Precalc 10.3

Determine and use standard and general forms for the equations of ellipses
Graph ellipses
Locate and use foci on ellipses

Quiz 10.1-10.2
Fri.

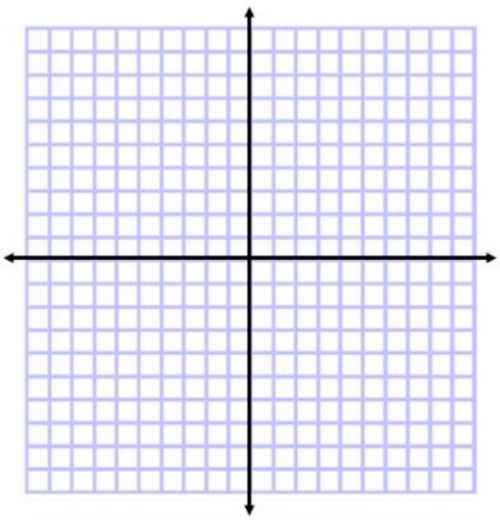
$$\frac{\quad}{a^2} + \frac{\quad}{b^2} = 1$$

major axis

minor axis

eccentricity $e = \frac{c}{a}$

3 For the equation $\frac{(y-3)^2}{25} + \frac{(x+4)^2}{9} = 1$, find the coordinates of the center, foci, and vertices of the ellipse. Then graph the equation.



$2^2 + c^2 = 3^2$

4 Find the coordinates of the center, the foci, and the vertices of the ellipse with the equation $4x^2 + 9y^2 - 40x + 36y + 100 = 0$. Then graph the equation.

$c = \pm\sqrt{5}$

(5, -4)

(5, 0)

$4(x^2 - 10x + 25) + 9(y^2 + 4y + 4) = -100 + 100 + 36$

(8, -2)

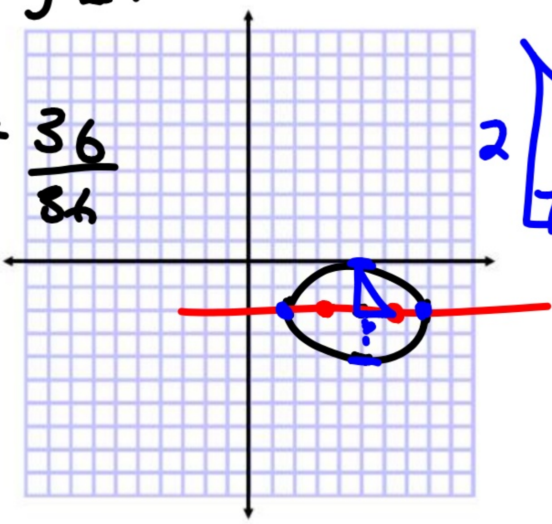
(2, -2)

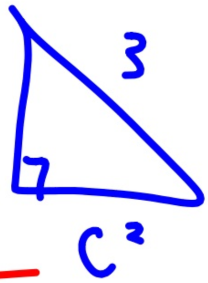
$$\frac{4(x-5)^2}{36} + \frac{9(y+2)^2}{36} = \frac{36}{36}$$

C(5, -2)

F$(5 \pm \sqrt{5}, -2)$

$$\frac{(x-5)^2}{9} + \frac{(y+2)^2}{4} = 1$$



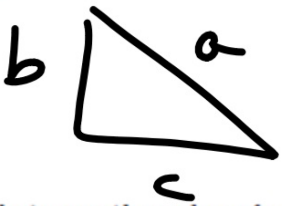


The **eccentricity** of an ellipse, denoted by e, is a measure that describes the shape of an ellipse. It is defined as $e = \frac{c}{a}$. Since $0 < c < a$, you can divide by a to show that $0 < e < 1$.

$0 < c < a$

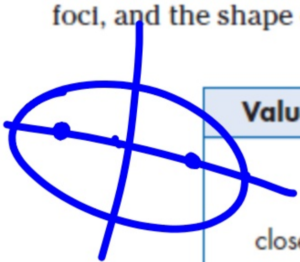
$0 < \frac{c}{a} < 1$ *Divide by a.*

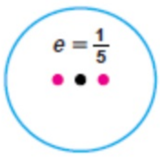
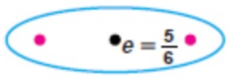
$0 < e < 1$ *Replace $\frac{c}{a}$ with e.*



c=distance from center to focus
a= semi-major axis

The table shows the relationship between the value of e, the location of the foci, and the shape of the ellipse.



Value of e	Location of Foci	Graph
close to 0	near center of ellipse	
close to 1	far from center of ellipse	

C = dist. to focus
a = semi major
$e = \frac{c}{a} < 1$

e=c/a

37. The center is the origin $\boxed{\frac{1}{2}=\frac{c}{a}}$, and the length of the horizontal semi-major axis is 10 units.

$e=\frac{c}{a}$ $\qquad \frac{1}{2}=\frac{c}{10}$ $\qquad 2c=10$

$c=5$

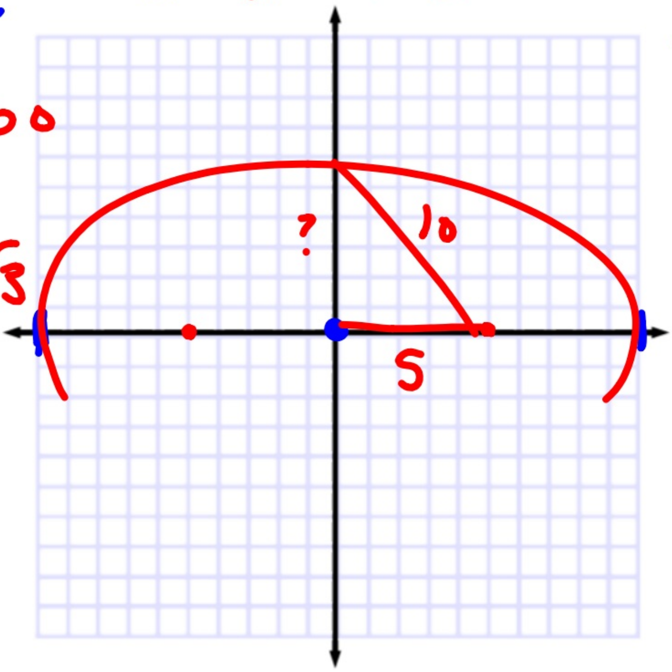
$$\frac{(x-0)^2}{100}+\frac{(y-0)^2}{75}=1$$

a^2

$b^2+25=100$

$b^2=75$

$b=\pm 5\sqrt{3}$



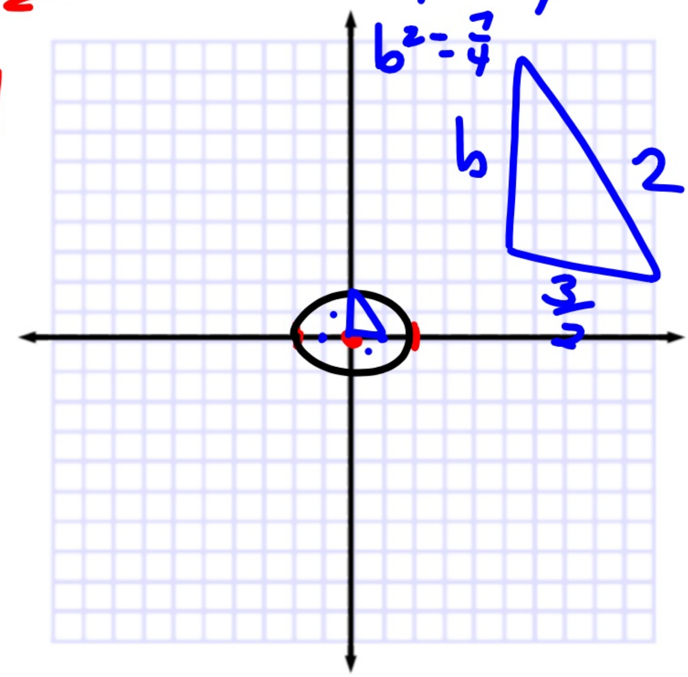
e=c/a

39. The ellipse has its center at the origin, $a = 2$, and $e = \frac{3}{4}$.

$b^2 + \frac{9}{4} = \frac{16}{4}$

$b^2 = \frac{7}{4}$

$$\frac{(x-0)^2}{4} + \frac{(y-0)^2}{1.75} = 1$$



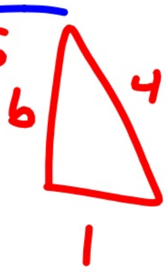
$e = \frac{c}{2} = \frac{3}{4}$

$\frac{4c}{4} = \frac{6}{4} \quad c = \frac{3}{2}$

40. The foci are at (3, 5) and (1, 5), and the ellipse has eccentricity 0.25.

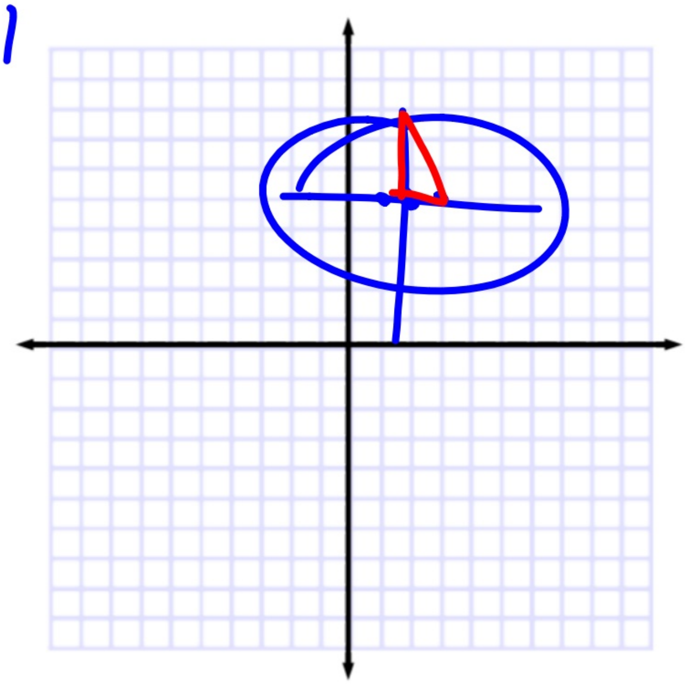
e=c/a

$$\frac{(x-2)^2}{4} + \frac{(y-5)^2}{15} = 1$$



$$\frac{c}{a} = \frac{1}{4}$$

$$\frac{1}{a} = \frac{1}{4} \quad a = 4$$



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