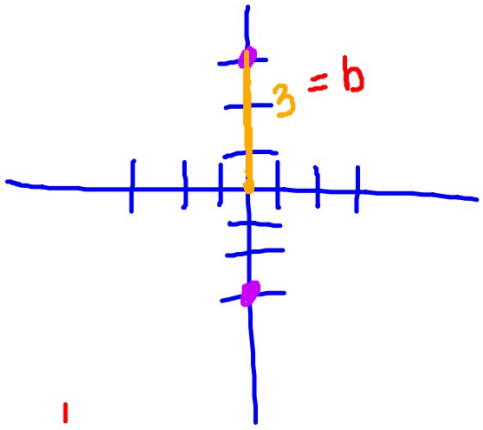
3b.) $V: (0, \pm 3)$

asymp. $y = \pm 3x$

$$\frac{y^2}{9} - \frac{x^2}{1} = 1$$

$$m = \pm \frac{3}{1}$$

$$m = \pm \frac{b}{a}$$



b : y's

a : x's

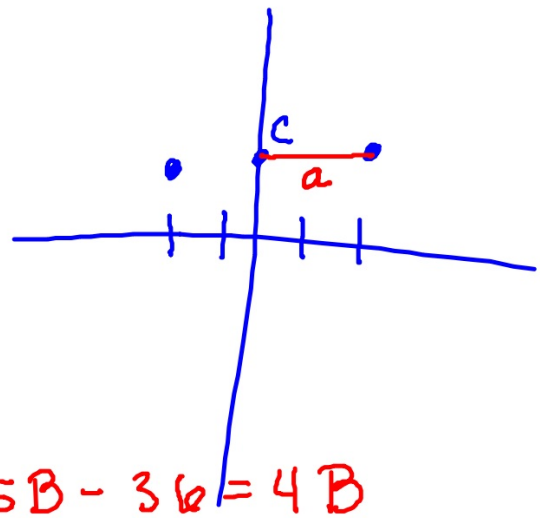
4b.) V $(\pm 2, 1)$

thru $(\underset{x}{5}, \underset{y}{4})$

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

$$\frac{25}{4} - \frac{(4-1)^2}{B} = 1$$

$$4B\left(\frac{25}{4} - \frac{9}{B} = 1\right)$$



$$25B - 36 = 4B$$

$$21B = 36$$

$$B = \frac{36}{21} = \frac{12}{7}$$

Parabolas $(x-h)^2 = 4p(y-k)$ $(y-k)^2 = 4p(x-h)$

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

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

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

Classify and sketch.

Parabola

$y^2 + x + 10y + 26 = 0$

$y^2 + 10y + 25 = -x - 26 + 25$

$(y+5)^2 = -x - 1$

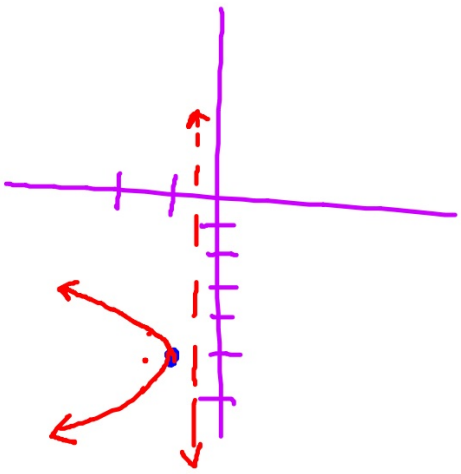
$(y+5)^2 = -1(x+1)$

vertex : $(-1, -5)$

$4p = -1$ $\quad$ L.R. $= |4p|$

$p = \frac{-1}{4}$ $\quad$ L.R. $= 1$

Focus $(-1\frac{1}{4}, -5)$ $\quad$ Directrix : $x = \frac{-3}{4}$



Write an equation in standard form.

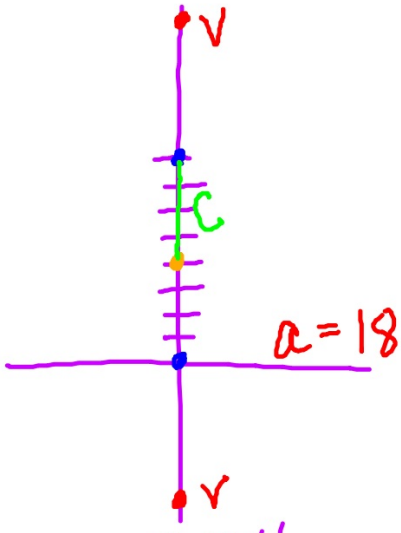
Ellipse

Foci (0,0), (0, 8)

major axis length 36

Center (0,4)

$$\frac{x^2}{308} + \frac{(y-4)^2}{324} = 1$$



$c = 4$

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

$18^2 - b^2 = 4^2$

$324 - 16 = b^2$

$308 = b^2$

Write an equation in standard form.

Circle
Center (2, -5)
tangent to the x-axis

$$(x-2)^2+(y+5)^2=25$$