

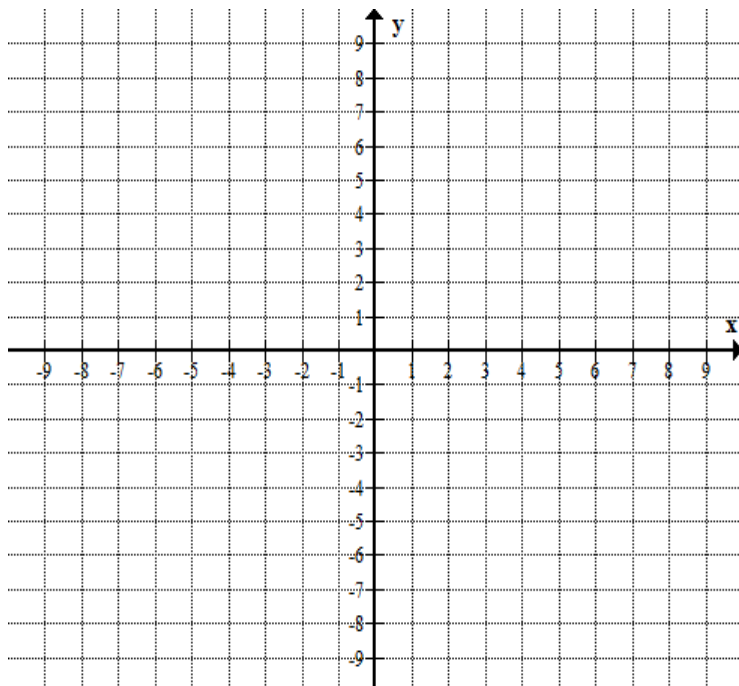
Cypress College Math Review: The Ellipse

Math 40 students – only the first two examples apply to your course.

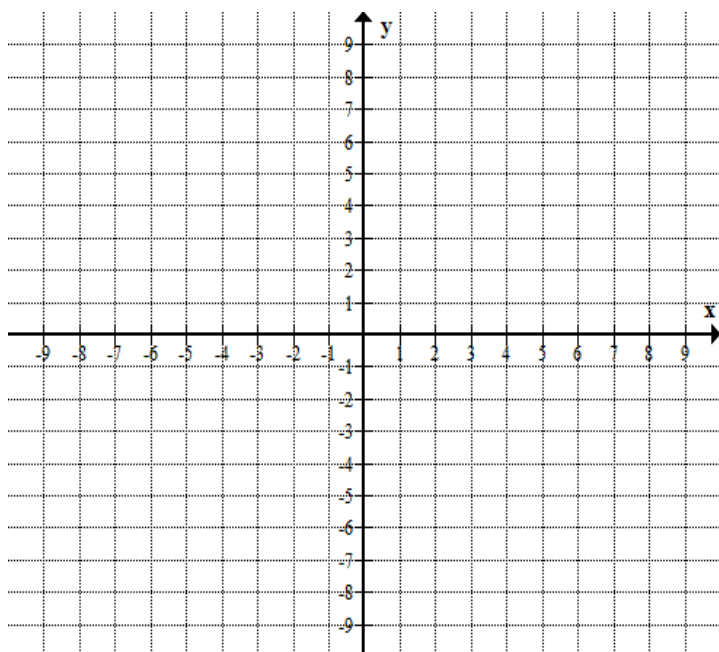
Recall that the standard form for the equation of an ellipse is

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1 \quad \text{or} \quad \frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1 \quad \text{The center is } (h,k).$$

Example) $\frac{(x-3)^2}{16} + \frac{(y+2)^2}{9} = 1$



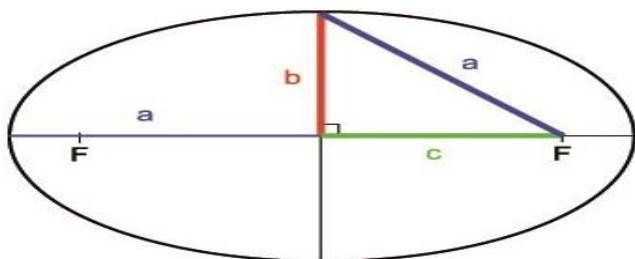
Example) $9x^2 + 4y^2 = 36$



In our Math 141 classes you will also need to find and graph the foci of the ellipse. The equation that you will use to find the foci is $a^2 = b^2 + c^2$ (some people write this as $b^2 = a^2 - c^2$ but I find the other easier). Which means that a and b are NOT interchangeable. Looking at either of these equations you can tell that a is bigger than b.

$$a > b$$

An ellipse is a set of points in a plane the sum of whose distances from two fixed points is a constant.

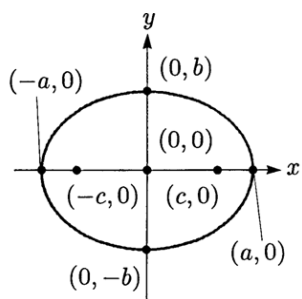


“a” is the distance from the center to a vertex

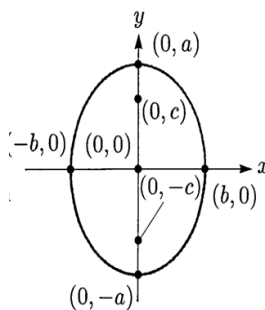
“b” is the distance from the center to a co-vertex

“c” is the distance from the center to a focus

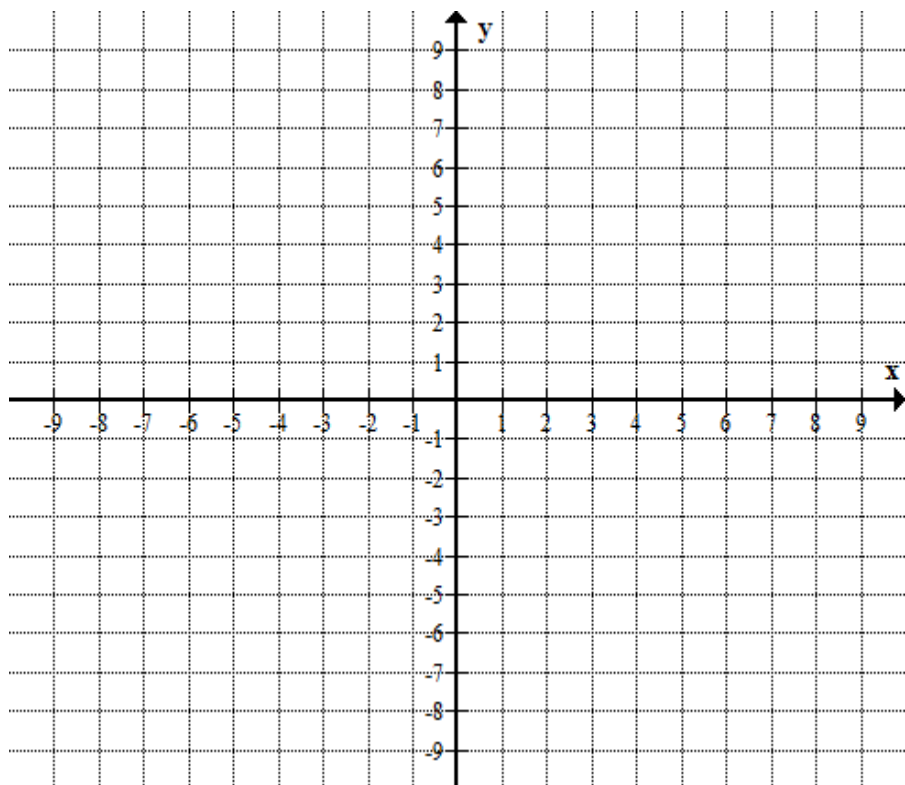
Horizontal major axis:



Vertical major axis:

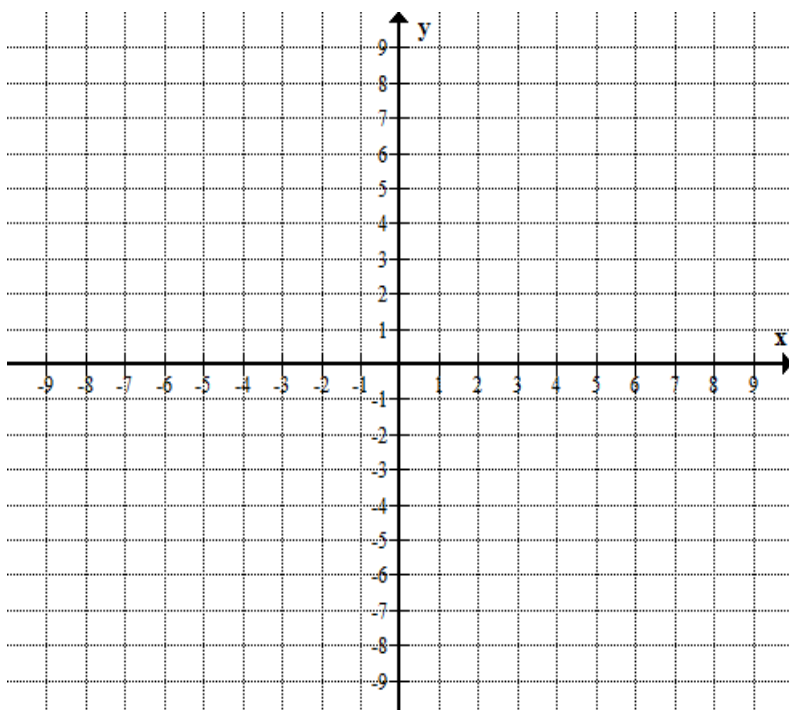


Example) $\frac{(x-1)^2}{4} + \frac{(y-3)^2}{16} = 1$

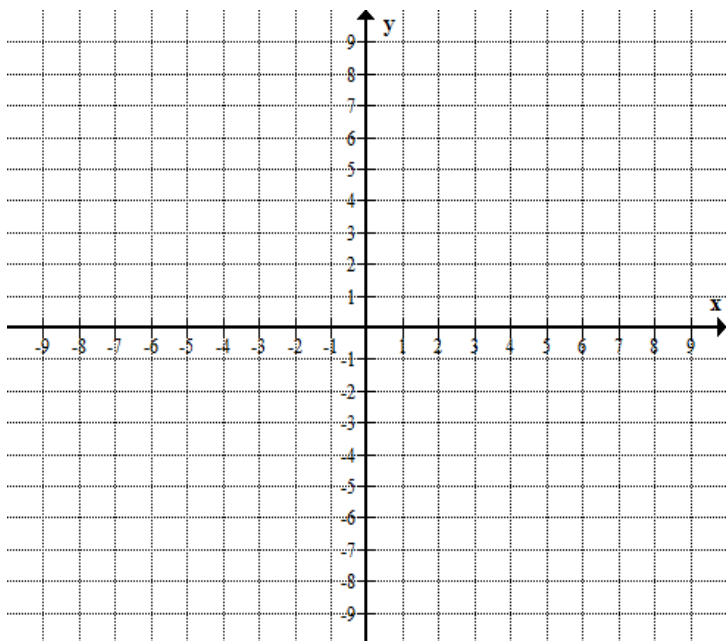


Example) $9x^2 + 25y^2 - 54x + 200y + 256 = 0$

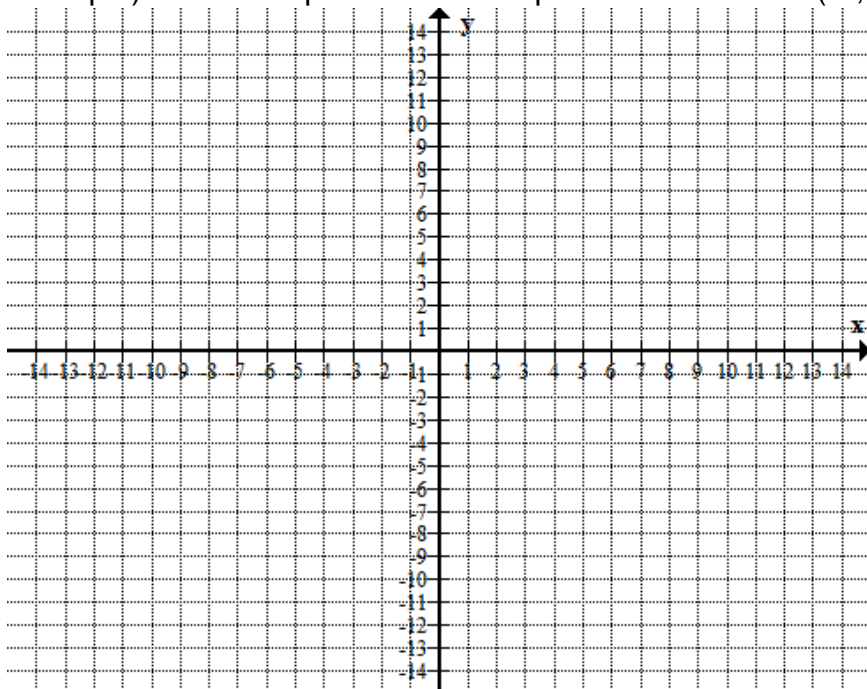
$$\frac{(x-3)^2}{25} + \frac{(y+4)^2}{9} = 1$$



Example) Find the equation of the ellipse with foci at $(0, 0)$ and $(0, -8)$ and length of the major axis 16.



Example) Find the equation of the ellipse with vertices at $(-5, 5)$ and $(13, 5)$ and focus at $(11, 5)$.



Example) An arch in the form of a semi-ellipse is 52 ft wide at the base and has a height of 20 ft. How wide is the arch at a height of 12 ft above the base?