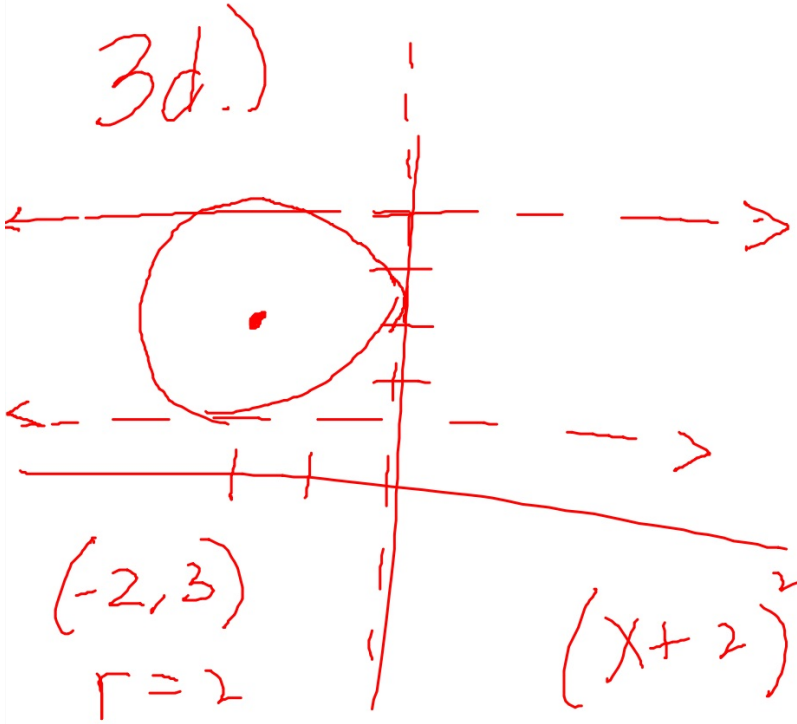
3d.)



$(-2, 3)$

$r = 2$

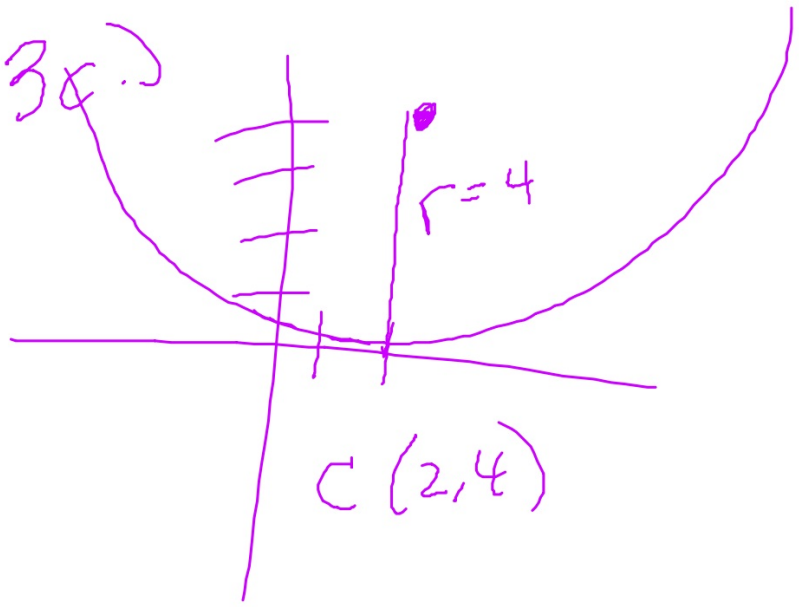
$(x+2)^2 + (y-3)^2 = 4$

2c.) $x^2 - 10x + \underline{25} + y^2 - 6y + \underline{9} + \underline{-25} + \underline{-9} = -25$

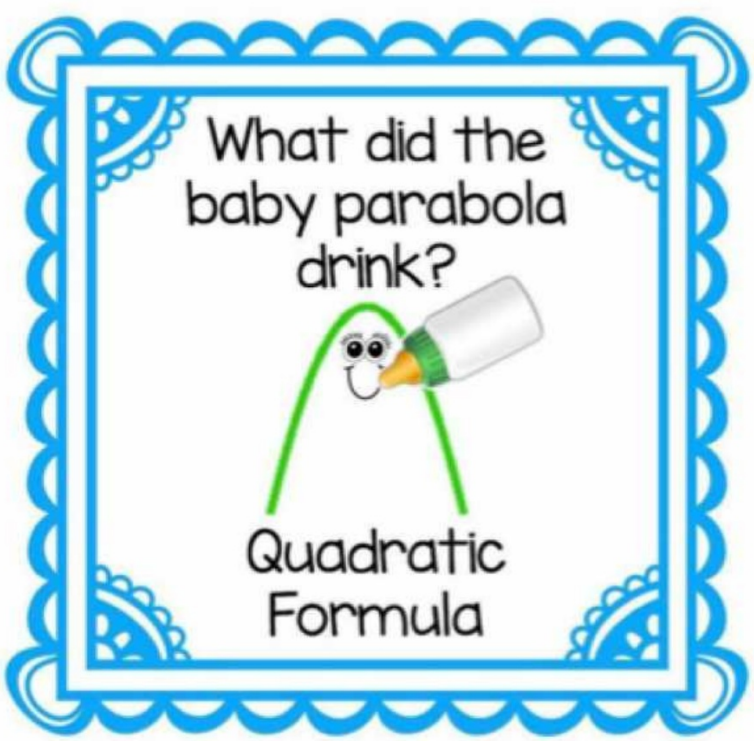
$(x-5)^2 + (y-3)^2 = 9$

$C(5, 3)$

$r = 3$


3x
r=4
C(2,4)

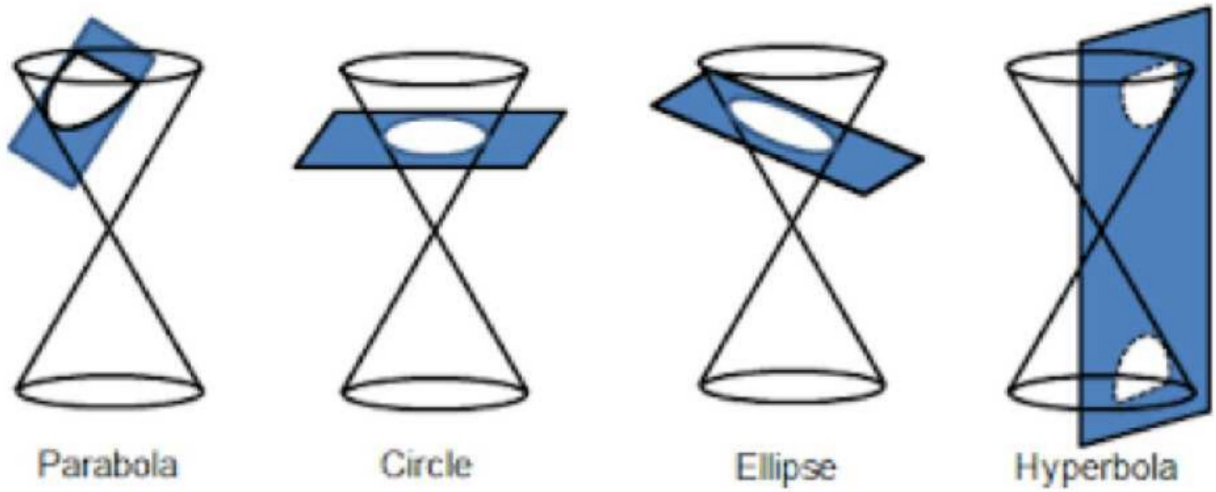
8.2 Parabolas



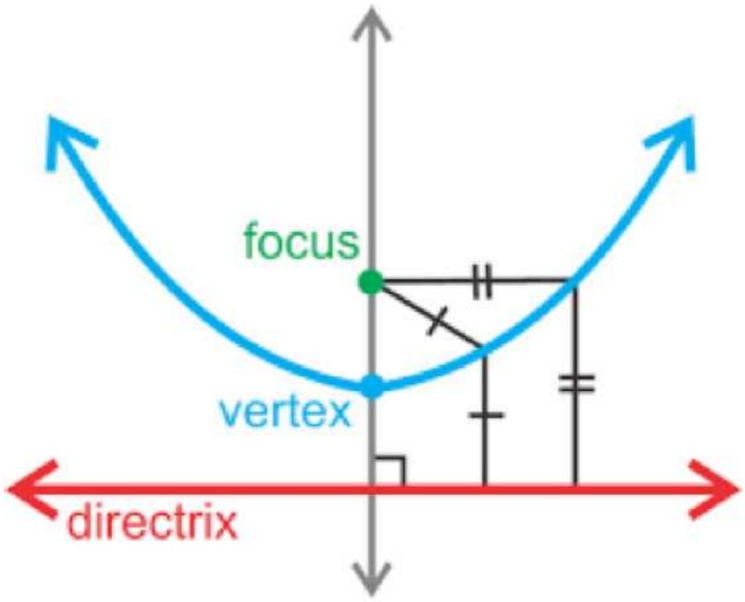
*See printout.

Conic Sections

conic section - a figure formed by the intersection of a plane and a double-napped cone.



parabola - locus of points equidistant from a focus and directrix



*The focus and directrix are not the actual graph. They are "graphing aids" that define the points on the parabola.

Standard Form

Opens: UP/DOWN

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

Opens: RIGHT/LEFT

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

Where:

vertex: *(h, k)*

p>0: *opens up or right*

p<0: *opens down or left*

$|p|$: *distance from focus to vertex AND vertex to directrix*

$|4p|$: *latus rectum (LR)*

ex: Sketch & state the vertex, focus and directrix.

a) $(x-5)^2 = 8(y+3)$

opens up

4p = 8

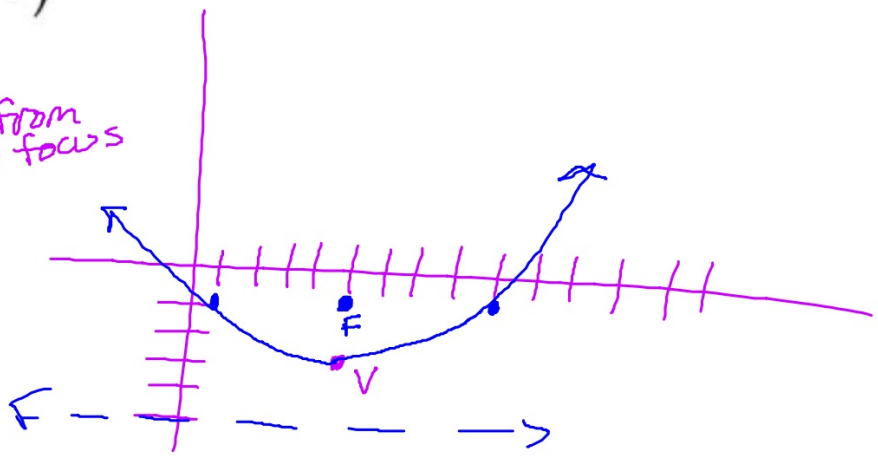
p = 2 ← distance from vertex to focus

Vertex (5, -3)

focus (5, -1)

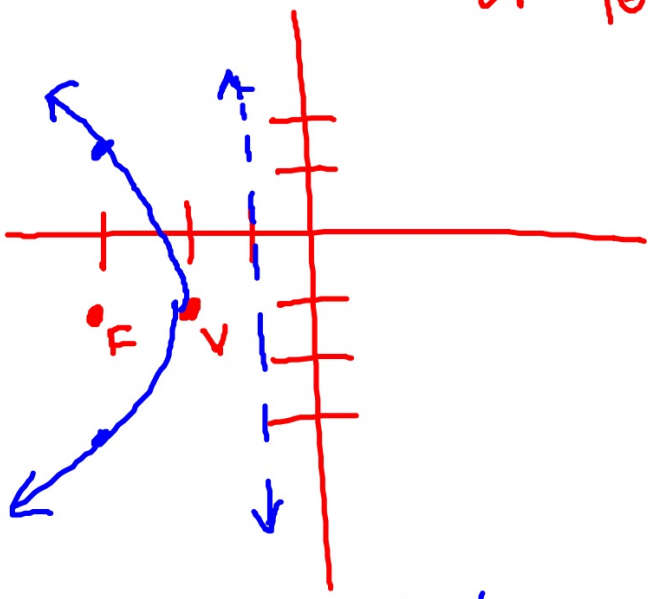
dir: $y = -5$

LR = 8



ex: Sketch & state the vertex, focus and directrix. opens left

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



V (-2, -1)

$4p = -4$

$p = -1$

F (-3, -1)

dir: $x = -1$

LR = 4

D: $\{x \mid x \leq -2\}$

R: $\{y \mid y \in R\}$

ex: Sketch & state the vertex, focus and directrix.

c) $(y-3)^2 = 12(x-2)$

opens right

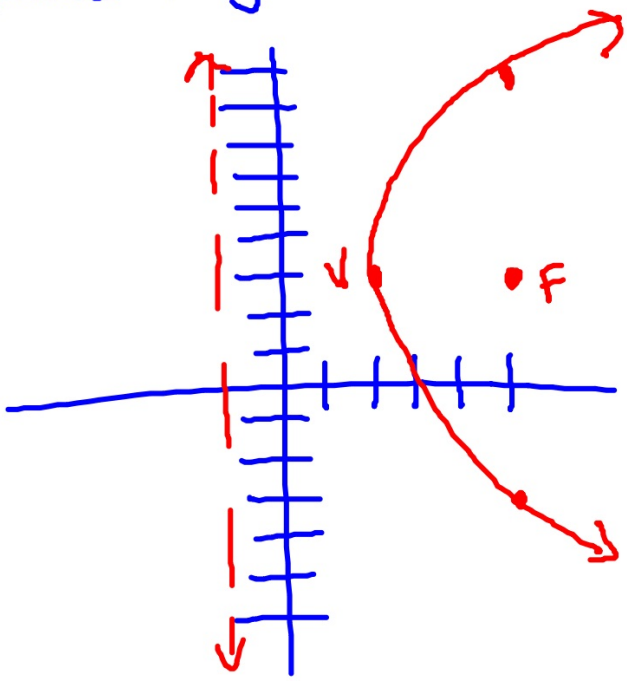
$V(2, 3)$

$4p = 12 \;/\; p = 3$

$F(5, 3)$

dir: $x = -1$

$LR = 12$



ex: Rewrite from general to standard form then sketch.

a) $y^2 + 2x + 6y + 1 = 0$

$y^2 + 6y + \underline{9} + \underline{-9} = -2x - 1$

$(y+3)^2 = -2x + 8$

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

$V(4,-3)$ $p = -\frac{1}{2}$

$F(3.5,-3)$ $LR = 2$

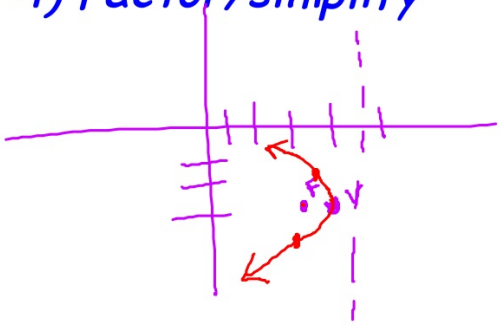
dir: $x = 4.5$

1) Leave the 'squared' variable terms on the left

2) Move the other variable and the constant to the right

3) CTS

4) Factor/simplify



ex: Rewrite from general to standard form then ~~sketch.~~

b) $4x^2+8x-5y-6=0$ opens up

$4(x^2+2x+\underline{1})+\underline{-4}=5y+6$

$4(x+1)^2=5y+10$

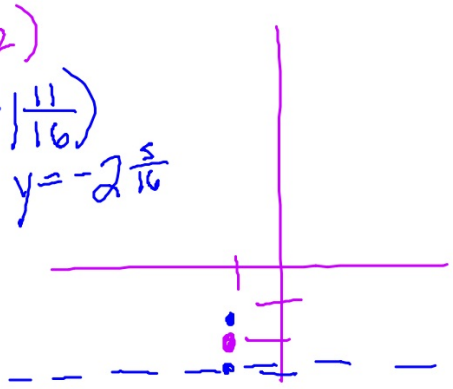
$4(x+1)^2=5(y+2)$

$(x+1)^2=\frac{5}{4}(y+2)$ $4p=\frac{5}{4}$ $p=\frac{5}{16}$

$V(-1,-2)$

$F(-1,-1\frac{11}{16})$

dir: $y=-2\frac{5}{16}$



ex: Rewrite from general to standard form then sketch.

c) $y^2 + 12x - 6y - 27 = 0$

$y^2 - 6y + \underline{9} + \underline{-9} = -12x + 27$

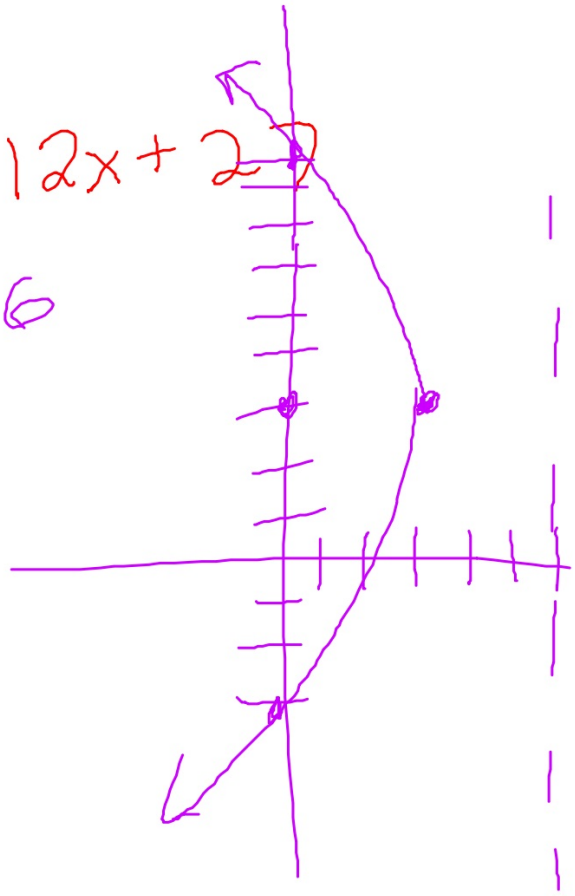
$(y-3)^2 = -12x + 36$

$(y-3)^2 = -12(x-3)$

V(3, 3)

F(0, 3)

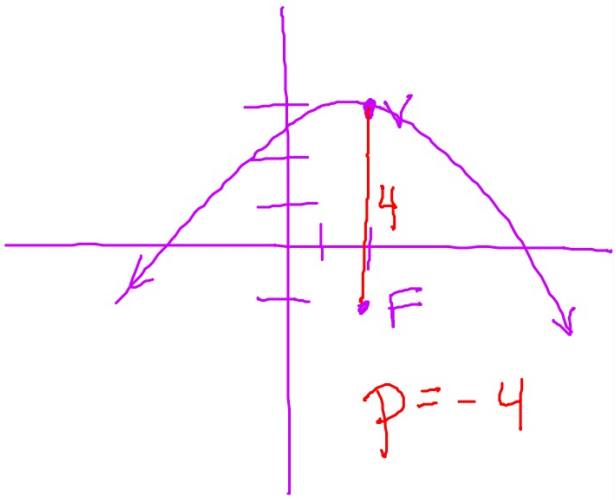
dir: x = 6



ex: Write an equation in standard form of the parabola with the given characteristics.

a)

vertex: (2, 3)
focus: (2, -1)



$p = -4$

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

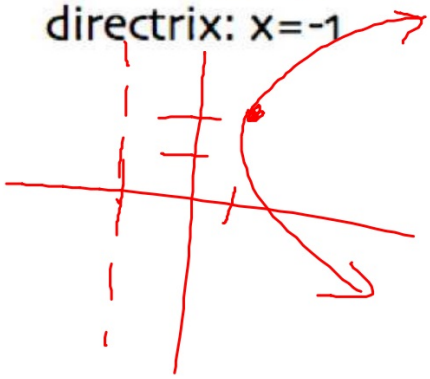
$(x-2)^2 = -16(y-3)$

ex: Write an equation in standard form of the parabola with the given characteristics.

b)

vertex: (1, 2)

directrix: x=-1



$p = 2$

$4p = 8$

$(y-2)^2 = 8(x-1)$

ex: Write an equation in standard form of the parabola with the given characteristics.

c)

focus: (4, 0)

directrix: x=8

$y^2 = -8(x-6)$

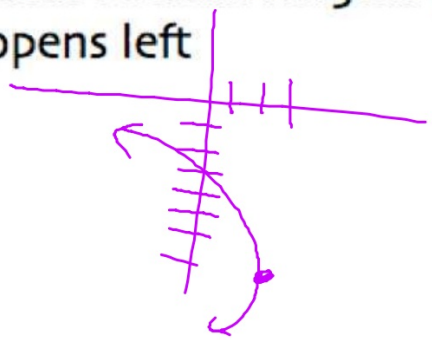
V(6,0)

$p = -2$ $4p = -8$

ex: Write an equation in standard form of the parabola with the given characteristics.

d)

vertex: (3, -7)
latus rectum length: 42
opens left



$$(y+7)^2 = -42(x-3)$$

ex: Write an equation in standard form of the parabola with the given characteristics.

e)

directrix: y=-2

right endpoint of the latus rectum: (1,0)

$4p = 4$

$(x+1)^2 = 4(y+1)$