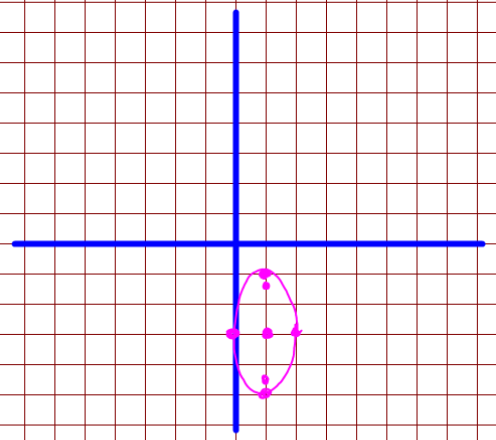

23. $4x^2 + y^2 - 8x + 6y + 9 = 0$

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

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

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

$h = 1$

$k = -3$

$a = 2$

$b = 1$

$c = \sqrt{3}$

$a^2 = 4$

$a = 2$

$b^2 = 1$

$b = 1$

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

$c^2 = 4 - 1$

$c^2 = 3$

center $(1, -3)$

vertices major $(1, -1)$ $(1, -5)$

minor $(2, -3)$ $(0, -3)$

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

33. The length of the semi-minor axis is $\frac{3}{4}$ the length of the horizontal semi-major axis, the center is at the origin, and $b = 6$.

$h = 0$

$k = 0$

$a = 8$

$b = 6$

$$b = \frac{3}{4}a$$

$$\frac{4}{3} \cdot 6 = \frac{3}{4}a$$

$$8 = a$$

$$\boxed{\frac{x^2}{64} + \frac{y^2}{36} = 1}$$