Warm Up

Complete the square to put in vertex form.

$$y = 2x^2 + 10x + 3$$

$y - 3 + 2\left(\frac{25}{4}\right) = 2\left(x^2 + 5x + \left(\frac{5}{2}\right)^2\right)$

$y - 3 + \frac{25}{2} = 2\left(x + \frac{5}{2}\right)^2$

$y + \frac{19}{2}$

$y = 2\left(x + \frac{5}{2}\right)^2 - \frac{19}{2}$

Nov 6-10:59 AM

10.2 Parabolas

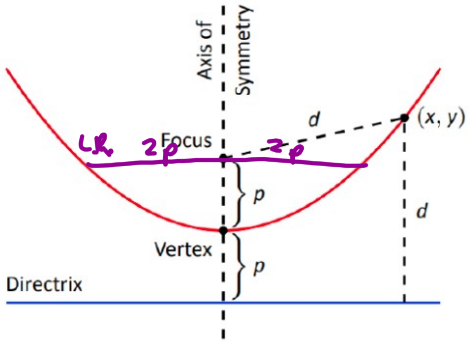
Standard Form

Vertex Form

Nov 6-11:00 AM

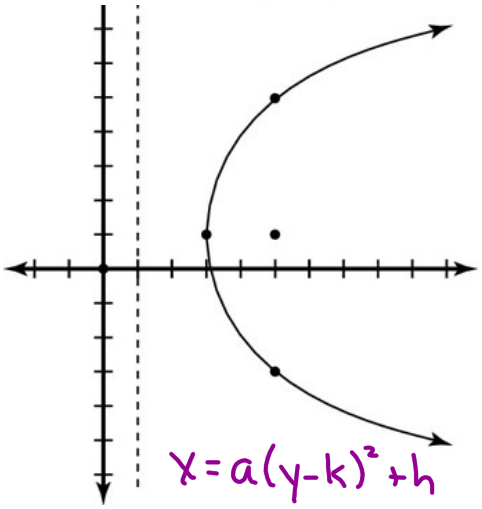
Definition of Parabola

A **parabola** is the set of all points (x, y) in a plane that are equidistant from a fixed line (**directrix**) and a fixed point (**focus**) not on the line.



LR $2p$ $=p$

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



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

Nov 8-11:43 AM

Focal Chord - a line segment with endpoints on the parabola through the focus.

Latus Rectum - a focal chord parallel to the directrix and perpendicular to the axis of symmetry. Its $length = \frac{1}{a}$

To find distance from V⟶F & V⟶D use $= p$ $= p$

$$p = \frac{1}{4a}$$

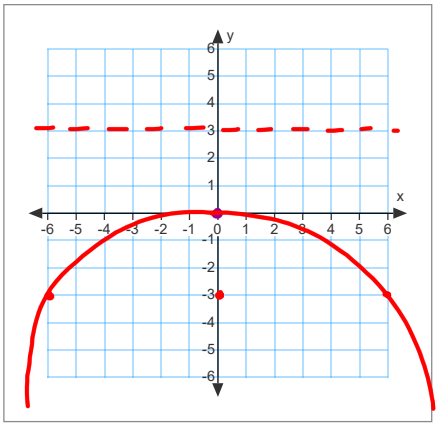
Nov 29-6:27 PM

Example

Find the vertex, focus and directrix for

$$y = \frac{-1}{12}x^2$$

Then sketch the graph



V (0,0)

F (0-3)

D y=3

$p = \frac{1}{4a}$

$p = \frac{1}{4(\frac{1}{12})}$

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

$= 3$

Nov 8-12:11 PM

Find the equation of the parabola whose vertex is (3, 2) and focus is (1, 2).

Sketch the parabola.

opens left

V (3,2)

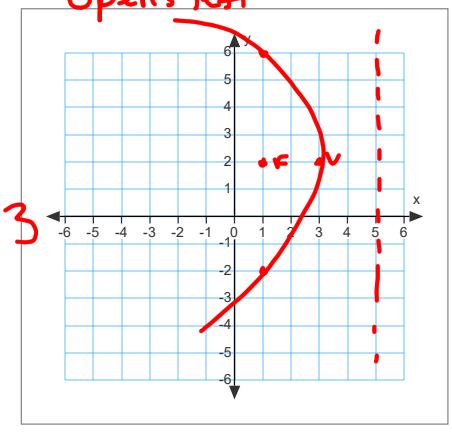
F (1,2)

p = 2

$2 = \frac{1}{4a}$

$a = \frac{1}{8}$

$x = -\frac{1}{8}(y-2)^2 + 3$



Nov 29-6:31 PM

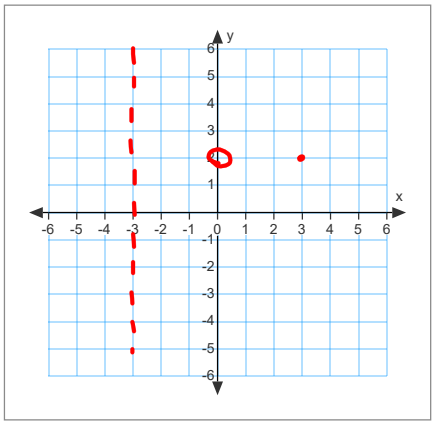
Find the equation of the parabola whose focus is (3, 2) and directrix is x = -3.

F (3, 2)
V (0, 2)] p = 3

$a = \frac{1}{12}$

D x = -3

$x = \frac{1}{12}(y-2)^2$



Nov 29-6:35 PM

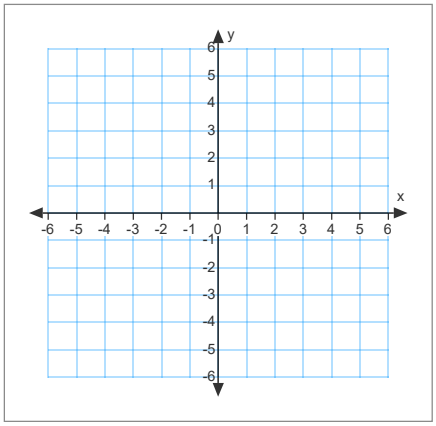
State the vertex, focus and directrix of the parabola $x = -\frac{1}{4}(y-2)^2 + 3$

V (3, 2)

$p = \frac{1}{4(-\frac{1}{4})} = 1$

F (2, 2)

D x = 4



Nov 29-6:36 PM

State the focus of the parabola

$$y=-\frac{1}{6}\left(x^2+4x-2\right)$$

$y-\frac{1}{3}=-\frac{1}{6}(x^2+4x+2^2)$

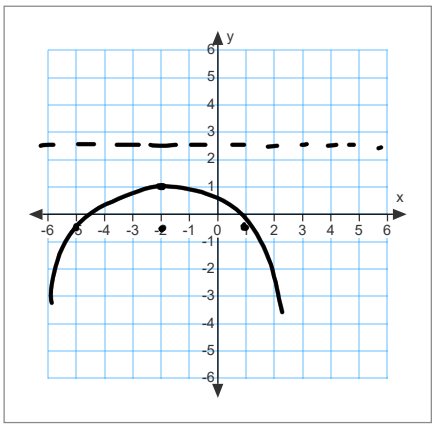
$+-\frac{1}{6}(4)$

$y-\frac{1}{3}-\frac{2}{3}=-\frac{1}{6}(x+2)^2$

$y=-\frac{1}{6}(x+2)^2+1$

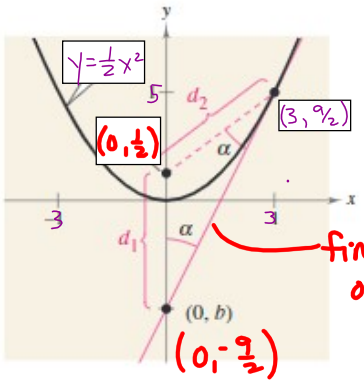
$V(-2,1)$ $\quad p=\frac{1}{4(-\frac{1}{6})}$

$F(-2,-\frac{1}{2})$ $\quad =\frac{3}{2}$



Nov 29-6:39 PM

Find the equation of line tangent to the parabola $y=\frac{1}{2}x^2$ through the point $\left(3,\frac{9}{2}\right)$.



find equation of this line

$p=\frac{1}{4(\frac{1}{2})}=\frac{1}{2}$

$d_2=\sqrt{3^2+4^2}$

$=5$

$d_1=5=\sqrt{0^2+(\frac{1}{2}-b)^2}$

$5=\frac{1}{2}-b$

$\frac{9}{2}=-b$

$-\frac{9}{2}=b$

$m=\frac{-\frac{9}{2}-\frac{9}{2}}{0-3}=3$

$y=3x-\frac{9}{2}$

Apr 13-2:18 PM

HOMEWORK

p 740 5-10,

15, 19-25 odd, (get in alternate form first!)

33, 35, 41, 45-49 odd,

55, 57 (in slope intercept form), 61, 63

Feb 2-9:51 PM

	$y = a(x-h)^2 + k$	$y = a(y-k)^{-} + h$
Vertex	(h,k)	(h,k)
Axis of Symmetry	$x = h$	$y = k$
Focus	$(h, k + \frac{1}{4a})$	$(h + \frac{1}{4a}, k)$
Directrix	$y = k - \frac{1}{4a}$	$x - h - \frac{1}{4a}$
LR	$\left\|\frac{1}{a}\right\|$	$\left\|\frac{1}{a}\right\|$

Nov 8-12:14 PM

HOMEWORK

p 667 5-9 odd, 11, 23-31 odd

37-42 all (get in alternate form), 51, 53

57-63 odd, 69, 77-81 odd

Aug 29-6:38 AM