CCGPS Analytic Geometry – Parabola Notes Day 2 March 10 (Tues)

Graph each parabola. Label the vertex, focus, and directrix.

For $y = x^2$, opens up is (+) and opens down is (–)

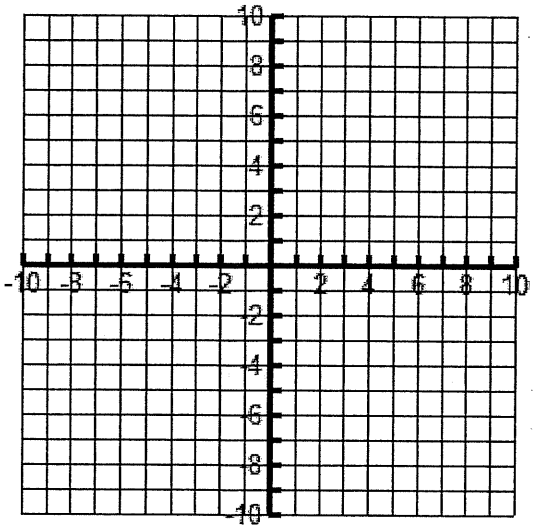
For $x = y^2$, opens right is (+) and opens left is (–)

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

Vertex: _____ **p =** _____

Focus: _____

Directrix: _____

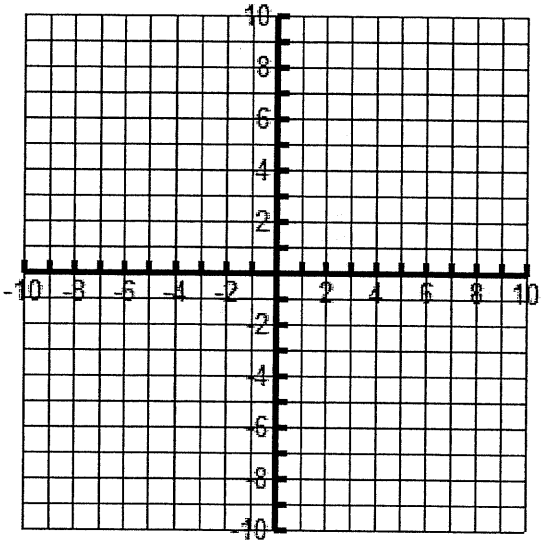


2. $(y + 2)^2 = x + 6$

Vertex: _____ **p =** _____

Focus: _____

Directrix: _____

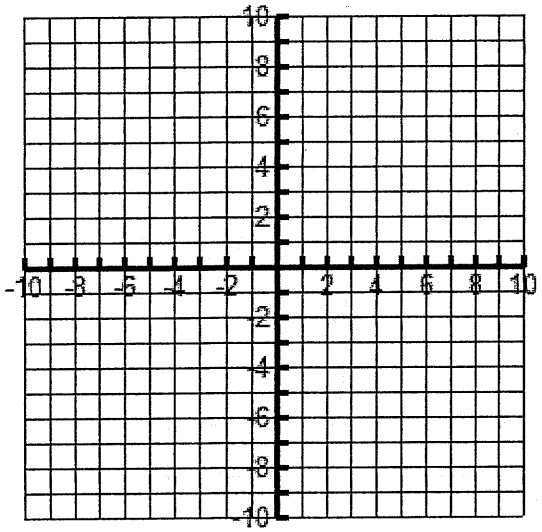


3. Completing the Square:

a) $x^2 + 10x + 25 = -8y + 24$

b) $y^2 - 2x + 14y = -41$

3. Graph the parabola $y^2 - 8y + 8x + 8 = 0$. Label the vertex, focus, and directrix. Notice that it is NOT IN STANDARD FORM!!!



Vertex: _____ p = _____

Focus: _____

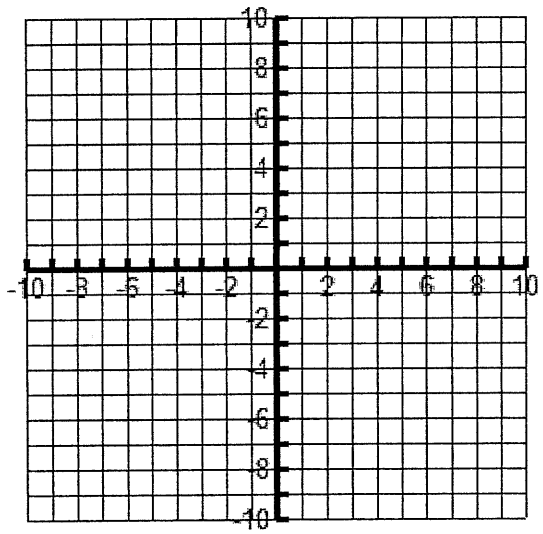
Directrix: _____

For $y = x^2$, opens up is (+) and opens down is (–) For $x = y^2$, opens right is (+) and opens left is (–

Graph each parabola. Label the vertex, focus and directrix.

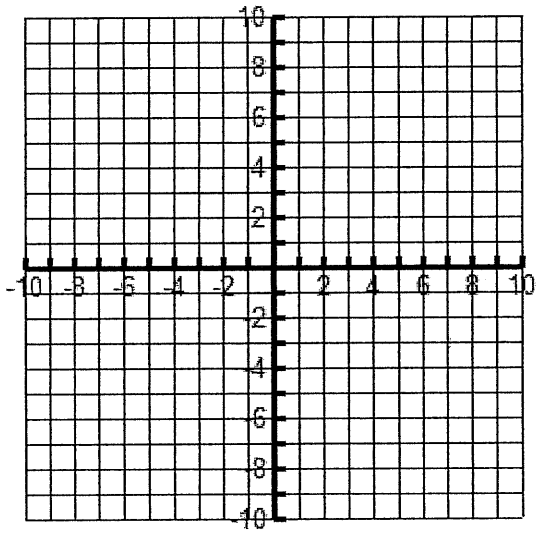
4. $x^2 + 4x - 16y = -20$

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



Vertex: _____ p = _____

Focus: _____ Directrix _____



Vertex: _____ p = _____

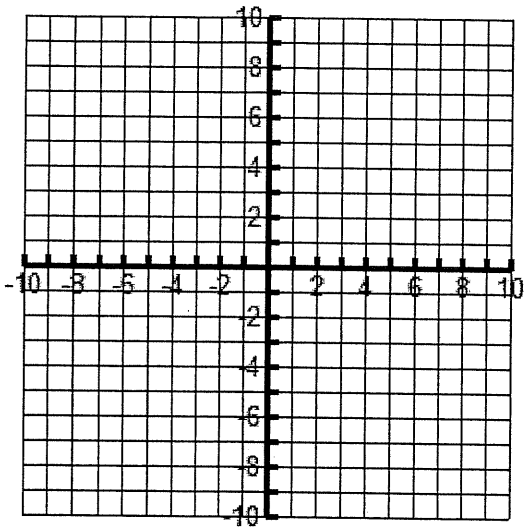
Focus: _____ Directrix _____

Name _____ Date _____ Period _____

CCGPS Analytic Geometry – Parabola Homework Day 2

Write the standard form of the equation of each parabola and list the coordinates of the vertex and the focus and then write the equation for the axis of symmetry and directrix. Then graph the equation.

1. $y^2 + 12x = 4y - 12$



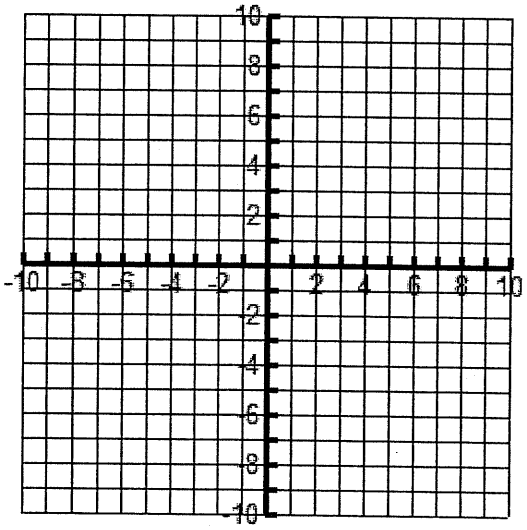
Standard Equation: _____

p = _____ Focus: _____

Vertex: _____ Directrix: _____

AOS: _____ Focal Width: _____

2. $x^2 + 10x + 25 = -8y + 24$



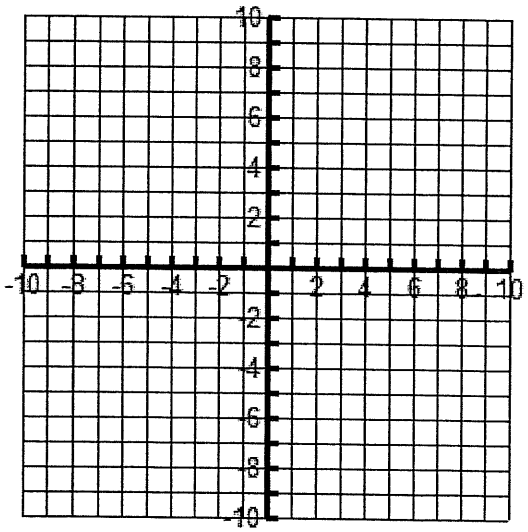
Standard Equation: _____

p = _____ Focus: _____

Vertex: _____ Directrix: _____

AOS: _____ Focal Width: _____

3. $3x^2 - 30y - 18x + 87 = 0$



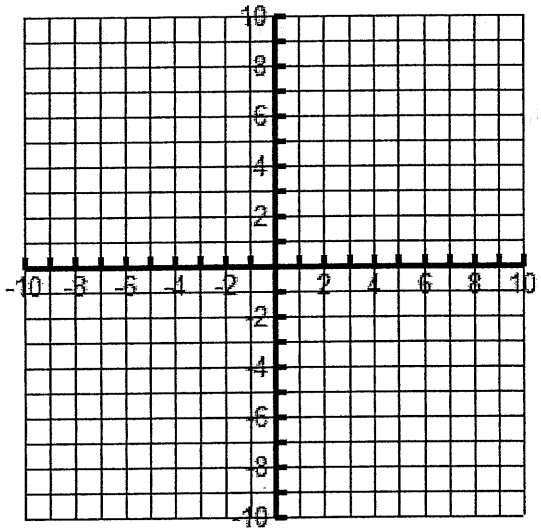
Standard Equation: _____

p = _____ Focus: _____

Vertex: _____ Directrix: _____

AOS: _____ Focal Width: _____

4. $12x - 15 = 3y^2 + 6y$



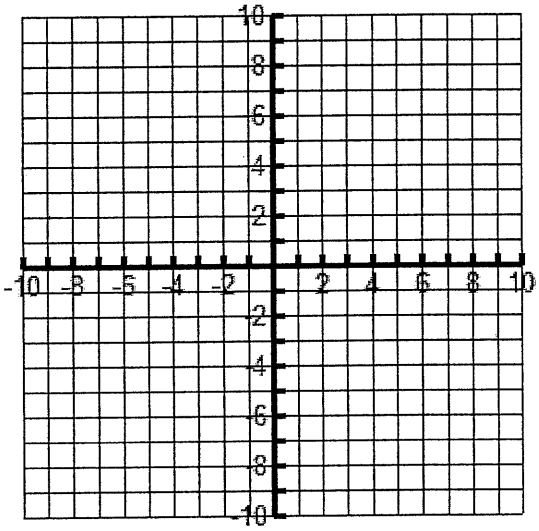
Standard Equation: _____

p = _____ Focus: _____

Vertex: _____ Directrix: _____

AOS: _____ Focal Width: _____

5. $x^2 + 8x + 14y = -44$



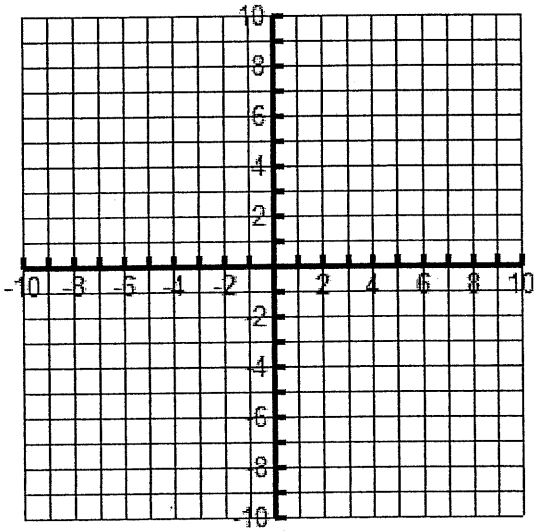
Standard Equation: _____

p = _____ Focus: _____

Vertex: _____ Directrix: _____

AOS: _____ Focal Width: _____

6. $2y^2 - 4y + 12x + 50 = 0$



Standard Equation: _____

p = _____ Focus: _____

Vertex: _____ Directrix: _____

AOS: _____ Focal Width: _____

CCGPS Analytic Geometry – Parabola Notes Day 2 **March 10 (Tues)** Key

Graph each parabola. Label the vertex, focus, and directrix.

For $y = x^2$, opens up is (+) and opens down is (–)

1. $(x + 2)^2 = 8(y + 3)$ (h, k) $4p = 8$

Vertex: $(-2, -3)$ **p =** 2

Focus: $(-2, -1)$

Directrix: $y = -5$

opens up

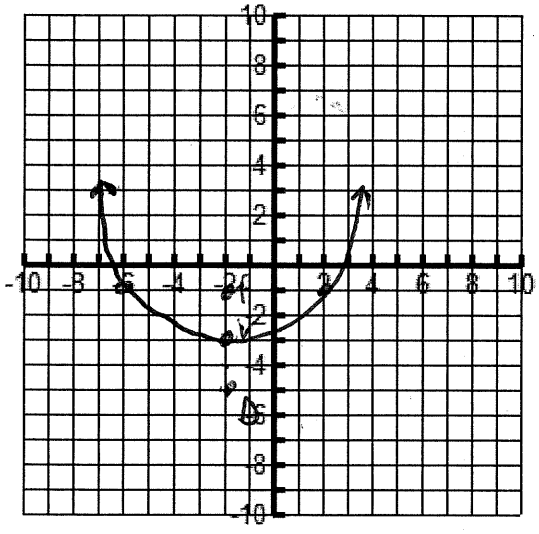
For $x = y^2$, opens right is (+) and opens left is (–)

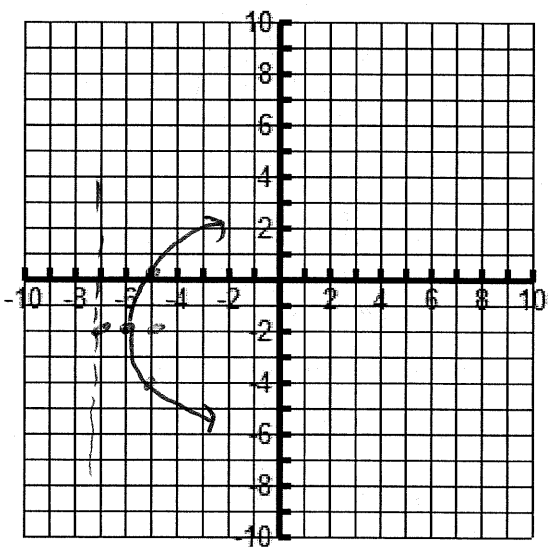
2. $(y + 2)^2 = x + 6$ $4(x+6)$ opens right

Vertex: $(-6, -2)$ **p =** 1

Focus: $(-5, -2)$

Directrix: $x = -7$





3. Completing the Square:

a) $x^2 + 10x + 25 = -8y + 24$

$\left(\frac{b}{2}\right)^2 = \left(\frac{10}{2}\right)^2 = (5)^2 = 25$

$x^2 + 10x + \underline{25} = -8y + 24 - \underline{25} + \underline{25}$

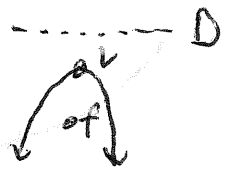
$(x+5)^2 = -8y + 24$

$\boxed{(x+5)^2 = -8(y-3)}$

vertex: $(-5, 3)$

$p = -2$

opens down



b) $y^2 - 2x + 14y = -41$

$\left(\frac{b}{2}\right)^2 = \left(\frac{14}{2}\right)^2 = (7)^2 = 49$

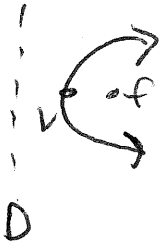
$y^2 + 14y + \underline{49} = 2x - 41 + \underline{49}$

$(y+7)^2 = 2x + 8$

$(y+7)^2 = 2(x+4)$

opens right

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



3. Graph the parabola $y^2 - 8y + 8x + 8 = 0$. Label the vertex, focus, and directrix.
Notice that it is NOT IN STANDARD FORM!!!

$y^2 - 8y + \underline{16} = -8x - 8 + \underline{16}$

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

$(y-4)^2 = -8(x-1)$

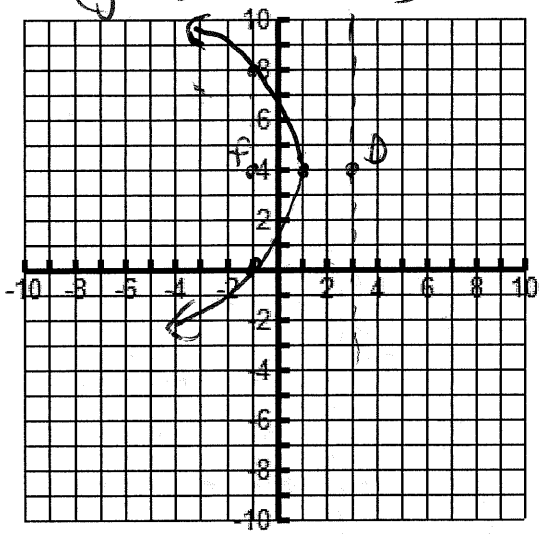
$\left(\frac{8}{2}\right)^2 = (-4)^2 = 16$

opens left

f, v, D

10

$4p = -8$



Vertex: (1,4) **p =** −2

Focus: (−1, 4)

Directrix: $x = 3$

For $y = x^2$, opens up is (+) and opens down is (–) **For $x = y^2$, opens right is (+) and opens left is (–**

Graph each parabola. Label the vertex, focus and directrix.

4. $x^2 + 4x - 16y = -20$

$x^2 + 4x + \underline{4} = 16y - 20 + \underline{4}$

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

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

opens up

$4p = 16$

$p = 4$

f, v, D

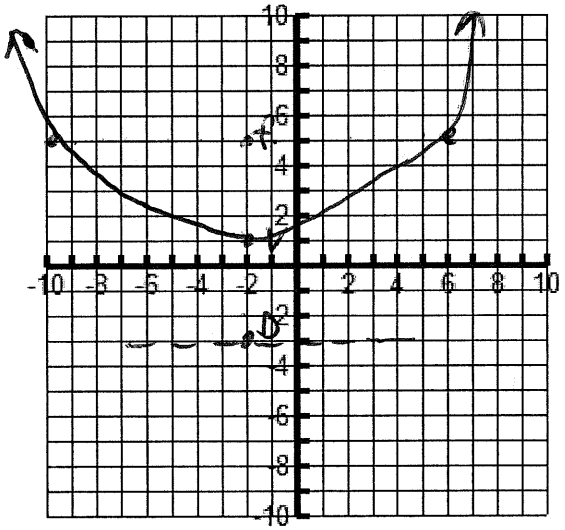
5. $4x + y^2 - 6y = -9$

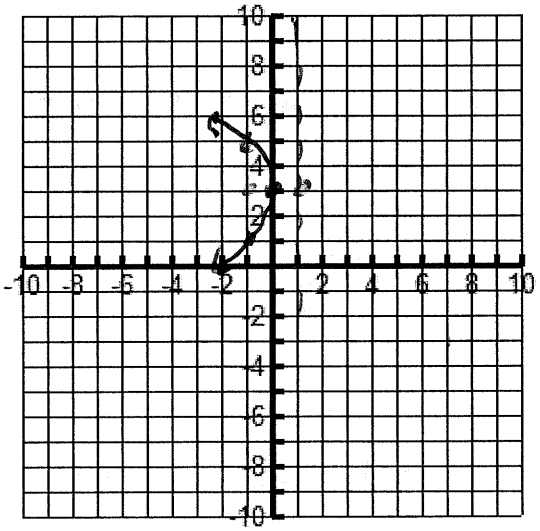
$y^2 - 6y + \underline{9} = -4x - 9 + \underline{9}$

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

opens left

f, v, D





Vertex: (−2, 1) **p =** 4

Focus: (−2, 5) **Directrix** $y = -3$

Vertex: (0, 3) **p =** −1

Focus: (−1, 3) **Directrix** $x = 1$

Name _____ Date _____ Period _____

CCGPS Analytic Geometry – Parabola Homework Day 2

Write the standard form of the equation of each parabola and list the coordinates of the vertex and the focus and then write the equation for the axis of symmetry and directrix. Then graph the equation.

1. $y^2 + 12x = 4y - 16$

$y^2 - 4y + 4 = -12x - 16 + 4$

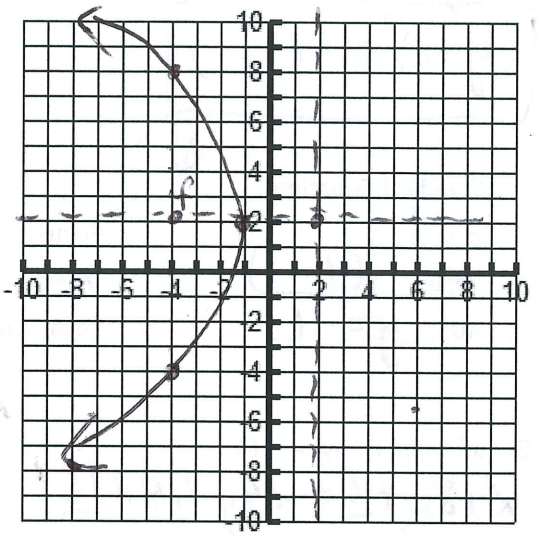
$(y-2)^2 = -12x - 12$

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

opens left

$4p = -12$

$p = -3$



Standard Equation: $(y-2)^2 = -12(x+1)$

p = -3 Focus: $(-4, 2)$

Vertex: $(-1, 2)$ Directrix: $x = 2$

AOS: $y = 2$ Focus Width: 12

2. $x^2 + 10x + 25 = -8y + 24$

$x^2 + 10x + 25 = -8y + 24 - 25 + 25$

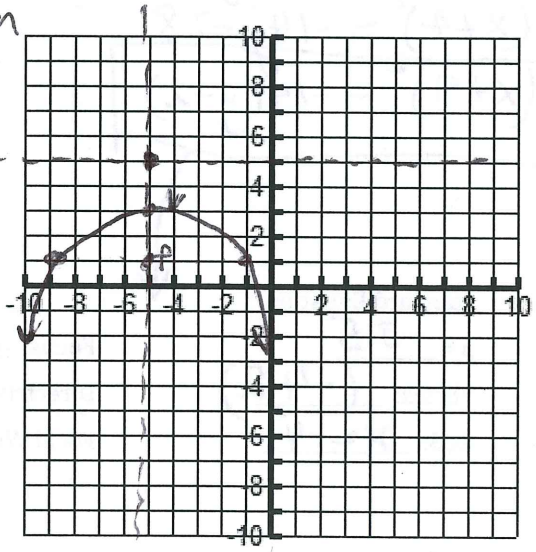
$(x+5)^2 = -8y + 24$

$(x+5)^2 = -8(y-3)$

$4p = -8$

$p = -2$

opens down



Standard Equation: $(x+5)^2 = -8(y-3)$

p = -2 Focus: $(-5, 1)$

Vertex: $(-5, 3)$ Directrix: $y = 5$

AOS: $x = -5$ Focus Width: 8

3. $3x^2 - 30y - 18x + 87 = 0$

$3x^2 - 18x + \quad = 30y - 87 +$

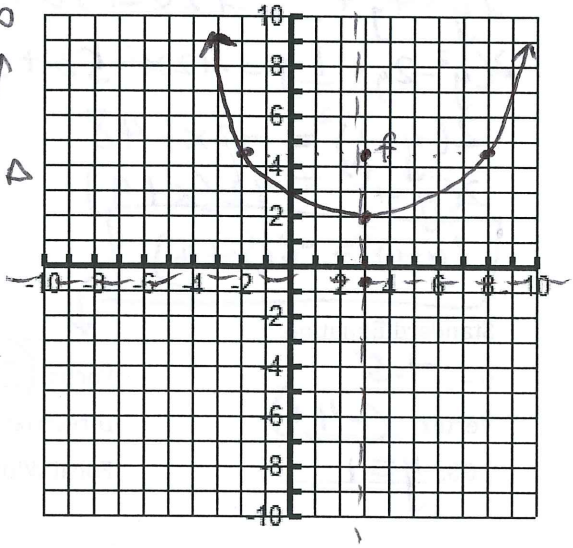
$3(x^2 - 6 + 9) = 30y - 87 + 27$

$3(x-3)^2 = 30y - 60$

$(x-3)^2 = 10y - 20$

$\boxed{(x-3)^2 = 10(y-2)}$

opens up



Standard Equation: _____

p = $+2.5$ Focus: $(3, 4.5)$

Vertex: $(3, 2)$ Directrix: $y = -0.5$

AOS: $x = 3$ Focus Width: 10

$3y^2+6y = 12x-15$

4. $12x - 15 = 3y^2 + 6y$

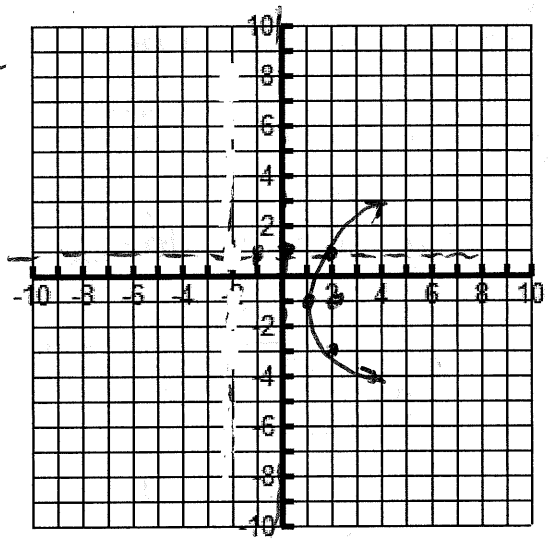
$3(y^2+2y+\underline{1}) = 12x-15+\underline{3}$

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

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

opens right

f v



Standard Equation: _____

p = 1 Focus: (2,-1)

Vertex: (1,-1) Directrix: x=0

AOS: y=-1 Focal Width: 4

5. $x^2 + 8x + 14y = -44$

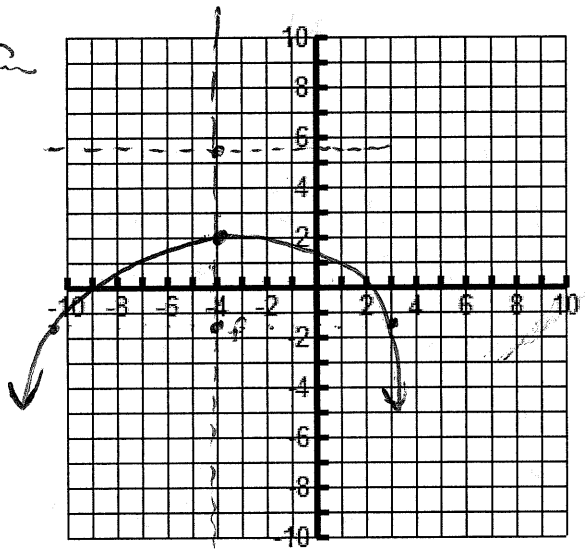
$x^2+8x+\underline{16} = -14y-44+\underline{16}$

$(x+4)^2 = -14y-28$

$\boxed{(x+4)^2 = -14(y-2)}$

opens down

v f



Standard Equation: _____

p = -3.5 Focus: (-4,-1.5)

Vertex: (-4,2) Directrix: y=5.5

AOS: x=-4 Focal Width: 14

6. $2y^2 - 4y + 12x + 50 = 0$

$2y^2-4y+\_ = -12x-50+\_$

$2(y^2-2y+\underline{1}) = -12x-50+\underline{2}$

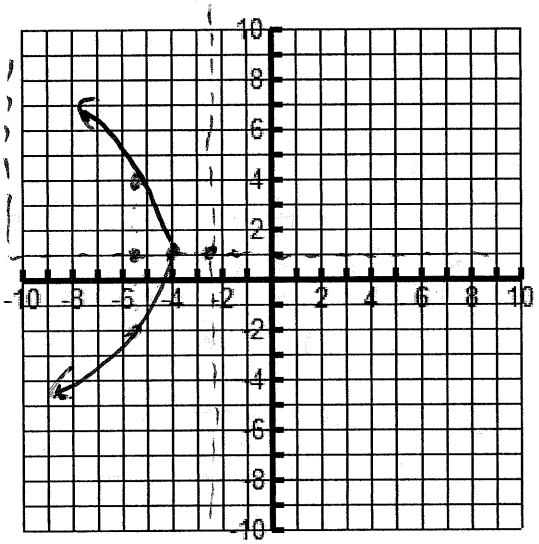
$2(y-1)^2 = -12x-48$

$2(y-1)^2 = -12(x+4)$

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

opens left

f v



Standard Equation: _____

p = -1.5 Focus: (-5.5,0)

Vertex: (-4,1) Directrix: x=-2.5

AOS: y=1 Focal Width: 6