

6.6 - Solving Exponential and Logarithmic Equations

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Warmup

1. $\log_3 7 + \log_3 x = \log_3 14$

2

2. $\log_2 10 - \log_2 t = \log_2 2$

5

3. $\log_3 y - \log_3 2 = \log_3 12$

24

4. $\log_3 14 + \log_3 m = \log_3 42$

3

5. $\log_5 x = 3 \log_5 7$

343

6. $\log_2 p = \frac{1}{2} \log_2 81$

9

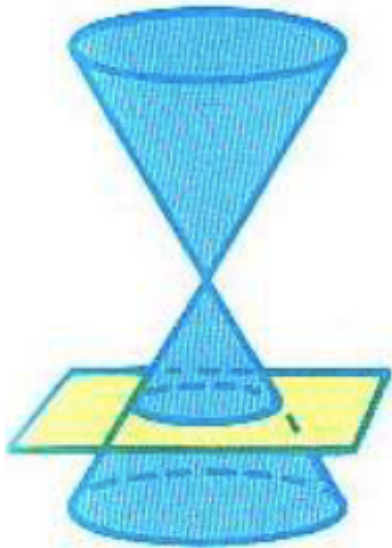
7. $\log_9 x = \frac{1}{2} \log_9 144 - \frac{1}{3} \log_9 8$

6

8. $\log_7 m = \frac{1}{3} \log_7 64 + \frac{1}{2} \log_7 121$

44

Conics - Hyperbolas 2 of 16



circle

Circle



parabola

Parabola



ellipse

Ellipse



hyperbola

Hyperbola

Conics - Parabola

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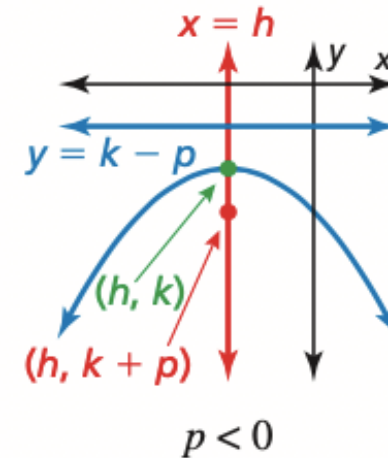
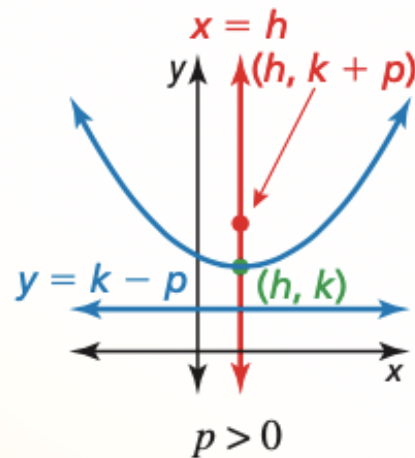
Standard Equations of a Parabola with Vertex at (h, k)

Vertical axis of symmetry ($x = h$)

Equation: $y = \frac{1}{4p}(x - h)^2 + k$

Focus: $(h, k + p)$

Directrix: $y = k - p$

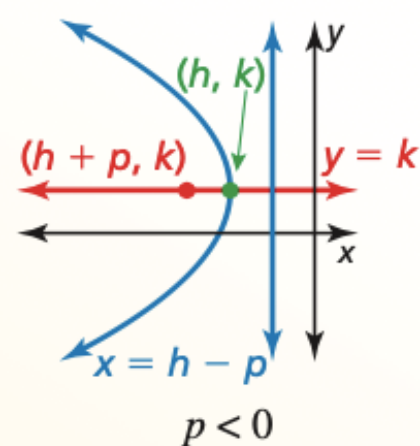
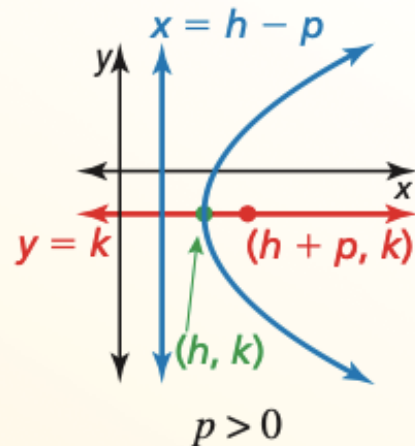


Horizontal axis of symmetry ($y = k$)

Equation: $x = \frac{1}{4p}(y - k)^2 + h$

Focus: $(h + p, k)$

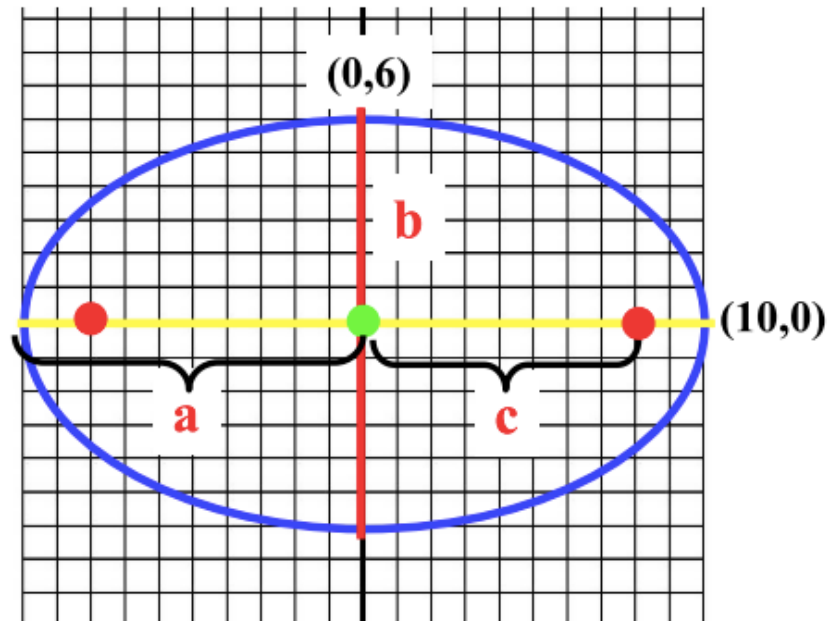
Directrix: $x = h - p$



Conics - Ellipses

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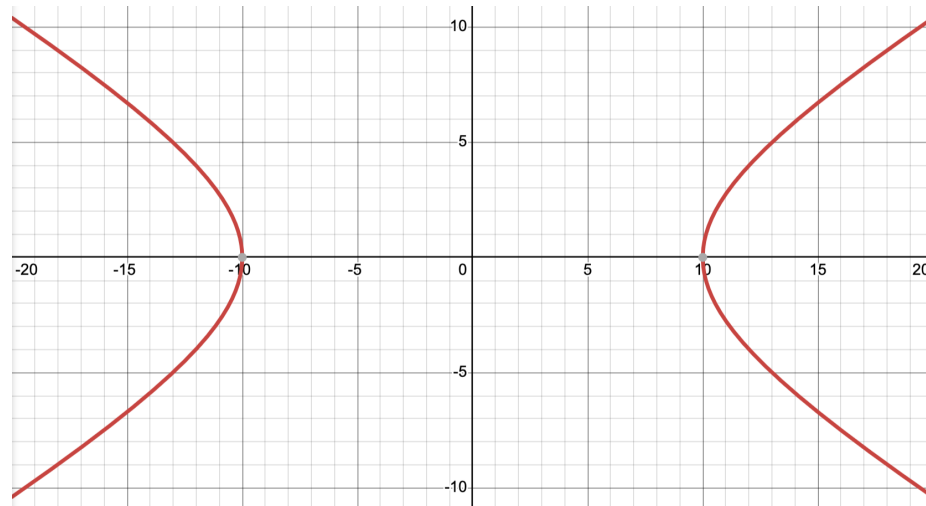
The equation for an ellipse.



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

$$\frac{x^2}{10^2} + \frac{y^2}{6^2} = 1$$

$$\frac{x^2}{100} + \frac{y^2}{36} = 1$$

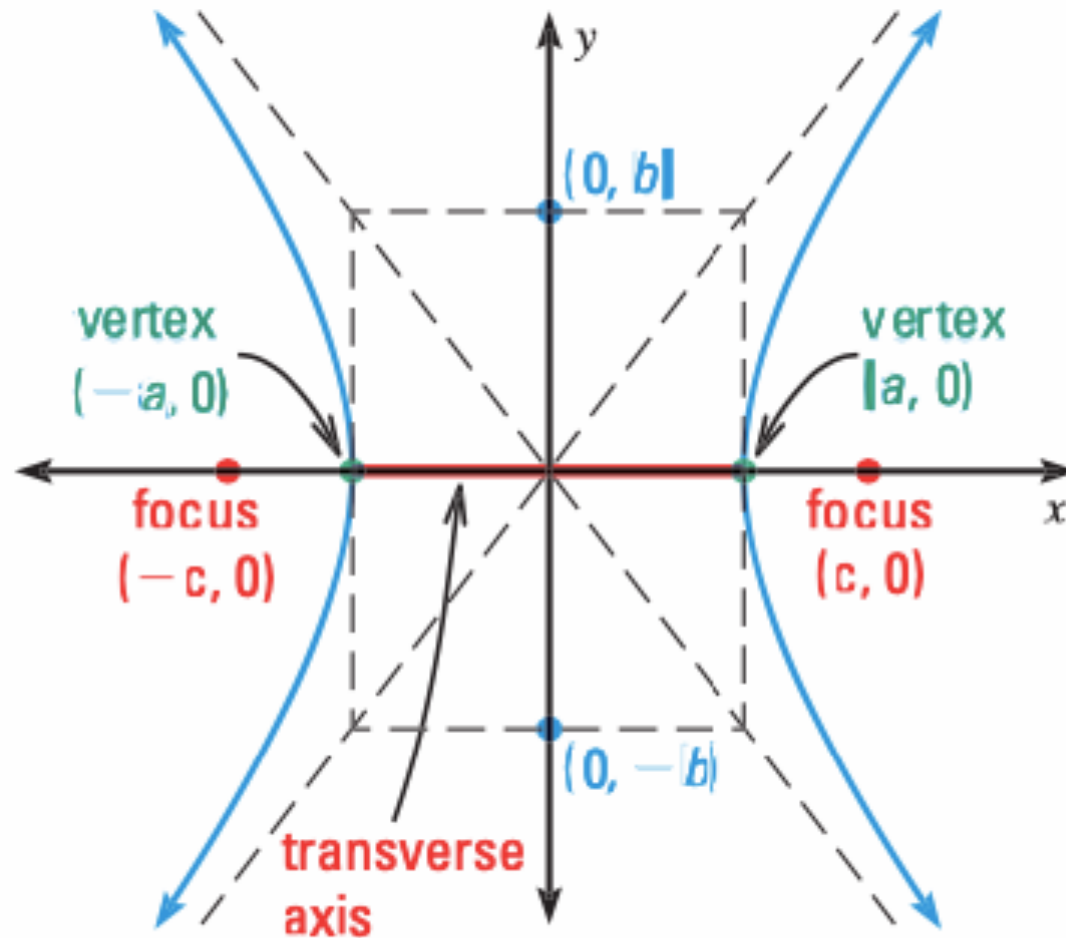


$$\frac{x^2}{100} - \frac{y^2}{36} = 1$$

Conics - Hyperbola

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Definition



Hyperbola with horizontal transverse axis

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

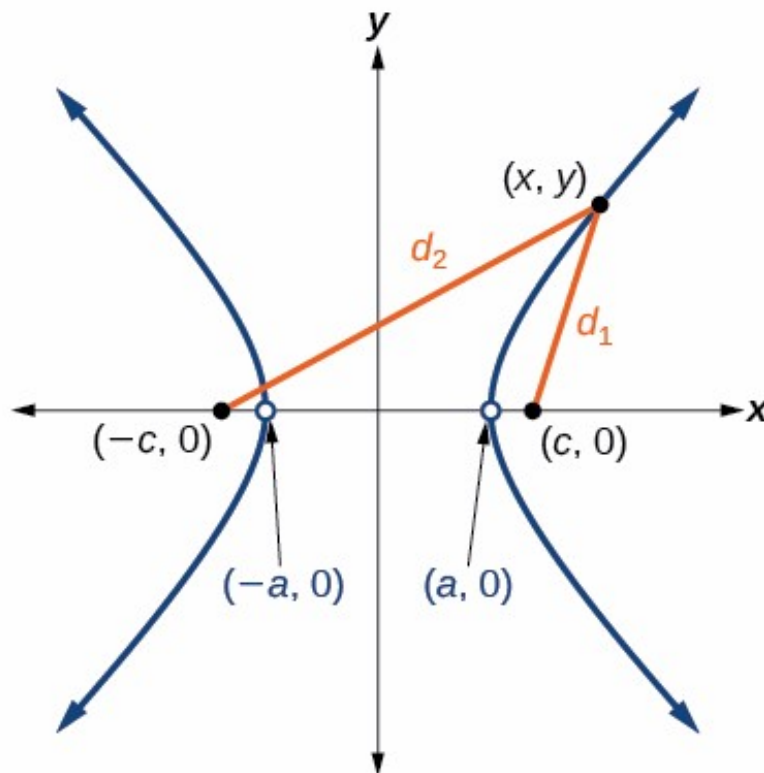
Conics - Hyperbola

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The equation for an hyperbola.

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

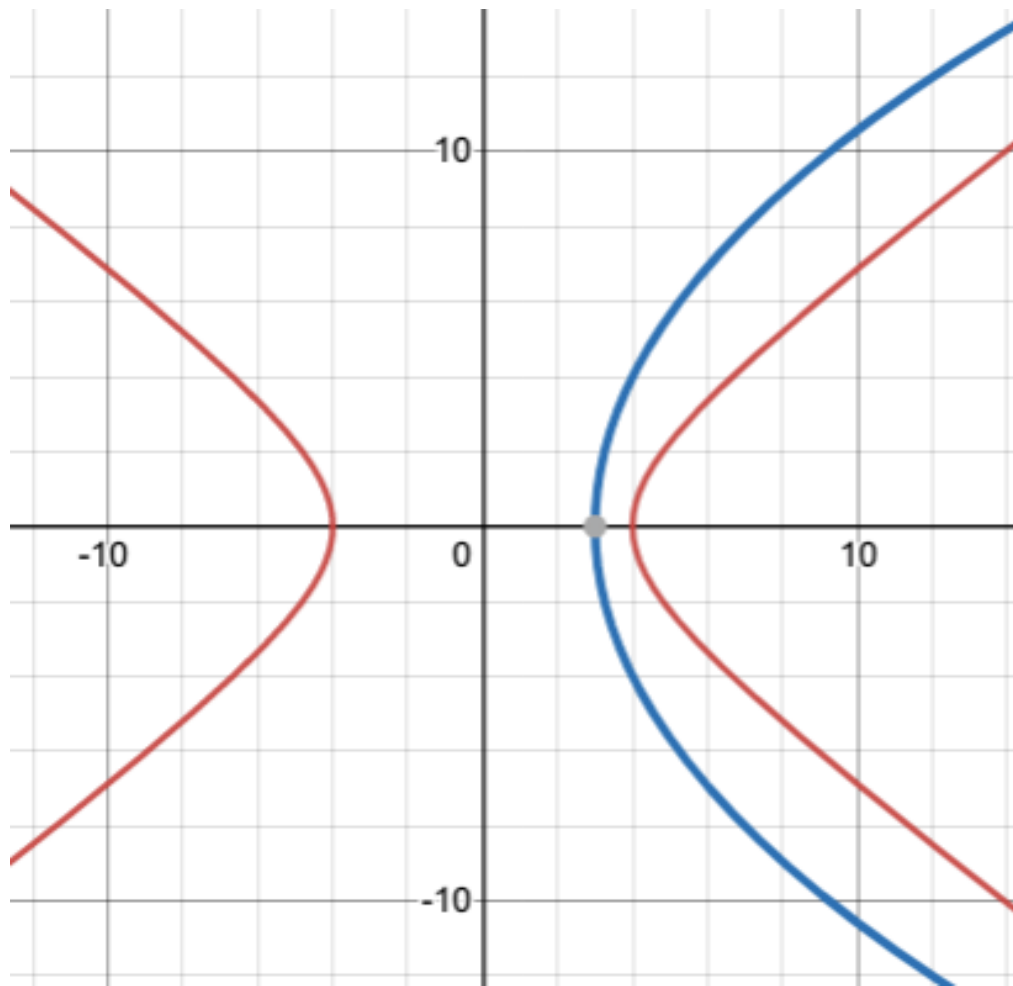
$d_2 - d_1$ is constant



Conics - Hyperbola

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Is a hyperbola the same as a parabola?



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

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

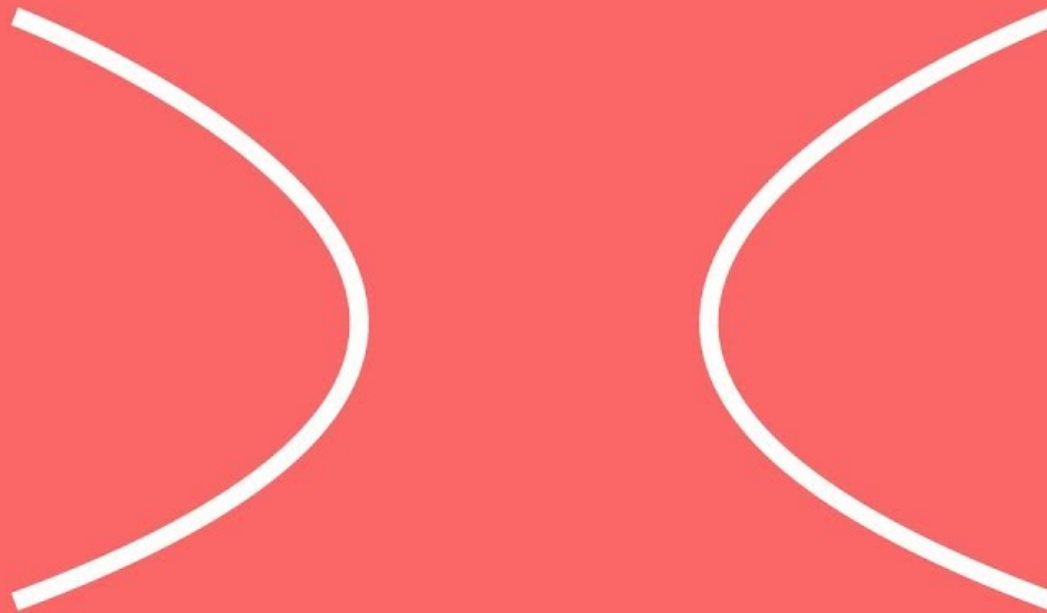
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Start 3:15



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HYPERBOLA (PART 1)



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Old

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

New

$$4x^2 - y^2 = 16$$

$$\frac{4x^2 - y^2 = 16}{16}$$

$$\frac{x^2}{4} - \frac{y^2}{16} = 1$$

Practice

1. $25x^2 - 4y^2 = 100$

$$\frac{x^2}{4} - \frac{y^2}{25} = 1$$

2. $-4x^2 = -9y^2 + 36$

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

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General equation

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

$$4x^2 - y^2 + 24x + 10y - 5 = 0$$

$$\frac{(x + 3)^2}{4} - \frac{(y - 5)^2}{16} = 1$$

Practice

1. $9x^2 - 4y^2 - 18x - 16y = 43$

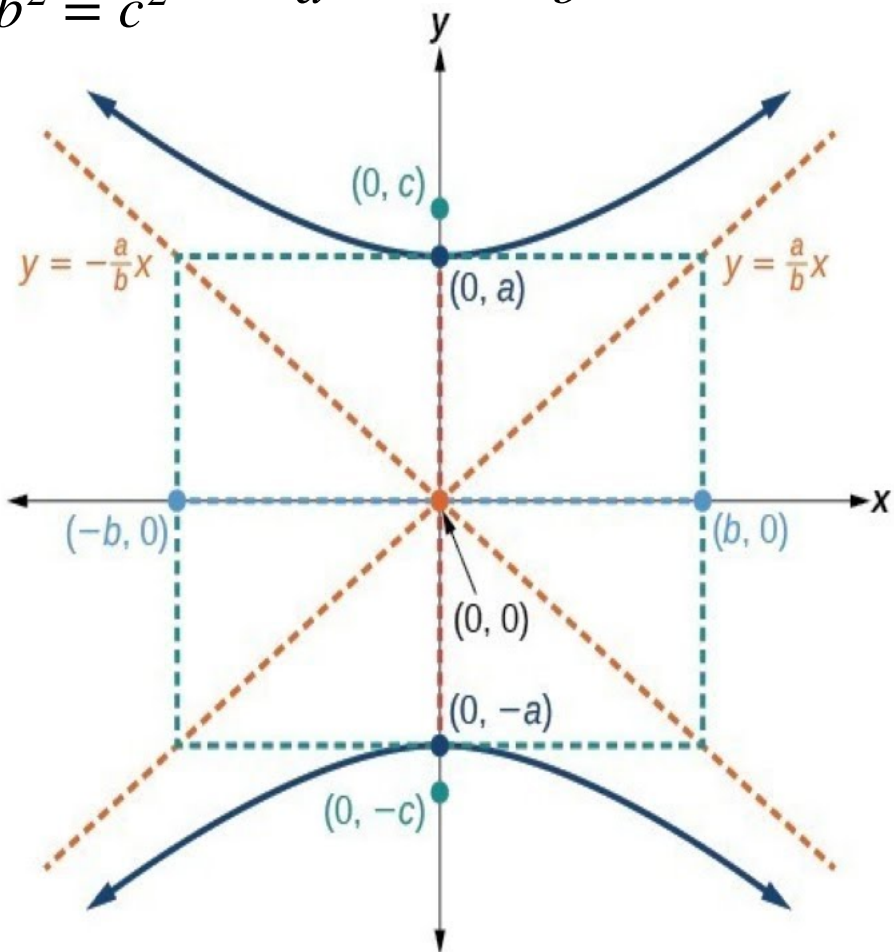
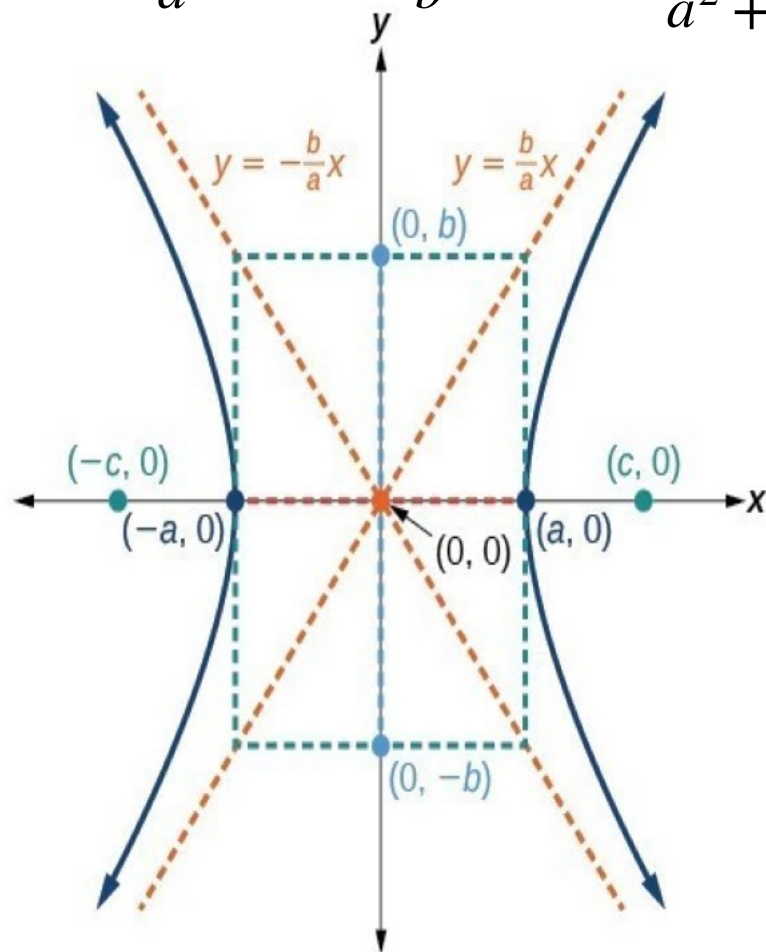
$$\frac{(x - 1)^2}{4} - \frac{(y + 2)^2}{9} = 1$$

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General equation

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

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



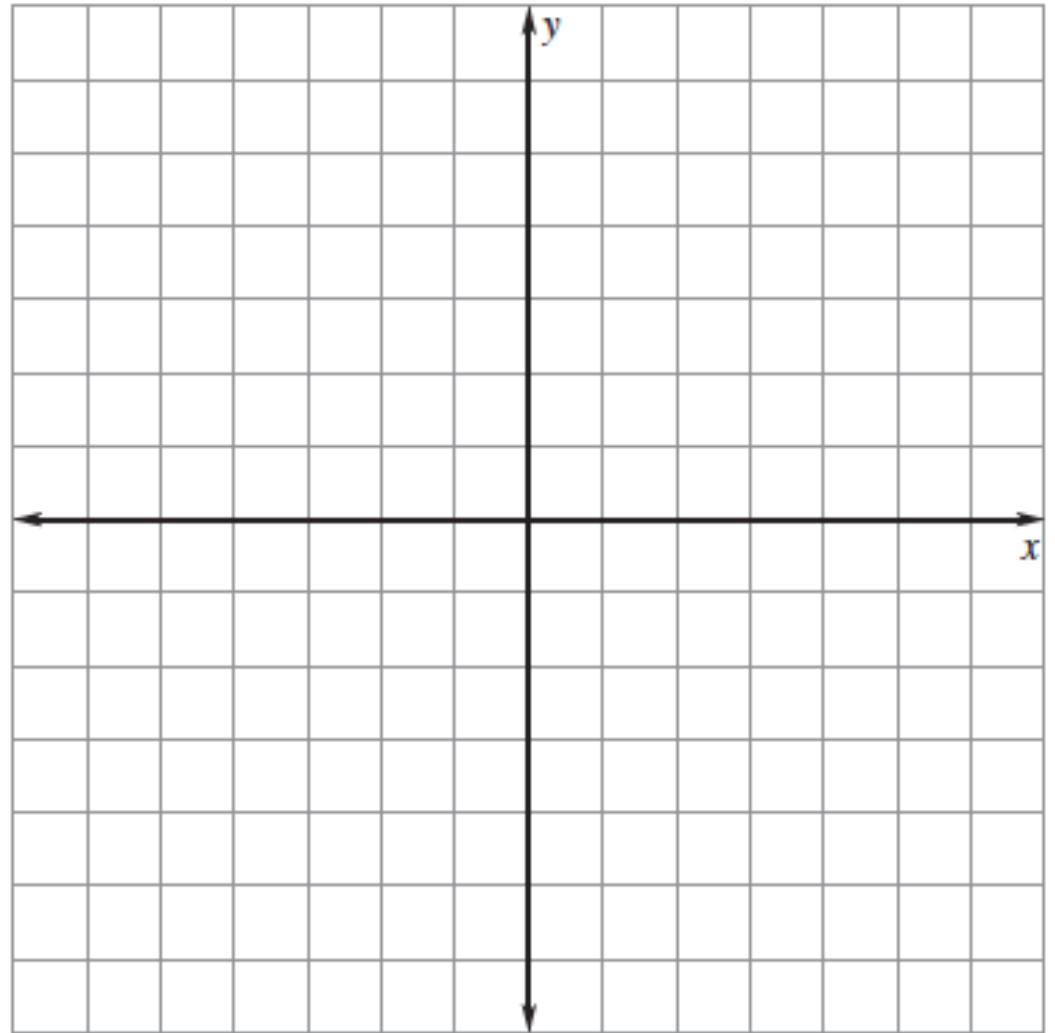
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Let's graph

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

Practice

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



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Find the equation:

$$f_1(6,0), f_2(-6,0)$$

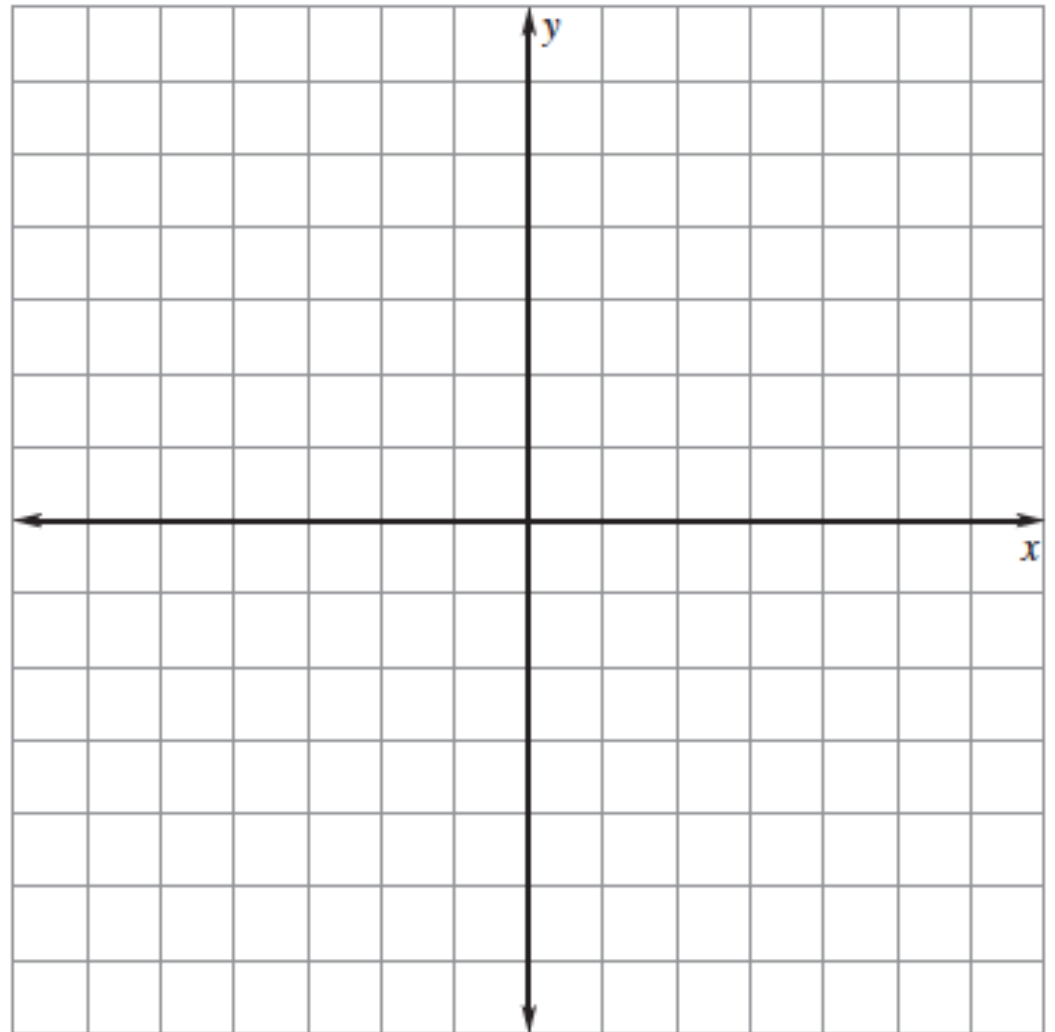
$$\text{focal radii} = 8$$

$$c = 6$$

$$a = 4$$

$$b^2 = c^2 - a^2 = 20$$

$$\frac{x^2}{16} - \frac{y^2}{20} = 1$$



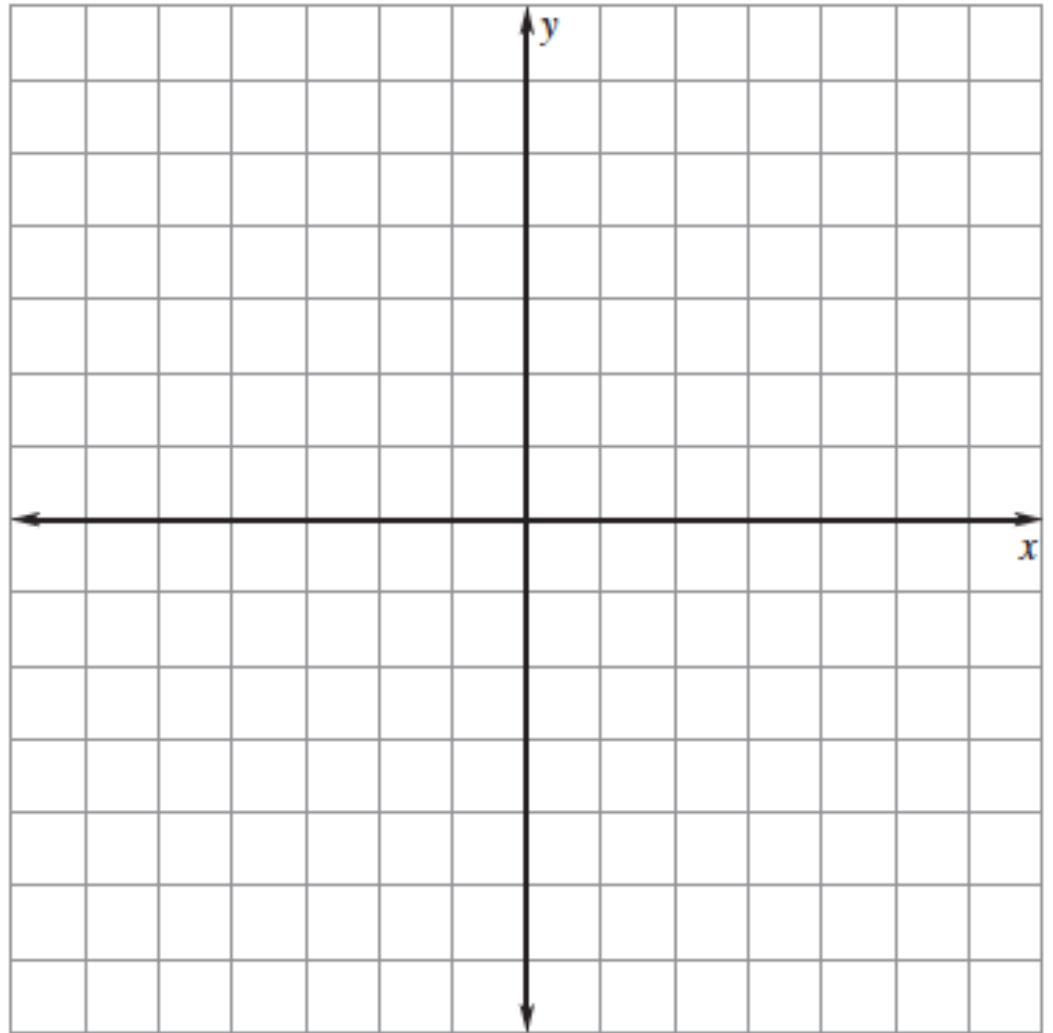
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Change the foci:

$$f_1(6,2), f_2(-6,2)$$

focal radii = 8

$$\frac{x^2}{16} - \frac{y^2}{20} = 1?$$



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Practice

$$f_1(0,8), f_2(0, -8)$$

focal radii = 14

$$\frac{y^2}{49} - \frac{x^2}{15} = 1$$

