

Notes Section 7.2 - Ellipses

standard equation of an ellipse

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



$$a > b$$

$$\text{major axis} = 2a$$

$$\text{minor axis} = 2b$$

$$c^2 = a^2 - b^2 \rightarrow \text{focal points}$$

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



example 1

sketch

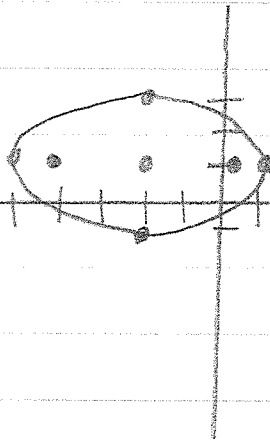
$$\frac{(x+2)^2}{9} + \frac{(y-1)^2}{4} = 1$$

$$c(-2, 1)$$

$$a=3 \quad b=2$$

$$\text{major axis} = 2(3) = 6$$

$$\text{minor axis} = 2(2) = 4$$



$$c^2 = 9 - 4$$

$$c = \sqrt{5}$$

$$\text{focal points} = (-2 \pm \sqrt{5}, 1)$$

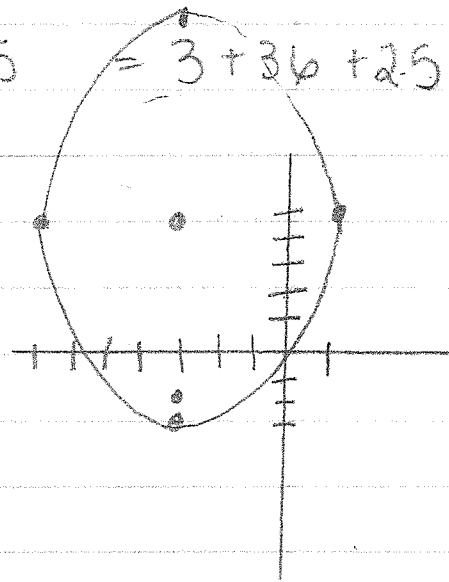
example 2

sketch $4x^2 + 24x + y^2 - 10y - 3 = 0$

$$4(x^2 + 6x + 9) + y^2 - 10y + 25 = 3 + 36 + 25$$

$$\frac{4(x+3)^2}{64} + \frac{(y-5)^2}{64} = \frac{64}{64}$$

$$\frac{(x+3)^2}{16} + \frac{(y-5)^2}{64} = 1$$



$C(-3, 5)$

major axis = 16

minor axis = 8

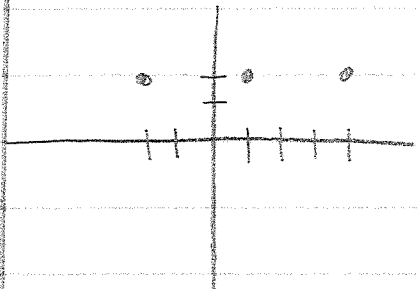
$$c^2 = 64 - 16$$

$$c^2 = 48 \rightarrow c = 4\sqrt{3}$$

$$F(-3, 5 \pm 4\sqrt{3})$$

example 3

find the standard form of the equation of the ellipse having foci at $(-2, 2)$ and $(4, 2)$ and a major axis of 10.



center $(1, 2)$

$$a = 5 \quad c = 3$$

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

$$25 - b^2 = 9$$

$$b^2 = 16$$

$$b = 4$$

$$\frac{(x-1)^2}{25} + \frac{(y-2)^2}{16} = 1$$