6.5 Parabolas

A parabola is a locus (set) of points in a plane equidistant from a fixed point (focus) and a fixed line (directrix).

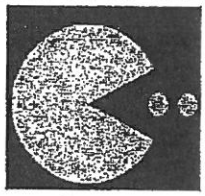
What do we already know about parabolas?

Vertical: $(x-h)^2 = \pm 4p(y-k)$

Horizontal: $(y-k)^2 = \pm 4p(x-h)$

Vertex: (h,k) Kind of like the center…think of it more as the starting point for the graph ☺

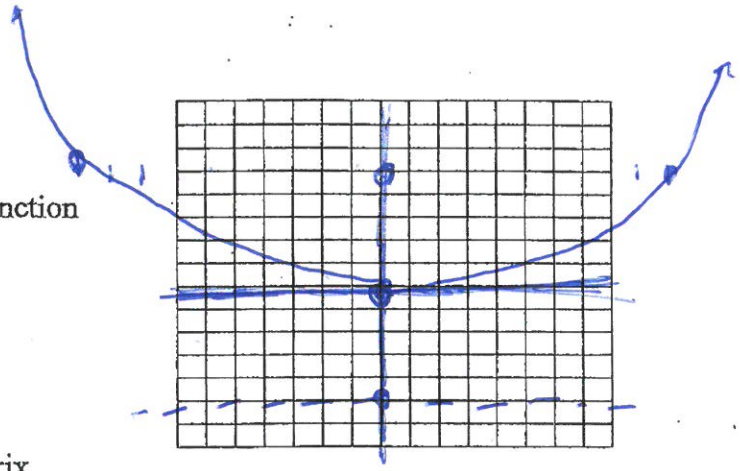
p units from the vertex in both directions is the focus and directrix. The parabola opens into the focus. Think of it like



4p- focal width (width through the focus)

Ex. 1

$x^2 = 20y$



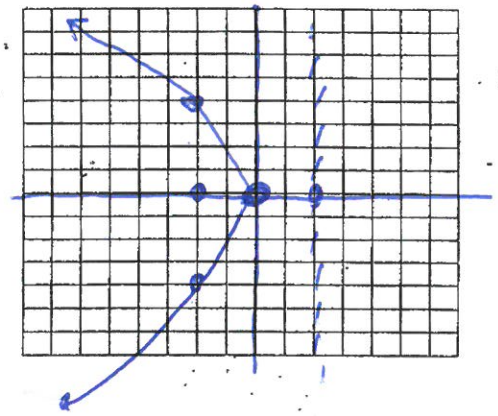
Identify:

Function/ Not a Function
Opens up

Identify:
Vertex (0,0)
Focus (0,5)
Focal Width 20
Equation of Directrix
y = -5

Ex. 2.

$y^2 = -8x$



Identify:

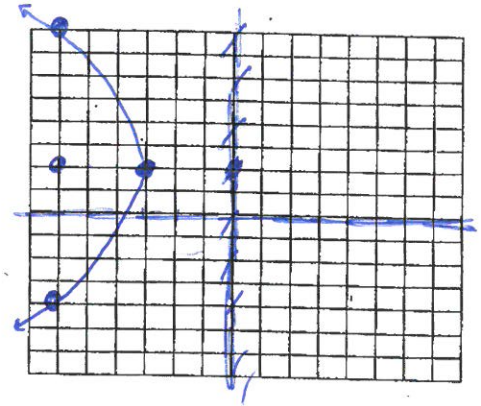
Identify:

Function/ Not a Function
Opens Left

Identify:
Vertex (0,0)
Focus (-2,0)
Focal Width 8
Equation of Directrix
x = 2

Ex. 3.

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



Identify:

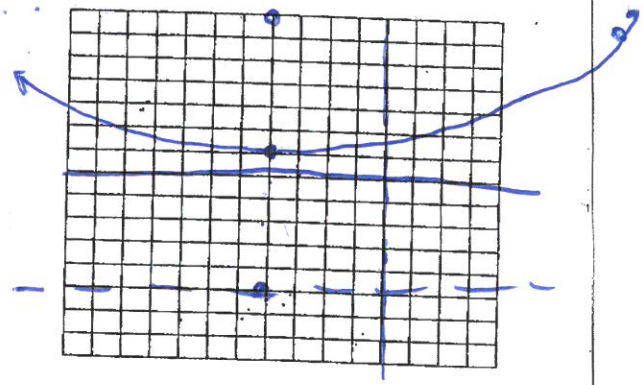
Function/ Not a Function
Opens Left

Identify:
Vertex (-3,2)
Focus
Focal Width
Equation of Directrix

Ex. 4.

$4p = 24$
$p = 6$

$(x+4)^2 = 24(y-1)$



Identify:

Function/ Not a Function
Opens up

Identify:
Vertex (-4,1)
Focus (-4,7)
Focal Width 12
Equation of Directrix
y = -5

Name: _____ Date: _____

Period: _____ Pre-Calculus Parabolas

Directions: Fill in the missing information and graph each parabola on a separate set of axes.

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

Function / Not a Function

Opens up

Vertex $(-2, 1)$

Focus $(-2, 2)$

Focal Width 4

Equation of Directrix $y = 0$

2. $(y+3)^2 = -8(x-7)$

Function / Not a Function

Opens Left

Vertex $(7, -3)$

Focus ~~$(4, -3)$~~ $(5, -3)$

Focal Width 8

Equation of Directrix $x = 9$

3. $y^2 = 8(x+1)$

Function / Not a Function

Opens Right

Vertex $(-1, 0)$

Focus $(1, 0)$

Focal Width 8

Equation of Directrix $x = -3$

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

Function / Not a Function

Opens down

Vertex $(0, 3)$

Focus $(0, -1)$

Focal Width 16

Equation of Directrix $y = 7$

5. $(y+5)^2 = -12(x+3)$

Function / Not a Function

Opens Left

Vertex $(-3, -5)$

Focus $(-6, -5)$

Focal Width 12

Equation of Directrix $x = 0$

6. $(x-2)^2 = 20y$

Function / Not a Function

Opens up

Vertex $(2, 0)$

Focus $(2, 5)$

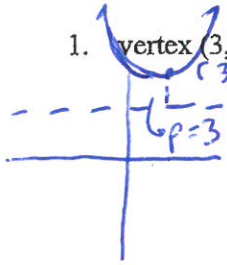
Focal Width 20

Equation of Directrix $y = -5$

6.5 Writing Equations of Parabolas

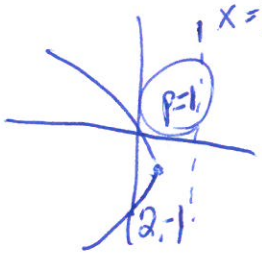
Write the equation for the parabola with…

1. vertex (3,7) and directrix y=4



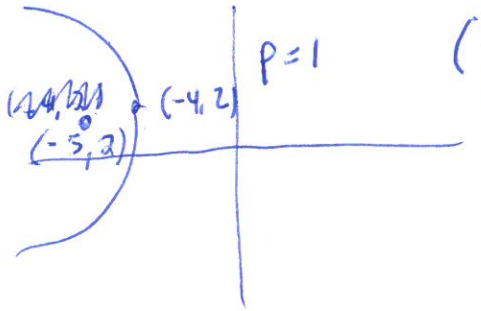
$(x-3)^2 = 12(y-7)$

2. vertex (2, -1) and directrix x=3



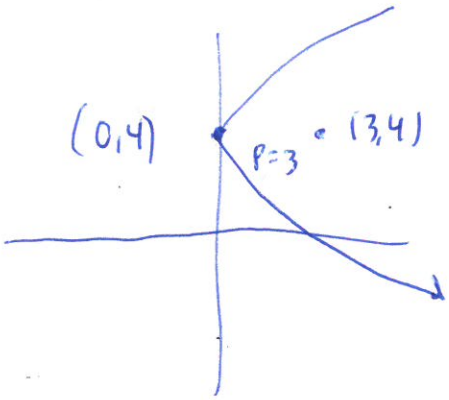
$(y+1)^2 = 4(x-2)$

3. vertex (-4, 2) and focus (-5, 2)



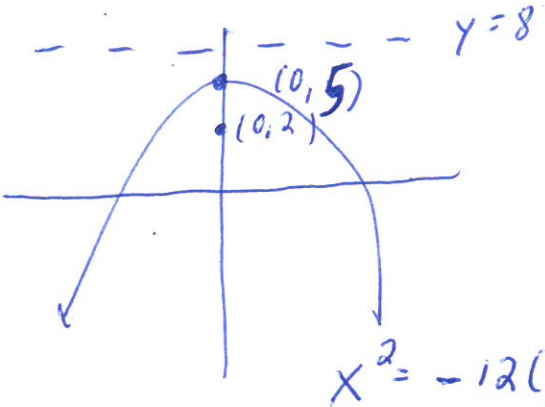
$(y-2)^2 = -4(x+4)$

4. vertex (0,4) and focus (3,4)



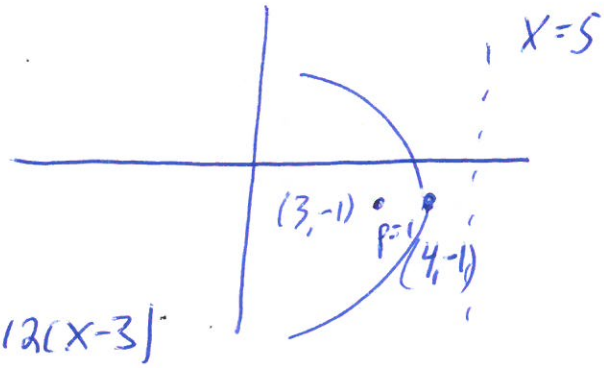
$(y-4)^2 = 12(x-3)$

5. focus (0,2) and directrix y=8



$x^2 = -12(y-5)$

6. focus (3, -1) and directrix x=-5



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