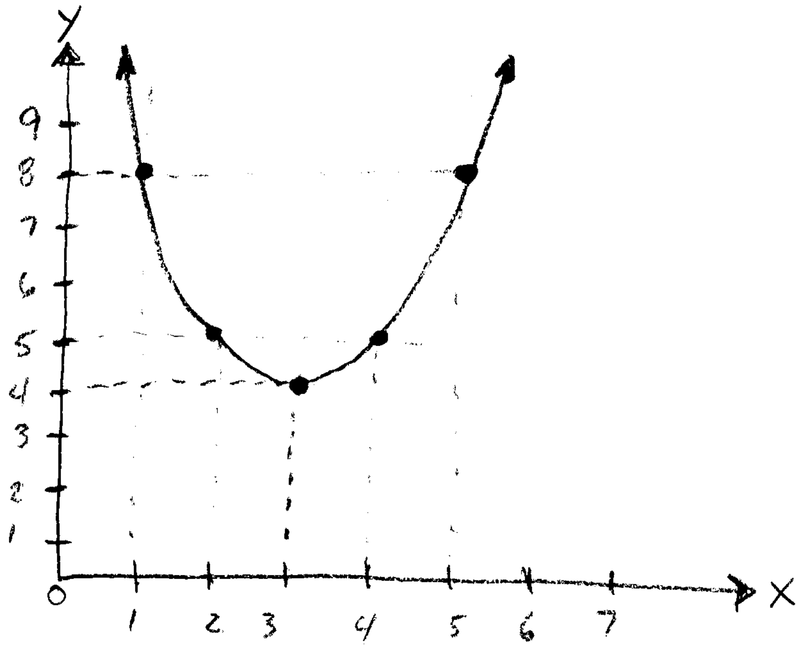
BE - Alg. 2 TUESDAY 3-22-11

① WRITE THE VERTEX form OF THE EQUATION OF THE PARABOLA:

USE AN (X, Y) PAIR ON AN EVEN grid BOUNDARY TO FIND a.



(ANS)

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

$h = 3$, $k = 4$

$$y = a(x-3)^2 + 4 \qquad \text{use } (1, 8) \; x, y$$

$$8 = a(1-3)^2 + 4$$

$$8 = a(-2)^2 + 4$$

$$8 = 4a + 4$$

$$4 = 4a \qquad \therefore a = 1 \Rightarrow \boxed{y = 1(x-3)^2 + 4}$$

Homework Review – Pg 429-430 # 20, 24, 38, 39.

(20) diameter at $(-5,2),(3,6) \Rightarrow \boxed{(x+1)^2+(y-4)^2=20}$

(24) $C(-8,-7)$ tangent to y-axis $\Rightarrow \boxed{(x+8)^2+(y+7)^2=64}$

(38) $x^2+y^2+6y=-50-14x$

$\Rightarrow \boxed{C(-7,-3),\ r=2\sqrt{2}\ (\sim 2.8)}$

(39) $x^2+y^2-6y-16=0$

$\Rightarrow \boxed{C(0,3),\ r=5}$

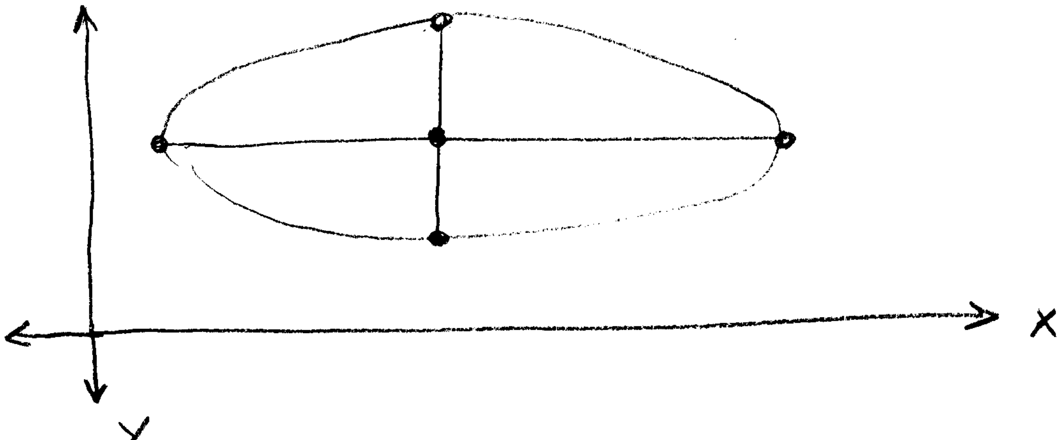
Recall: Ellipse $\Rightarrow$ set of all points in a plane such that the <u>sum</u> of the distances from 2 fixed points (the foci) is constant.

Look at a Circle: $\dfrac{(x-h)^2}{r^2}+\dfrac{(y-k)^2}{r^2}=\dfrac{r^2}{r^2}=1$

WHAT IF THESE WERE DIFFERENT?

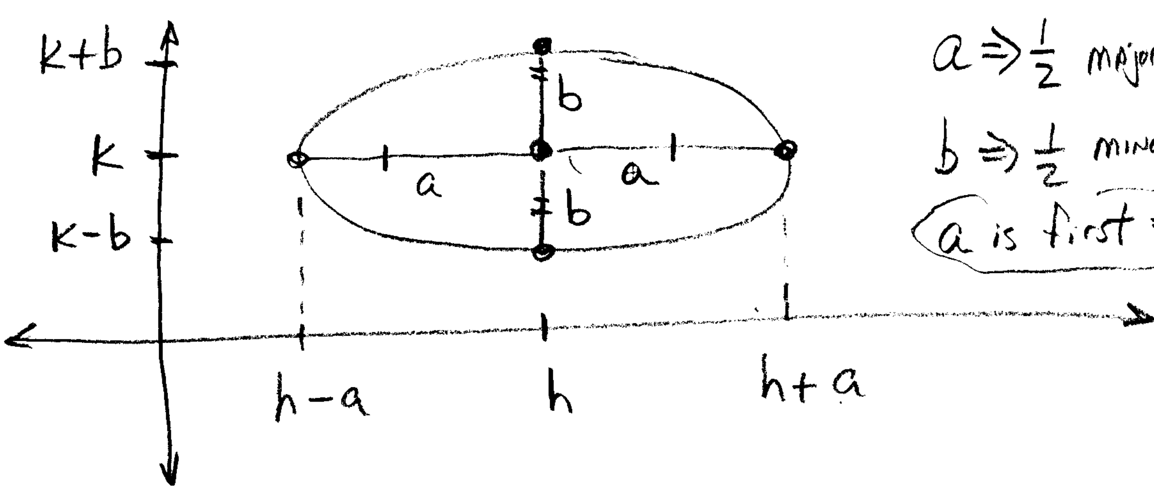
"h-k form" or "STANDARD form" of the EQUATION OF AN ELLIPSE. CAN YOU guess WHAT the (h, k) point represents?

(EX) Left-right ellipse in QUADRANT I



The (h,k) is the midpoint, i.e., the center of the ellipse. A circle can be thought of AS A special case or AN Ellipse.

There is NO SINGLE RADIUS for AN ellipse, instead the length of the major ↔ AND minor ↕ AXES Are called a AND b.



$a \Rightarrow \frac{1}{2}$ major AXIS

$b \Rightarrow \frac{1}{2}$ MINOR AXIS

a is first = major

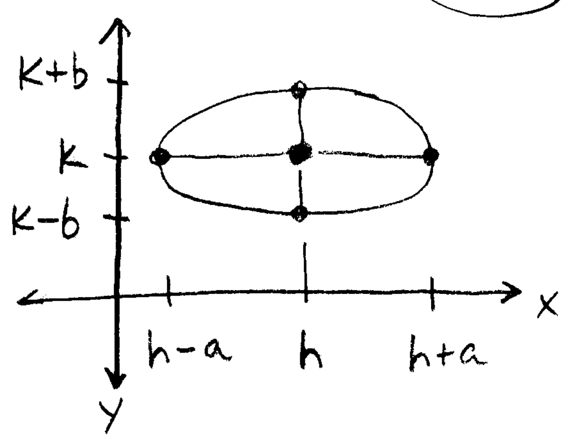
memory AID

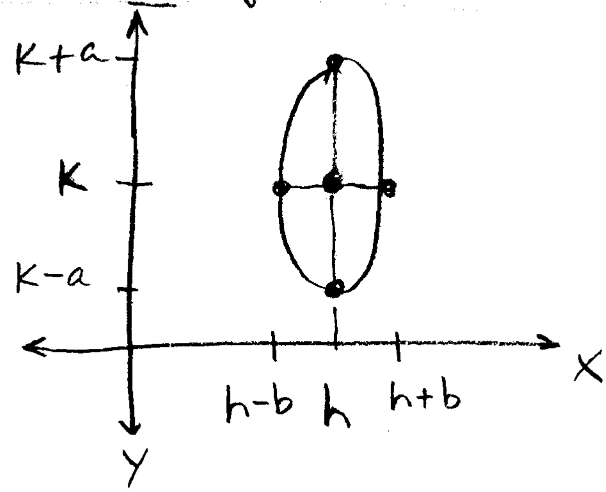
In a left-right ellipse, $a \to h \to x$
$b \to k \to y$

But in an up-down ellipse $a \to k \to y$
$b \to h \to x$

Summary a is $\frac{1}{2}$ the major axis!

$\therefore\ a > b$





Standard Form of Ellipse

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

$a > b$ 

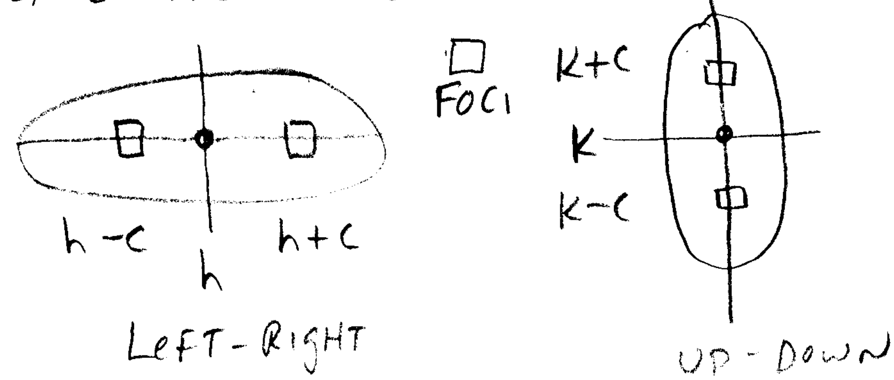
OR $$\boxed{\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1}$$ Up-Down

$a > b$ 

How do you find the foci?

$$\boxed{c^2 = a^2 - b^2}$$ a is always > b

Where the foci ARE $\pm c$ from (h, k)

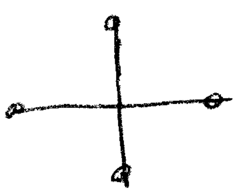


Why is the right-side 1?

Circle could be 1, it is just simpler to make it r^2

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

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



$a^2 = b^2$ if it was an ellipse major and minor axes are the same.

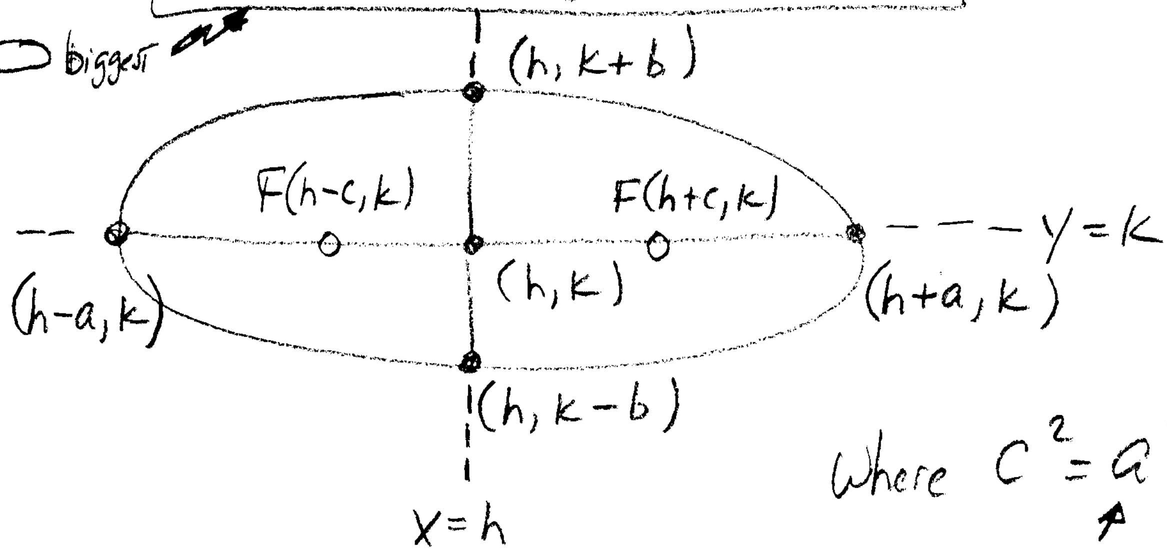
Foci is ± 0 since $a^2 - b^2 = 0$

Need right side $= 1$ to "see" different a, b's

GRAPHING AN ELLIPSE $\Rightarrow$ PUT EQUATION IN STANDARD form for an ellipse $\Rightarrow$

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

⬭ biggest

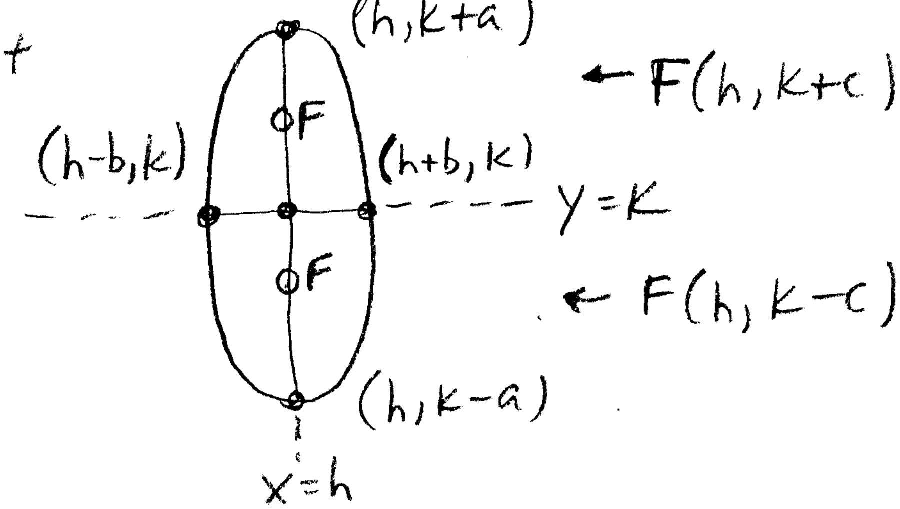


Where $c^2 = a^2 - b^2$

biggest

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

0 biggest



Ex4 Pg436 GRAPH $x^2+4y^2+4x-24y+24=0$

$$x^2+4x \quad + \quad 4y^2-24y \quad = -24$$

4·9 CAREFUL

$$x^2+4x+2^2 + 4(y^2-6y+3^2) = -24+4+36$$

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

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

h, k

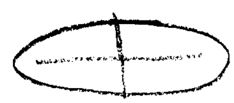
$\boxed{C(-2,3)}$

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

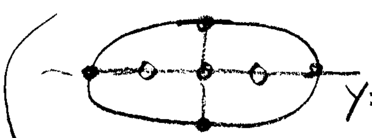
$a=4$ $b=2$

$c^2=a^2-b^2=12$

biggest under $(x-h)^2$ term $\Rightarrow$



LEFT - RIGHT ELLIPSE



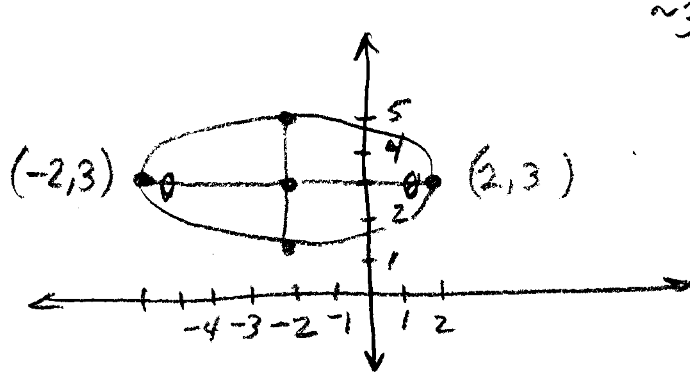
$\boxed{\text{Major Axis Vertices } (h \pm a, k) = (-2 \pm 4, 3)}$

$c=\sqrt{12}=\sqrt{4}\sqrt{3}=2\sqrt{3}=c$

$\boxed{\text{Minor Axis Vertices } (h, k \pm b) = (-2, 3 \pm 2)}$

$\boxed{F(h \pm c, k) = (-2 \pm 2\sqrt{3}, 3)}$

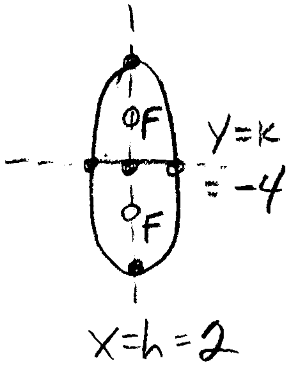
$2\sqrt{3} \approx 3.5$



PUT X FIRST IF YOU PREFER

(Ex) GRAPH: $\dfrac{(y+4)^2}{25} + \dfrac{(x-2)^2}{9} = 1$

a^2 under $(y-k)$ term $\Rightarrow$ 0 UP/DOWN ELLIPSE.



$a^2 = 25$ $a=5$ $b^2 = 9$ $b=3$

$c^2 = a^2 - b^2 = 25 - 9 = 16 \therefore c = 4$

$\boxed{C(2,-4)}$ WATCH OUT, Y's ARE 1st!

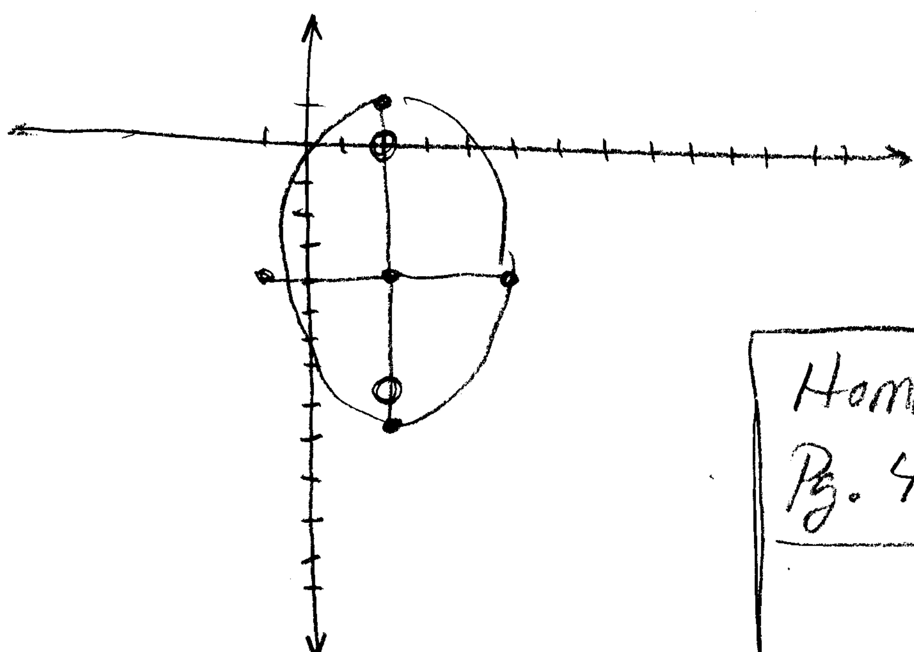
h, k

V_{major} $(2, -4 \pm 5) \Rightarrow \boxed{(2,1),(2,-9)}$

MAJOR AXIS VERTICES

V_{minor} $(2 \pm 3, -4) \Rightarrow \boxed{(5,-4),(-1,-4)}$

Foci $(2, -4 \pm 4) \Rightarrow \boxed{(2,0),(2,-8)}$



HOMEWORK:
Pg. 438 # 8, 10