Parabola Notes

- I know the difference between a vertical axis parabola and a horizontal axis parabola
- I can write the general form of an equation to standard form of a parabola
- I can graph a parabola by using the vertex, focus, and directrix
- I can find the equation of a parabola given points on the graph, vertex, focus or directrix

1. $y^2 = -8x$

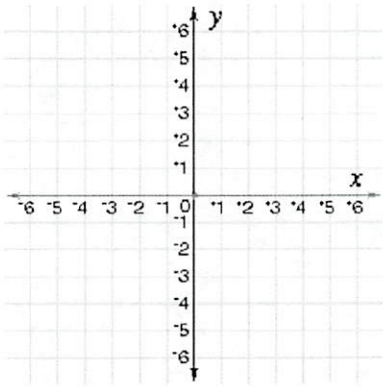
opens: _____

p = _____

vertex _____

focus _____

directrix _____



axis of symmetry _____

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

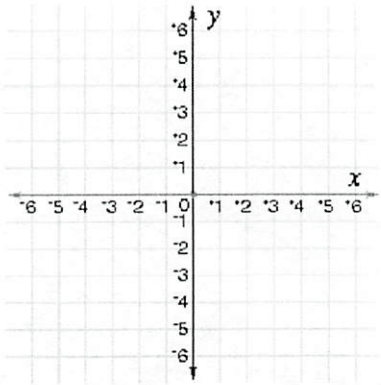
opens: _____

p = _____

vertex _____

focus _____

directrix _____



axis of symmetry ____

Rewrite each equation in standard form

3. $x^2 - 6x - 8y + 17 = 0$

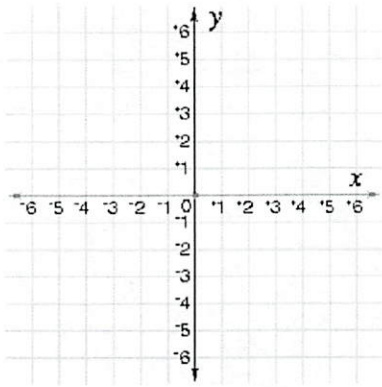
opens: _____

p = _____

vertex _____

focus _____

directrix _____



axis of symmetry _____

Write the equation of each parabola with the given information

4. Vertex (-1, 2), focus (-1, 0)

5. Opens up or down, Vertex (3, -1), Passes through (5, 1)

6. Satellite Antenna: The receiver in a parabolic television dish antenna is 4.5 feet from the vertex and is located at the focus. Write an equation for a cross section of the reflector. Assume that the dish is directed upward and the vertex is at the origin.

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1. $y^2 = -8x$

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

opens: left

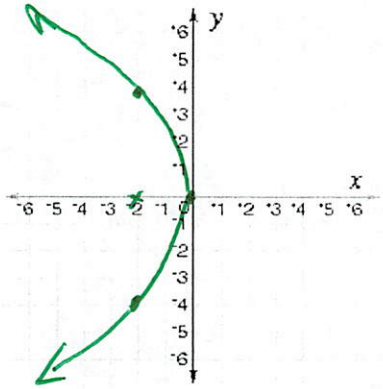
p = -2

vertex (0,0)

focus (-2,0)

directrix $x = 2$

axis of symmetry $y = 0$



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

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

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

opens: down

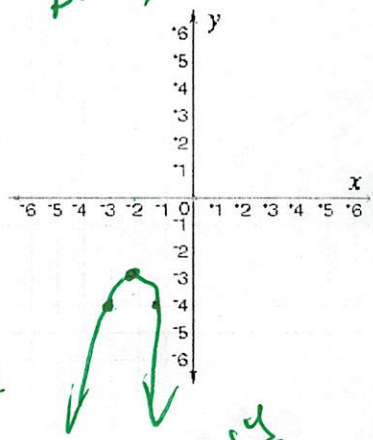
p = $-\frac{1}{4}$

vertex (-2,-3)

focus $(-2, -3\frac{1}{4})$

directrix $y = -2\frac{3}{4}$

axis of symmetry $x = -2$



x	y
-3	-4

$-1 = (y+3)$
$y = -4$

Rewrite each equation in standard form

3. $x^2 - 6x - 8y + 17 = 0$

opens: up

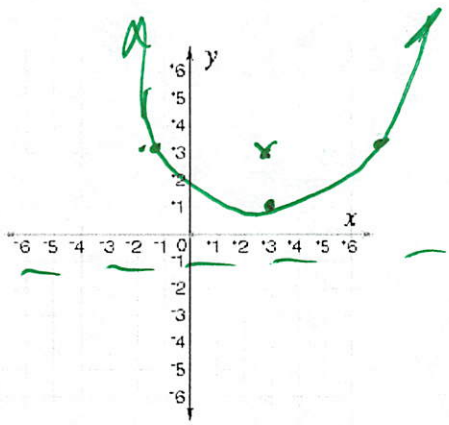
p = 2

vertex (3,1)

focus (3,3)

directrix $y = -1$

axis of symmetry $x = 3$



$x^2 - 6x = 8y - 17$

$x^2 - 6x + 9 = 8y - 17 + 9$

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

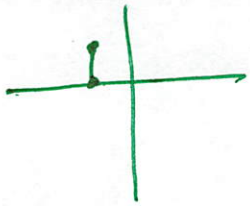
$(x-3)^2 = 8(y-1)$

$4p = 8$

$p = 2$

Write the equation of each parabola with the given information

4. Vertex (-1, 2), focus (-1, 0)



$p = 2$

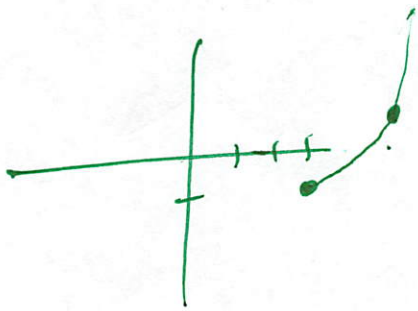
opens up

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

$(h,k) = (-1,2)$

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

5. Opens up or down, Vertex (3, -1), Passes through (5, 1)



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

$(x-3)^2 = 4p(y+1)$

$(5-3)^2 = 4p(1+1)$

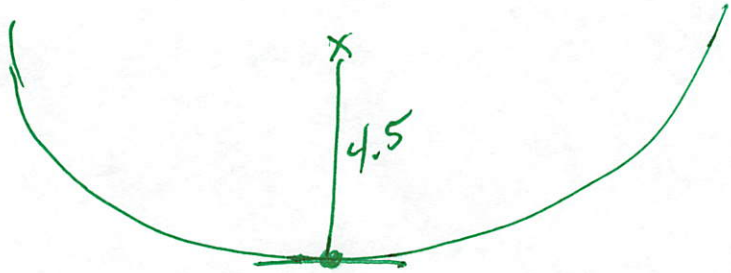
$4 = 4p \cdot 2$

$4 = 8p$

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

$(x-3)^2 = 2(y+1)$

6. Satellite Antenna: The receiver in a parabolic television dish antenna is 4.5 feet from the vertex and is located at the focus. Write an equation for a cross section of the reflector. Assume that the dish is directed upward and the vertex is at the origin.



$x^2 = 4py$

$x^2 = 18y$

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Parabola with vertex (0, 0)

	Vertical axis	Horizontal axis
Equation	$x^2 = 4py$	$y^2 = 4px$
Direction of Opening		
Graph		
Focus		
Focal Diameter		
Axis of Symmetry		
Directrix		
Eccentricity		

Parabola with vertex (0, 0)

Equation	**Vertical axis** $x^2 = 4py$	**Horizontal axis** $y^2 = 4px$
Direction Of Opening	$p > 0$; *opens up* $p < 0$; *opens down*	$p > 0$; *opens to the right* $p < 0$; *opens to the left*
Focus	(0, p)	(p, 0)
Focal Diameter	4p	4p
Axis of Symmetry	$x = 0$	$y = 0$
Directrix	$y = -p$	$x = -p$
Eccentricity	$e = 1$	$e = 1$
Graph		

Parabola with vertex (h, k)

Equation	Vertical axis $(x-h)^2 = 4p(y-k)$	Horizontal axis $(y-k)^2 = 4p(x-h)$
Direction Of Opening		
Graph		
Focus		
Axis of Symmetry		
Directrix		
Focal length		

Parabola with vertex (h, k)

Equation	**Vertical axis** $(x-h)^2 = 4p(y-k)$	**Horizontal axis** $(y-k)^2 = 4p(x-h)$
Direction Of Opening	$p > 0$; *opens up* $p < 0$; *opens down*	$p > 0$; *opens to the right* $p < 0$; *opens to the left*
Graph		
Focus	(h, k + p)	(h + p, k)
Focal Diameter	4p	4p
Axis of Symmetry	$x = h$	$y = k$
Directrix	$y = k - p$	$x = h - p$