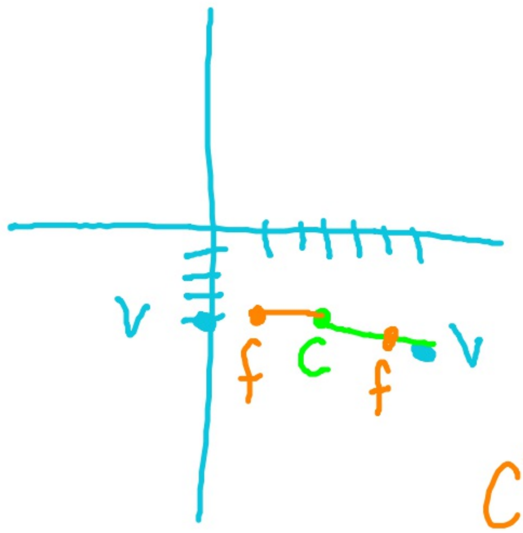
33. ~~maj end: (-2,3) (-2,7)~~ $c=2$

Vertices ~~end maj~~ $(0,-4)$ $(6,-4)$ $\ell\,maj = 6$

foci $(1,-4)$ $(5,-4)$ $a=3$



$C(3,-4)$

$$\frac{(x-3)^2}{9}+\frac{(y+4)^2}{5}=1$$

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

$$4=9-b^2$$

$$b^2=5 \begin{smallmatrix}5\\1\end{smallmatrix}$$

$$b=\pm\sqrt{5}$$

46. $3x^2 - 12x + 5y^2 + 30y = -42$

$3(x^2 - 4x + 4) + 5(y^2 + 6y + 9) = -30$

$+12$

$+45$

$\frac{3(x-2)^2}{15} + \frac{5(y+3)^2}{15} = \frac{15}{15}$

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

$c^2 = 5 - 3$

$c = \pm\sqrt{2}$

foci: $(2 \pm \sqrt{2}, -3)$

$e = \frac{\sqrt{2}}{\sqrt{5}} = \sqrt{\frac{2}{5}}$

$\sqrt{8}$

$(2 \pm 2\sqrt{2}, -3)$

$\frac{\sqrt{2}\sqrt{5}}{5}$ $\frac{\sqrt{10}}{5}$

$\frac{2}{3}$ $\frac{2}{3}(x - \#)^2$

$\frac{3}{2}$

24. f $(0, \pm 3)$

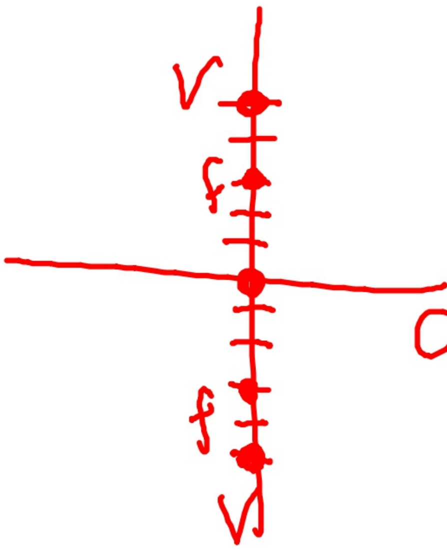
maj $\ell = 10$

C$(0,0)$

$c = 3$

$a = 5$

$$\frac{(x-0)^2}{16} + \frac{(y-0)^2}{25} = 1$$



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

$9 = 25 - b^2$

$b^2 = 16$

48

$4x^2 - 32x + y^2 + 16y = -124$

$\frac{1}{2}(-8)$

$(-4)^2$

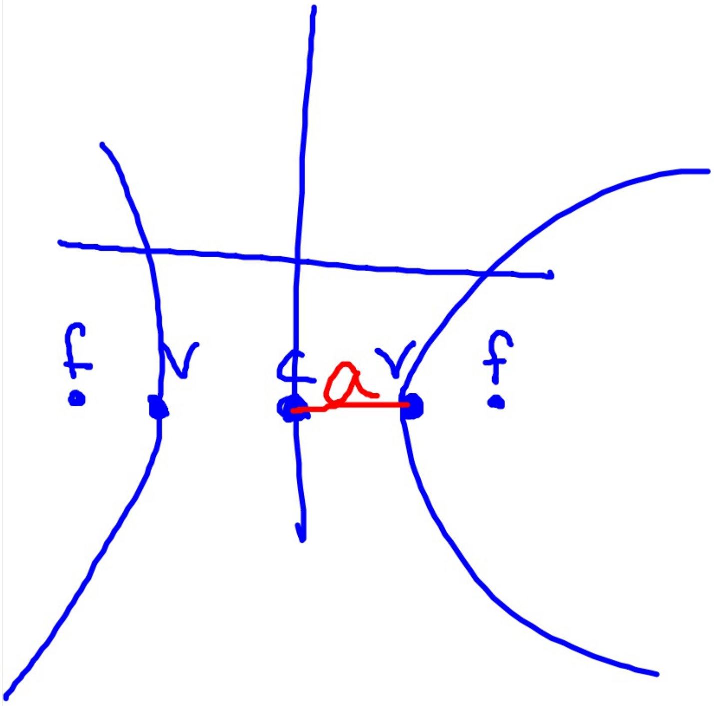
$4(x^2 - 8x + 16) + (y^2 + 16y + 64) = -124 + 64 + 64$

$\frac{1}{2}(16)$

$(8)^2$

$$\frac{4(x-4)^2}{4} + \frac{(y+8)^2}{4} = \frac{4}{4}$$

$$\frac{(x-4)^2}{1} + \frac{(y+8)^2}{4} = 1$$



$$y-k=\pm\frac{b}{a}(x-h)$$

48. $4(x-2)^2 - 9(y+4)^2 = 1$

$C(2,-4)$

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

$a^2 = \frac{1}{4}$ $b^2 = \frac{1}{9}$

$a = \pm\frac{1}{2}$ $b = \pm\frac{1}{3}$

$c^2 = \frac{1}{4} + \frac{1}{9} = \frac{9}{36} + \frac{4}{36}$

$\sqrt{\frac{13}{36}}$ $\frac{\sqrt{13}}{6}$

$\left(2+\frac{1}{2}, -4\right)$

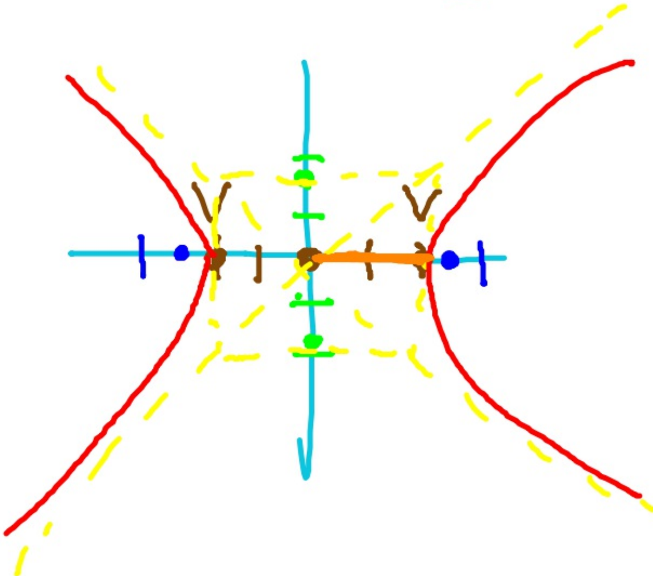
$\left(2-\frac{1}{2}, -4\right)$

$\left(\frac{5}{2}, -4\right)$

$\left(\frac{3}{2}, -4\right)$

⑤ $\dfrac{3x^2}{12} - \dfrac{4y^2}{12} = \dfrac{12}{12}$

$\dfrac{x^2}{4} - \dfrac{y^2}{3} = 1$



$C(0,0)$

$a^2 = 4$ | $b^2 = 3$

$a = \pm 2$ | $b = \pm\sqrt{3}$

$c^2 = a^2 + b^2$

$c^2 = 4 + 3$

$c^2 = 7$

$c = \pm\sqrt{7}$

$f\ (0+\sqrt{7},0)$

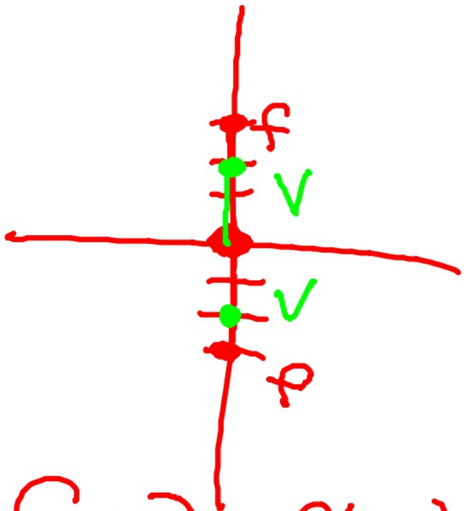
$(0-\sqrt{7},0)$ $> (\pm\sqrt{7},0)$

$y - 0 = \pm\dfrac{\sqrt{3}}{2}(x-0)$

24. $f(0, \pm 3)$

~~maj = 10~~

transverse = 4



$$\frac{(y-0)^2}{4} - \frac{(x+0)^2}{5} = 1$$

$c = 3$ $\quad C(0,0)$ $\quad a = 2$

$a^2 = 4$

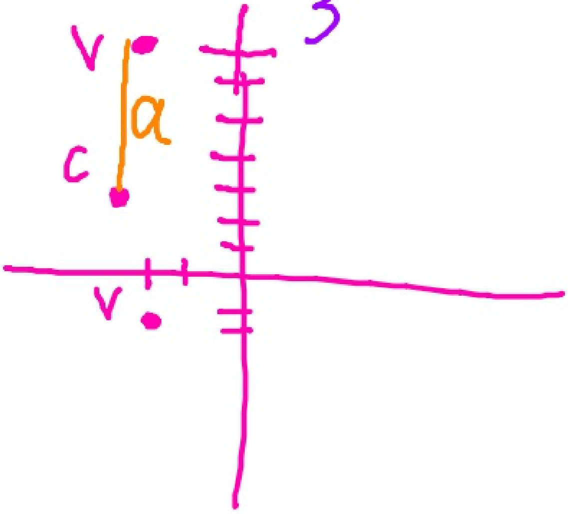
$c^2 = a^2 + b^2$

$9 = 4 + b^2$

$b^2 = 5$

34. $(-2,-2)(-2,7)$ ~~ends trans.~~ vertices

$m = \frac{4}{3}$



$a = 4.5$ or $\frac{9}{2}$

$C(-2, 2.5)$ or $\left(-2, \frac{5}{2}\right)$

$$\frac{\left(y-\frac{5}{2}\right)^2}{\frac{81}{4}} - \frac{(x+2)^2}{\frac{729}{64}} = 1$$

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

$$\frac{\frac{9}{2}}{b} = \frac{4}{3}$$

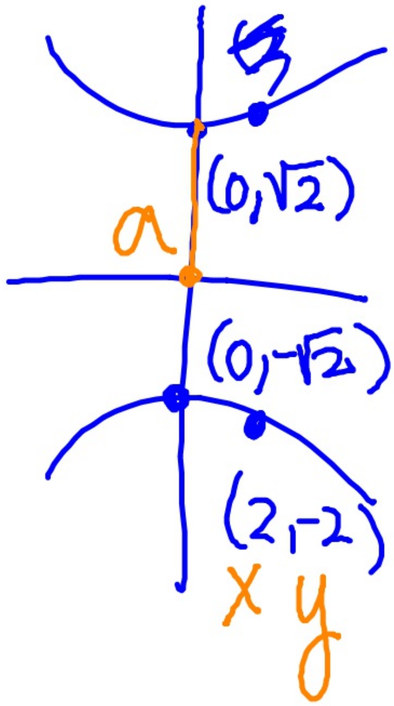
$$\frac{1}{4}\cdot\frac{27}{2} = 4b\cdot\frac{1}{4}$$

$$b = \frac{27}{8}$$

$$b^2 = \left(\frac{27}{8}\right)$$

$$b^2 = \frac{729}{64}$$

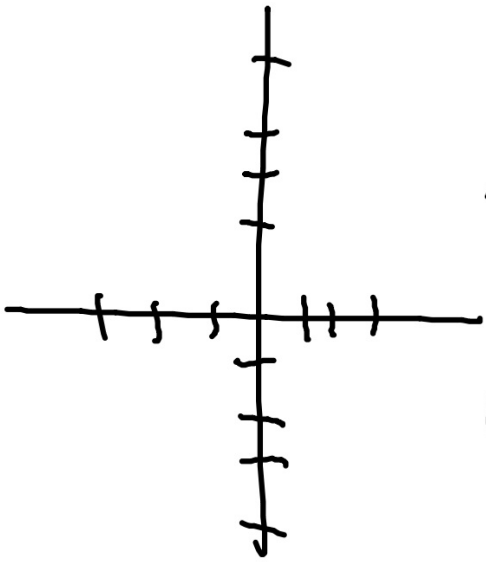
$$\begin{array}{r} 27 \\ \times\ 27 \\ \hline 189 \\ 540 \\ \hline 729 \end{array}$$



$$\frac{(y-0)^2}{2} - \frac{(x-0)^2}{b^2} = 1$$

$a = \sqrt{2}$

$a^2 = 2$



$$x^2 - 5x = 9y^2 + 10y + 13$$

$$0 = -x^2 + 5x + 9y^2 + 10y + 13$$

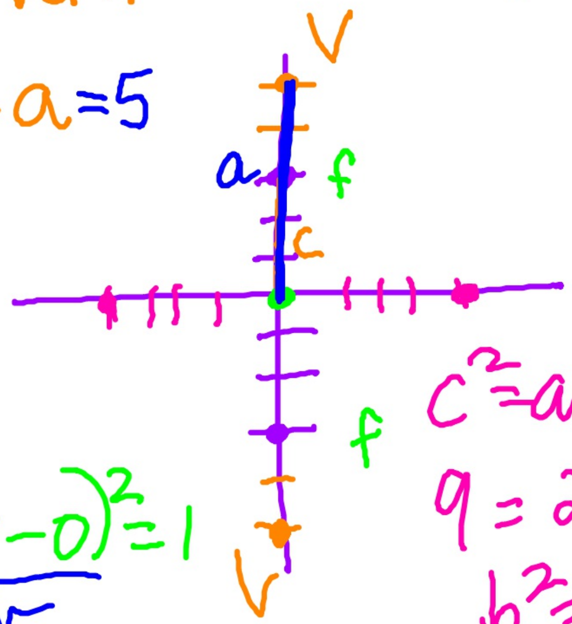
24) f $(0, \pm 3)$

$\ell\,maj = 10$ — Vertices $(0,5)$ $(0,-5)$

$a = 5$

$c = 3 \quad c^2 = 9$

$C(0,0)$



$$\frac{(x+0)^2}{16} + \frac{(y-0)^2}{25} = 1$$

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

$9 = 25 - b^2$

$b^2 = 16$

$b = \pm 4$

46. $4(x-7)^2 - 9(y+4)^2 = 1$

46. $3x^2 - 12x \quad + 5y^2 + 30y = -42$

$+12$

$3(x^2 - 4x + 4) + 5(y^2 + 6y + 9) = -30 + 45$

$\frac{1}{2}(-4)$

$(-2)^2$

4

$\frac{1}{2}(6)$

$(3)^2$

9

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

$c^2 = 5 - 3$

$c^2 = 2$

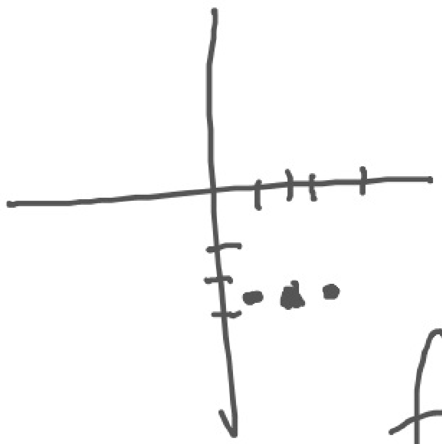
$c = \pm\sqrt{2}$

$$\frac{3(x-2)^2}{15} + \frac{5(y+3)^2}{15} = \frac{15}{15}$$

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

$e = \frac{c}{a}$

$e = \frac{\sqrt{2}}{\sqrt{5}}$



$(2, -3)$

$\pm\sqrt{2}$

$f(2 \pm \sqrt{2}, -3)$

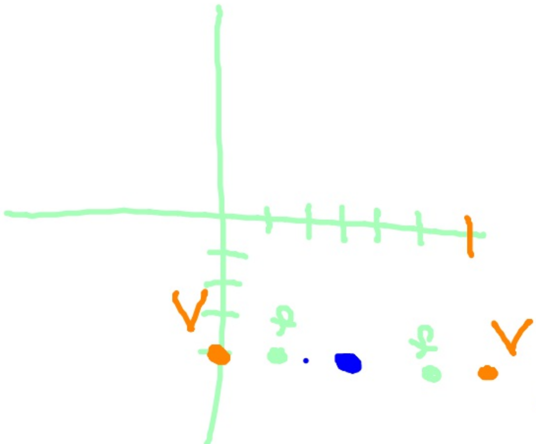
33 f $(1,-4)$ $(5,-4)$ center $(3,-4)$

$c = 2$

~~maj ends~~ $(0,-4)$ $(6,-4)$ center

Vertices

$a = 3$



$$\frac{(x-3)^2}{9} + \frac{(y+4)^2}{5} = 1$$

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

$4 = 9 - b^2$

$b^2 = 5$

*one squared variable- parabola
*two sq. variables, same sign, same coefficient--circle
*two sq. variables, same sign, different coefficients---ellipse
*two sq. variables, different signs--hyperbola

ex) A. $x^2+5x-7=10y-8y^2$

x^2+8y^2 ellipse

B. $y-8=x^2+y^2-10$ circle

C. $10x+4y+18-3\cancel{x}^2=42y-8x+4y^2$

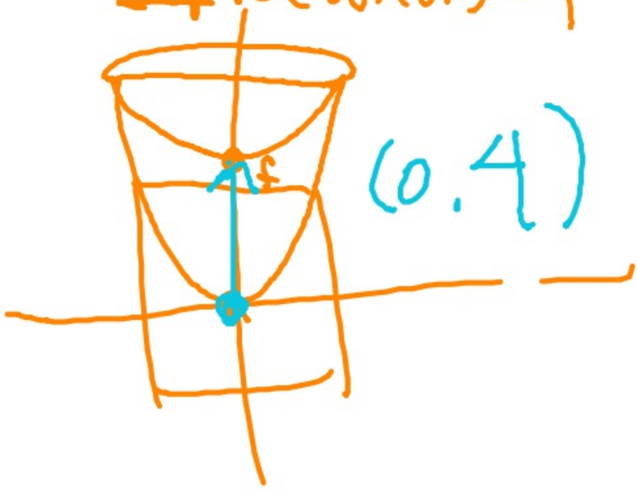
$-3\cancel{x}^2-4y^2$ ellipse

$x^2+y^2-y=-8+10$ $\frac{1}{2}(-1)$

$(x-0)^2+y^2-y+\frac{1}{4}=2+\frac{1}{4}$ $\left(-\frac{1}{2}\right)$

$(x-0)^2+\left(y-\frac{1}{2}\right)^2=\frac{9}{4}$ $\frac{1}{4}$

Ex In Zimbabwe many people don't have running H_2O.
To heat H_2O for a bath, the Zimbabweians developed a paraboloid to heat H_2O w/ the sun. The dish to collect & heat H_2O is located at the focus. If the dish is 16ft wide ~~find~~ at the focus, find the ~~eq~~ location of the bowl



(0,4)

$$y = ax^2$$

$16 = 4c$

$c = 4$

$$a = \frac{1}{4c} = \frac{1}{16}$$

$$y = \frac{1}{16}x^2$$

48 $4(x-2)^2 - 9(y+4)^2 = 1$

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

$C(+2, -4)$

$a^2 = \frac{1}{4}$ | $b^2 = \frac{1}{9}$

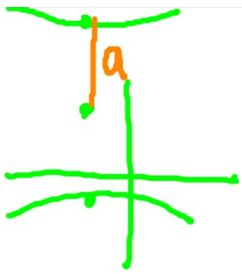
$a = \pm\frac{1}{2}$ | $b = \pm\frac{1}{3}$

$V\left(\frac{5}{2}, -4\right)$

$\left(\frac{3}{2}, -4\right)$

$y-h = \pm\frac{b}{a}(x-k$

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



$$\boxed{\frac{(y-4)^2}{16}} - \frac{(x+1)^2}{9} = 1$$

$C(-1, 4)$

$a^2 = 16$ | $b^2 = 9$

$a = \pm 4$ | $b = \pm 3$

V | ~~cv~~ - box - asymp

$$y-k = \pm \frac{a}{b}(x-h)$$

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

26

$f(\pm 5, 0)$

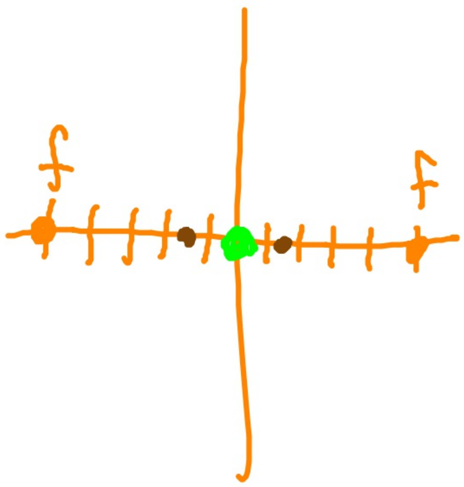
trav. $\ell = 3$

$C(0,0)$

$25 = \frac{9}{4} + b^2$

$c = 5$

$a = 1.5 = \frac{3}{2}$



$$\frac{(x-0)^2}{\frac{9}{4}} - \frac{(y+0)^2}{} = 1$$