

Warm Up

Get into partners and...Pg 607 #47-51

odd, 59-63 odd

$$\sum_{n=0}^{20} 3\left(\frac{3}{2}\right)^n \quad a_1 = 3 \quad 3\left(\frac{1 - \left(\frac{3}{2}\right)^{21}}{1 - \frac{3}{2}}\right)$$

$$n=0 \uparrow \quad n=21 \quad r = \frac{3}{2}$$

Complete the square to put in vertex form.

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

$$\sum_{n=1}^{\infty} 2\left(\frac{7}{3}\right)^{n-1} \quad 2\left(\frac{1}{1 - 7/3}\right) = 2\left(\frac{1}{-4/3}\right)$$

$$1 \cdot -\frac{3}{4}$$

$$2 + 8 + 32 + \dots = \infty \quad 2\left(-\frac{3}{4}\right)$$

$$\rightarrow 32 + 8 + 2 + \frac{1}{2} + \frac{1}{8} + \dots$$

GO COUGARS!



Homework Questions

③1 $a_2 = -18$ $a_5 = \frac{2}{3}$ $n = 6$

$$a_n = a_1(r)^{n-1}$$

↑

$$\sqrt[4]{\frac{1}{16}}$$

$$\frac{\frac{2}{3}}{-18} \cdot \frac{1}{\frac{2}{3}} \cdot -\frac{1}{18} = -\frac{1}{27}$$

$$\sqrt[3]{-\frac{1}{27}}$$

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

$$a_n = a_1 \left(-\frac{1}{3}\right)^{n-1}$$

$$-18 = a_1 \left(-\frac{1}{3}\right)^1$$

$$-18 = \frac{a_1}{-3} \left(-\frac{1}{3}\right)$$

$$-3 \cdot -18 = \frac{a_1}{-3} \cdot -3$$

$$54 = a_1$$

$$a_n = 54 \left(-\frac{1}{3}\right)^{n-1}$$

$$a_n = 54 \left(-\frac{1}{3}\right)^5$$

$$a_n = 54 \left(-\frac{1}{243}\right)$$

$$= -\frac{54}{243}$$

9.1 Circles and Parabolas

Circles

Standard Form

Center Form

Parabolas

Standard Form

Vertex Form

vertex

{ focus
directrix

Standard Form $ax^2 + by^2 + cx + dy + e = 0$

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

(h, k) is center

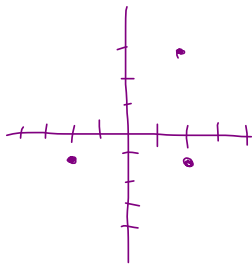
$r = \text{radius}$

Find the equation of circle if

$$C(2, -1) \quad r = 4$$

$$(x-2)^2 + (y+1)^2 = 16$$

4^2



Identify the center & radius of the circle.

$$(x+4)^2 + \left(y - \frac{1}{2}\right)^2 = 27 \quad C\left(-4, \frac{1}{2}\right) \quad r = \sqrt{27} = 3\sqrt{3}$$

$$x^2 + (y+2)^2 = \frac{1}{9} \quad C(0, -2) \quad r = \frac{1}{3}$$

$$x^2 + y^2 - 8x + 10y - 12 = 0$$

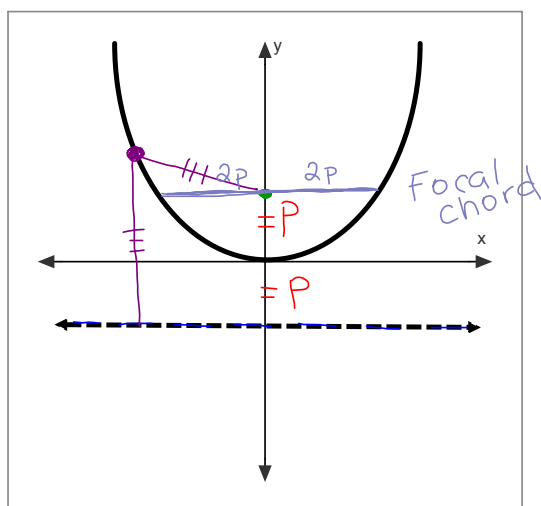
$$x^2 + y^2 - 8x + 10y = 12$$

$$x^2 - 8x + 16 + y^2 + 10y + 25 = 12 + 16 + 25$$

$$(x-4)^2 + (y+5)^2 = 53$$

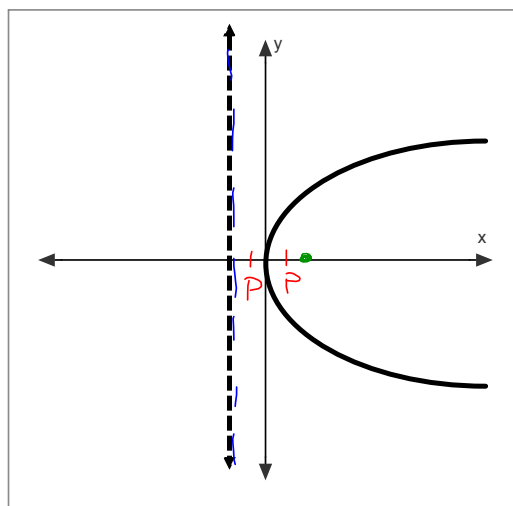
$$C(4, -5) \quad r = \sqrt{53}$$

Parabola - set of all points equidistant from a point called a focus and a line called a directrix



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

opens down?
-a

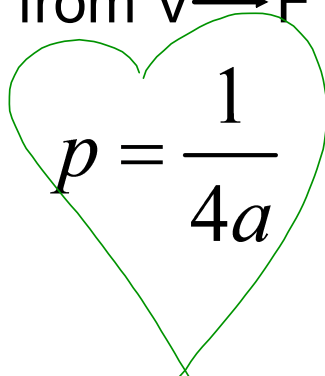


$$x = a(y-k)^2 + h$$

opens left?
-a

Focal Chord - a line segment parallel to directrix
through the focus $length = \frac{1}{a}$

To find distance from $V \rightarrow F$ & $V \rightarrow D$ use


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

Example

Find the vertex, focus and directrix for

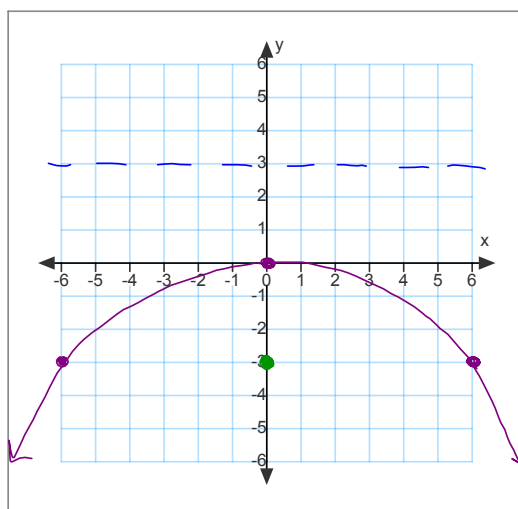
$$y = \frac{-1}{12}x^2$$

Then sketch the graph

vertex: $(0, 0)$

Focus: $p = \frac{1}{4(\frac{1}{12})}$
 $(0, -3) = \frac{1}{\frac{1}{3}} = 3$

Directrix: $y = 3$



Find the equation of the parabola whose vertex is $(0, 0)$ and focus is $(5, 0)$.

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

$$x = ay^2$$

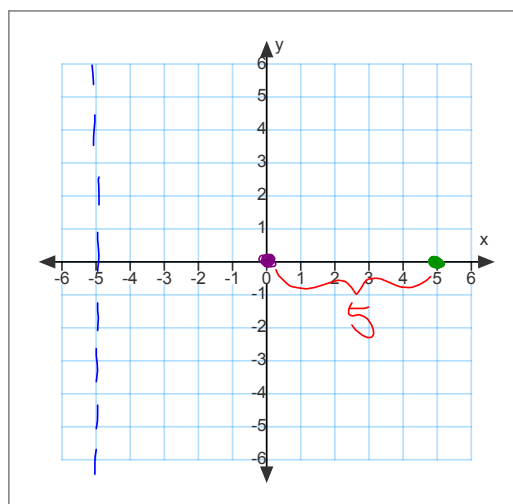
$$x = \frac{1}{20}y^2$$

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

$$5 = \frac{1}{4a}$$

$$20a = 1$$

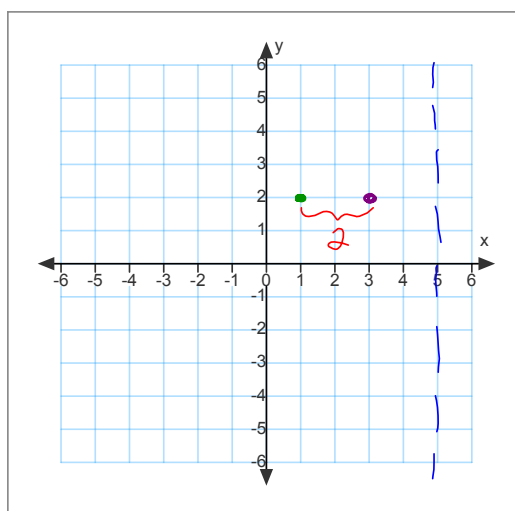
$$a = \frac{1}{20}$$



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

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

$$\boxed{x = -\frac{1}{8}(y - 2)^2 + 3}$$
$$p = \frac{1}{4a}$$
$$2 = \frac{1}{4a}$$
$$8a = 1$$
$$a = \frac{1}{8}$$



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

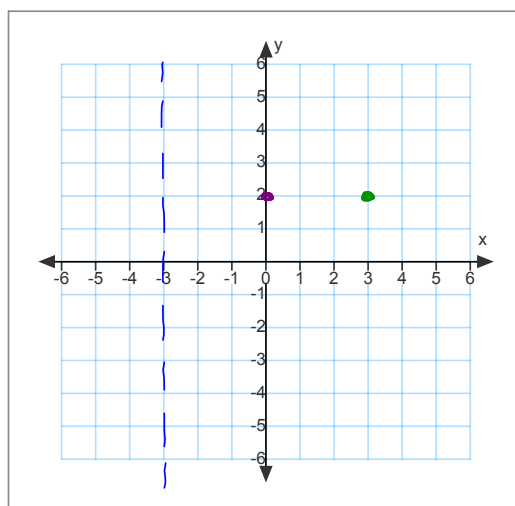
$$x = a(y - k)^2 + h$$

$$x = a(y - 2)^2 + 0 \quad v(0, 2)$$

$$3 = \frac{1}{4a}$$

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

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



State the vertex, focus and directrix of the parabola

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

vertex: $(3, 2)$

Focus:

$(2, 2)$

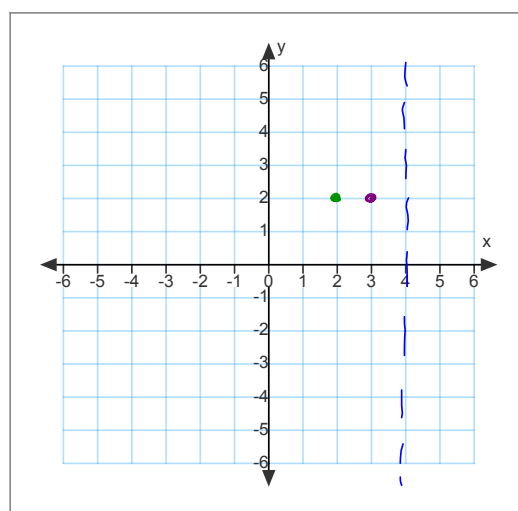
Directrix:

$x = 4$

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

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

$$p = 1$$



State the vertex, focus and directrix of the parabola $x^2 + 6x + 4y + 5 = 0$

$$x^2 + 6x + 9 = -4y - 5 + 9$$

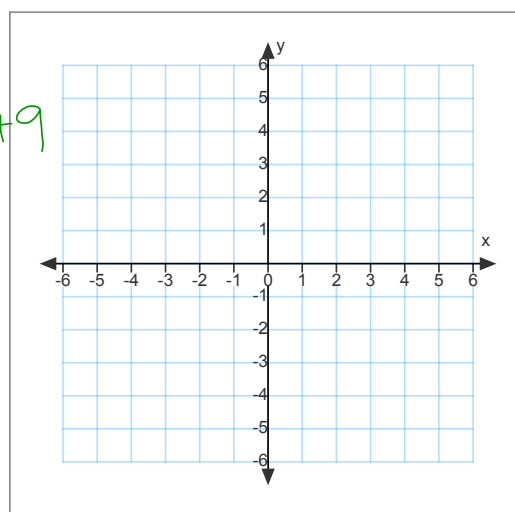
$$(x+3)^2 = -4y + 4$$

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

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

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

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



vertex: $(-3, 1)$

Homework

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

[37-42 all (get in alternate form first!),]

51, 53, [57-63 odd, 69 (get in
alternate form first!)], 77-81 odd

Warm Up

Find center, radius & x and y-int

$$x^2 + y^2 - 8x + 10y - 12 = 5$$

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

$$x^2 + 6x + 4y + 5 = 0$$

$$3y^2 - 24x - 12y - 36 = 0$$

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