Math 112

Q's

center $(0,-3)$
$r=2$

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

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

$$(y+3) = \sqrt{4-x^2} \qquad (y+3) = -\sqrt{4-x^2}$$

$$y = -3 + \sqrt{4-x^2} \qquad y = -3 - \sqrt{4-x^2}$$

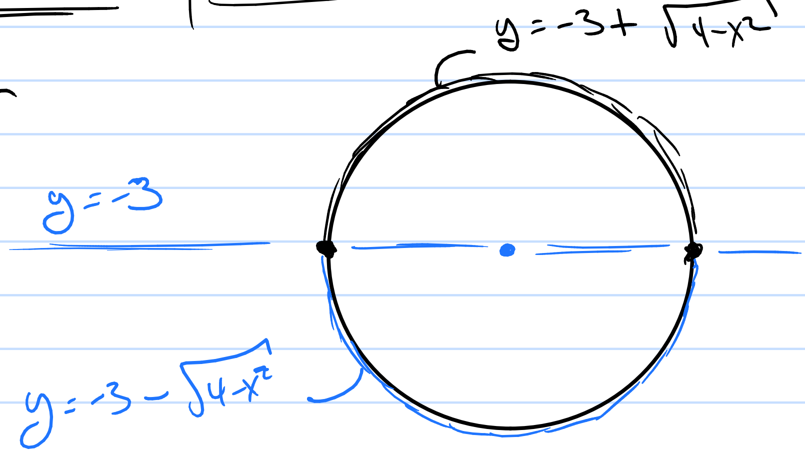
upper lower

b/c

$$u^2 = c$$

$$u = \pm\sqrt{c}$$

$$u = \sqrt{c} \qquad u = -\sqrt{c}$$



ex center $(10,-10)$ $r=10$

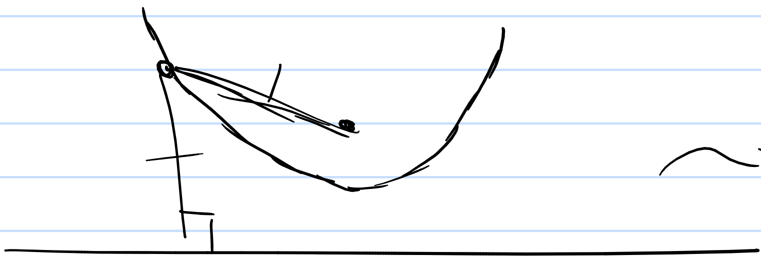
$$(x-10)^2 + (y+10)^2 = 10^2$$

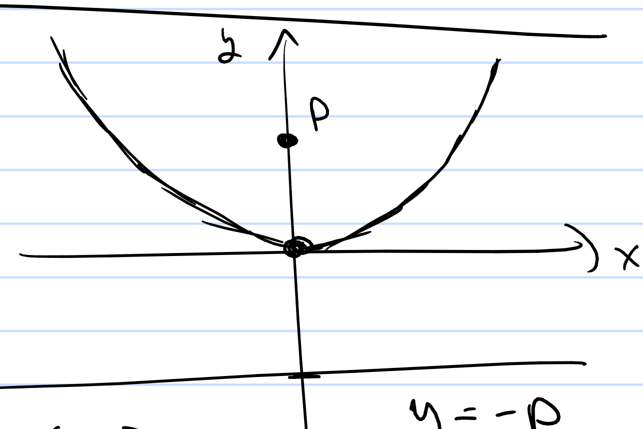
$$\boxed{(x-10)^2 + (y+10)^2 - 100 = 0}$$

center (h,k) radius of r

<u>circle</u>

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





Focus $(0,p)$

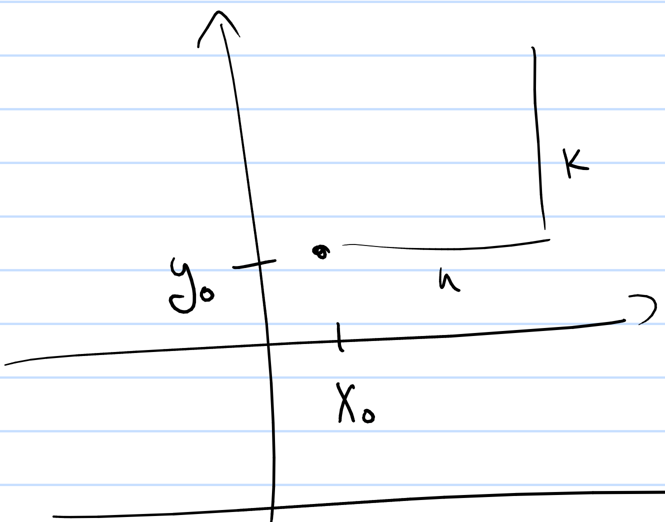
directrix $y=-p$

eqn $\quad y=\frac{1}{4p}x^2$

or

$$4py=x^2$$

vert/horz - translation



$f(x)$ vs $f(x-h)$ moves right h units

$y=f(x)+K$ moves up k units

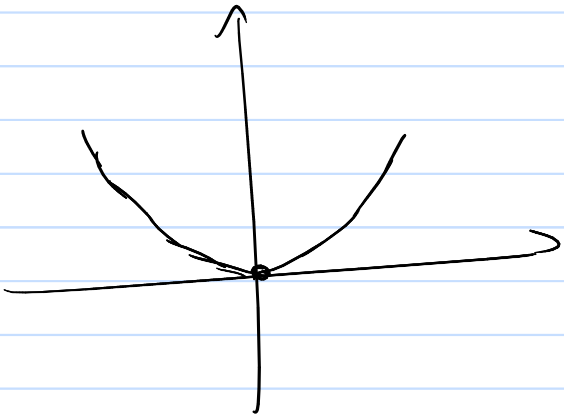
or

$(y-K)=f(x)$ moves up k units

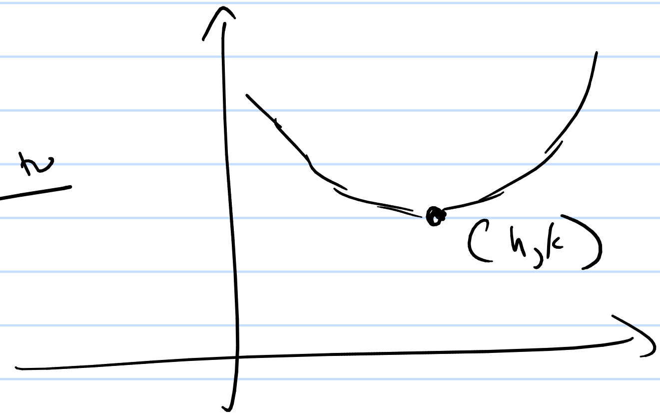
$x^2+y^2=r^2$ to $(x-h)^2+(y-k)^2=r^2$

circle

$4py = x^2$ or $y = \frac{1}{4p} x^2$



move to



$(y-k) = \frac{1}{4p}(x-h)^2$

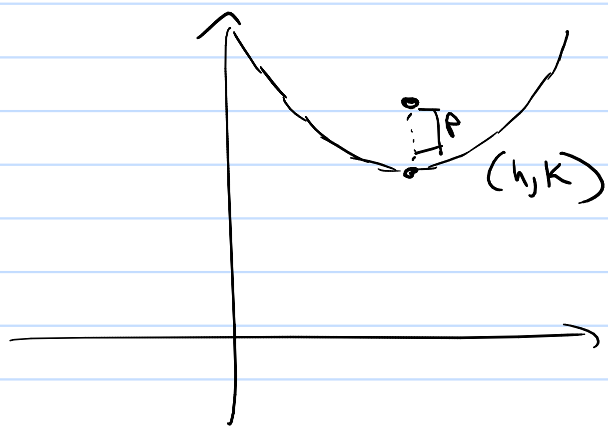
or

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

Standard form $\boxed{4p(y-k) = (x-h)^2}$ or $(y-k) = \frac{1}{4p}(x-h)^2$

$p > 0$ opens up

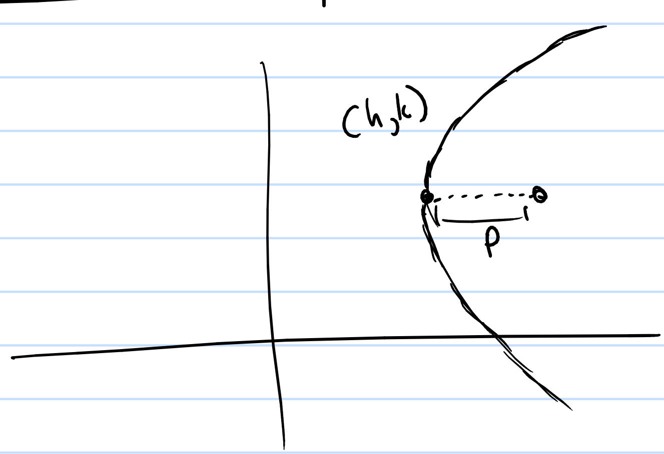
$p < 0$ opens down



horz. parabola $\boxed{4p(x-h) = (y-k)^2}$ or $(x-h) = \frac{1}{4p}(y-k)^2$

$p > 0$ opens right

$p < 0$ opens left



$y = x^2 + 3x - 4$

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

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

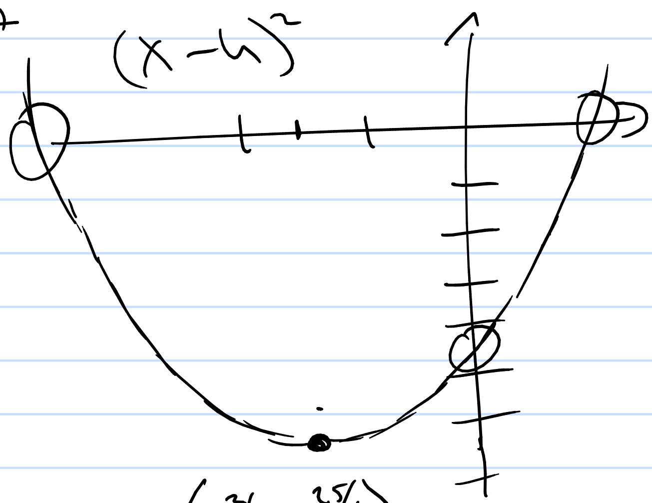
$y + \frac{25}{4} = (x + 3/2)^2$

$1 \cdot \left(y + \frac{25}{4}\right) = (x + 3/2)^2$ so $1 = 4p$

so $p = 1/4$

$4\left(\frac{1}{4}\right)\left(y + 25/4\right) = (x + 3/2)^2$

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



$(-3/2, -25/4)$

$y = 3x^2 - 2x + 7$

$\frac{1}{3}y = x^2 - 2/3\,x + 7/3$

$\frac{1}{3}y - 7/3 = x^2 - 2/3\,x$

$\frac{1}{3}y - 7/3 + (-1/3)^2 = x^2 - 2/3\,x + (-1/3)^2$

$\frac{1}{3}y - \frac{7}{3} + 1/9 = (x - 1/3)^2$

$\frac{1}{3}y - \frac{20}{9} = (x - 1/3)^2$

$\frac{1}{3}y - \frac{20}{9} = (x - 1/3)^2$ compare $4p(y-k) = (x-h)^2$

$\frac{1}{3}\left(y - \frac{20}{3}\right) = (x - 1/3)^2$

so $\frac{1}{3} = 4p \rightarrow p = \frac{1}{12}$

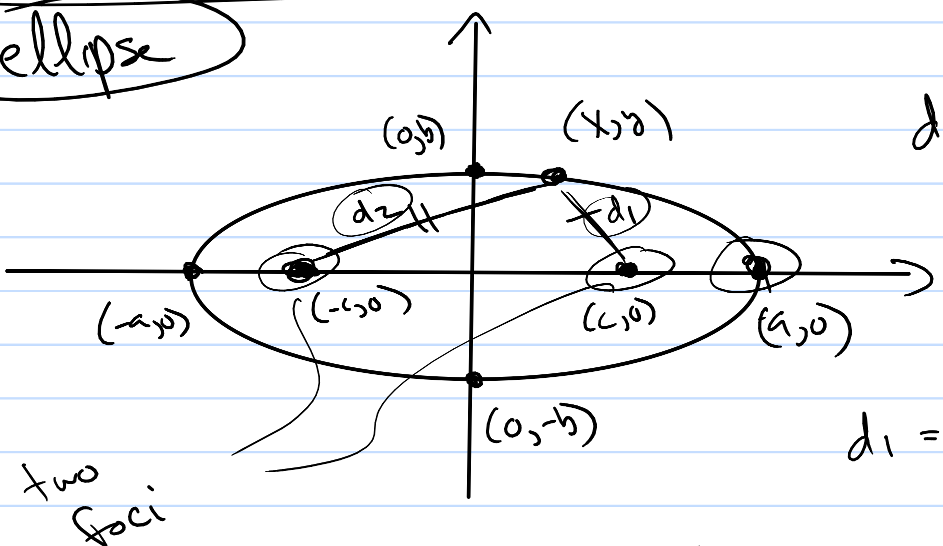
$4\underset{\substack{\uparrow \\ p}}{\left[\frac{1}{12}\right]}\left(y - \underset{\substack{\uparrow \\ k}}{20/3}\right) = \left(x - \underset{\substack{\uparrow \\ h}}{1/3}\right)^2$

① vertex $(1/3, 20/3)$

② opens up

③ focus is $1/12$ above vertex

ellipse



$d_1 + d_2 = $ constant

$d_1 = $ distance from (x,y) to $(c,0)$

$d_2 = $ distance from (x,y) to $(-c,0)$

Solve

$$\boxed{\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1}$$

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