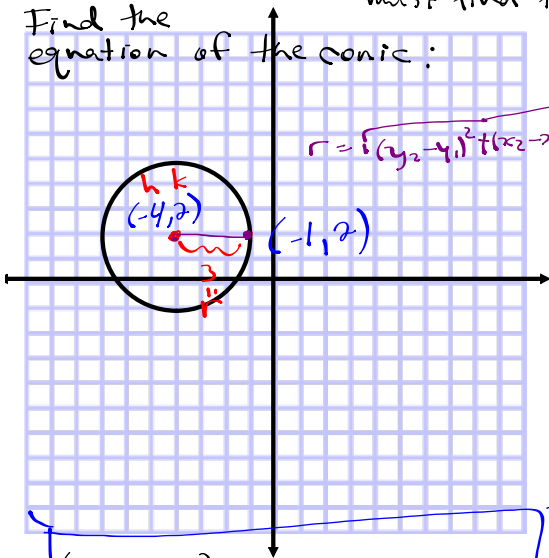


Unit 8: Equations or Inequalities associated with a graph

You're given the graph and you must find the equation aka the parameter of the conic.

Find the equation of the conic:



$$r = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$$

Find the starting equation for the conic.

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

parameters
variables

Label and use info from the graph to determine the parameters

To find the last parameter, temporary sub in a point (x, y) into equation. *on the line.*

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

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

sub in $(-1, 2)$

$$(-1 + 4)^2 + (2 - 2)^2 = r^2$$

$$3^2 + 0^2 = r^2$$

$$\sqrt{9} = \sqrt{r^2}$$

$$r = 3$$

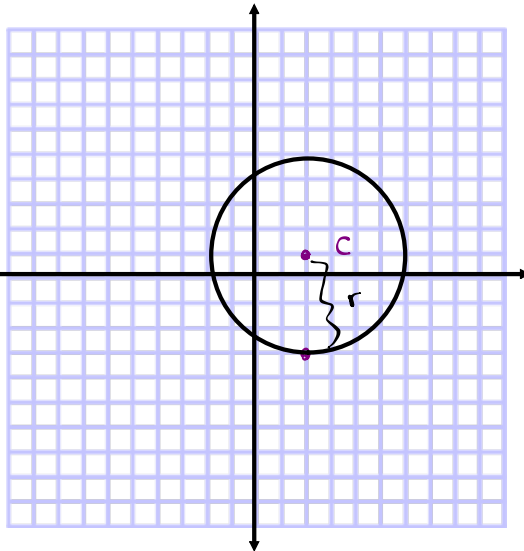
$$(x + 4)^2 + (y - 2)^2 = 9$$

Find the equation of the circle with centre $(2, 1)$ and point $(2, -3)$ on the circle.

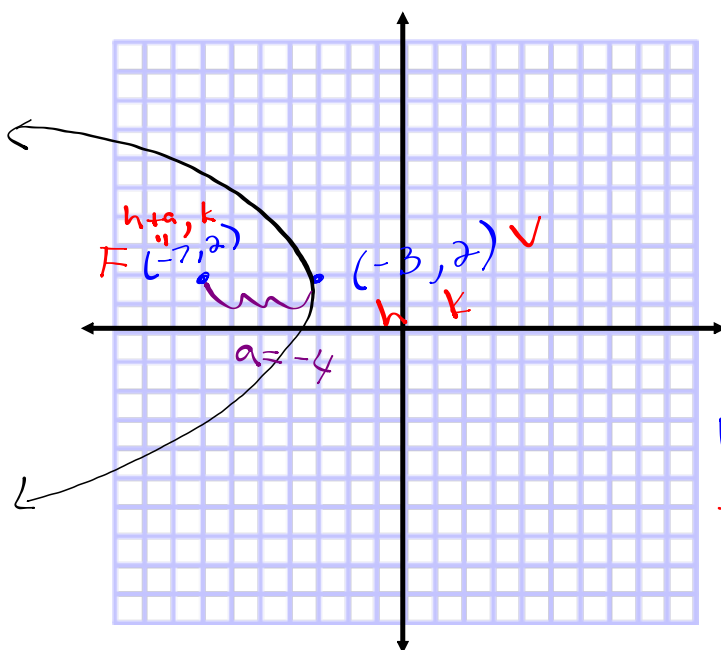
$$(x - h)^2 + (y - k)^2 = r^2$$

$$(2 - 2)^2 + (y - 1)^2 = r^2$$

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



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

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

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

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

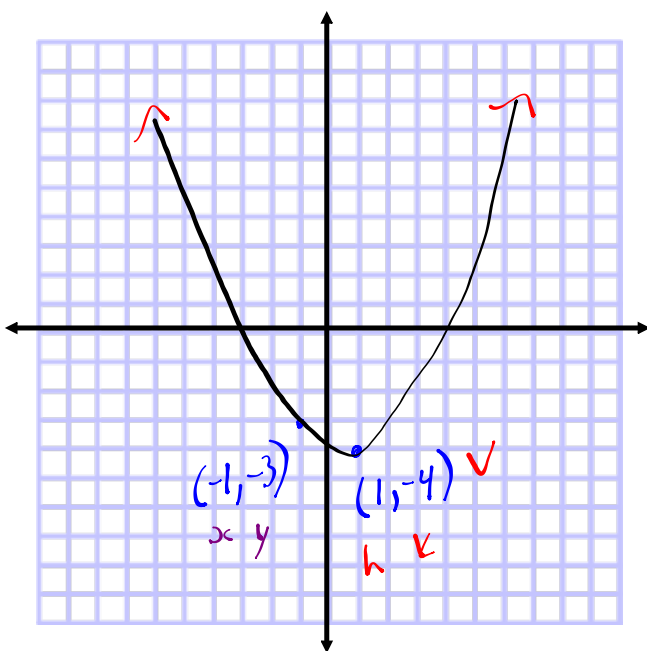
Another way to find a :

$$h + a = -7$$

$$-3 + a = -7 + 3$$

$$a = -4$$

Find the equation:



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

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

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

$$(-2)^2 = 4a(1)$$

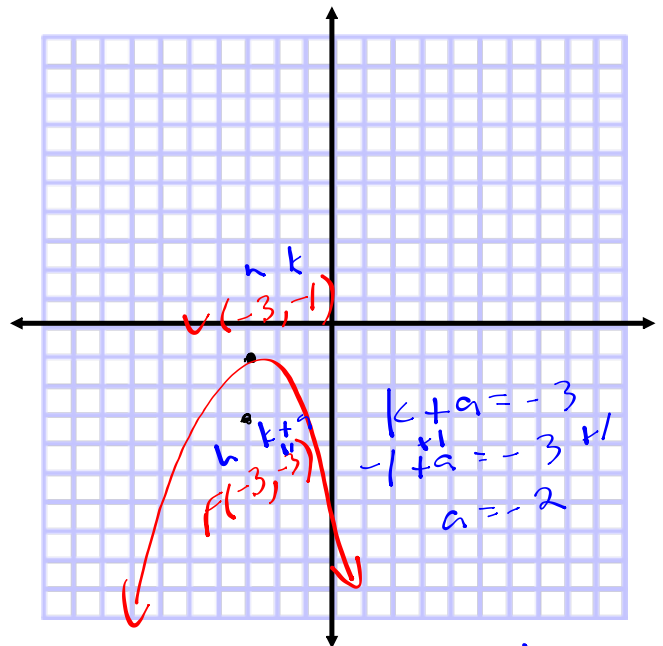
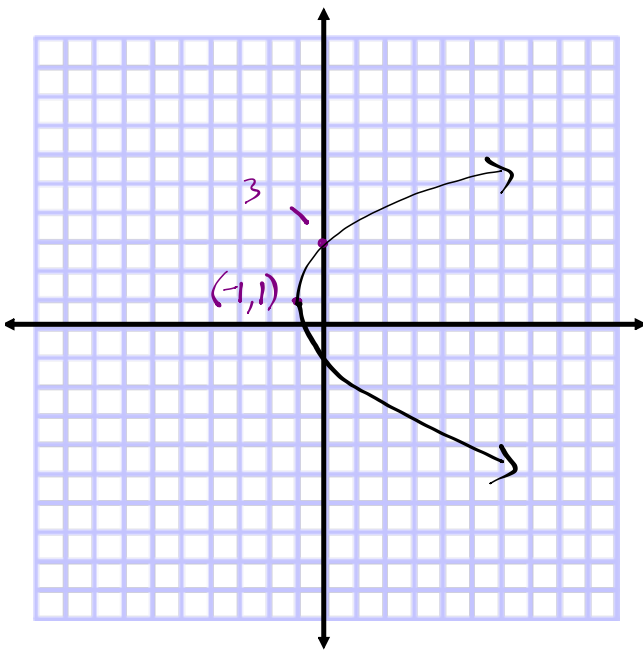
$$\frac{4}{4} = \frac{4a}{4}$$

$$a = 1$$

Sub in a

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

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



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

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

$$(x+3)^2 = -8(y+1)$$

Find the equation:

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

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

To find b:

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

$$4^2 = |5^2 - b^2|$$

Solve for b

$$16 = |25 - b^2|$$

+

$$16 = 25 - b^2$$

$$b^2 = 25 - 16$$

$$b = \sqrt{9}$$

$$b = 3$$

or $16 = -(25 - b^2)$

$$16 = -25 + b^2$$

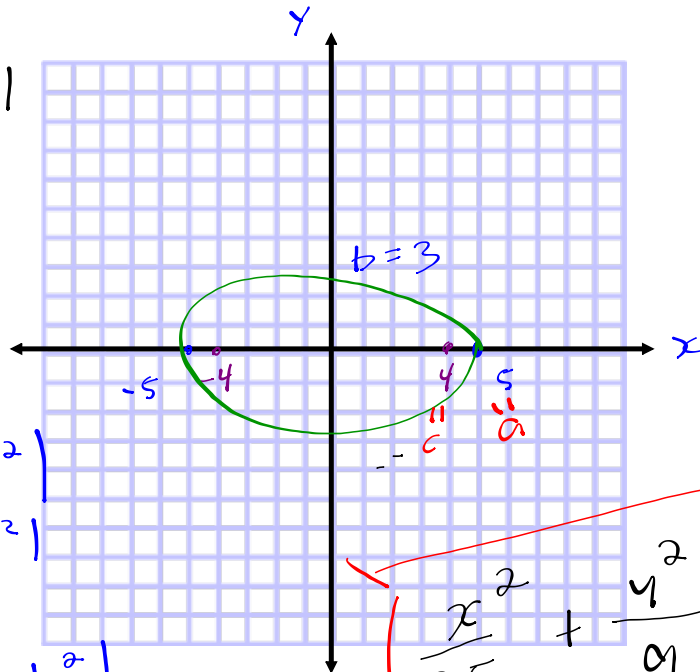
$$16 + 25 = b^2$$

$$41 = b^2$$

$$b = \sqrt{41}$$

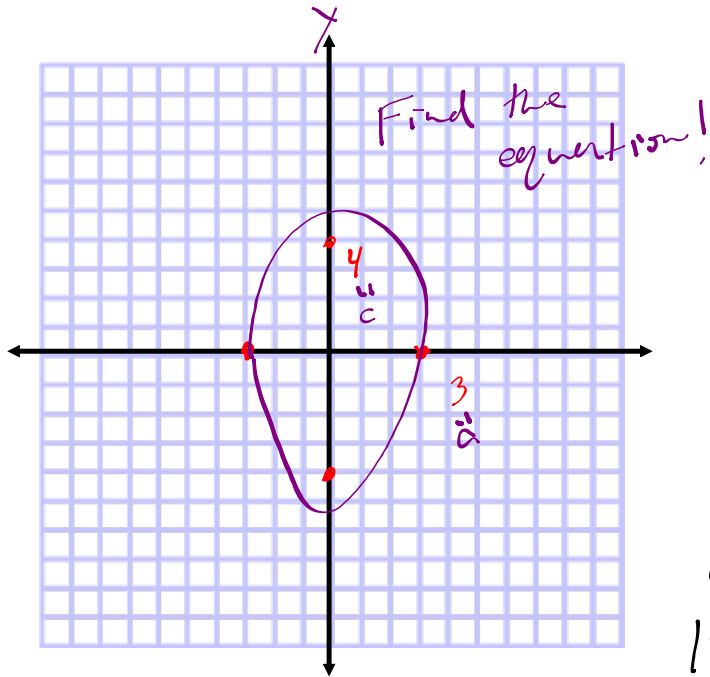
~~$$b = 6.4$$~~

b has to be smaller than a since it's minor axis!



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

x'



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

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

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

$$|b| = |9 - b^2|$$

$$|b| = +(9 - b^2)$$

$$|b|^{-9} = 9 - b^2$$

$$\frac{7}{-1} = \frac{-b^2}{-1}$$

$$b^2 = -7$$

no answer

or $|b| = -(9 - b^2)$

$$|b|^{+9} = -9 + b^2$$

$$\sqrt{25} = \sqrt{b^2}$$

$$b = 5$$

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

Determine the inequality of the shaded region.

Step ①: Determine the equation of the corresponding equation.

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

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

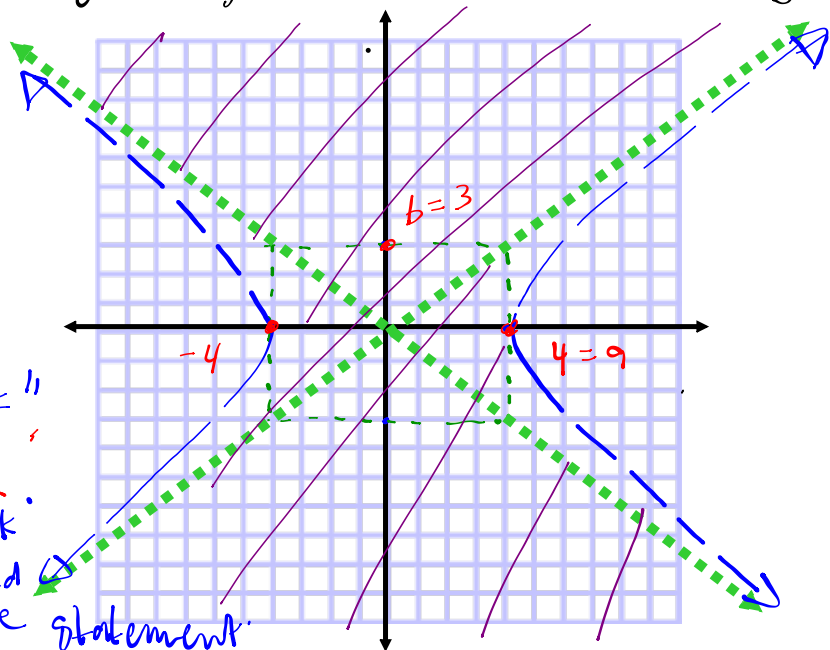
Step ②: Replace "=" with either ">" or "<".
 To know which one, pick a point from the shaded region and make a true statement.

sub (0, 0)

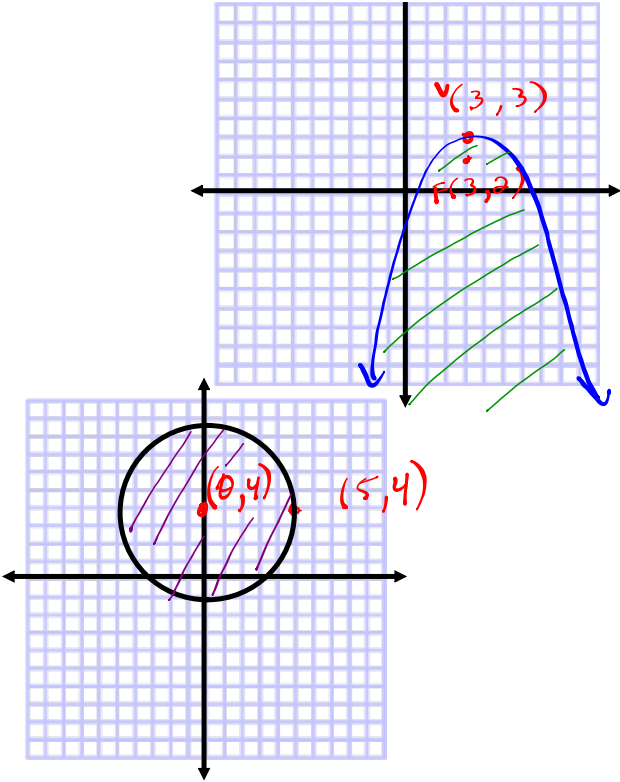
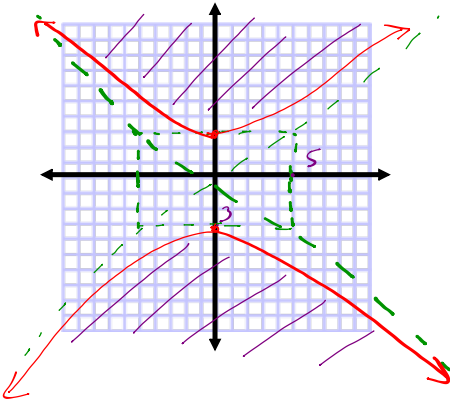
$$\frac{0^2}{16} - \frac{0^2}{9} ? 1$$

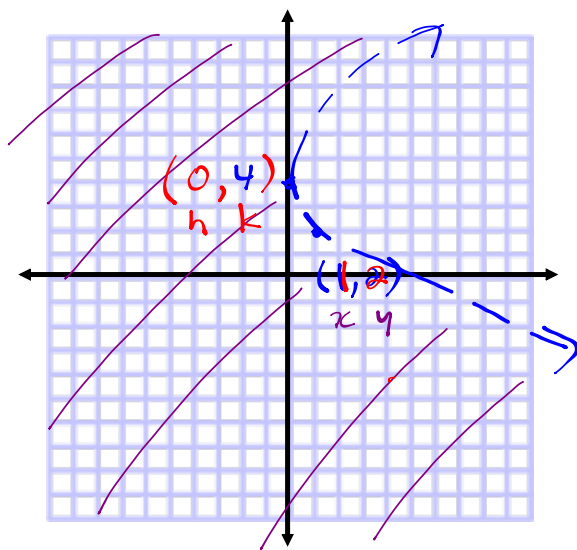
$$0 ? 1$$

$$0 < 1$$



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





$$(y-4)^2 > 4x$$

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

$$(y-4)^2 = 4a(x-0)$$

$$(2-4)^2 = 4a(1-0)$$

$$\frac{4}{4} = \frac{4a}{4}$$

$$a=1$$

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

sub in (0,0)

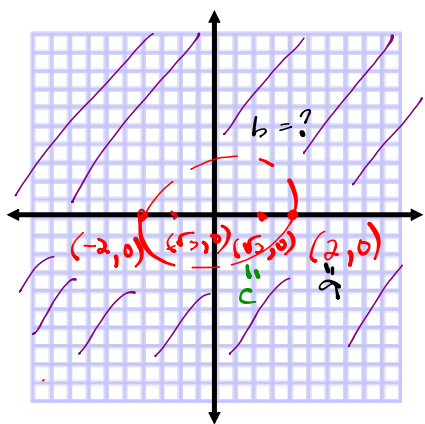
$$(0-4)^2 \stackrel{?}{=} 4(0)$$

$$16 \stackrel{?}{=} 0$$

$$16 > 0$$

Step 2

> <



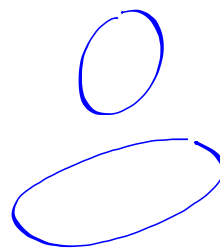
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

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

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

$$(1\sqrt{9})^2 = |2^2 - b^2|$$

$$3 =$$



Unit 9: Finding the equation of a conic using the description of another conic section

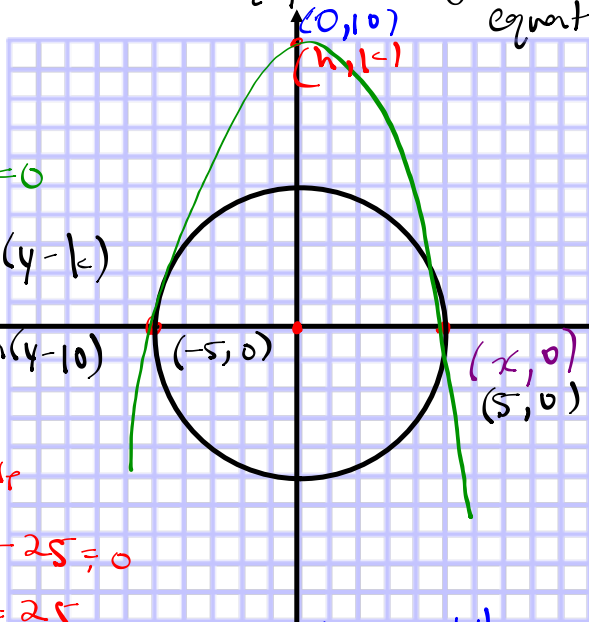
{ you'll be given a graph and the equation of a 2nd conic }

pg 9.2 #1

$$x^2 + y^2 - 25 = 0$$

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

$$(x-0)^2 = 4a(y-10)$$



• Identify which equation

• LABELING

• Translate sentences into points on the graph.

• use the given equation to find the missing x or y coordinate.

the circle

$$x^2 + y^2 - 25 = 0$$

$$x^2 + y^2 = 25$$

sub $y=0$

$$x^2 + 0^2 = 25$$

$$\sqrt{x^2} = \sqrt{25}$$

$$x = \pm 5$$

the parabola

$$x^2 = 4a(y-10)$$

sub $(5, 0)$

$$5^2 = 4a(0-10)$$

$$\frac{25}{(-10) \cdot 4} = \frac{4a(-10)}{4(-10)}$$

$$a = -0.625$$

$$x^2 = 4(-0.625)(y-10)$$

$$x^2 = -2.5(y-10)$$

p 9.4

hyperbola:

$$\frac{x^2}{39} - \frac{y^2}{25} = 1$$

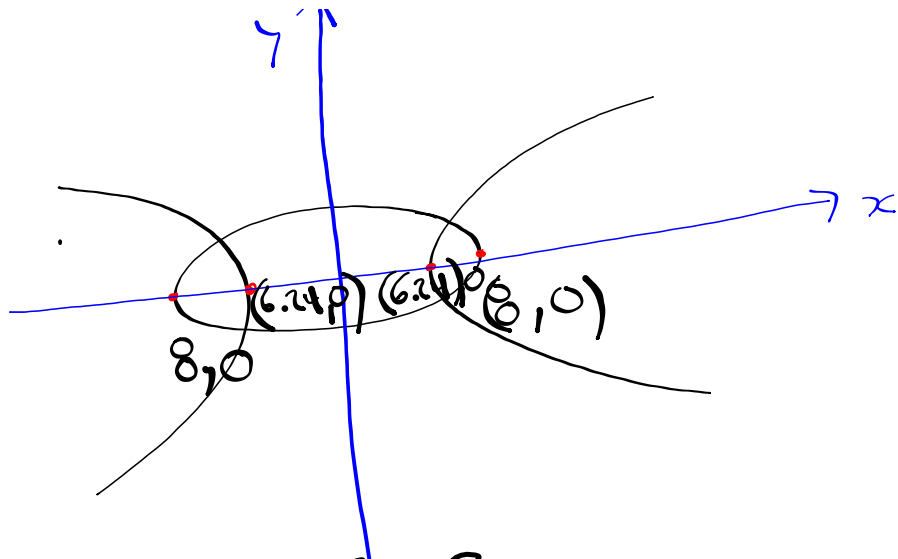
Find the equation of the ellipse.

$$\frac{x^2}{8^2} + \frac{y^2}{5^2} = 1$$

$$6.24^2 = 8^2 - b^2$$

$$b^2 = 8^2 - 6.24^2$$

$$b = \sqrt{5}$$



$$x^2 + y^2 \overset{\text{circle}}{-4x + 6y - 3 = 0} \quad v = (2, -3) \quad r = 4$$

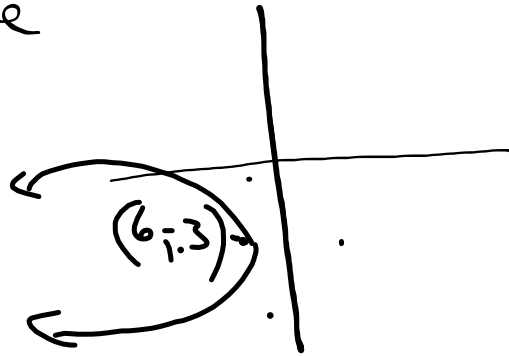
- Find equation of parabola that opens left
- Vertex center of circle
 - Focus on circle

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

$$\overset{2}{(-3 + 3)} \overset{16}{= 4a(6 - 2)}$$

$$4a(4)$$

$$16a$$



$$x^2 = 6\left(y + \frac{2}{3}\right)$$

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

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

$$\frac{4a}{4} = \frac{6}{4}$$

$$a = \frac{6}{4}$$

$$a^2$$

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

directrix $y = k - a$

$$y = -\frac{2}{3} - \frac{6}{4}$$

