

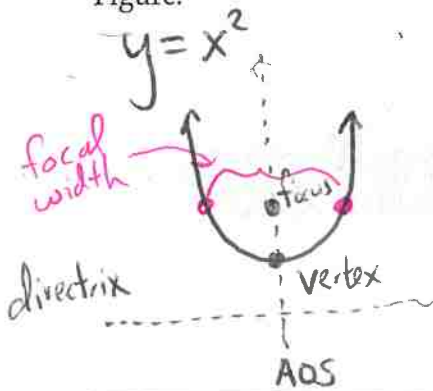
Accel Pre-Calculus

8.01 Parabolas - Day 1

Name: Key  
Date: \_\_\_\_\_

Parabola: a conic section where the distance from 1 fixed point (focus) and a line (directrix) is equal.

Figure:



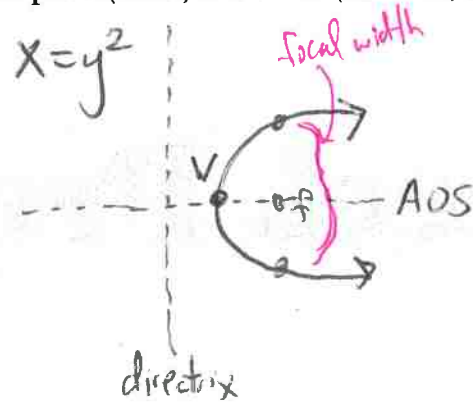
Vertex:

Axis of Symmetry:

Focus:

Directrix:

Focal Width:



| Vertical Axis of Symmetry   | Horizontal Axis of Symmetry   |
|---|---|
| $(x - h)^2 = 4p(y - k)$   | $(y - k)^2 = 4p(x - h)$   |
| Vertex: $(h, k)$<br>Axis of Symmetry: $x = h$<br>Focus: $(h, k + p)$<br>Directrix: $y = k - p$<br>Focal width: $ 4p $ | Vertex: $(h, k)$<br>Axis of Symmetry: $y = k$<br>Focus: $(h + p, k)$<br>Directrix: $x = h - p$<br>Focal width: $ 4p $ |

$(y+3)^2 = -4(x-0)$

Examples: Graph the parabola. State the vertex, AOS, focus, directrix, and focal width.

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

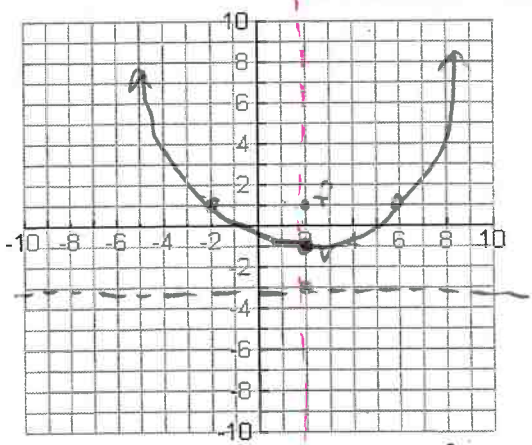
Vertex:  $(2, -1)$   
Axis of Symmetry:  $x = 2$   
Focus:  $(2, 1)$   
Directrix:  $y = -3$   
Focal Width:  $8$

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

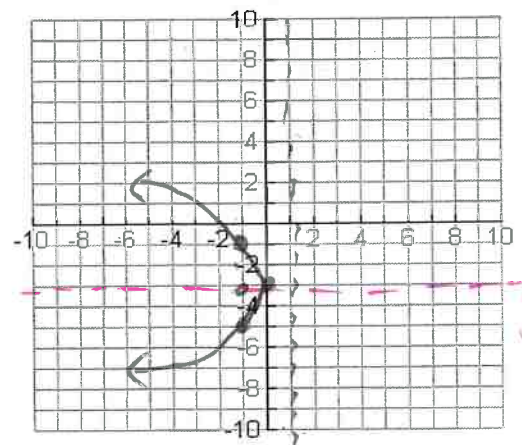
Vertex:  $(0, -3)$   
Axis of Symmetry:  $y = -3$   
Focus:  $(-1, -3)$   
Directrix:  $x = 1$   
Focal Width:  $4$

$4p=8$   
 $p=2$

$4p=-4$   
 $p=-1$



AOS  
 $x=2$



AOS  
 $y=-3$

8.01 Practice: Graph the parabola. State the vertex, AOS, focus, directrix, and focal width.

1.  $(x + 4)^2 = 6(y - 2)$

opens up ↕

Vertex:  $(-4, 2)$

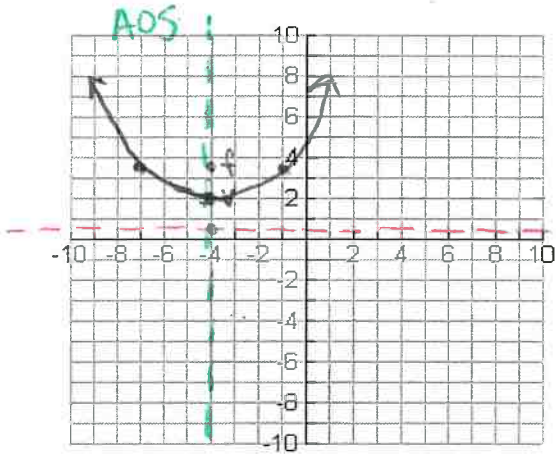
Axis of Symmetry:  $x = -4$

Focus:  $(-4, 3.5)$

Directrix:  $y = 0.5$

Focal Width: 6

$4p = 6$   
 $p = \frac{6}{4} = \frac{3}{2}$   
 $p = 1.5$



2.  $(y - 3)^2 = 12(x - 1)$

opens right ↷

Vertex:  $(1, 3)$

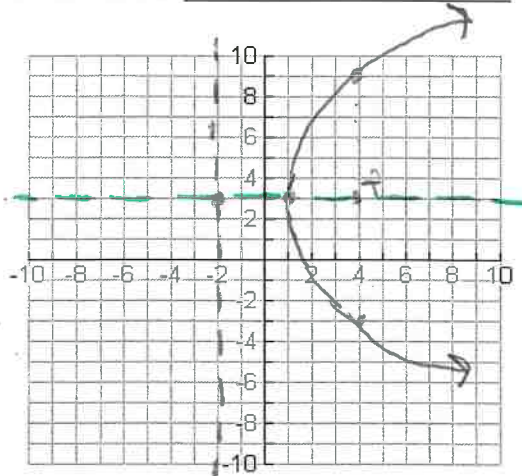
Axis of Symmetry:  $y = 3$

Focus:  $(4, 3)$

Directrix:  $x = -2$

Focal Width: 12

$4p = 12$   
 $p = 3$



AOS  
 $y = 3$

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

up/down ↕

Vertex:  $(5, -5)$

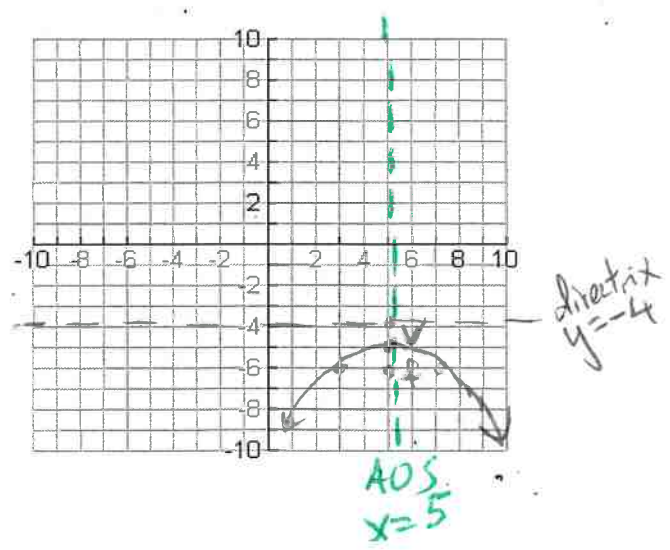
Axis of Symmetry:  $x = 5$

Focus:  $(5, -6)$

Directrix:  $y = -4$

Focal Width: 4

$4p = -4$   
 $p = -1$



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

left/right ↶

Vertex:  $(-2, -2)$

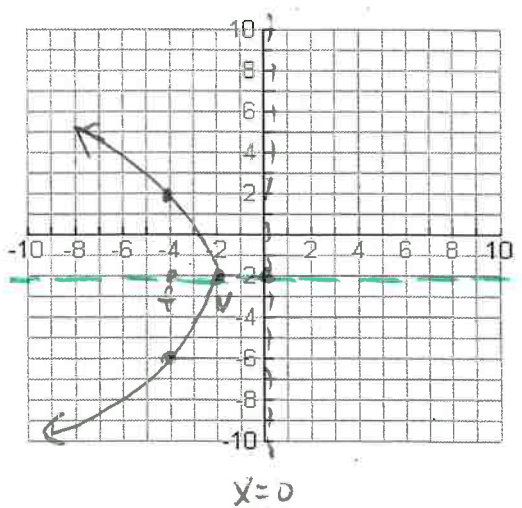
Axis of Symmetry:  $y = -2$

Focus:  $(-4, -2)$

Directrix:  $x = 0$

Focal Width: 8

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



AOS  
 $y = -2$

$x = 0$