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IIT JEE

Physics DPP

DPP-3 Basic Maths: Geometry (Mathematical Curves)
By Physicsaholics Team

Q) Which of the following is an equation of circle:

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

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

(c) $xyz + y^2 = 2^2$

(d) None of these

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Ans. a

Equation of circle

$$(x-a)^2 + (y-b)^2 = r^2$$

where; (a, b) centre

& $r = \text{radius}$.

$$\therefore x^2 + y^2 = 2^2$$

is equation of circle.

with centre $(0, 0)$

and radius = 2 unit.

Q) Which of the following is an equation of parabola:

(a) $x^2 = 4ay$

(b) $y^2 = 2^2bx$

(c) $x^2 = cy$

(d) All of these

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Ans. d

Equation of Parabola

$y^2 = 4ax$ [where, a & b are constants]

② $x^2 = 4by$

Comparing given equation with these standard forms:

(a) $x^2 = 4ay$ (Parabola) ✓

(b) $y^2 = 2^2bx$ [$4a = 2^2b$] ✓

(c) $x^2 = cy$ [$4b = c$] ✓

∴ a, b, c all are equation of parabola.

Q) Which of the following is an equation of ellipse:

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

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

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

(d) All of the above

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Ans. d

Ellipse

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

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

$$(c) \quad \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

all are equation of ellipse,

Q) Which of the following is not an equation of circle:

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

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

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

(d) None of these

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Ans. d

Equation of circle

$$(x-a)^2 + (y-b)^2 = r^2$$

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

centre, $C(2, 1)$; radius, $r = 2$ unit

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

cen $C(-2, 4)$, $r = 2$ unit

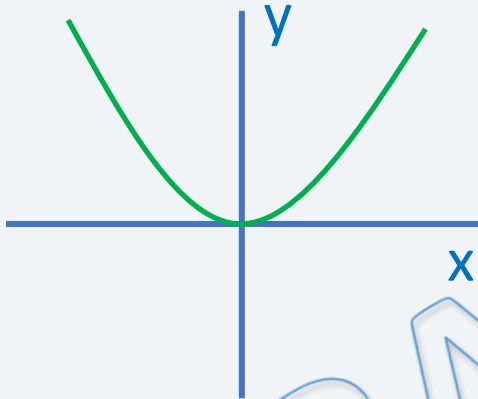
$$(c) (x-2)^2 + y^2 = 2^2$$

$C(2, 0)$, $r = 2$ unit.

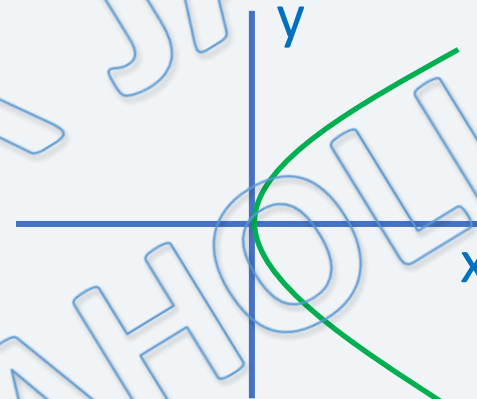
\therefore all are equation of circle.

Q) Curve of $Y = 3x^2$ can be:

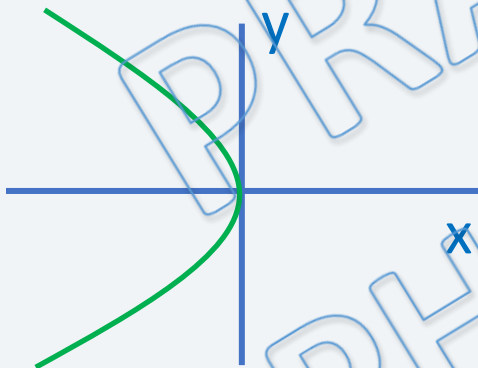
(a)



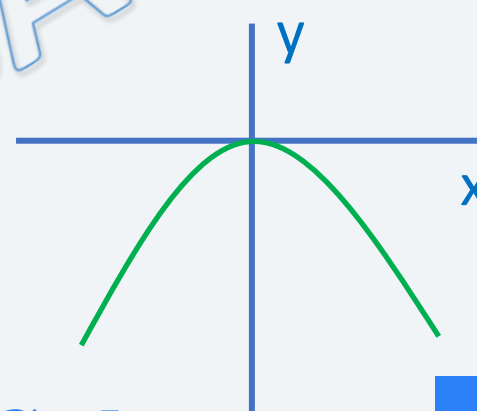
(b)



(c)



(d)



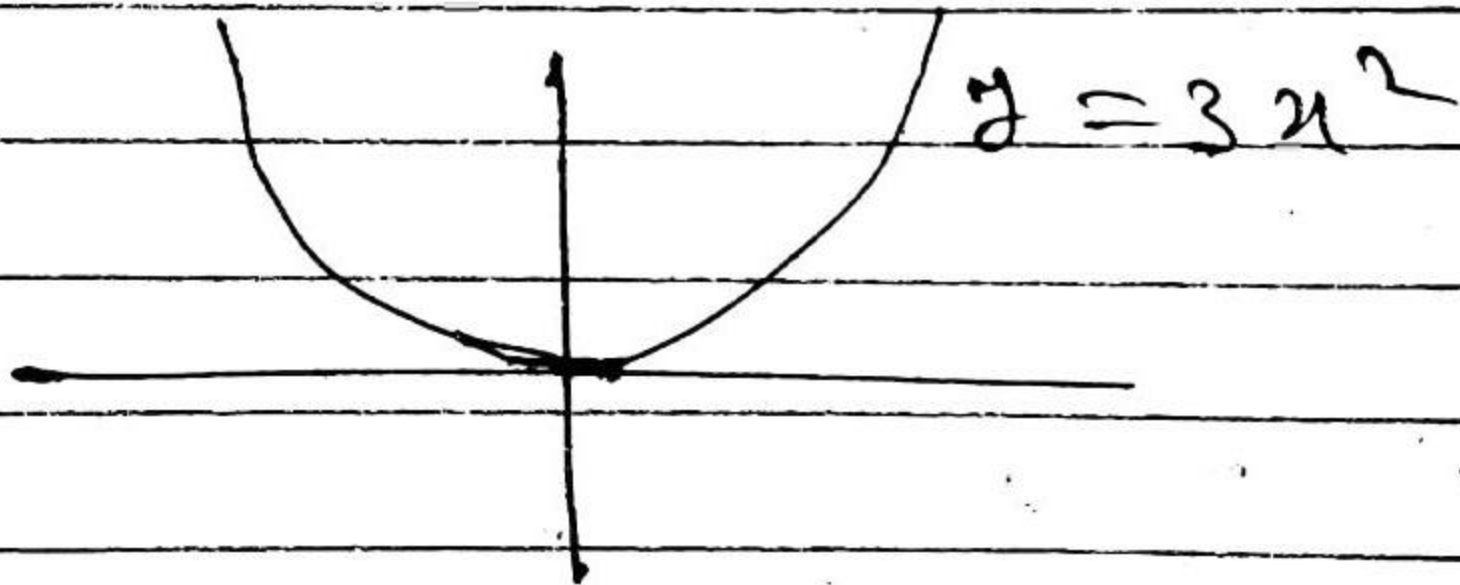
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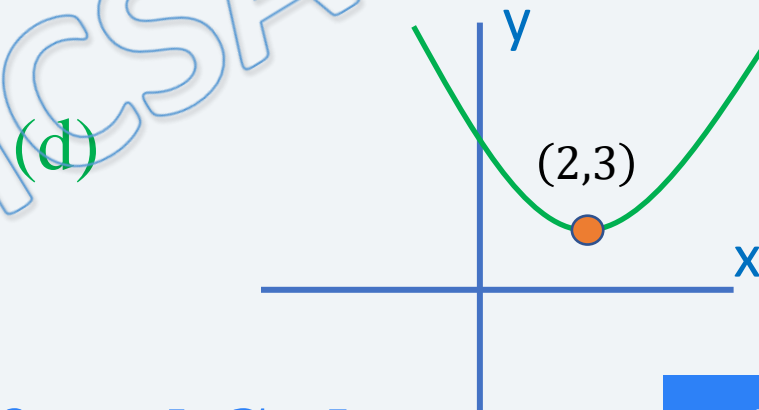
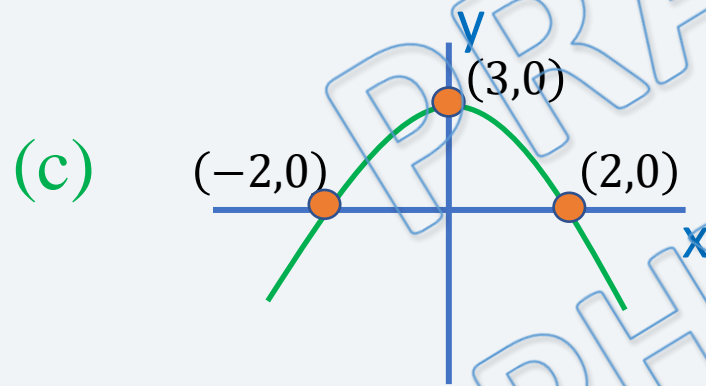
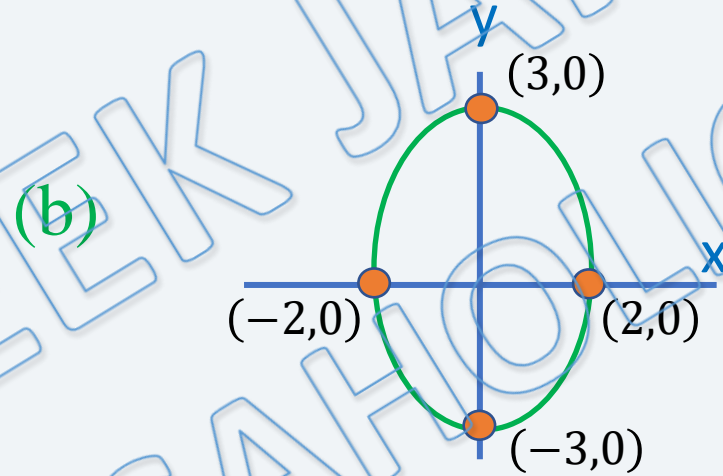
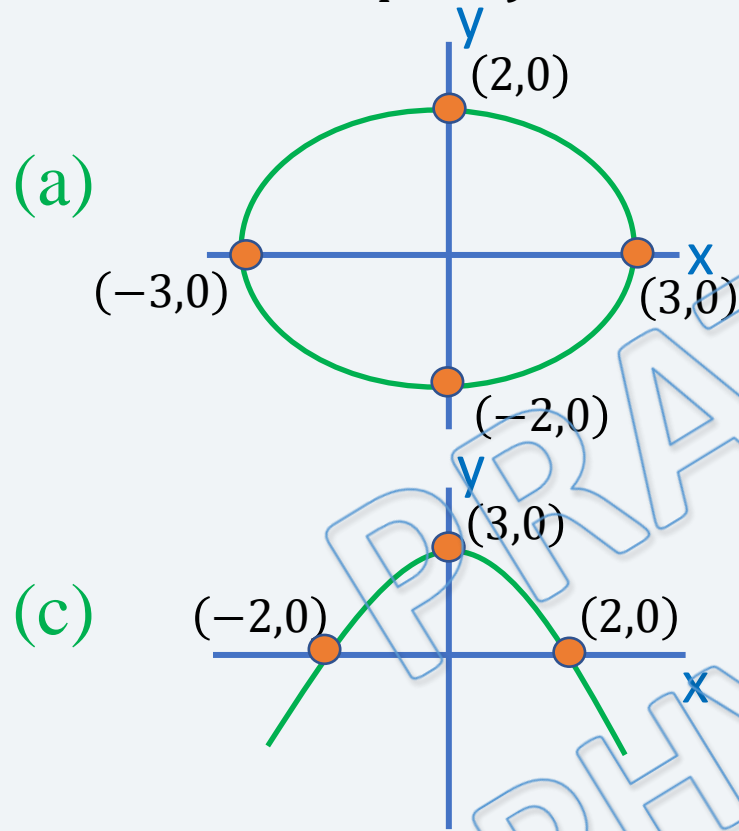
Ans. a

$$y = 3x^2$$

equation of parabola
opening towards +y-axis



Q) Curve of $\frac{x^2}{4} + \frac{y^2}{9} = 1$ is:



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Ans. b

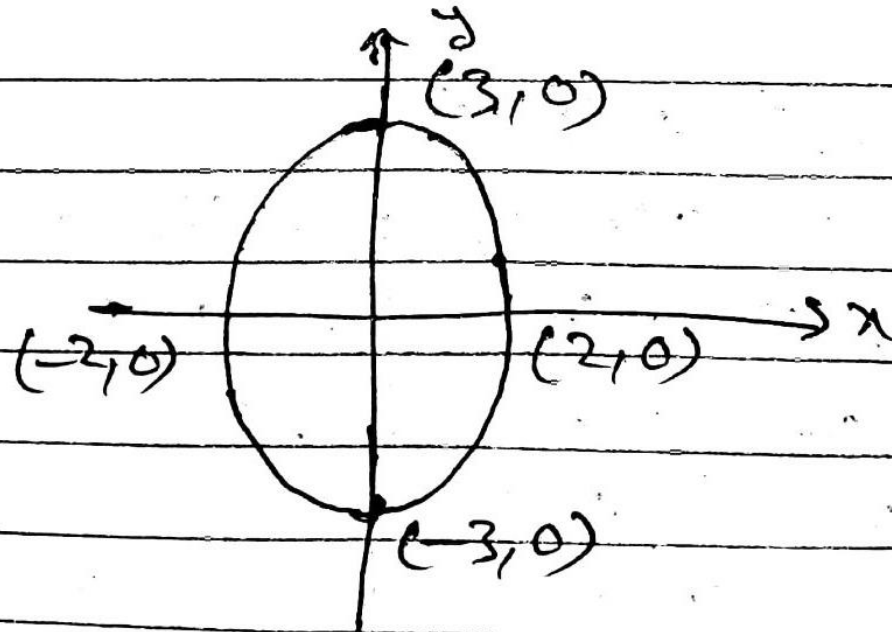
$$\frac{x^2}{4} + \frac{y^2}{9} = 1$$

equation of Ellipse:

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

$$a^2 = 4 \Rightarrow a = \pm\sqrt{4} = \pm 2$$

$$b^2 = 9 \Rightarrow b = \pm\sqrt{9} = \pm 3$$



Q) Find radius r and coordinate of centre C of the circle $(x - 3)^2 + y^2 = 4$:

(a) $r = 2 \text{ unit}, C(0,3)$

(b) $r = 4 \text{ unit}, C(3,0)$

(c) $r = 2 \text{ unit}, C(3,0)$

(d) $r = 2 \text{ unit}, C(-3,0)$

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Ans. c

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

compare with standard equation
of circle! $(x-a)^2 + (y-b)^2 = r^2$

$$a=3, b=0, r^2=4$$

\therefore Centre: $C(3, 0)$

radius: $r = 2$ unit

Q) Which of the following is an equation of hyperbola:

(a) $xy = 1$

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

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

(d) All of these

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Ans. d

Standard Equation of Hyperbola:

$$xy = c \quad \text{and} \quad \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

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

$$\therefore (a) \quad xy = 1 \quad \checkmark$$

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

$$(c) \quad \frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

all are equations of Hyperbola.

Q) Equation of circle which has radius 4 unit and centre is C(-1,3):

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

(b) $(x + 1)^2 + (y - 3)^2 = 16$

(c) $(x + 1)^2 + (y + 3)^2 = 4^2$

(d) None of these

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Ans. b

$$C(-1, 3) \equiv (a, b)$$

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

$$\text{radius, } r = 4 \text{ unit}$$

Standard Equation of circle:

$$(x-a)^2 + (y-b)^2 = r^2$$

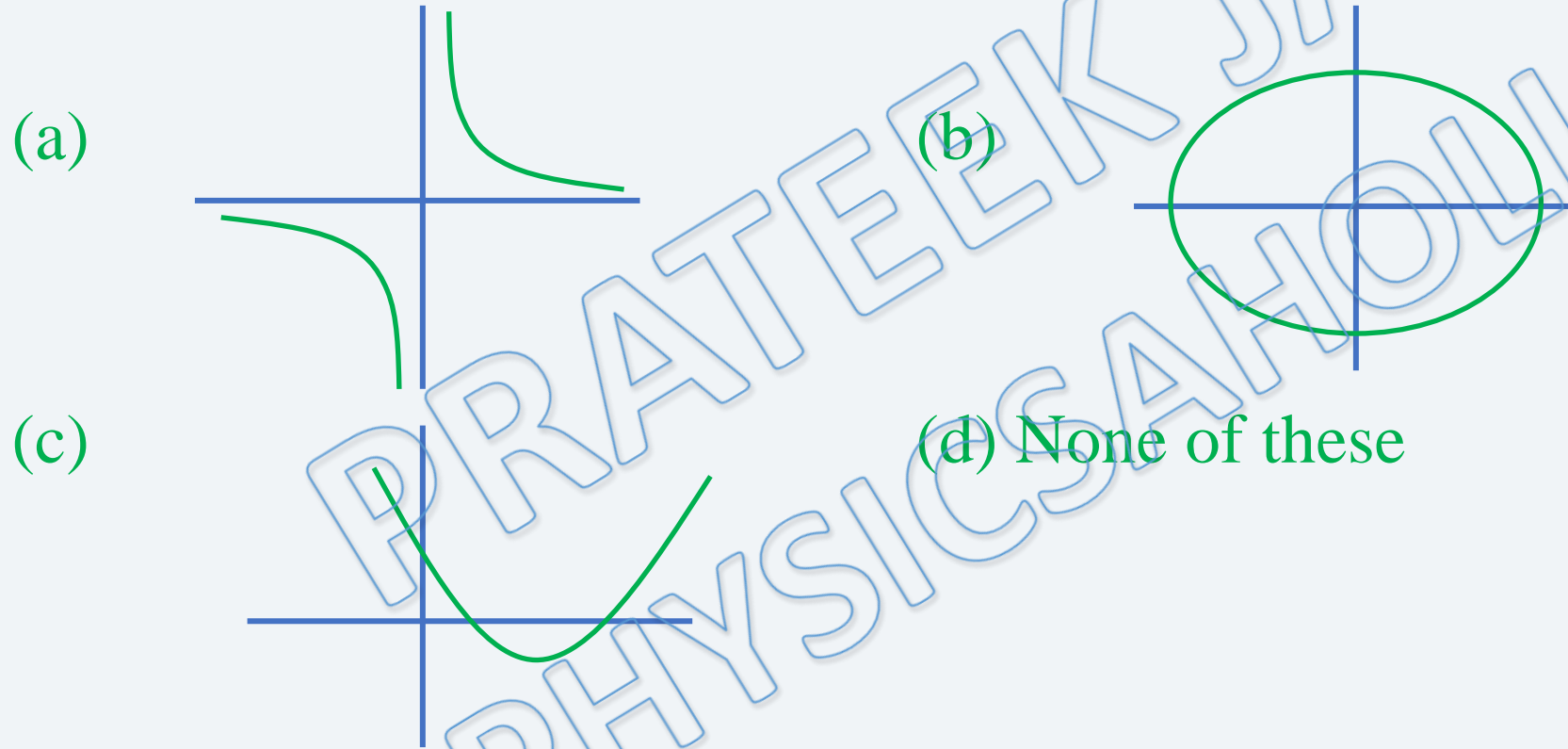
$$(x-(-1))^2 + (y-3)^2 = 4^2$$

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

or

$$(x+1)^2 + (y-3)^2 = 16$$

Q) Curve of hyperbola is:



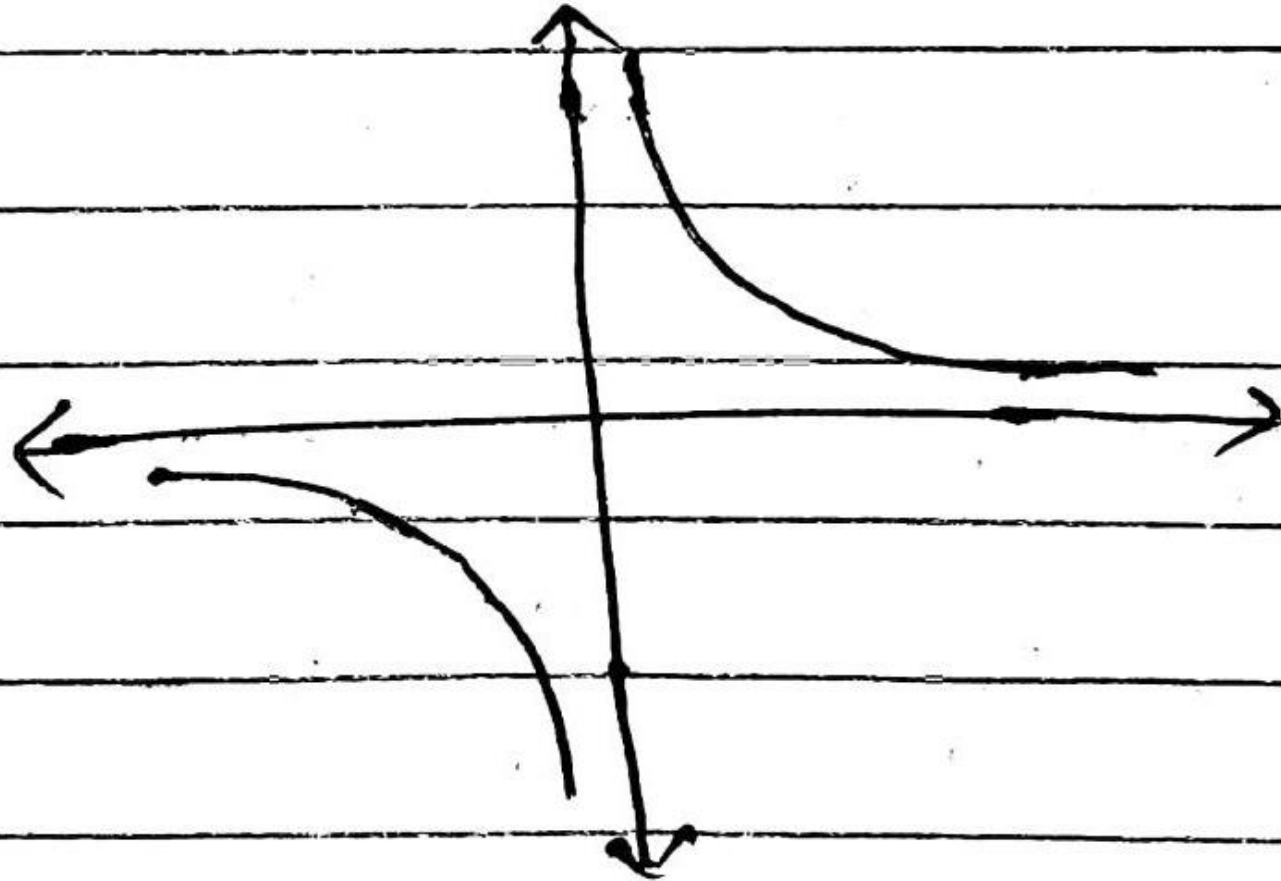
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Ans. a

Hyperbola :

$$xy = c$$



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Chalo Niklo