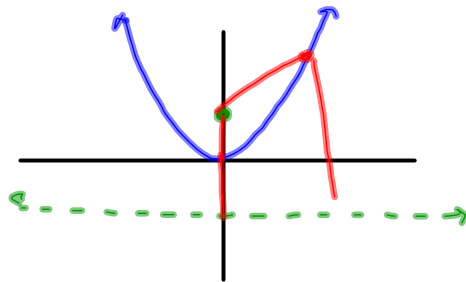


8.1 Conic Sections & Parabolas

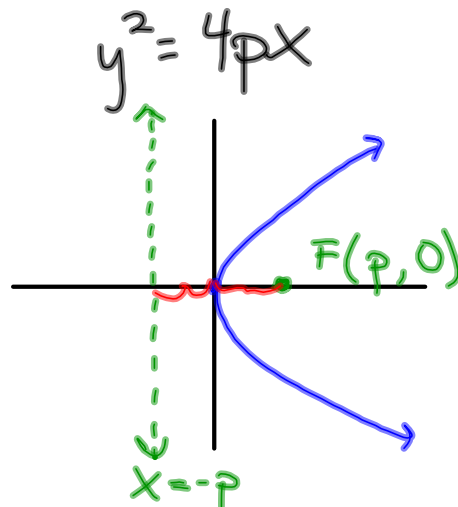
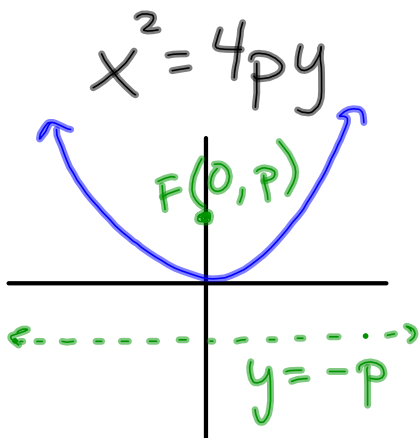
Obj: 1. Find equation, focus & directrix of a parabola.

Parabola: Set of all points in a plane equidistant from a particular line (directrix) and a particular point (focus).



May 1-9:06 AM

Standard Form:



May 1-9:27 AM

Parabolas w/ vertex (h, k)

Standard eq:	$(x-h)^2 = 4p(y-k)$	$(y-k)^2 = 4p(x-h)$
Opens:	up or down $p > 0$ $p < 0$	left or right $p < 0$ $p > 0$
Focus:	$(h, k+p)$	$(h+p, k)$
Directrix:	$y = k-p$	$x = h-p$
Focal length:	p	p
Focal width:	$ 4p $	$ 4p $

May 1-9:31 AM

Find: focus, directrix, and focal width

$-2(y) = (-\frac{1}{2}x^2) - 2$ opens down

$4p y = x^2$ vertex: (h, k)
 $(0, 0)$

$-2y = x^2 \rightarrow -2(y-0) = (x-0)^2$

$4p = -2$

$p = -\frac{1}{2}$ Focus: $(h, k+p)$
 $(0, -\frac{1}{2})$

Focal width: $|4p|$
 $= |4(-\frac{1}{2})| = 2$ Directrix: $y = k-p$
 $y = \frac{1}{2}$

May 1-9:37 AM

Find the vertex, focus & directrix of:

$$x^2 = 6y$$

$$x^2 = 4py$$

$$4p = 6$$

$$p = \frac{3}{2}$$

vertex: $(0, 0)$

Focus: $(h, k+p)$

$(0, \frac{3}{2})$

D: $y = k - p$

$y = -\frac{3}{2}$

May 1-9:45 AM

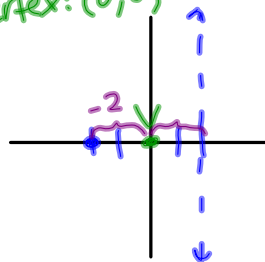
Find an equation in standard form for a parabola w/ directrix $x=2$ and focus $(-2, 0)$.

vertex: $(0, 0)$

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

$$y^2 = 4px$$

$$y^2 = -8x$$



algebraically:

$$D: h - p = 2$$

$$F: h + p = -2$$

$$2h = 0$$

$$h = 0$$

$$0 - p = 2$$

$$p = -2$$

May 1-9:52 AM

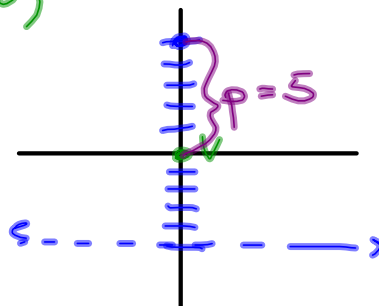
Find the eq. in standard form of parabola
w/ Focus (0,5) and dir $y = -5$

$v: (h, k)$

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

$$x^2 = 4py$$

$$x^2 = 20y$$



D: $y = k - p$

F: $k + p$

$$\begin{array}{r} k - p = -5 \\ k + p = 5 \\ \hline k = 0 \end{array} \quad p = 5$$

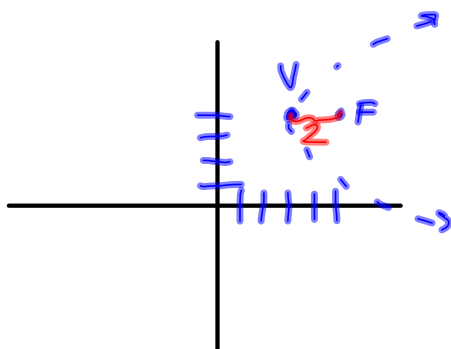
May 1-9:58 AM

Find the eq: $V: (3, 4)$
 $F: (5, 4)$

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

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

$$(y-4)^2 = 8(x-3)$$



May 1-10:05 AM

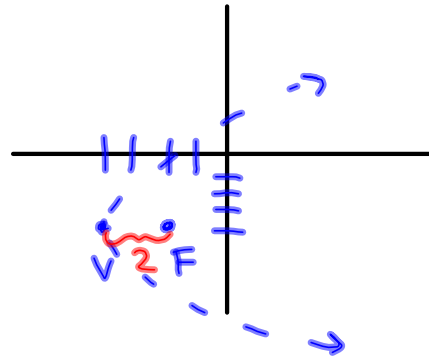
Find eq: $F: (-2, -4)$

$V: (-4, -4)$
 h, k

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

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

$$(y + 4)^2 = 8(x + 4)$$



May 1-10:07 AM

Graph by hand: $(y - 4)^2 = 8(x - 3)$

Vertex $(3, 4)$
 Focus
 Directrix } Parabola

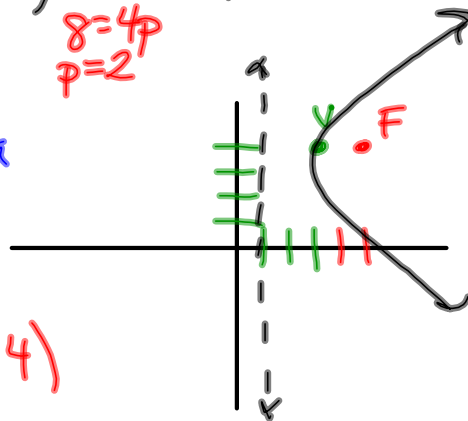
$$8 = 4p$$

$$p = 2$$

$$F: (h + p, k) = (5, 4)$$

$$D: x = h - p$$

$$x = 1$$



May 1-10:12 AM

Prove that $y^2 - 6x + 2y + 13 = 0$ is a
 parabola. Find vertex, focus, directrix.
 put eq. in standard form! $(y-k)^2 = 4p(x-h)$

$$y^2 + 2y = 6x - 13$$

$$(y^2 + 2y + 1) = 6x - 13 + 1$$

$$(y+1)^2 = 6x - 12$$

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

$$V: (2, -1)$$

$$6 = 4p$$

$$p = \frac{3}{2}$$

$$F: (h+p, k)$$

$$(3.5, -1)$$

$$D: x = h-p$$

$$x = \frac{1}{2}$$

May 1-10:16 AM