇓

$m_1 \cdot m_2 = -1$

$m_1 = \dfrac{-1}{m_2}$ $m_2 = \dfrac{-1}{m_1}$

② Parallel

⇓

$m_1 = m_2$.

(*) (1) If line L is Parallel to x-axis

$$\theta = 0^\circ$$

$$m = 0$$

(2) If line L is parallel to y-axis

$$\theta = 90^\circ$$

$$m = N.D = \frac{1}{0}$$

Angle b/w 2 lines :-

$$\tan\theta = \left|\frac{m_2 - m_1}{1 + m_1 m_2}\right|$$

Acute angle

$\therefore$ obtuse angle $\Rightarrow$ $\boxed{\phi = \pi - \theta}$

Eq^n of a line:-

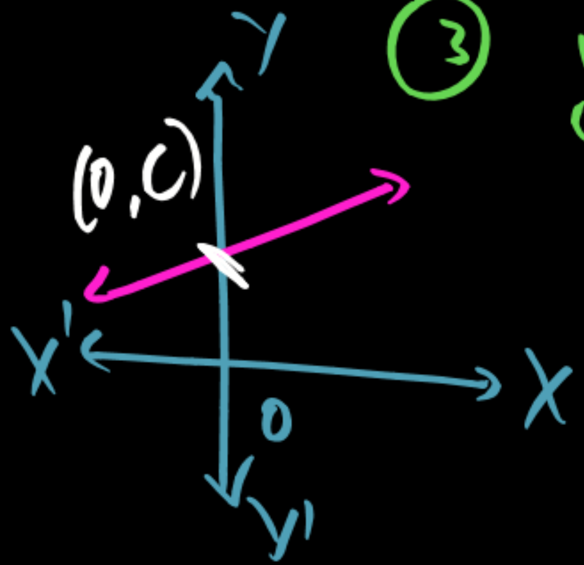
① Slope Point form :-

$$y - y_1 = m(x - x_1)$$

② Two point form:-

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

③ y-intercept form:-



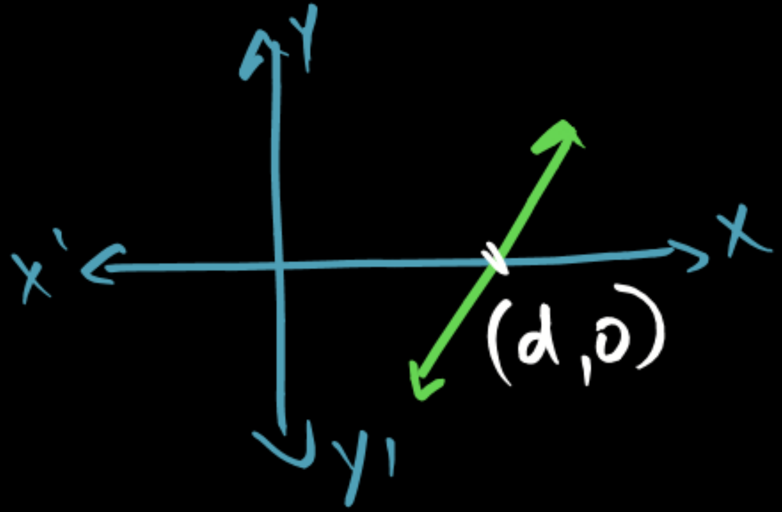
$$y = mx + c$$

$c \rightarrow$ y-intercept

④ x-intercept form:-

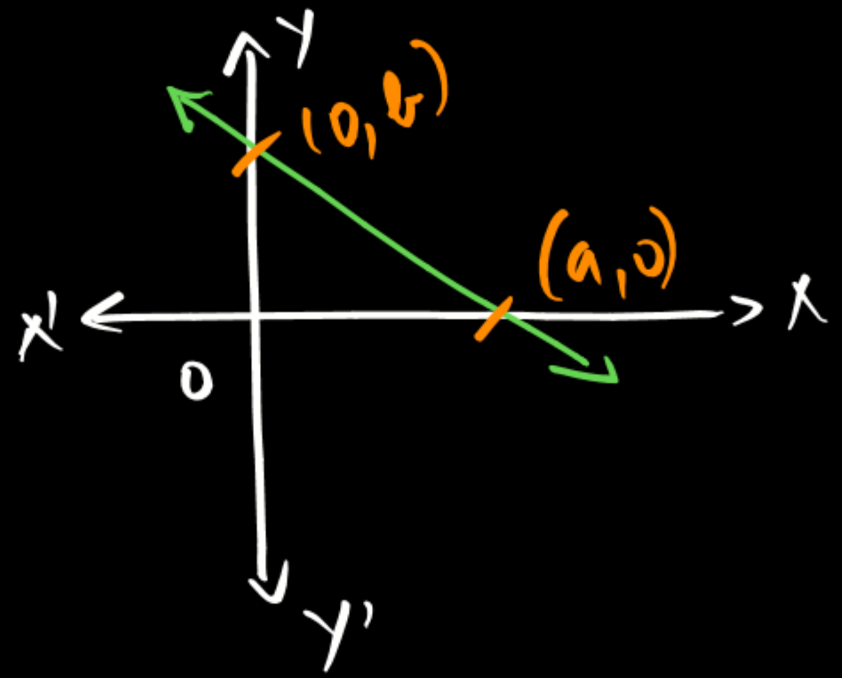
$$y = m(x - d)$$

$d \rightarrow$ x-intercept



(5) Intercept form:-

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



(*) general form of a line:-

$$Ax + By + C = 0$$

(1) slope(m) $= -\frac{A}{B}$

(2) x-intercept:-

Put $y = 0$

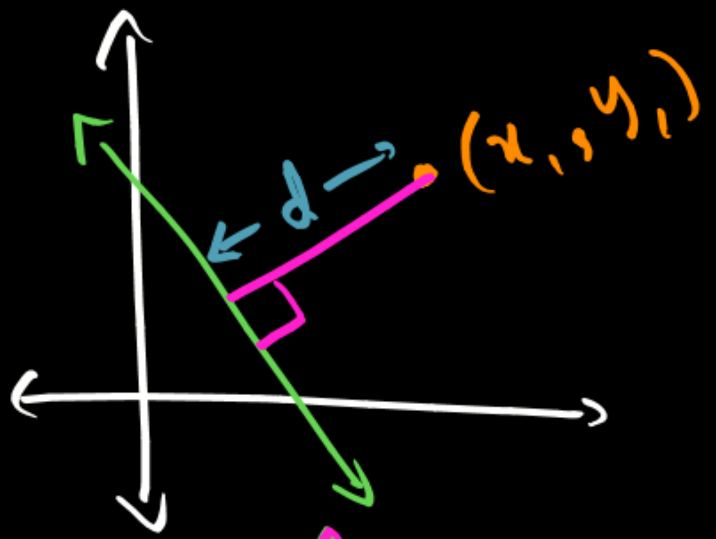
$$\boxed{x = -\frac{C}{A}}$$

(3) y-intercept:-

Put $x = 0$

$$y = -\frac{C}{B}$$

(*) Distance b/w a point & a line:-



$Ax + By + C = 0$

$$d = \frac{|Ax_1 + By_1 + C|}{\sqrt{A^2 + B^2}}$$

(*) Distance b/w 2 parallel lines:-

$Ax + By + C_1 = 0$

&

$Ax + By + C_2 = 0$

$$\Rightarrow d = \left| \frac{C_2 - C_1}{\sqrt{A^2 + B^2}} \right|$$

① Find the distance b/w the point (2,3) & the line

$3x+4y+6=0$

Soln:- $A=3 \mid B=4 \mid (x_1,y_1)=(2,3) \mid C=6$

$$d=\left|\frac{Ax_1+By_1+C}{\sqrt{A^2+B^2}}\right|=\left|\frac{3(2)+4(3)+6}{\sqrt{9+16}}\right|=\left|\frac{24}{5}\right|=\frac{24}{5}$$

② Find the distance b/w the lines

$6x+8y+4=0 \rightarrow ①$

&

$3x+4y+9=0 \rightarrow ②$

Soln:-

$\div ①$ by 2 $\Rightarrow 3x+4y+2=0$

② $\Rightarrow 3x+4y+9=0$

$C_1=2$ & $C_2=9$

$A=3$ & $B=4$

$$d=\left|\frac{C_2-C_1}{\sqrt{A^2+B^2}}\right|=\left|\frac{9-2}{\sqrt{9+16}}\right|$$

$$d=\frac{7}{5}$$

QUESTION

#Q. Find the angle between the x-axis and the line joining the points $(3,-1)$ and $(4,-2)$.

(A) 130°

(B) 135°

(C) 150°

(D) None of these

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2+1}{4-3} = -1$$

$$\tan\theta = -1$$

$$\tan\theta = \tan 135$$

$$\theta = 135$$

QUESTION

#Q. The slope of the straight line which $\boxed{\text{does not intersect } x\text{-axis}}$ is equal to

$\Downarrow$

Parallel to x-axis

$\Downarrow$

$\theta = 0$

$m = \tan\theta = 0$

A) $1/2$

B) $1/\sqrt{2}$

C) $\sqrt{3}$

D) 0

QUESTION

$m_1 = \frac{2}{6} = \frac{1}{3}$

#Q. If line through the points $(-2,6)$ and $(4,8)$ is perpendicular to the line through the points $(8, 12)$ and $(x, 24)$, then the value of x is

$m_2 = \frac{12}{x-8}$

(A) 1

(B) 2

(C) 3

(D) 4

Here $m_1 \cdot m_2 = -1$

$\frac{1}{3} \frac{12}{x-8} = -1$

$4 = 8 - x$

$x = 4$

QUESTION

$m_2 = -\frac{1}{m_1}$

$A = 1$ & $B = -7$

#Q. Find the equation of the line perpendicular to the line $x - 7y + 5 = 0$ and having x-intercept 3.

$m = -\frac{A}{B} = \frac{-1}{-7} = \frac{1}{7}$

$d = 3$

$m_2 = \frac{-1}{m_1} = \frac{-1}{1/7} = -7$

$y = m_2(x - d)$

$y = -7(x-3)$

$y = -7x + 21$

$7x + y - 21 = 0$

(A) $7x + y + 21 = 0$

(B) $7x + y - 21 = 0$

(C) $7x - y - 21 = 0$

(D) None of these

QUESTION

$y - y_1 = m(x - x_1)$

$m_1 = m_2$

#Q. Find the equation of the line $\boxed{\text{parallel}}$ to the line $3x - 4y + 2 = 0$ and passing through the point $(-2,3)$.

$m_1 = \frac{-3}{-4} = +\frac{3}{4}$

$m_2 = m_1 = \frac{3}{4}$

$y - 3 = \frac{3}{4}(x+2)$

$4y - 12 = 3x + 6$

$3x - 4y + 18 = 0$

(A) $3x - 4y + 18 = 0$

(B) $3x + 4y + 18 = 0$

(C) $3x - 4y - 18 = 0$

(D) None of these

QUESTION

#Q. Find the equation of a line passing through $(2, -3)$ and inclined at an angle of 135° with the positive direction of x-axis.

$\theta = 135$

$m = -1$

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

$y + 3 = -x + 2$

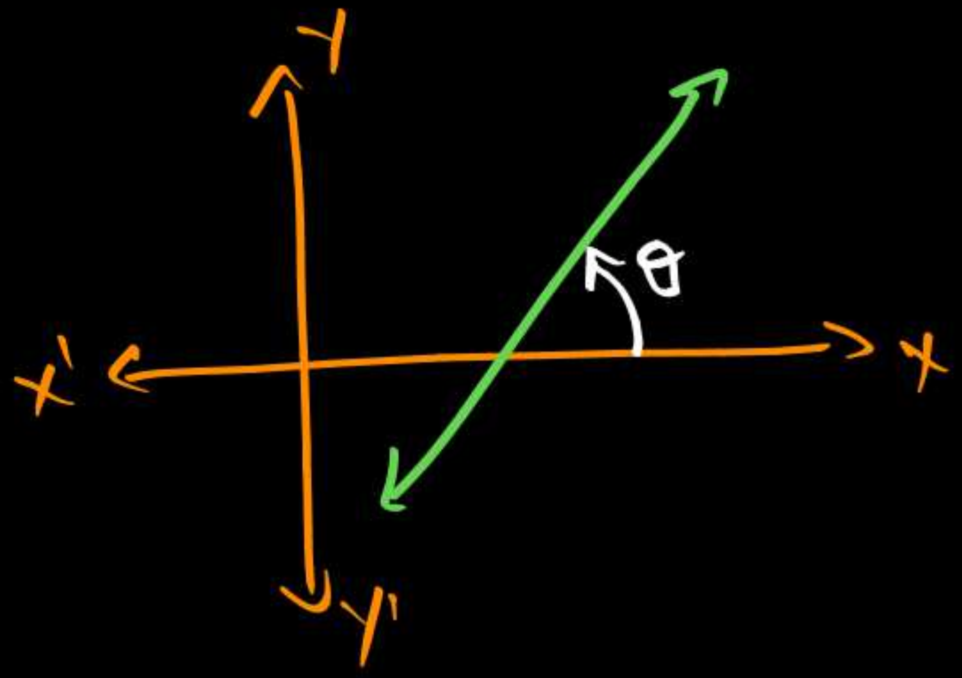
$x + y + 1 = 0$

(A) $x - y + 1 = 0$

(B) $x + y + 1 = 0$

(C) $-x + y + 1 = 0$

(D) $x + y - 1 = 0$



Y
θ
X'
X
Y'

QUESTION

#Q. A straight line passes through the point (α, β) and this point bisects the part of the line intercepted between the axis. The equation of the straight line is

(A) $\frac{x}{\alpha} + \frac{y}{\beta} = 1$

(B) $\frac{x}{\beta} + \frac{y}{\alpha} = 1$

(C) $\frac{x}{\alpha} + \frac{y}{\beta} = 2$

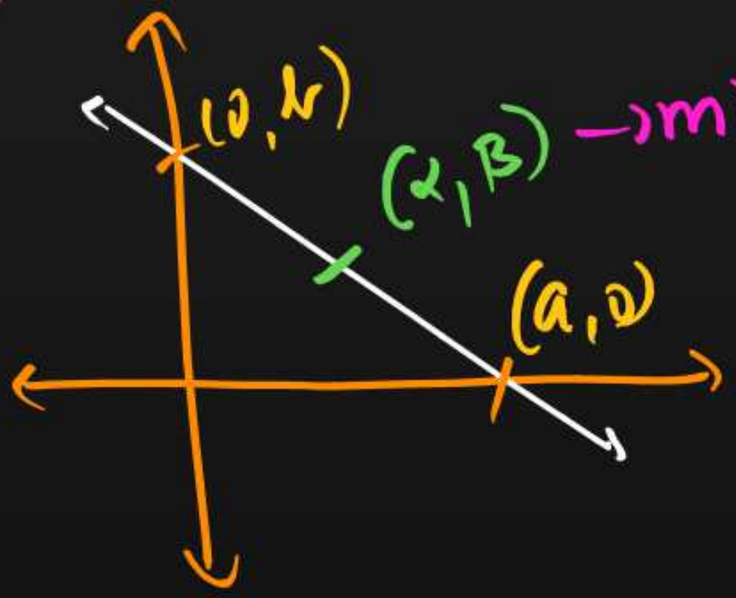
(D) None of these

LHS

$\frac{\alpha}{\alpha} + \frac{\beta}{\beta} = 1 + 1 = 2 = RHS$

Proper method:-

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



$(\alpha,\beta) \rightarrow$ midpoint

$(\alpha,\beta) = \left(\frac{a+0}{2}, \frac{0+b}{2}\right)$

$\alpha = \frac{a}{2}$ | $\beta = \frac{b}{2}$

$a = 2\alpha$ | $b = 2\beta$

$\frac{x}{2\alpha} + \frac{y}{2\beta} = 1$

$\boxed{\frac{x}{\alpha} + \frac{y}{\beta} = 2}$

QUESTION

(A) $2x+3y=-6$ | $3x-2y=-6$

$\frac{x}{-3}+\frac{y}{-2}=1$ | $\frac{x}{-2}+\frac{y}{3}=1$

$a+b=-5$

#Q. Find the equations of the lines, which cut off intercepts on the axes whose sum and product are 1 and -6 , respectively.

$a+b=1$ & $ab=-6$

$b=1-a \rightarrow a(1-a)=-6$

$a-a^2=-6$

$a^2-a-6=0$

$(a-3)(a+2)=0$

$-6 \rightarrow -3, +2$

$a=3$ | $a=-2$

$\Downarrow$ | $\Downarrow$

$b=-2$ | $b=3$

$\Downarrow$ | $\Downarrow$

$\frac{x}{3}+\frac{y}{-2}=1$ | $\frac{x}{-2}+\frac{y}{3}=1$

$-2x+3y=-6$ | $3x-2y=-6$

$2x-3y-6=0$ | $3x-2y+6=0$

(A) ✗ $2x+3y+6=0$ or $3x-2y+6=0$

$\frac{x}{3}+\frac{y}{-2}=1$ $\qquad$ $\frac{x}{-2}+\frac{y}{3}=1$

(B) ✓ $2x-3y-6=0$ or $3x-2y+6=0$

$a+b=+1$ $\qquad$ $a+b=1$

$ab=-6$ $\qquad$ $ab=-6$

(C) $2x-3y-6=0$ or $3x+2y+6=0$

(D) None of these

QUESTION

#Q. Find the equation of the line which passes through the point (3,4) and the sum of its intercepts on the axis is 14.

(A) $x+y=7, 4x+3y=24$

(B) $x+y=7, 4x-3y=24$

(C) $x-y=7, 4x+3y=24$

(D) $x+y=4, 4x-3y=24$

QUESTION

#Q. If the slope of the line joining the points (3,4) and $(-2, a)$ is equal to $-\frac{2}{5}$, then the value of a is equal to

(A) 6

(B) 4

(C) 3

(D) 2

$m = -\frac{2}{5}$

$\frac{a-4}{-2-3} = -\frac{2}{5}$

$\frac{a-4}{-5} = -\frac{2}{5}$

$a - 4 = 2$

$a = 6$

QUESTION

#Q. If the straight lines $4x + 6y = 5$ and $6x + ky = 3$ are parallel, then the value of k is equal to

$m_1 = \frac{-4}{6}$

$m_1 = \frac{-2}{3}$

$m_2 = \frac{-6}{k}$

(A) $-2/3$

(B) 8

(C) 9

(D) 10

$m_1 = m_2$

$-\frac{2}{3} = -\frac{6}{k}$

$k = \frac{3 \times 6}{2}$

$k = 9$

QUESTION

#Q. If the straight lines $3x + 2y - 4 = 0$ and $x + ky + 5 = 0$ are perpendicular, then the value of k is

$m_1 = -\frac{3}{2}$ $m_2 = -\frac{1}{k}$

$-\frac{3}{2} \times \left(-\frac{1}{k}\right) = -1$

$3 = -2k$

$k = -3/2$

(A) 2/3

(B) 3/2

(C) −2/3

(D) −3/2

QUESTION

$|x| = a$

$x = \pm a$

$\theta = \frac{\pi}{4}$ | $\tan\theta = 1$

$m_1 = 1/2$

#Q. If the angle between two lines is $\frac{\pi}{4}$ and slope of one of the lines is $\frac{1}{2}$, then find the slope of the other line.

(A) 3 or −1/3

(B) 2 or −1/2

(C) 4 or −1/4

(D) 3 or −3

$$\tan\theta = \left|\frac{m_2 - m_1}{1 + m_1 m_2}\right|$$

$$1 = \left|\frac{m_2 - 1/2}{1 + \frac{m_2}{2}}\right|$$

$$\frac{m_2 - \frac{1}{2}}{1 + \frac{m}{2}} = 1 \quad \Big| \quad \frac{m_2 - \frac{1}{2}}{1 + \frac{m}{2}} = -1$$

$$m_2 - \frac{1}{2} = 1 + \frac{m}{2} \quad \Big| \quad m_2 - \frac{1}{2} = -1 - \frac{m}{2}$$

$$\frac{m_2}{2} = \frac{3}{2}$$

$$m_2 = 3$$

$$\frac{3}{2} m_2 = -\frac{1}{2}$$

$$m_2 = -\frac{1}{3}$$

QUESTION

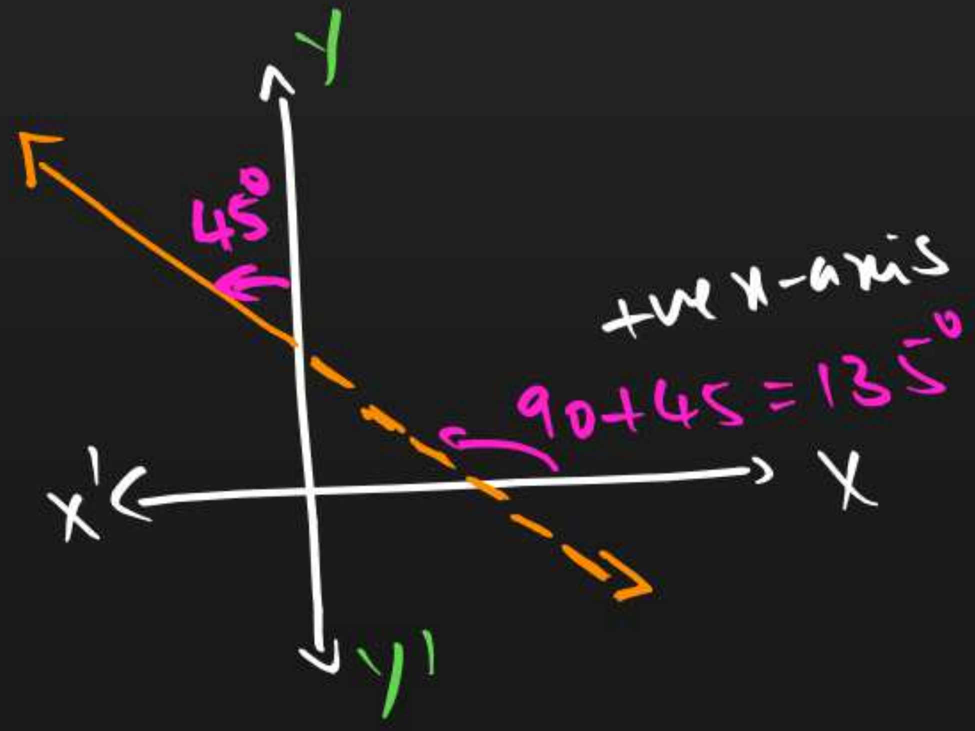
#Q. Find the slope of the line which makes angle of $45°$ with the positive direction of the $\boxed{y\text{-axis}}$ measured anticlockwise.

(A) 0

(B) 1

(C) 2

(D) -1



$m = \tan 135$

$= -1$

$$\sin 15^\circ = \frac{\sqrt{3}-1}{2\sqrt{2}} = \cos 75^\circ$$

$$\sin 75^\circ = \frac{\sqrt{3}+1}{2\sqrt{2}} = \cos 15$$

$$\tan 15 = 2-\sqrt{3}$$

$$\tan 75 = 2+\sqrt{3}.$$

QUESTION

$\tan 15^\circ = 2-\sqrt{3}$ $\tan 75^\circ = 2+\sqrt{3}$

#Q. Equation of a line passing through $(2, 2\sqrt{3})$ and inclined with x-axis at an angle of 75° is

$y - 2\sqrt{3} = (2+\sqrt{3})(x-2)$

$(2+\sqrt{3})x - 4 - 2\cancel{\sqrt{3}} + 2\cancel{\sqrt{3}} - y = 0$

$(2+\sqrt{3})x - y - 4 = 0$

A $(2+\sqrt{3})x - y - 4 = 0$ ✓

B $(2-\sqrt{3})x - y - 4 = 0$

C $(2-\sqrt{3})x + y - 4 = 0$

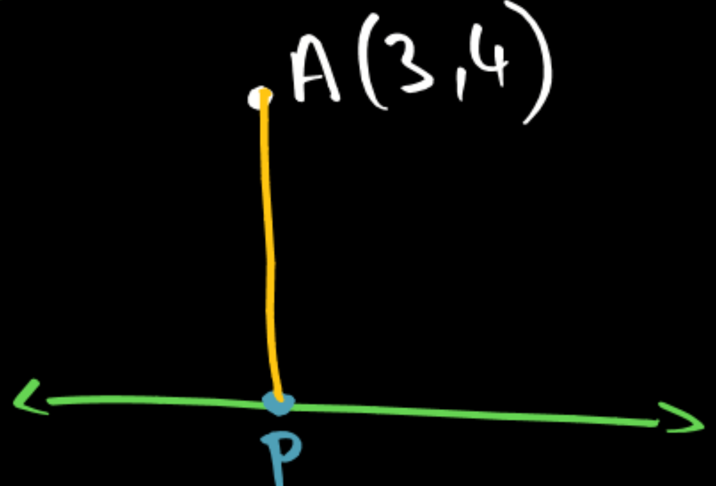
D None of these

(*) Find the Foot of $\perp^r$ of the point (3,4) on the line

$2x+3y+6=0$

Soln:

$$\frac{\frac{-126}{5}-6}{3}$$



$\left(x, \frac{-2x-6}{3}\right)$

$\Downarrow$

Arbitrary Point

$m_2 = -\frac{2}{3}$

$\Uparrow$

$2x+3y+6=0$

$\Downarrow$

$y = \frac{-2x-6}{3}$

Foot $= \left(\frac{63}{5}, \frac{-156}{5}\right)$

Slope of AP (m_1)

$$\frac{\frac{-2x-6}{3}-4}{x-3} = \frac{-2x-18}{3(x-3)}$$

Here $m_1 m_2 = -1$

$$\frac{-2x-18}{3(x-3)}\left(\frac{-2}{3}\right) = -1$$

$$-4x-36 = -9(x-3)$$

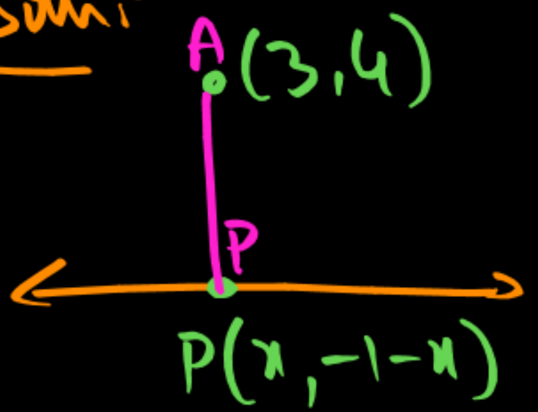
$$-4x-36 = -9x+27$$

$$5x = 63$$

$$x = 63/5$$

(*) Find the Foot of $\perp^r$ of the point $(3,4)$ on the line $x+y+1=0$

Soln:



$m_2 = -1$

$x+y+1=0 \rightarrow y = -x-1$

Slope of AP $(m_1) = \dfrac{-1-x-4}{x-3}$

Here $m_1 \cdot m_2 = -1$

$$(-1)\left(\frac{-x-5}{x-3}\right) = -1$$

$$-x-5 = x-3$$

$$-2 = 2x$$

$$x = -1$$

$$y = -x-1$$

$$\Downarrow$$

$$y = 0$$

Foot $= (-1,0)$

(*) Find the image of the point $(3,4)$ about the line $x+y-1=0$

$m_2 = -1$

Soln :-

$P(x, 1-x)$ & $A(3,4)$

m_1 = slope of AP

$$= \frac{4-(1-x)}{3-x}$$

$$= \frac{3+x}{3-x}$$

Here $m_1 \cdot m_2 = -1$

$$\left(\frac{3+x}{3-x}\right)(-1) = -1$$

$$3+x = 3-x$$

$$x = 0$$

$\Downarrow$

$$y = 1-x$$

$$y = 1$$

$\therefore$ Foot $= (0,1)$

$A(3,4)$

$P(0,1) \rightarrow$ midpoint of AP

$A'(x_1, y_1)$

$$(0,1) = \left(\frac{x_1+3}{2}, \frac{y_1+4}{2}\right)$$

$x_1 = -3 \mid y_1 = -2$

$\therefore (x_1, y_1) = (-3, -2)$

QUESTION

#Q. The equation of the line perpendicular to the line $2x - 3y + 5 = 0$ and making an intercept 3 with y-axis is

$m_1 = \frac{-2}{-3} = \frac{2}{3}$

$m_2 = \frac{-1}{m_1} = -\frac{3}{2}$

(A) $3x + 2y - 6 = 0$

(B) $3x + 2y - 12 = 0$

(C) $3x - 2y - 6 = 0$

(D) $3x + 2y + 6 = 0$

$y = m_2 x + c$

$y = -\frac{3}{2}x + 3$

$2y = -3x + 6$

$3x + 2y - 6 = 0$

QUESTION

#Q. Find the equation of line parallel to y-axis and drawn through the point of intersection of the line $x - 7y + 5 = 0$ and $3x + y = 0$.

$x = 7y - 5$

$3(7y-5) + y = 0$

$21y - 15 + y = 0$

$22y = 15$

$y = \frac{15}{22}$

$x = 7\left(\frac{15}{22}\right) - 5$

$22x = 105 - 110$

$22x + 5 = 0 \Rightarrow$ here slope $= -\frac{22}{0} = ND$

line is parallel to y-axis.

(A) $x + 22 = 0$

(B) $22x + 5 = 0$

(C) $x + 44 = 0$

(D) $22x - 5 = 0$

Passes through $(-1,-3)$ & $\perp^r$ to $x+6y=5$, x-intercept $=$?

Soln :

$x+6y=5 \Rightarrow m_1 = -\frac{1}{6} \Rightarrow \boxed{m_2 = -\frac{1}{m_1} = 6}$

$$y-(-3) = m_2(x+1)$$

$$y+3 = 6(x+1)$$

$$y+3 = 6x+6$$

Put $y=0$

$$3-6 = 6x$$

$$x = -\frac{3}{6} = -\frac{1}{2}$$

$$x = -1/2$$

QUESTION

$m=-1$

#Q. Find the equation of a line with slope -1 and cutting off an intercept of 4 units on negative direction of y-axis.

$(0,c)=(0,-4)$

(A) $x+y+4=0$

$y=mx+c$

(B) $-x-y+4=0$

$y=-x-4$

$x+y+4=0$

(C) $2x+y+4=0$

(D) None of these

QUESTION

#Q. If the line $(6x - 7y + 8) + \lambda(3x - y + 5) = 0$ is parallel to y-axis, then $\lambda =$

(A) -7

(B) -2

(C) 7

(D) 2

$x(6+3\lambda) + y(-7-\lambda) + (8+5\lambda) = 0$

$\Downarrow$

$m_2 = \frac{1}{0}$

$m_1 = -\frac{A}{B} = -\frac{(6+3\lambda)}{-7-\lambda}$

Here $m_1 = m_2$

$\frac{-(6+3\lambda)}{-7-\lambda} = \frac{1}{0}$

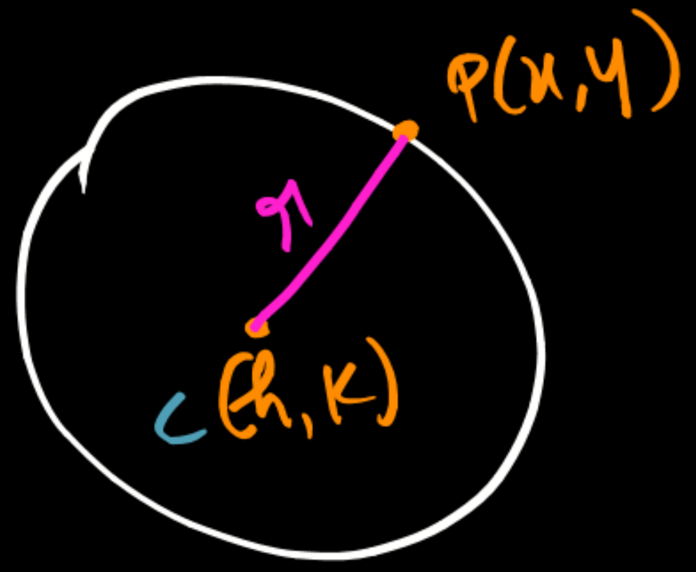
$-7-\lambda = 0$

$\lambda = -7$

Circles:

if (h, k) is the centre, r is the radius

& let $P(x, y)$ be a point on the circle



$PC = r$

$(PC)^2 = r^2$

$(x-h)^2 + (y-k)^2 = r^2$

$\Downarrow$

eq^n of circle

(*) General eq^n of a circle:-

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

centre $= (-g, -f)$

& radius$(r) = \sqrt{g^2+f^2-c}$

Note:- coefficient of x^2 & y^2 is one if given

$$2x^2+2y^2+8x+10y+4=0$$

find centre & radius.

Soln:-

given $2x^2+2y^2+8x+10y+4=0$

$\div$ by 2

$$x^2+y^2+4x+5y+2=0$$

$2g=4$ $\quad$ $2f=5$ $\quad$ $c=2$

$g=2$ $\quad$ $f=\frac{5}{2}$

centre $=(-g,-f)$

$=\left(-2,-\frac{5}{2}\right)$

$r=\sqrt{g^2+f^2-c}$

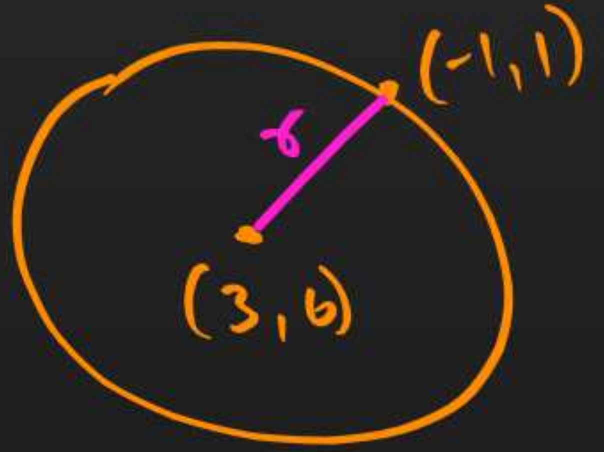
$=\sqrt{4+\frac{25}{4}-2}$

$=\sqrt{2+\frac{25}{4}}=\frac{\sqrt{33}}{2}$

QUESTION

To get the eq^n of circle
we need centre & radius

A circle with centre (3,6) passes through (−1,1). Its equation is



$r = \sqrt{4^2+5^2} = \sqrt{16+25}$

$r^2 = 41$

A. $x^2 + y^2 - 6x - 12y + 3 = 0$

B. $x^2 + y^2 + 6x - 10y + 3 = 0$

C. $x^2 + y^2 - 3x - 6y + 1 = 0$

D. $x^2 + y^2 - 6x - 12y + 4 = 0$ ✓

$(x-3)^2 + (y-6)^2 = 41$

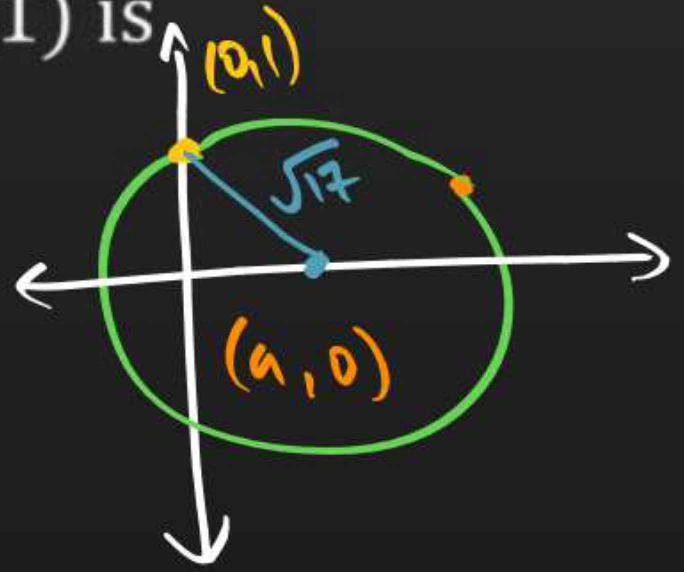
$x^2 + y^2 - 6x - 12y + 9 + 36 - 41 = 0$

$x^2 + y^2 - 6x - 12y + 4 = 0$

QUESTION

@guruPrasad NS

The equation of circle of radius $\sqrt{17}$ units, with centre on the positive side of x-axis and through the point $(0,1)$ is



$r^2 = a^2 + 1^2$

$17 = a^2 + 1$

$a^2 = 16$

$a = 4 \Rightarrow$ centre $= (4,0)$

(A) $x^2 + y^2 - 8x - 1 = 0$

(B) $x^2 + y^2 + 8x - 1 = 0$

(C) $x^2 + y^2 - 9y + 1 = 0$

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

$(x-4)^2 + y^2 = 17$

$x^2 + y^2 - 8x - 1 = 0$

QUESTION

Find the centre and the radius of the circle $x^2 + y^2 + 8x + 10y - 8 = 0$.

$\to c = -8$

$2g = 8 \mid 2f = 10$

$(-g, -f) = (-4, -5)$

$r = \sqrt{16+25+8}$

$= \sqrt{49}$

$= \underline{7}$

A. $(5,4), -7$

B. $(-4, -5), 7$

C. $(4, -5), 7$

D. $(5, -4), 7$

QUESTION

The radius of the circle $3x(x-2)+3y(y+1)=4$ is

$\div$ by 3

(A) 2

(B) 3

(C) $\sqrt{15/4}$

(D) $\sqrt{31/12}$

$x^2-2x+y^2+y=\frac{4}{3}$

$x^2+y^2-2x+y-\frac{4}{3}=0$

$2g=-2$, $g=-1$ | $2f=1$, $f=\frac{1}{2}$ | $c=-\frac{4}{3}$

$r=\sqrt{1+\frac{1}{4}+\frac{4}{3}}$

$=\sqrt{\frac{12+3+16}{12}}$

$=\sqrt{\frac{31}{12}}$

QUESTION

The equation of a circle with centre at $(2, -3)$ and the circumference 10π units, is

(A) $x^2 + y^2 + 4x + \overset{+6y}{\wedge} 12 = 0$

(B) $x^2 + y^2 - 4x + \overset{+6y}{\wedge} 12 = 0$

(C) $x^2 + y^2 - 2x \overset{+6y}{\wedge} - 24 = 0$

(D) $x^2 + y^2 - 4x \overset{+6y}{\wedge} - 12 = 0$

$\Downarrow$

$(x-2)^2 + (y+3)^2 = 25$

$x^2 + y^2 - 4x + 6y - 12 = 0$

$\Downarrow$

$2\pi r = 10\pi$

$r = 5$

QUESTION

Find the equation of the circle which passes through the point P (4,5) and has its centre at A (2,2).

$AP = r = \sqrt{2^2+3^2} = \sqrt{13}$

$r^2 = 13$

$(x-2)^2+(y-2)^2 = 13$

A $(x+2)^2+(y+2)^2=13$

B $(x-3)^2+(y-2)^2=13$

C $(x-2)^2+(y-2)^2=13$

D $(x-2)^2+(y-3)^2=13$

QUESTION

Find the centre of the circle given by the equation $2x^2 + 2y^2 + 3x + 4y + \frac{9}{5} = 0$

$\div$ by 2 $\Rightarrow x^2 + y^2 + \frac{3}{2}x + 2y + \frac{9}{10} = 0$

$2g = \frac{3}{2}$ | $2f = 2$

$g = \frac{3}{4}$ | $f = 1$

A $\left(\frac{-3}{4}, -1\right)$

B $\left(\frac{3}{4}, 1\right)$

C $\left(\frac{-3}{4}, 1\right)$

D $\left(\frac{3}{4}, -1\right)$

QUESTION

$\pi r^2 = 9\pi$

$\Uparrow$ $r = 3$

If the area of the circle $4x^2 + 4y^2 + 8x - 16y + \lambda = 0$ is 9π sq. units, then the value of λ is

$x^2 + y^2 + 2x - 4y + \frac{\lambda}{4} = 0$

$2g = 2$, $g = 1$ | $2f = -4$, $f = -2$ | $c = \frac{\lambda}{4}$

$r = \sqrt{g^2 + f^2 - c}$

$3 = \sqrt{1 + 4 - \frac{\lambda}{4}}$

$9 = 5 - \frac{\lambda}{4}$

$\frac{\lambda}{4} = -4$

$\lambda = -16$

(A) 4

(B) −4

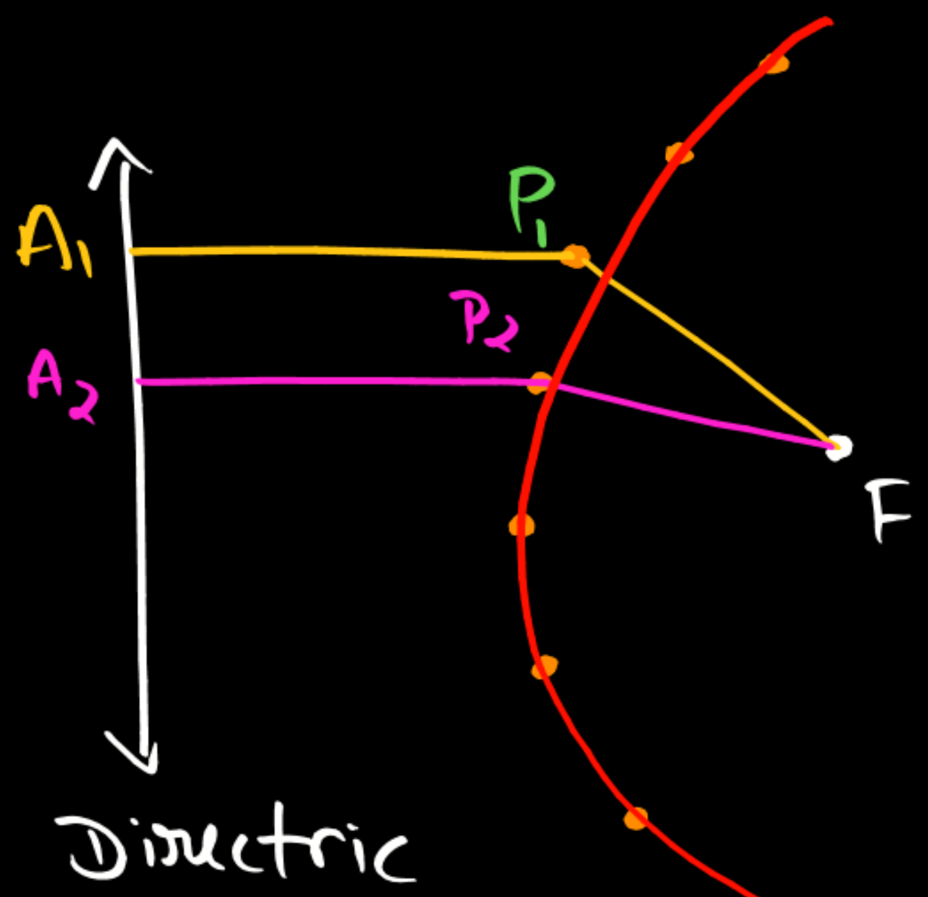
(C) 16

(D) −16

Parabola: The set of all points in the Plane whose distance from the fixed Point & fixed line is constant (same)

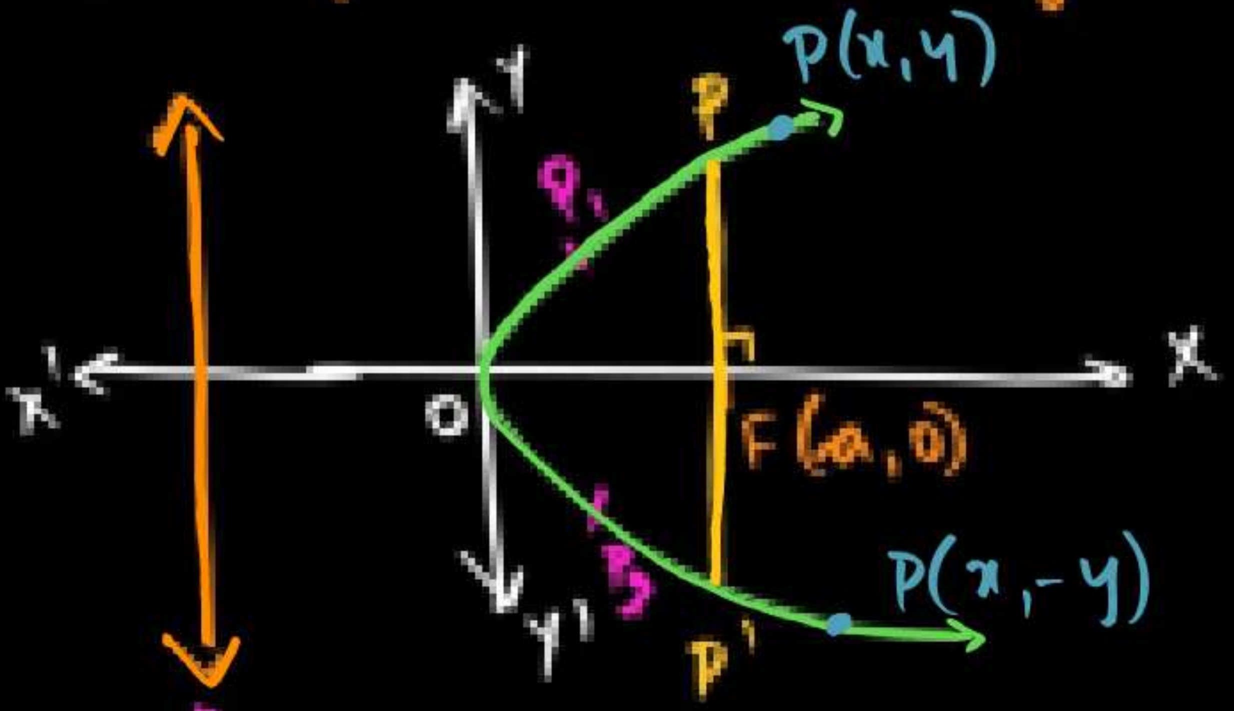
$P_1F = P_1A_1$

$P_2F = P_2A_2$



The fixed line is called as Directrix & the fixed Point is called as Focus.

(1) $y^2 = 4ax \longrightarrow$ Right Parabola



⇓

Directrix

⇓

$x = -a$

Note:- Here the Points on the Parabola will be either on the 1st Quadrant or 4th Quadrant

(1) vertex → origin

(2) Focus → $F(a, 0)$

(3) Axis → x-axis

(4) Eqⁿ of Directrix $\Rightarrow x = -a$

$\Rightarrow x + a = 0$

(5) Length of Latus rectum (PP') $= 4a$

⇓

same for all types of Parabola

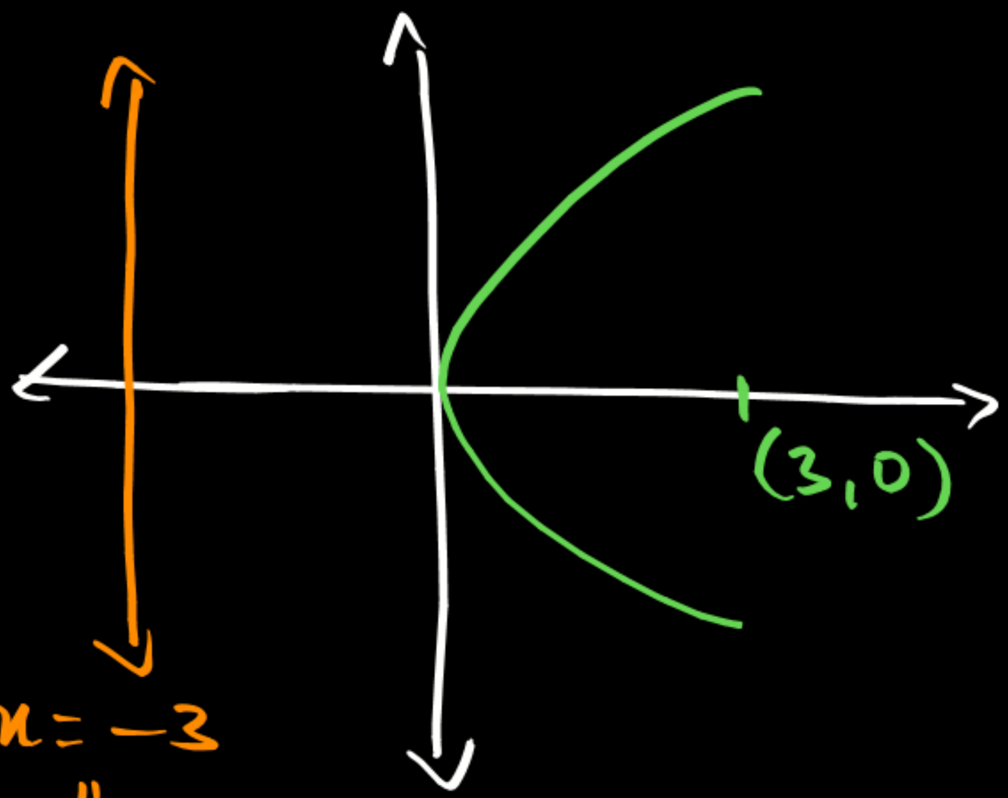
$y^2 = 4ax$

Ex:

$y^2 = x$

$y^2 = 2x$

$y^2 = 3x$

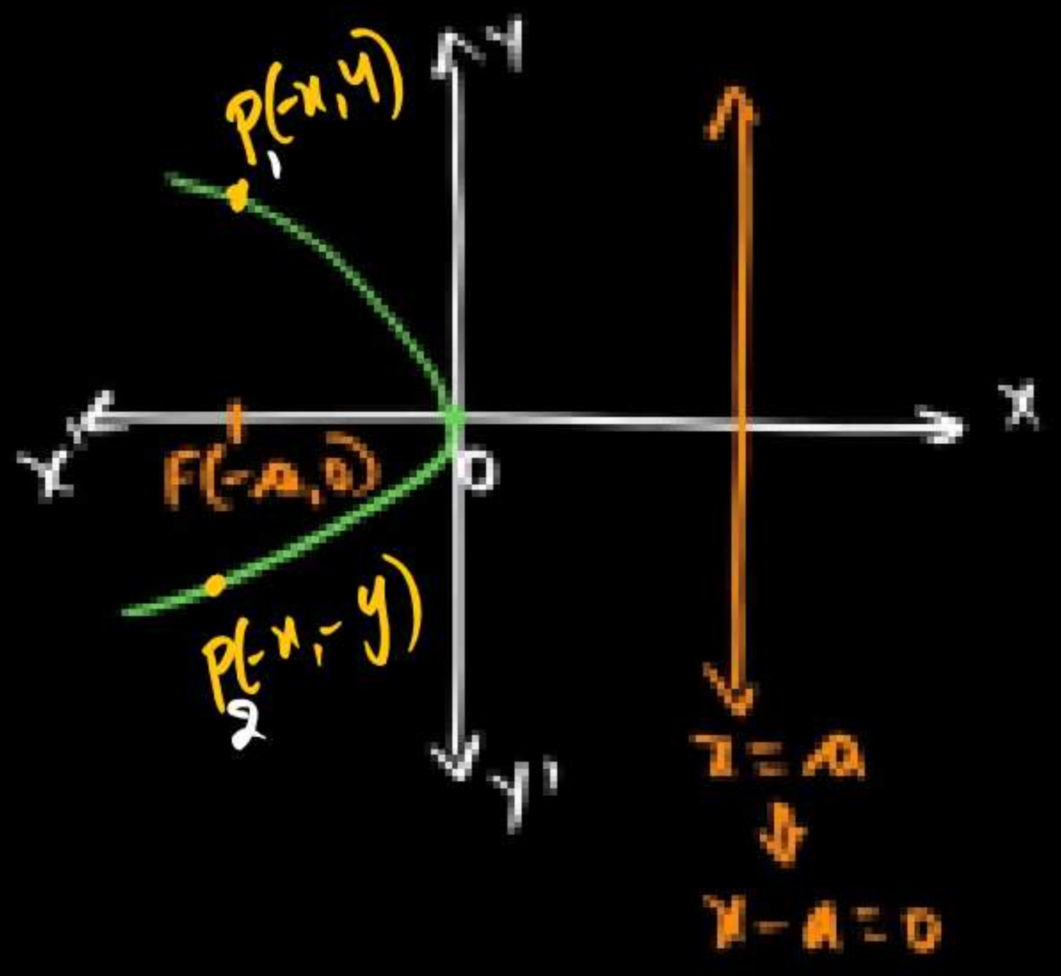


$x = -3$

$\Downarrow$

$x + 3 = 0$

② $y^2 = -4ax \rightarrow$ Left Parabola



① Vertex $= (0, 0)$

② Focus $= (-a, 0)$

③ Axis $\rightarrow$ x-axis

④ Eq^n of Directrix $\Rightarrow x = a$

(or) $x - a = 0$

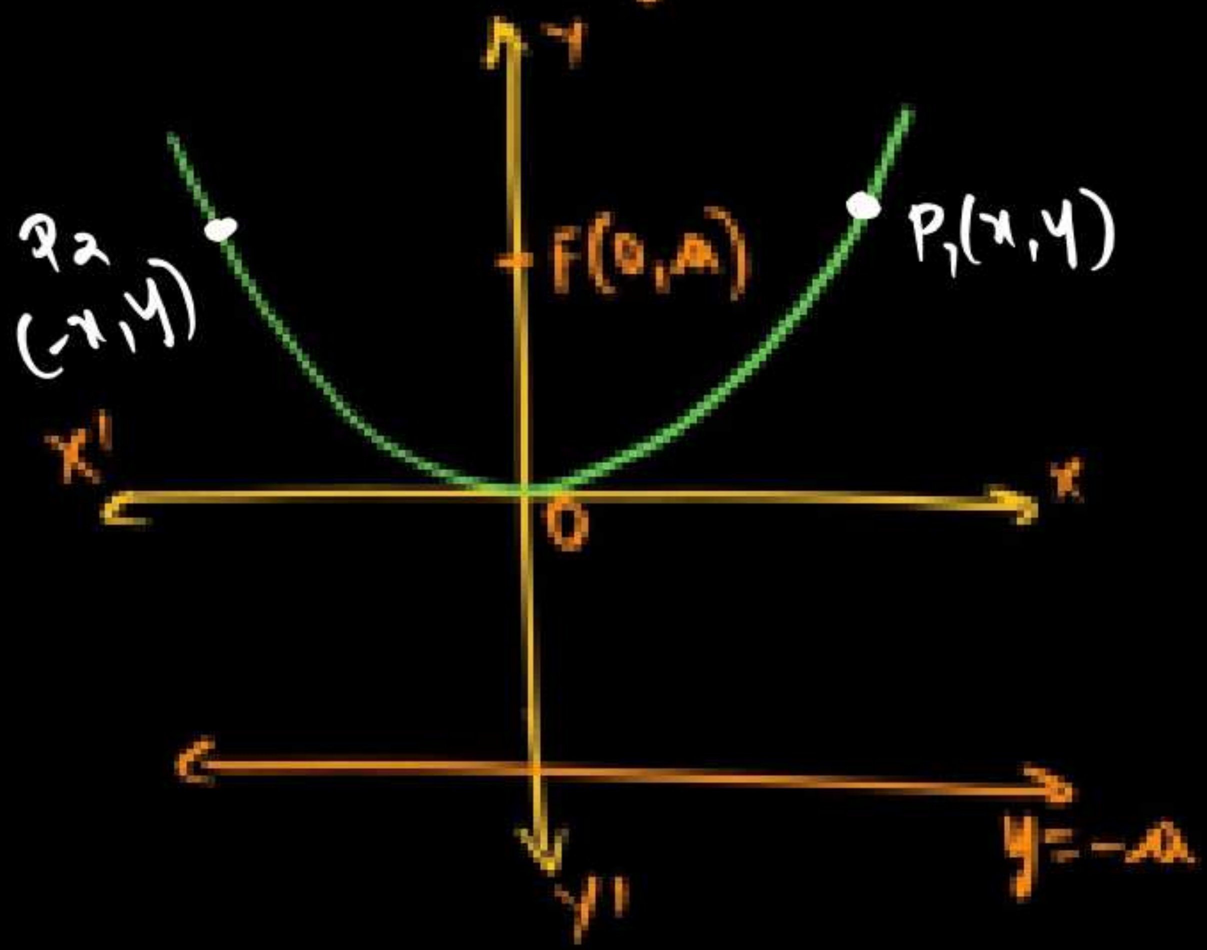
Ex :-

$y^2 = -x$

$y^2 = -2x$

Note :- Here the Points on the Parabola will be either on 2nd (or) 3rd Quadrant

③ $x^2 = 4ay \longrightarrow$ upper Parabola



① vertex = (0, 0)

② Focus = (0, a)

③ Axis = y - axis

④ Eq^n of Directrix $\Rightarrow$ $y = -a$.

(or)

$y + a = 0$

Ex:-

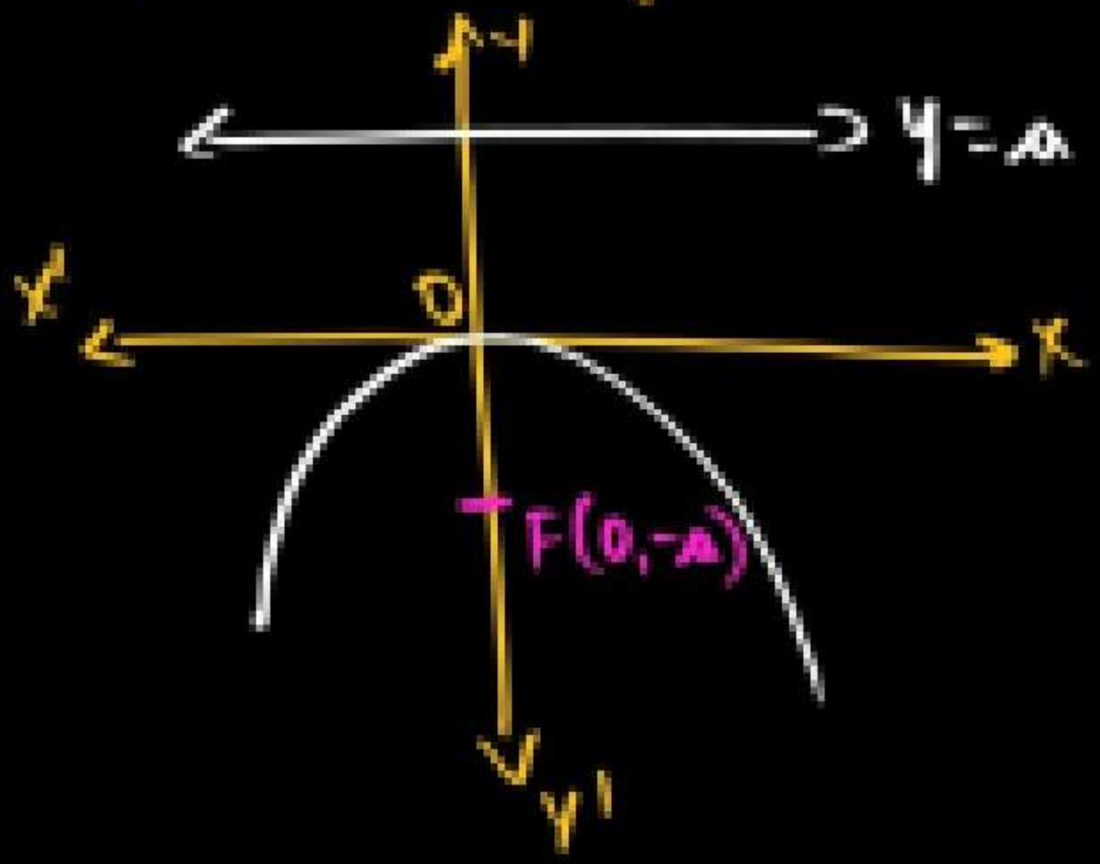
$x^2 = y$

$x^2 = 2y$

$x^2 = 3y$

Here the Points will be either on 1st or 2nd Quadrant

(4) $x^2 = -4ay \longrightarrow$ lower Parabola



(1) vertex = (0, 0)

(2) Focus = (0, −a)

(3) Axis = y-axis

(4) Eq^n of Directrix ⇒ $y = a$

or

$y - a = 0$

QUESTION

The focus of $y^2 = 10x$ is

↳ Right Parabola (Axis − x axis)

A $(2, 0)$

$4a = 10$

$a = \frac{10}{4} = \frac{5}{2}$

B $(5, 0)$

C × $(0, 5/2)$

$F(c, 0) = \left(\frac{5}{2}, 0\right)$

D $(5/2, 0)$

QUESTION

Right Parabola

If focus (6,0); directrix $x = -6$, then the equation of parabola is

Axis → +ve x-axis

(A) $y^2 = 24x$

(B) $y^2 = 36x$

(C) $x^2 = 24y$

(D) $y^2 = -6x$

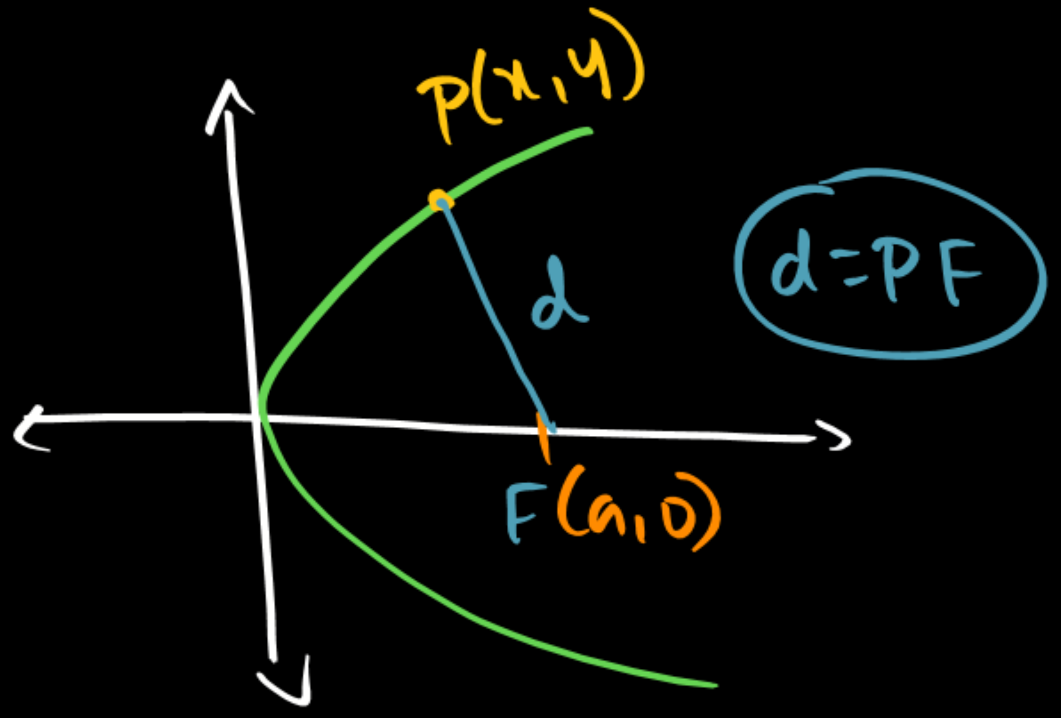
$a = 6$

$y^2 = 4ax$

$y^2 = 24x$

⊛ Focal Distance :-

The Distance b/w the Foci & any point on the Parabola



QUESTION

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

One of the points on the parabola $y^2 = 12x$ with focal distance 12 is

$4a = 12$

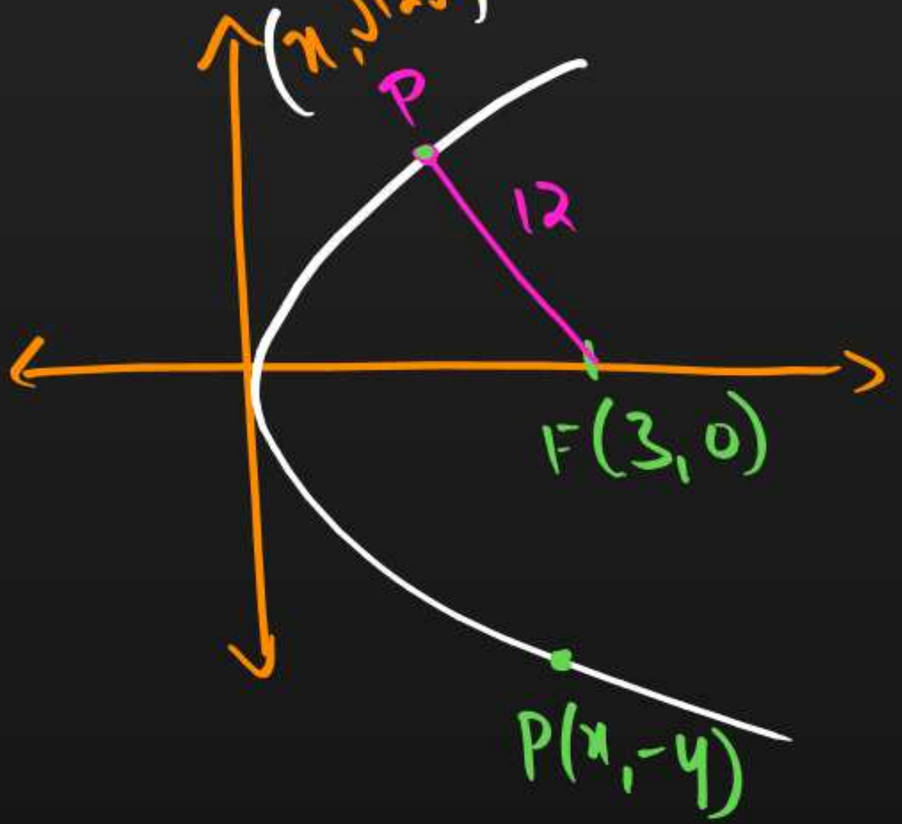
$a = 3 \rightarrow F = (3,0)$

A $(3, 6)$

B $(9, 6\sqrt{3})$

C $(7, 2\sqrt{21})$

D $(8, 4\sqrt{6})$



$PF = 12$

$(PF)^2 = 144$ Distance formula

$(x-3)^2 + (\sqrt{12}\sqrt{x} - 0)^2 = 144$

$x^2 + 9 - 6x + 12x = 144$

$x^2 + 6x - 135 = 0$

-135

$+15 \quad -9$

$x = -15$ | $x = 9$

Right Parabola

$\therefore y = \sqrt{12x}$

$y = \sqrt{12(9)}$

$y = \sqrt{4 \times 3 \times 9}$

$y = 2 \times 3\sqrt{3}$

$y = 6\sqrt{3}$

$\Downarrow$

Point $= (x, y)$

$= \underline{(9, 6\sqrt{3})}$

QUESTION

$y=\sqrt{4x}=2\sqrt{x}$

For the parabola $y^2 = 4x$, the point P whose focal distance is 17, is

$\Downarrow$

$4a = 4$

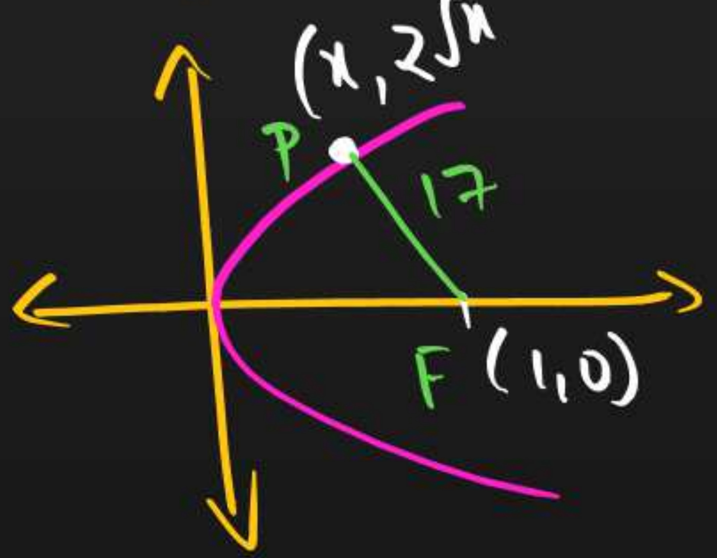
$a = 1$

A (2,8) or (2, −8)

B (16,8) or (16, −8)

C (8,8) or (8, −8)

D (4,8) or (4, −8)



$PF = 17$

$(PF)^2 = 289$

$(x-1)^2 + (2\sqrt{x})^2 = 289$

$x^2 + 1 - 2x + 4x = 289$

$x^2 + 2x - 288 = 0$

$-288 \to +18,\ -16$

$x = -18$ | $x = 16$

$y^2 = 4(16) = 64$

$y = \pm 8$

QUESTION

Find the equation of parabola with vertex (0,0), passing through (2,3) and axis is along $\boxed{x\text{-axis.}}$ $\rightarrow$ $y^2 = 4ax$

$\Downarrow$

Point lies in 1st Quad

(A) $2y^2 = 9x$

(B) $y^2 = 9x$

(C) $y^2 = 8x$

(D) $2x^2 = 9y$

use (2,3)

$9 = 4a(2)$

$a = \frac{9}{8}$

$y^2 = 4\left(\frac{9}{8}\right)x$

$y^2 = \frac{9}{2}x$

$2y^2 = 9x$

QUESTION

Find the equation of parabola with vertex (0,0), passing through (5,2) and symmetric with respect to y-axis.

(A) $2x^2 = 25y$

(B) $2y^2 = 25x$

(C) $x^2 = 50y$

(D) $y^2 = 50x$

$x^2 = 4ay$

use (5, 2)

$25 = 4a(2)$

$a = \frac{25}{8}$

$x^2 = \frac{25}{2}y$

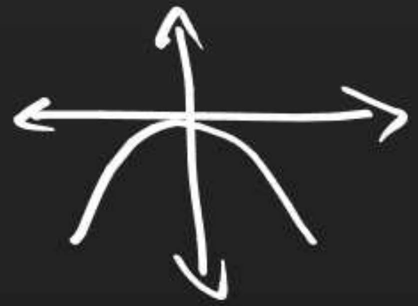
$2x^2 = 25y$

QUESTION

Find the equation of the parabola which is symmetric about the y-axis, and passes through the point $(2, -3)$.

4th Quad

$x^2 = 4ay$ $\quad$ $x^2 = -4ay$



(A) $x^2 = 4y$

(B) $4y = 3x^2$

(C) $3x^2 = -4y$

(D) $3y = -4x^2$

$4 = -4a(-3)$

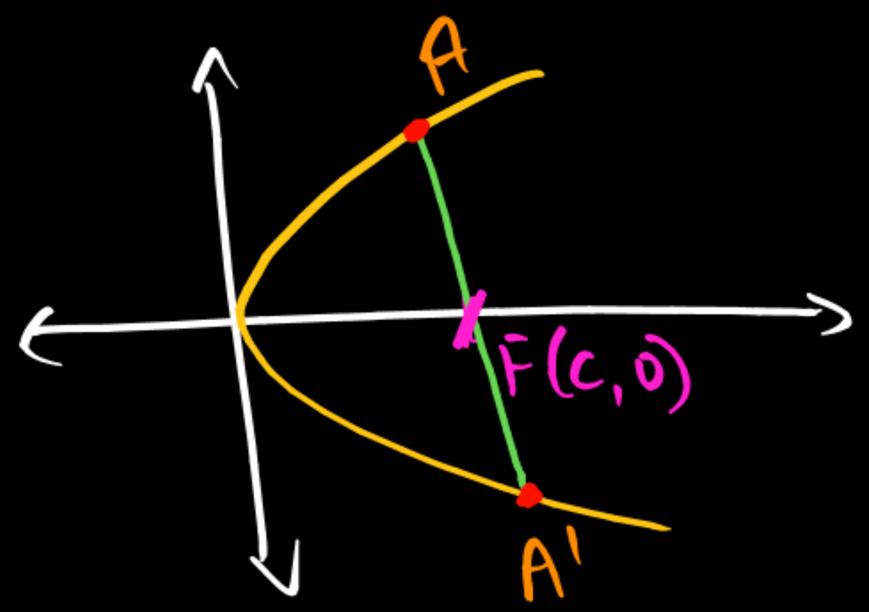
$a = +\frac{1}{3}$

$\therefore x^2 = -4\left(+\frac{1}{3}\right)y$

$3x^2 = -4y$

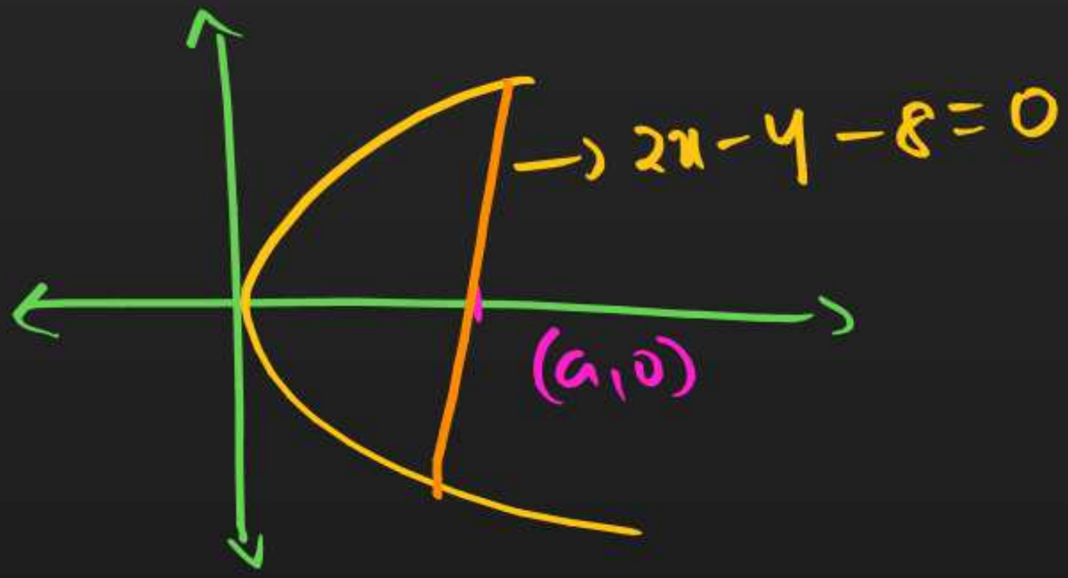
⊛ Focal chord:-

The straigh line passing through the focus & whose end Point lie on the Parabola (AA')



QUESTION

If a focal chord of the parabola $y^2 = ax$ is $2x - y - 8 = 0$, then equation of the directrix is



Here (a,0) is the Point on

$2x - y - 8 = 0$

$2a - 0 - 8 = 0$

$a = 4$

$\therefore$ eqn of Directrix

$x = -4$

$x + 4 = 0$

(A) $x + 4 = 0$

(B) $x - 4 = 0$

(C) $y - 4 = 0$

(D) $y + 4 = 0$

QUESTION

$y = 2\sqrt{2x}$ | $P(x, 2\sqrt{2x})$

Find the coordinates of a point on the parabola $y^2 = 8x$, whose focal distance is 4

option verification

$\Downarrow$

$4a = 8$

$a = 2 \rightarrow F = (2, 0)$

A (2,4) and (2, −4)

B (4,2) and (4, −2)

C (1,2) and (1, −2)

D none of these

$PF = 4$

$(PF)^2 = 16$

$(x-2)^2 + 8x = 16$

$x^2 + 4 - 4x + 8x = 16$

$x^2 + 4x - 12 = 0$

-12

$+6 \quad -2$

$(x+6)(x-2) = 0$

$x = -6$ ✗ | $x = 2$

$\Downarrow$

$y^2 = 16$

$y = \pm 4$

QUESTION

Find the coordinates of a point on the parabola $y^2 = 8x$, whose focal distance is 4

option verification

A $(2, \pm 4)$

B $(\pm 2, 4)$

C $(2, \pm 2)$

D none of these

QUESTION

If the distance of the focus of a parabola from its directrix is 4 , then find the length of the latus rectum.

$\Downarrow$

$2a = 4$

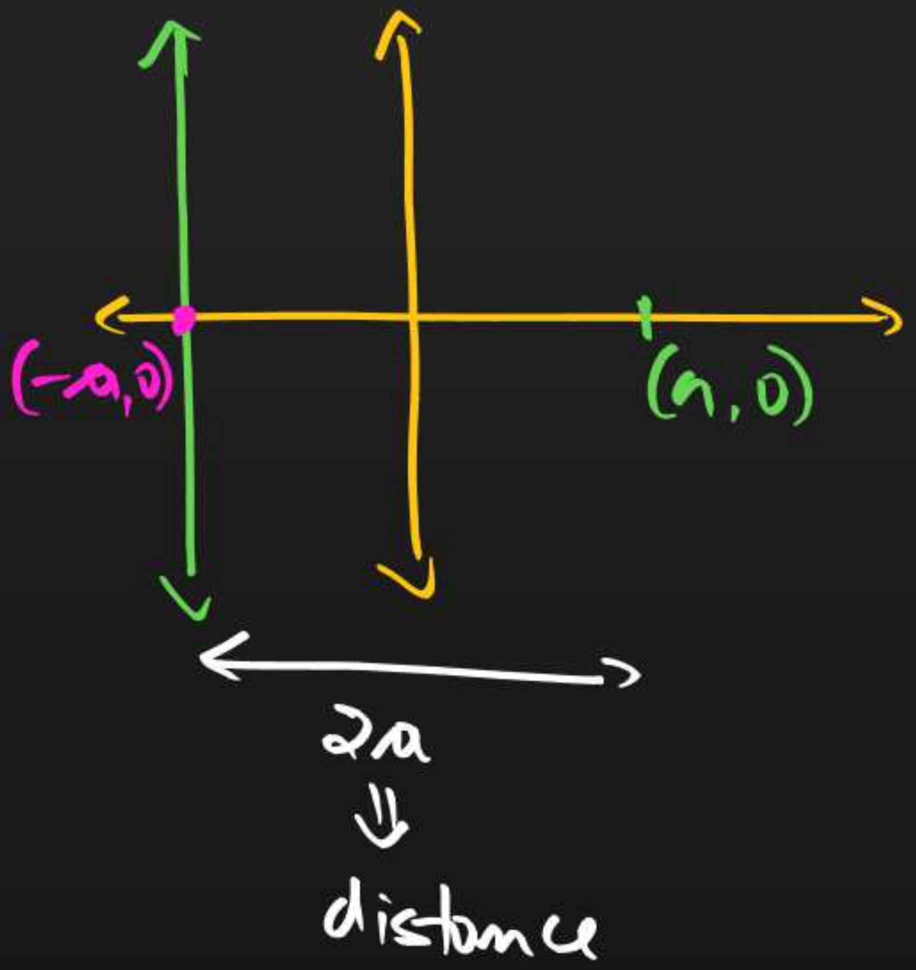
$a = 2$

(A) 4

(B) 8

(C) 12

(D) 6



$\therefore$ length of latus rectum is $= 4a$

$= \underline{8}$

QUESTION

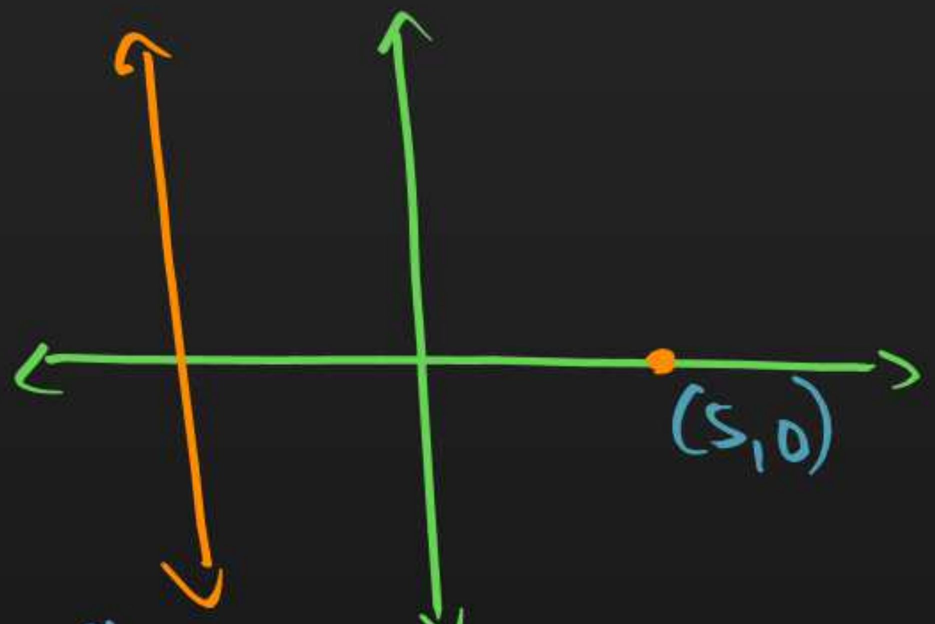
If a line passes through the focus of the parabola $y^2 = ax$ is $2x - y - 10 = 0$, then equation of the directrix is

(A) $x + 5 = 0$

(B) $x - 5 = 0$

(C) $y - 5 = 0$

(D) $y + 5 = 0$



$x = -5$

$\Downarrow$

$x + 5 = 0$

$\Downarrow$

$(a, 0)$ is a point

$2a - 0 - 10 = 0$

$a = 5$

$\Downarrow$

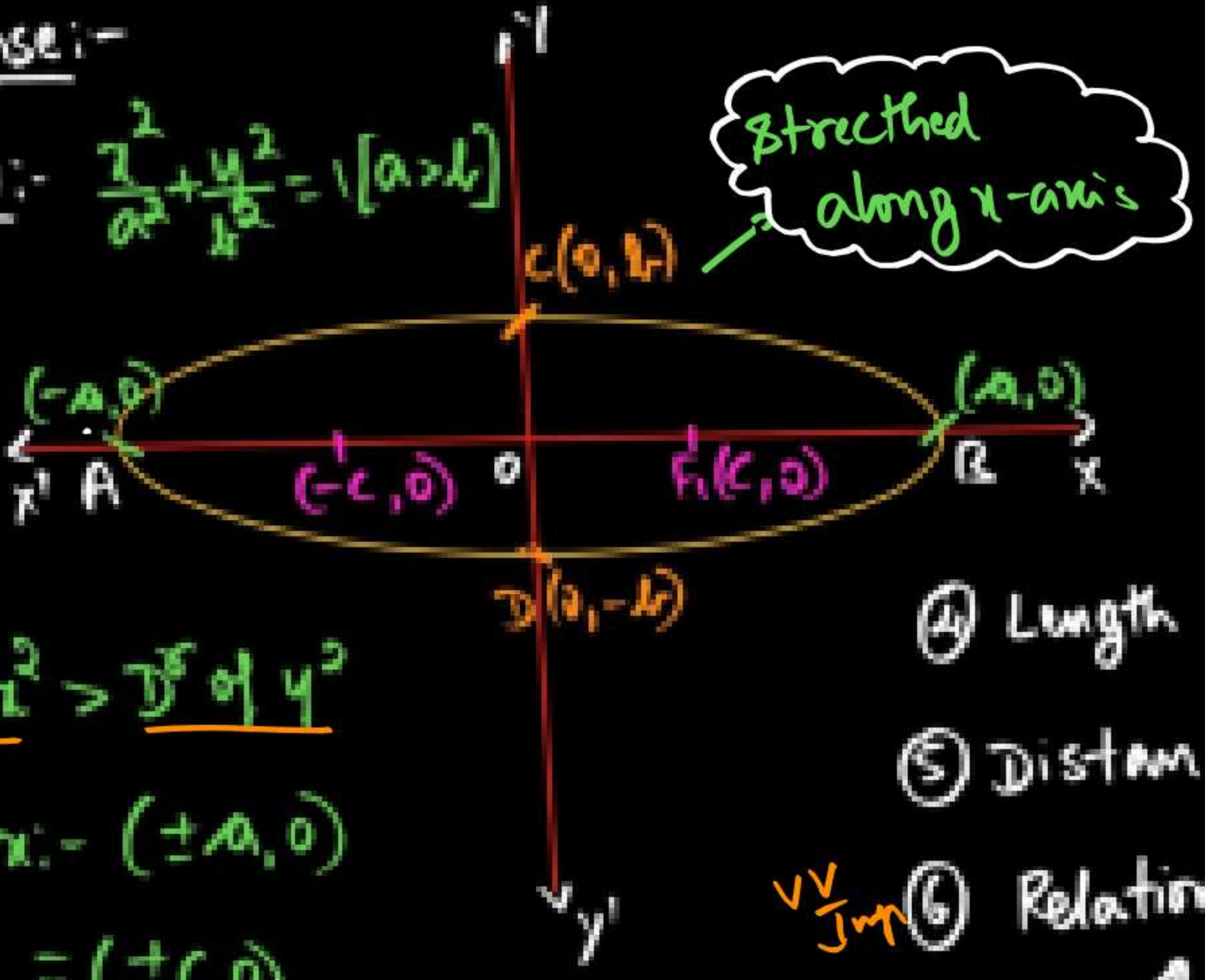
eqn of Directrix

$x = -5$

$x + 5 = 0$

Ellipse:-

Type 1:- $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1\ [a>b]$



D^r of $x^2 > D^r$ of y^2

vertex:- $(\pm a, 0)$

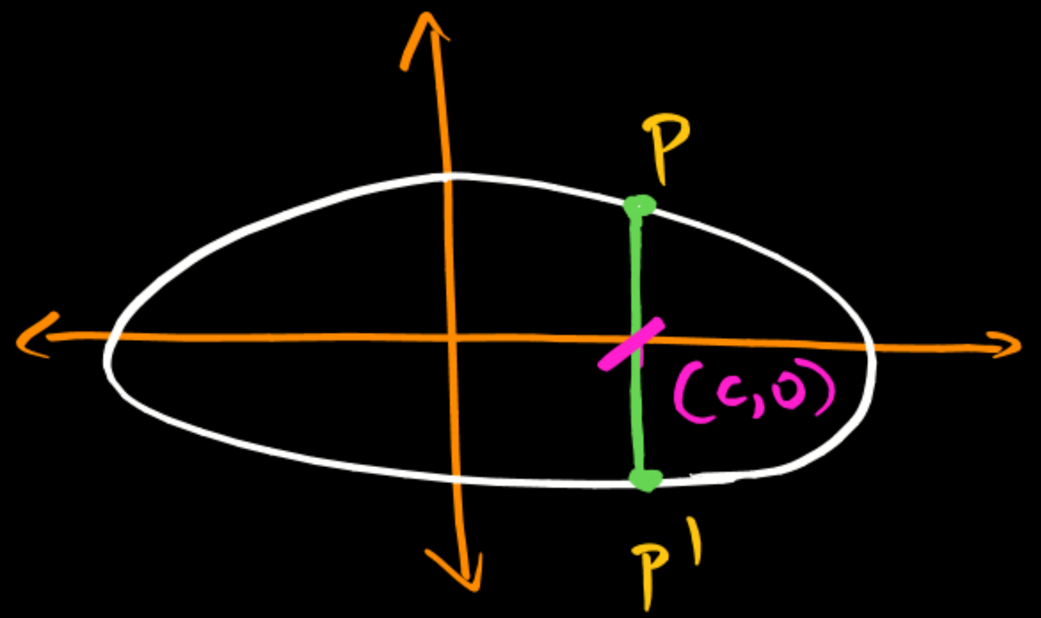
Foci $= (\pm c, 0)$

$e<1$ → eccentricity

1. Major Axis:- Along x-axis
2. Minor Axis:- Along y-axis
3. Length of Major Axis:- $AB = 2a$
4. Length of Minor Axis:- $CD = 2b$
5. Distance b/w Foci:- $F_1F_2 = 2c$
6. VV Imp Relationship b/w a, b, c :- $c^2 = a^2 - b^2$
7. Length of latus rectum :- $\frac{2b^2}{a}$
8. Eccentricity $(e) = \frac{c}{a}$

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

D^r of $x^2 > D^r$ of y^2



$PP' \rightarrow$ latus rectum

$\Downarrow$

St. line $\perp^r$ to major Axis & Passing through one of the foci & whose end points lie on the ellipse.

Type 2:-

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

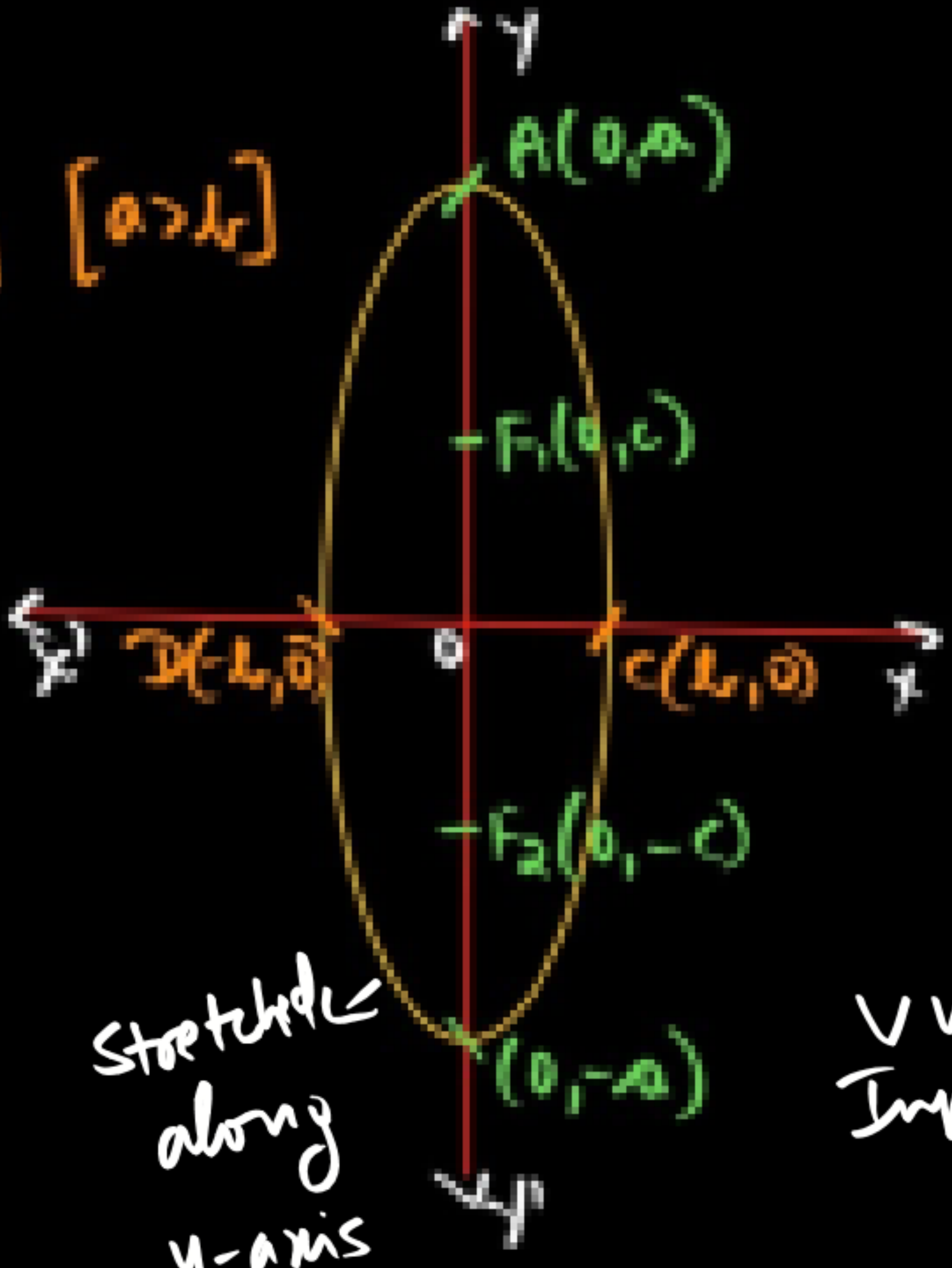
D^r of $y^2 > D^r$ of x^2

Vertex $=(0,\pm a)$

Foci $=(0,\pm c)$

Ex:-

① $\frac{x^2}{4}+\frac{y^2}{9}=1$



① Major Axis :- Along y-axis

② Minor Axis :- Along x-axis

③ Length of Major Axis :- $AB = 2a$

④ Length of Minor Axis :- $CD = 2b$

⑤ Distance b/w Foci :- $F_1F_2 = 2c$

VV Imp ⑥ Relationship b/w a, b, c :- $c^2 = a^2 - b^2$

⑦ Length of Latus rectum :- $\frac{2b^2}{a}$

⑧ Eccentricity $(e) = \frac{c}{a}$

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

D^r of $y^2 > D^r$ of x^2

$a^2 = 9$ & $b^2 = 4$

In both the cases

Highest value will be

considered as a^2

QUESTION

Find the equation of ellipse whose eccentricity is 2/3, length of latus rectum is 5 and the centre is (0,0).

(A) $\frac{x^2}{81}+\frac{y^2}{45}=1$

(B) $\frac{4x^2}{81}+\frac{4y^2}{45}=1$

(C) $\frac{2x^2}{81}+\frac{2y^2}{45}=1$

(D) None of these

$e=\frac{2}{3}$

$\frac{c}{a}=\frac{2}{3}$

$c=\frac{2a}{3}$

$c^2=\frac{4a^2}{9}$

$\frac{2b^2}{a}=5$

$b^2=\frac{5a}{2}$

WKT $c^2=a^2-b^2$

$\frac{4a^2}{9}=a^2-\frac{5a}{2}$

$-\frac{\cancel{5}a^2}{9}=-\frac{\cancel{5}a}{2}$

$2a^2=9a$

$2a^2-9a=0$

$a(2a-9)=0$

$a=9/2$

$a = \frac{9}{2}$

$b^2 = \frac{5a}{2} = \frac{45}{4}$

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

$\frac{x^2}{\frac{81}{4}} + \frac{y^2}{\frac{45}{4}} = 1$

$\frac{4x^2}{81} + \frac{4y^2}{45} = 1$

QUESTION

The eccentricity of an ellipse, the length of whose minor axis is equal to the distance between the foci, is

(A) 1/2

(B) 1/3

(C) $1/\sqrt{3}$

(D) $1/\sqrt{2}$

$b = c$

WKT

$c^2 = a^2 - b^2$

$c^2 = a^2 - c^2$

$2c^2 = a^2$

$\frac{c^2}{a^2} = \frac{1}{2}$

$\frac{c}{a} = \frac{1}{\sqrt{2}}$

QUESTION

$\rightarrow a=5$
$a^2=25$
$\rightarrow c=4$

If vertices (±5,0), foci (±4,0), then find the equation of the ellipse.

(A) $\dfrac{x^2}{16}+\dfrac{y^2}{25}=1$

(B) $\dfrac{x^2}{9}+\dfrac{y^2}{25}=1$

(C) $\dfrac{x^2}{25}+\dfrac{y^2}{16}=1$

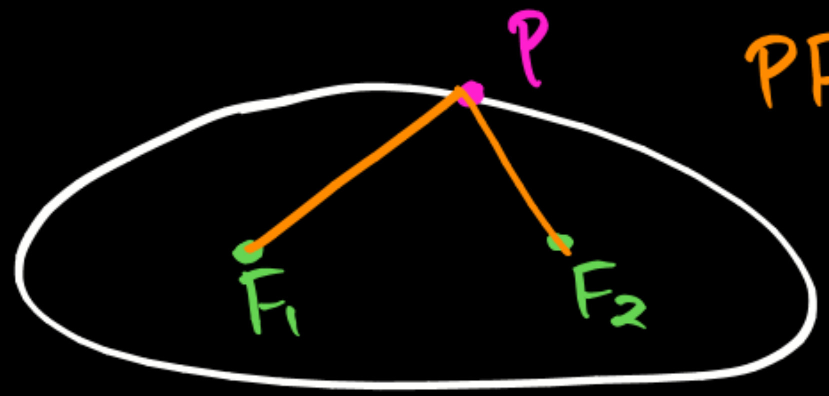
(D) $\dfrac{x^2}{25}+\dfrac{y^2}{9}=1$

$c^2=a^2-b^2$

$16=25-b^2$

$b^2=9$

$\dfrac{x^2}{25}+\dfrac{y^2}{9}=1$



$PF_1 + PF_2 = 2a$

$2a \to$ Distance b/w major Axis

By the definition of ellipse

F_1 & $F_2 \to$ Foci

if P is the Point on the ellipse

Then $\boxed{PF_1 + PF_2 = 2a} \to$ Focal Distance

QUESTION

If $P = (x, y), P_1 = (3,0), P_2 = (-3,0)$ and $16x^2 + 25y^2 = 400$, then $PP_1 + PP_2$ equals

$\frac{x^2}{25} + \frac{y^2}{16} = 1$

$a^2 = 25$

$a = 5$

$\Downarrow$

$2a$

$= \underline{10}$

(A) 8

(B) 10

(C) 5

(D) 4

QUESTION

$\to a=3$ $\to b=2$

If ends of major axis is $(\pm 3, 0)$, ends of minor axis is $(0, \pm 2)$, then find the equation of ellipse.

(A) $\frac{x^2}{9}+\frac{y^2}{4}=1$

(B) $\frac{x^2}{4}+\frac{y^2}{9}=1$

(C) $\frac{x^2}{16}+\frac{y^2}{9}=1$

(D) None of these

QUESTION

If the length of the major axis of an ellipse is twice the length of its minor axis, its eccentricity is

$$2a = 2[2b]$$

$$a = 2b$$

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

$$c^2 = a^2 - b^2$$

$$c^2 = a^2 - \frac{a^2}{4}$$

$$c^2 = \frac{3a^2}{4}$$

$$\frac{c^2}{a^2} = \frac{3}{4}$$

$$\frac{c}{a} = \frac{\sqrt{3}}{2} = e$$

A $\frac{1}{3}$

B $\frac{1}{\sqrt{3}}$

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

D $\frac{\sqrt{3}}{2}$

QUESTION

$c=2$

The foci of an ellipse are $(\pm 2,0)$ and its eccentricity is $1/2$, find its equation if given that its centre is at the origin and axes are along the coordinates axes.

(A) $\frac{x^2}{25}+\frac{y^2}{9}=1$

(B) $\frac{x^2}{12}+\frac{y^2}{16}=1$

(C) $\frac{x^2}{9}+\frac{y^2}{25}=1$

(D) ✓ $\frac{x^2}{16}+\frac{y^2}{12}=1$

$e=\frac{1}{2}$

$\frac{c}{a}=\frac{1}{2}$

$\frac{2}{a}=\frac{1}{2}$

$a=4$

$\Downarrow$

$a^2=16$

$c^2=a^2-b^2$

$4=16-b^2$

$b^2=12$

QUESTION

In $\mathrm{s/w}$ $\frac{x^2}{a^2}$ & $\frac{y^2}{b^2}$ there is +ve sign

The equation of the ellipse whose centre is at the origin and the x-axis, the major axis, which passes through the points $(-6,1)$ and $(4,-4)$ is

(A) × $3x^2 - 4y^2 = 32$

option verification

(B) $3x^2 + 4y^2 = 112$

① $3(36)+4(1)$

$108+4=112$

$3(16)+4(16)$

$48+64$

$=112$

(C) × $4x^2 - 3y^2 = 112$

(D) $4x^2 + 3y^2 = 112$

QUESTION

Find the coordinates of the foci and eccentricity respectively of the ellipse $\frac{x^2}{36}+\frac{y^2}{9}=1.$ → major axis is along x-axis

⇓

Foci = $(\pm c, 0)$

(A) $\left(0, \pm 3\sqrt{3}\right), \frac{\sqrt{3}}{2}$ ✗

(B) ✓ $\left(\pm 3\sqrt{3}, 0\right), \frac{\sqrt{3}}{2}$

(C) ✗ $(0, \pm 4), \frac{\sqrt{3}}{2}$

(D) ✗ $(0, \pm 2), \frac{\sqrt{3}}{2}$

QUESTION

The sum of the $\boxed{\text{focal distances}}$ from any point on the ellipse $9x^2 + 16y^2 = 144$ is

$PF_1 + PF_2 = 2a$

$\frac{x^2}{16} + \frac{y^2}{9} = 1$

$\Downarrow$

$a^2 = 16$

$a = 4$

$2a = 8$

A 2

B 3

C 4

D 8

QUESTION

If the eccentricity of an ellipse is $\frac{5}{8}$ and the distance between its foci is 20 , then find the latus rectum of the ellipse.

(A) 98/3

(B) 39/2

(C) 39/8

(D) 39/9

$2c = 20$

$c = 10$

$e = \frac{5}{8}$

$\frac{c}{a} = \frac{5}{8}$

$\frac{10}{a} = \frac{5}{8}$

$a = 16$

$c^2 = a^2 - b^2$

$100 = 256 - b^2$

$b^2 = 156$

$\therefore$ Length of latus rectum $= \frac{2b^2}{a} = \frac{2(156)}{16}$

$= \frac{\cancel{156}^{39}}{\cancel{8}_{2}}$

$= \frac{39}{2}$

$x^2+3y^2=12$

$\frac{x^2}{12}+\frac{y^2}{4}=1$

$a^2=12$ | $b^2=4$

$a=2\sqrt{3}$

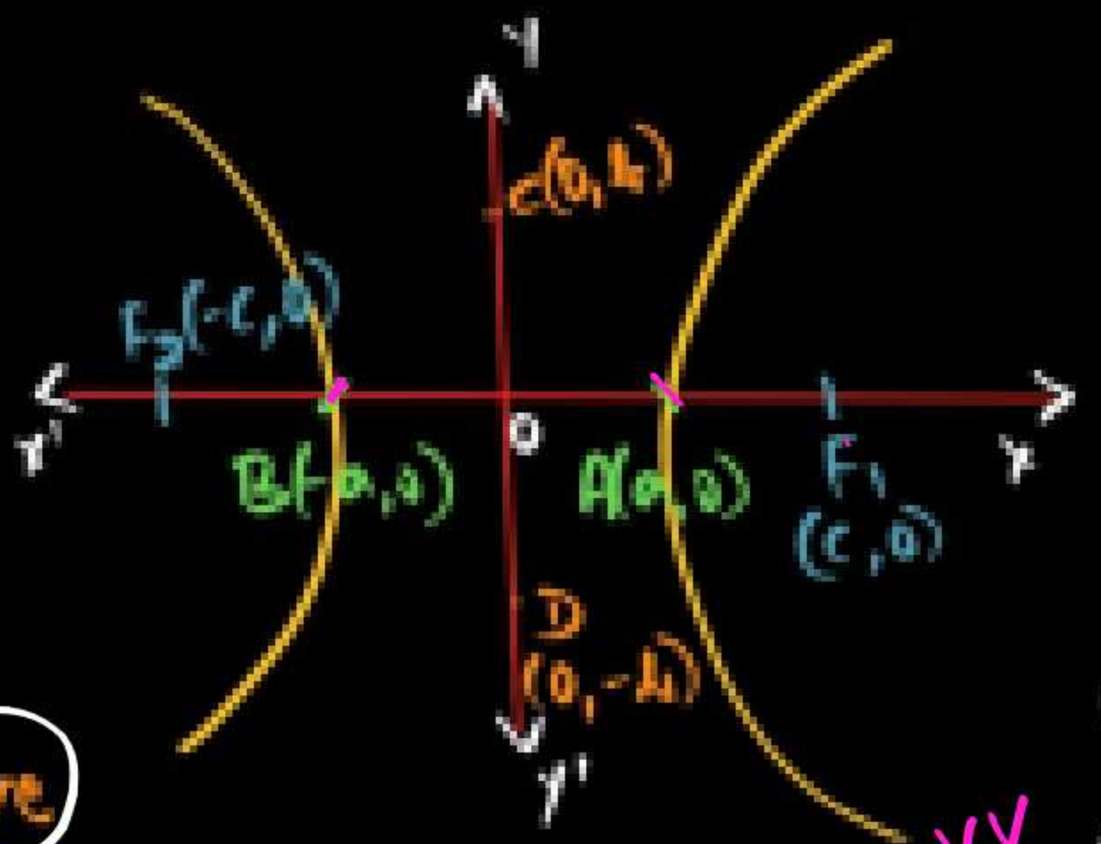
Length of L.R $=\frac{2b^2}{a}=\frac{2(4)}{2\sqrt{3}}=\frac{4}{\sqrt{3}}$.

Hyperbola:-

Type 1:-

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

$\Downarrow$



① Here coefficient of x^2 = +ve & coefficient of y^2 = -ve

② vertice = $(\pm a, 0)$

③ Foci = $(\pm c, 0)$

④ $e>1$

① Transverse Axis :- Along x-axis

② Conjugate Axis :- Along y-axis

③ Length of Transverse Axis:- $AB = 2a$

④ Length of Conjugate Axis:- $2b$

⑤ Distance b/w Foci :- $F_1F_2 = 2c$

VV Imp ⑥ Relationship b/w a, b, c :- $c^2 = a^2 + b^2$

⑦ Length of Latus rectum:- $\frac{2b^2}{a}$

⑧ Eccentricity$(e) = \frac{c}{a}$

Type 2:-

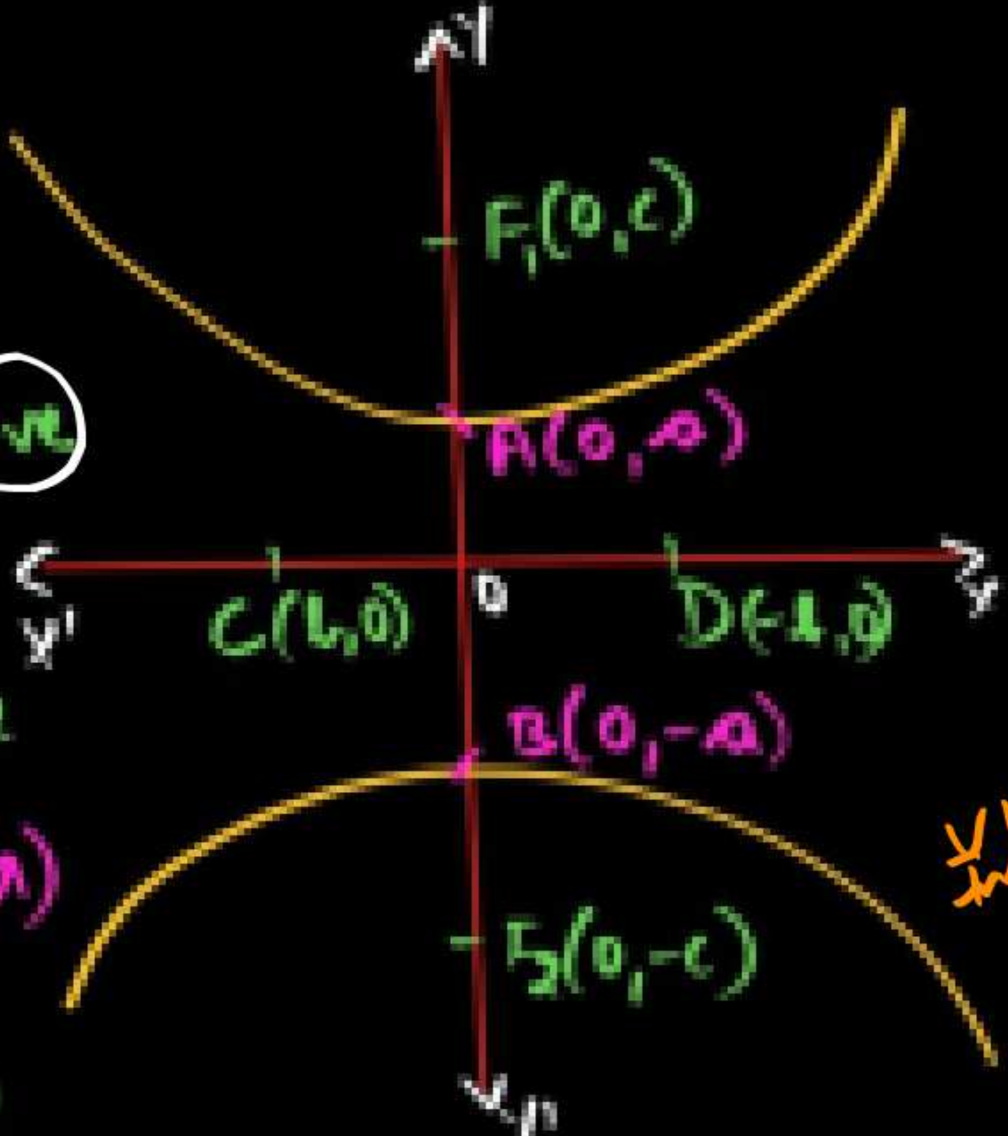
$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

(1) Here
coefficient of y^2 = +ve
coefficient of x^2 = -ve

(2) vertices = $(0, \pm a)$

(3) Foci = $(0, \pm c)$

(4) $e > 1$



(1) Transverse Axis :- Along y-axis

(2) Conjugate Axis :- Along x-axis

(3) Length of Transverse Axis :- $AB = 2a$

(4) Length of Conjugate Axis :- $CD = 2b$

(5) Distance b/w Foci :- $F_1F_2 = 2c$

imp (6) Relationship b/w a, b, c :- $c^2 = a^2 + b^2$

(7) Length of Latus rectum :- $\frac{2b^2}{a}$

(8) Eccentricity $(e) = \frac{c}{a}$

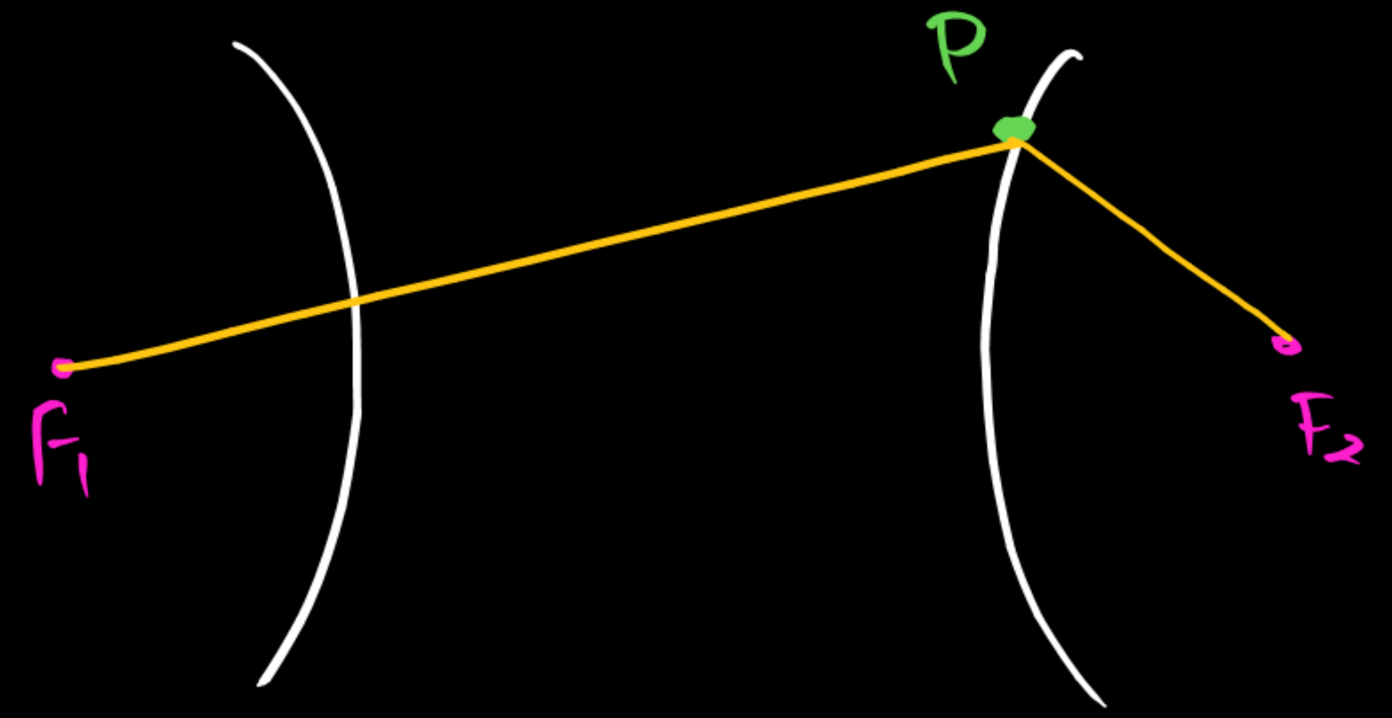
Rectangular Hyperbola

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

if $a = b$

Ex:

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



$$PF_1 - PF_2 = 2a$$

QUESTION

Find the eccentricity of the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$.

(A) 5/4

(B) 4/5

(C) 5

(D) 4

$a^2 = 16 \quad | \quad b^2 = 9$

$a = 4 \quad | \quad b = 3$

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

$c^2 = 16 + 9 = 25$

$c = 5$

$e = \frac{c}{a} = \frac{5}{4}$

(*) $\frac{y^2}{9} - \frac{x^2}{16} = 1$ find eccentricity

$a^2 = 9$ | $b^2 = 16$

$a = 3$ | $b = 4$

$c^2 = a^2 + b^2 = 9 + 16 = 25$

$c = 5$

$e = \frac{c}{a} = \frac{5}{3}$

QUESTION

The eccentricity of a hyperbola $3x^2 - 3y^2 = 25$ is

$$\frac{x^2}{25/3} - \frac{y^2}{25/3} = 1$$

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

$c^2 = \frac{50}{3}$

$c = \frac{5\sqrt{2}}{\sqrt{3}}$

$a = \frac{5}{\sqrt{3}}$

$e = \frac{5\sqrt{2}}{\sqrt{3}} \times \frac{\sqrt{3}}{5}$

$e = \sqrt{2}$

A) 4

B) $\sqrt{2}$

C) 2

D) 4/3

QUESTION

Transverse axis is along x-axis

Foci $(\pm 3\sqrt{5}, 0)$, the latus rectum is of length 8 . Find the equation of hyperbola.

$c = 3\sqrt{5}$

$c^2 = 45$

$\frac{2b^2}{a} = 8$

$b^2 = 4a$

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

$45 = a^2 + 4a$

$a^2 + 4a - 45 = 0$

-45

$+9 \quad -5$

$a = -9$ ✗ since $a = +ve$

$a = 5$ $\Downarrow$ $b^2 = 4a = 20$

(A) $\frac{x^2}{25} - \frac{y^2}{20} = 1$

(B) $\frac{x^2}{20} - \frac{y^2}{25} = 1$

(C) $\frac{x^2}{5} - \frac{y^2}{4} = 1$

(D) None of these

$\frac{x^2}{25} - \frac{y^2}{20} = 1$

QUESTION

If vertices $(\pm 7,0)$, $e=\frac{4}{3}$, then find the equation of hyperbola.

$= a = 7$

$(28)^2$

$= 4\ \underline{32}\ 64 = 784$

$e = \frac{c}{a} = \frac{4}{3}$

$\frac{c}{7} = \frac{4}{3}$

$c = \frac{28}{3}$

$c^2 = \frac{784}{9}$

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

$b^2 = c^2 - a^2$

$= \frac{784}{9} - 49$

$= \frac{784 - 441}{9}$

$b^2 = \frac{343}{9}$

$\frac{x^2}{49} - \frac{y^2}{343/9} = 1$

(A) $\frac{x^2}{343} - \frac{y^2}{49} = 1$

(B) $\frac{x^2}{49} - \frac{y^2}{343} = 1$

(C) $\frac{9x^2}{343} - \frac{y^2}{49} = 1$

(D) $\frac{x^2}{49} - \frac{9y^2}{343} = 1$

QUESTION

$\rightarrow c = \sqrt{10}$ $\rightarrow$ Transverse axis

$c^2 = 10$ is along y-axis

If foci $(0, \pm\sqrt{10})$, passing through (2,3), then find the equation of hyperbola.

option verification

(1) $9 - 4 = 5 \neq 1$

A $y^2 - x^2 = 1$

B ✗ $x^2 - y^2 = 1$

C ✗ $x^2 - y^2 = 5$

D ✓ $y^2 - x^2 = 5$

$x^2 - y^2 = 2004$

$a^2 = b^2 = 2004$

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

$c^2 = 4008$

$c = \sqrt{4008}$

$e = \frac{c}{a} = \sqrt{\frac{4008}{2004}} = \sqrt{2}$

QUESTION

The eccentricity of the hyperbola with latus rectum 12 and semi conjugate axis $2\sqrt{3}$, is

(A) 3

(B) $\sqrt{3/2}$

(C) $2\sqrt{3}$

(D) 2

$\frac{2b^2}{a} = 12$

$b^2 = 6a$

$b = 2\sqrt{3}$

$b^2 = 4(3) = 12$

$6a = 12$

$a = 2$

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

$c^2 = 4 + 12 = 16$

$c = 4$

$e = \frac{4}{2} = 2$

QUESTION

The equation $\frac{x^2}{14-a} + \frac{y^2}{9-a} = 1$ represents a/an

(A) ellipse if $a > 9$

(B) hyperbola if $9 < a < 14$

(C) hyperbola if $a > 14$

(D) ellipse if $9 < a < 14$

$\frac{x^2}{14-a} + \frac{y^2}{9-a} = 1$

This should be -ve

① ellipse :-

$14-a>0$ & $9-a>0$

$14>a$ $\quad 9>a$

$a<14$ $\quad a<9$

intersection

$a<9$

② Hyperbola :-

$14-a>0$ & $9-a<0$

$14>a$ $\quad 9<a$

$a<14$

$9<a<14$

QUESTION

A point moves in such a way that the $\boxed{\text{difference}}$ of its distance from two points (8,0) and (−8,0)

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

9.45 → end

$$\text{3m to 4m}\left\{\begin{array}{llll} \text{Tomorrow} & - \text{ P\&C} & - \text{ 90min} \\ \text{Sat} & - \text{ LPP} & - \text{ 90min} \\ \text{Sun} & - \text{ Bayes' theorem} & - \text{ 90min} \end{array}\right\} \text{270min} \to \text{4hr 30min}$$

Thank You