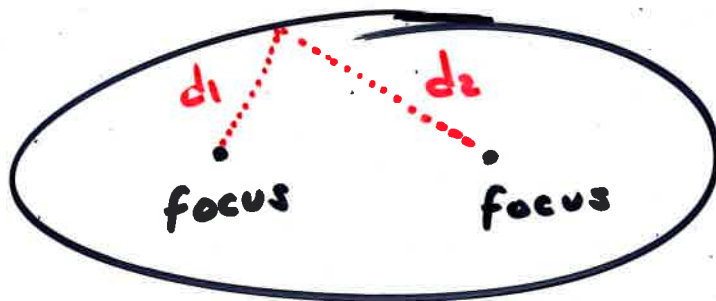


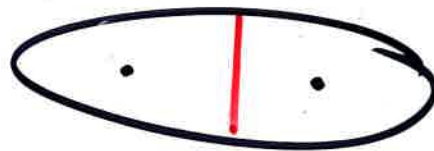
10.4 ELLIPSES



$$d_1 + d_2 = \text{CONSTANT}$$



MAJOR AXIS



MINOR AXIS

STANDARD FORM OF ELLIPSE
WITH CENTER (h, k)

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

MAJOR AXIS
PARALLEL TO X-AXIS

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

MAJOR AXIS
PARALLEL TO Y-AXIS

$$a^2 > b^2$$

* THE FOCI LIE ON THE MAJOR AXIS

C UNITS FROM THE CENTER,

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

EX: GRAPH $\frac{x^2}{16} + \frac{y^2}{9} = 1$

FIND FOCI.

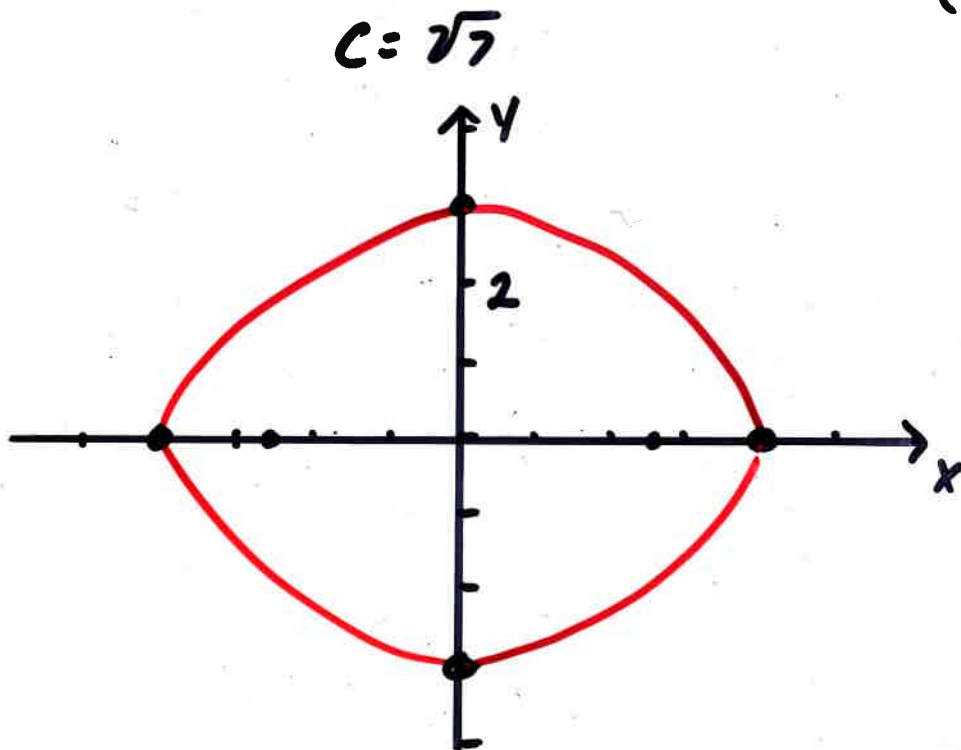
CENTER AT (0, 0)

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

$b^2 = 9$ $b = 3$

$c^2 = 16 - 9 = 7$

Foci: $(\sqrt{7}, 0)$
 $(-\sqrt{7}, 0)$



Ex: FIND THE FOCI AND GRAPH

$$x^2 + 4y^2 + 6x - 8y + 9 = 0$$

$$x^2 + 6x + 4y^2 - 8y = -9$$

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

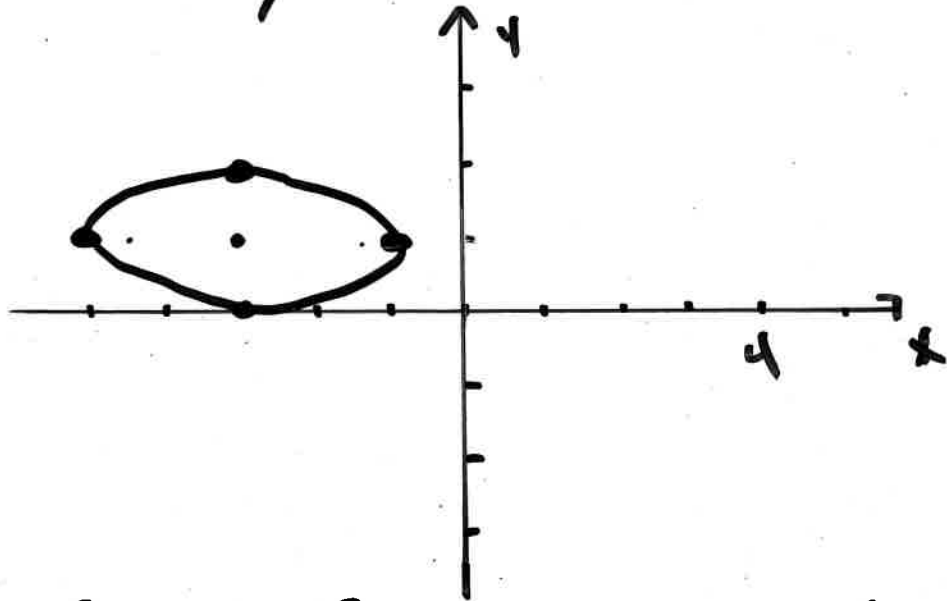
$$x^2 + 6x + 9 + 4(y^2 - 2y + 1) = -9 + 9 + 4$$

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

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

CENTER
 $(-3, 1)$

$a = 2$
 $b = 1$



Foci $c^2 = a^2 - b^2$
 $c^2 = 4 - 1$
 $c = \sqrt{3}$

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

Ex: WRITE THE EQUATION OF
THE ELLIPSE WITH
FOCI $(\pm 5, 0)$ AND WITH

CO-VERTICES $(0, \pm 8)$

$$c = 5 \quad b = 8$$

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

$$25 = a^2 - 64$$

$$a^2 = 89$$

$$\frac{x^2}{89} + \frac{y^2}{64} = 1$$