Bell Ringer

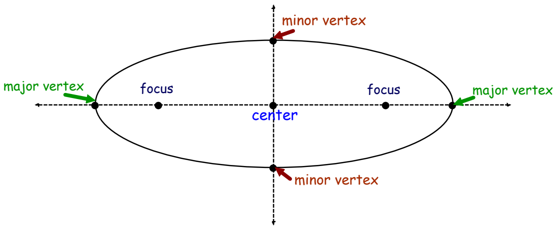
Solve by completing the square.

$$2x^2 + 8x - 10 = 0$$

10.3 - Ellipses

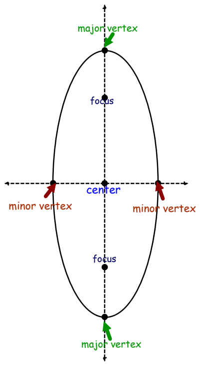
An ellipse is the set of all points in a plane such that the sum of the distances from the foci is constant.

Horizontal Ellipse



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

Vertical Ellipse



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

a is larger number in denominator

Major Axis - Contains center and foci.

Minor Axis - Perpendicular to Major Axis, contains Center.

(h, k) Center

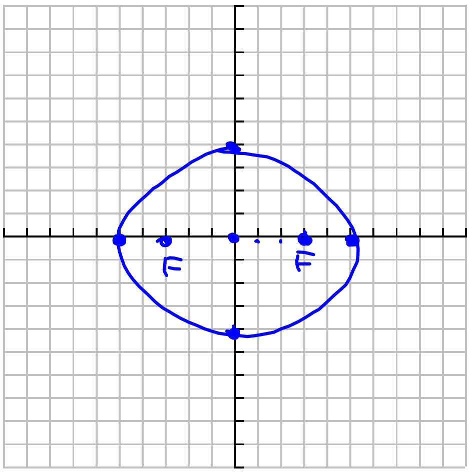
c - Distance from center to Foci

b - Distance from center to minor vertices.

a - Distance from center to major vertices.
Larger number in denominator.

Relationship of a, b, and c. $a^2 - b^2 = c^2$

STEPS WHEN GRAPHING
1. Is it Horiz. or Vertical?
2. Find CENTER
3. Find a, b, & c.
4. Count "a" & "c" from center.
5. Count "b" in other direction.



Ex 1: $\frac{x^2}{25} + \frac{y^2}{16} = 1$

$(x-0)^2$ $(y-0)^2$

$a^2 - b^2$
$25 - 16 = 9$

$a^2 = 25$ $b^2 = 16$ $c^2 = 9$

$a = 5$ $b = 4$ $c = 3$

Center: $(0,0)$

Foci: $(-3,0)$ $(3,0)$

Major Vertices: $(-5,0)$ $(5,0)$

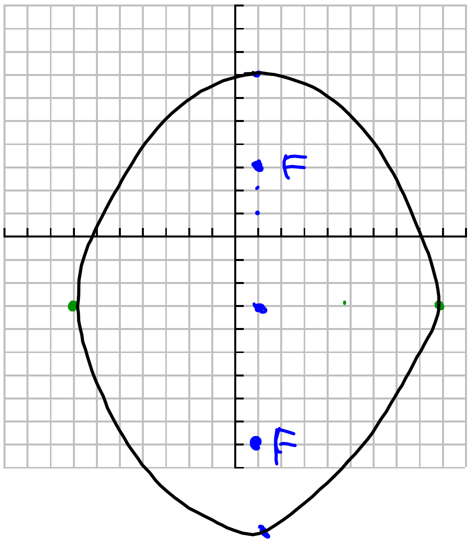
Minor Vertices: $(0,4)$ $(0,-4)$

Ex 2: $\dfrac{(x-1)^2}{64}+\dfrac{(y+3)^2}{100}=1$

vertical

$a^2 = 100$ $b^2 = 64$ $c^2 = 36$ (100 − 64)

$a = 10$ $b = 8$ $c = 6$



Center: $(1, -3)$

Foci : $(1, 3)$ $(1, -9)$

Major Vertices: $(1, 7)$ $(1, -13)$

Minor Vertices: $(-7, -3)$ $(9, -3)$

Ex 3: $4x^2 - 8x + y^2 + 6y - 3 = 0$ (+3, +3)

$4(x^2 - 2x + 1) + y^2 + 6y + 9 = 3 + 4 + 9$

$\dfrac{\cancel{4}^{1}(x-1)^2}{\cancel{16}\,4} + \dfrac{(y+3)^2}{16} = \dfrac{\cancel{16}\,1}{\cancel{16}}$

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

$a^2 = 16$ $b^2 = 4$ $c^2 = 12$

$a = 4$ $b = 2$ $c = \sqrt{12}$

$= 2\sqrt{3}$

≈ 3.5

vertical

Center: $(1, -3)$

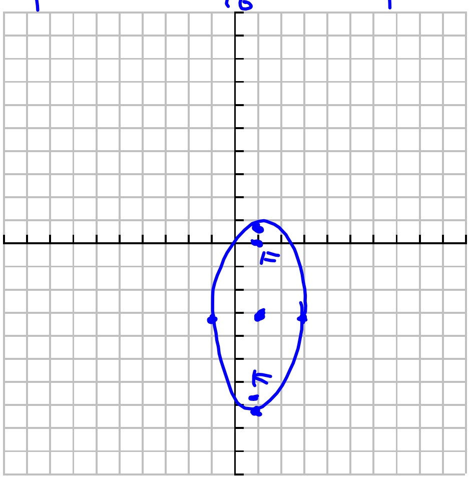
Foci : $(1, -3+2\sqrt{3})$ $(1, -3-2\sqrt{3})$

Major Vertices:

$(1, 1)$ $(1, -7)$

Minor Vertices:

$(-1, -3)$ $(3, -3)$



Ex 4: $4x^2+9y^2+16x-18y-11=0$

$4x^2+16x \quad +9y^2-18y \quad = 11$

$4(x^2+4x+4)+9(y^2-2y+1) = 11+16+9$

$\dfrac{4(x+2)^2}{36}+\dfrac{9(y-1)^2}{36}=\dfrac{36}{36}$

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