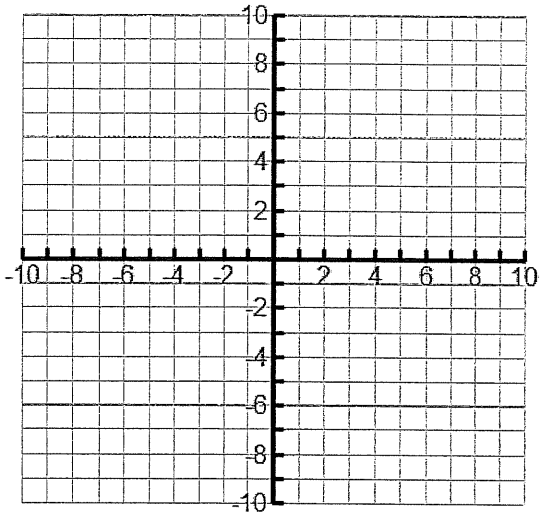
CCGPS Analytic Geometry Unit 6 Review: Circles, Parabolas, Systems of Equations

Equations: $(x-h)^2+(y-k)^2=r^2$ $(x-h)^2=4p(y-k)$ $(y-k)^2=4p(x-h)$

Graph the equation and identify the important characteristics

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



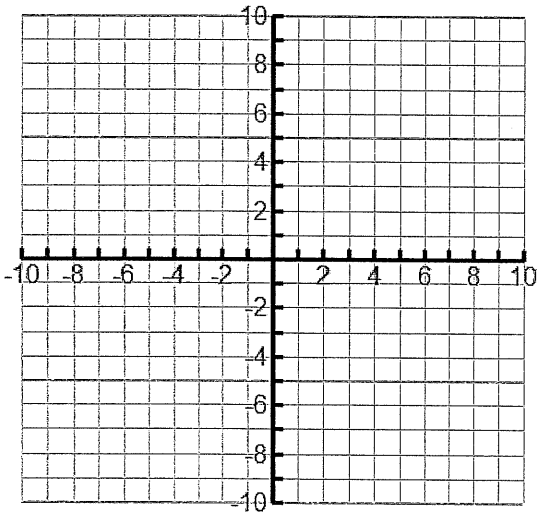
Opens:_____

Vertex:_____ p = _____

Focus:_____ Directrix:_____

Focal Width:_____ Axis of Symmetry: _____

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



Opens:_____

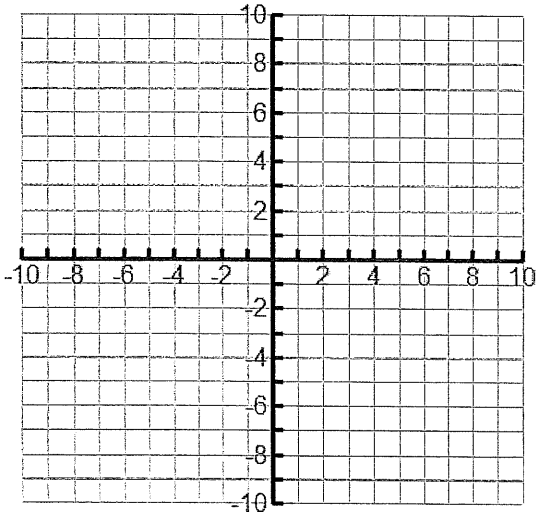
Vertex:_____ p = _____

Focus:_____ Directrix:_____

Focal Width:_____ Axis of Symmetry: _____

Write the equation for each circle in <u>standard</u> <u>form</u>. Then identify the center and radius.

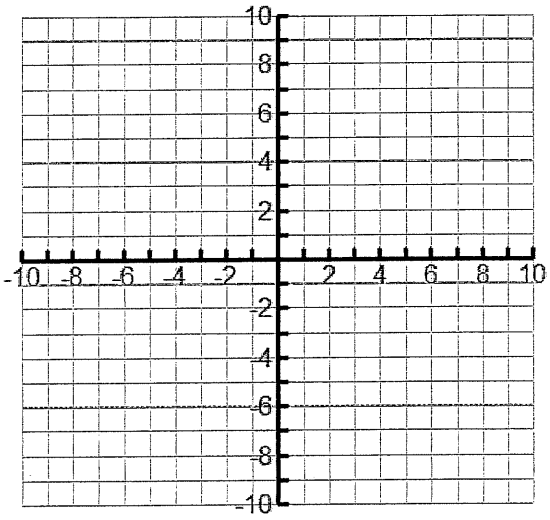
3. The endpoints of a diameter are at (3, 4) and at (−7, −12).



Equation:_____

Center:_____ Radius:_____

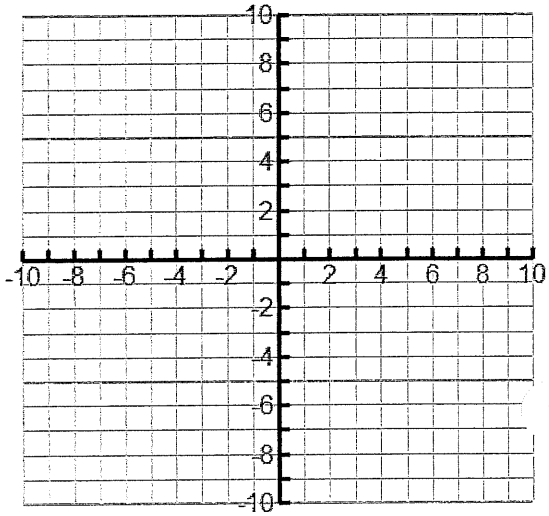
4. $x^2 + y^2 + 10x - 6y + 30 = 0$



Standard Form Equation :_____

Center:_____ Radius:_____

5. $x^2 + y^2 - 10x - 2y + 1 = 24$



Standard Form Equation :_____

Center:_____ Radius:_____

6. The circle passes through the point (1, 4) and has its center at (2, 9).

Write the equation of the circle in standard form:_____

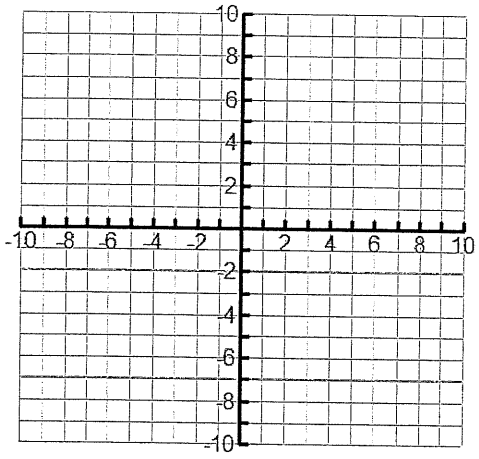
7. Given the circle with a center at (4, -1) and a radius of $2\sqrt{13}$.

Write the equation of the circle in standard form:_____

8. Solve the system algebraically, and then prove your solution graphically.

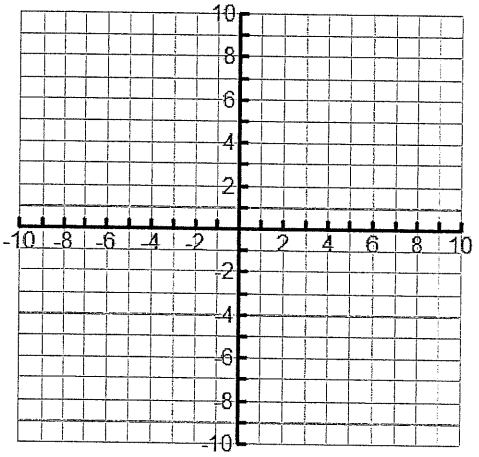
$y^2 - 4y - 8x - 2 = 10$

$2x + y + 2 = 0$



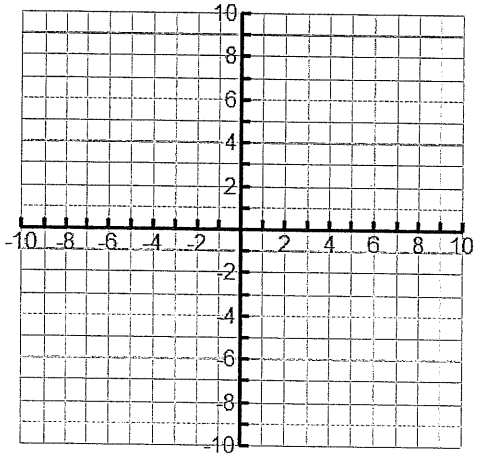
Parabola Equation: _____ Vertex: _____ Focus: _____ Focal Width: _____

9. Find the standard form of the equation for the parabola with a focus located at (-4, –3) and directrix at $y = 5$.



Standard form equation _____

10. Find the standard form of the equation for the parabola with Axis of Symmetry at $y = -4$ and Directrix at $x = 3$, and $p = 2$

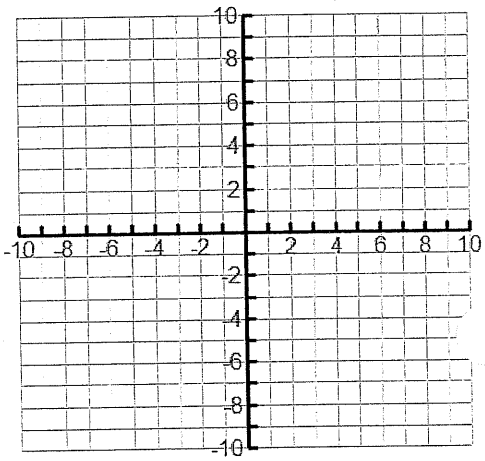


Standard form equation _____

11. Solve the system $\begin{cases} x^2 + y^2 = 16 \\ x + y + 4 = 0 \end{cases}$ using algebra. SHOW ALL WORK.

12. Solve the system $\begin{cases} y^2 - 6y - 27 = -12x \\ 2x + y = 9 \end{cases}$ using algebra. SHOW ALL WORK.

13. Find the standard form of the equation for the parabola that passes through the point (-5, -6) and has vertex at (-1, -4) and opens left or right.



Standard form equation _____

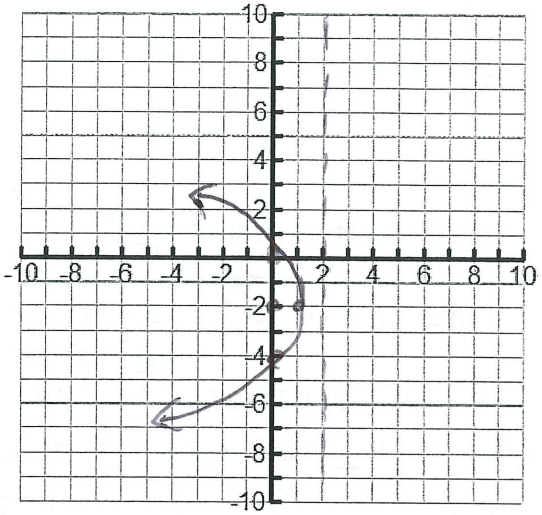
CCGPS Analytic Geometry Unit 6 Review: Circles, Parabolas, Systems of Equations

Key

Equations: $(x-h)^2+(y-k)^2=r^2$ $(x-h)^2=4p(y-k)$ $(y-k)^2=4p(x-h)$

Graph the equation and identify the important characteristics

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



Opens: left

Vertex: (1, -2) p = -1

Focus: (0, -2) Directrix: x = 2

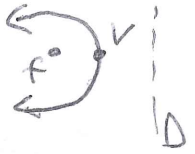
Focal Width: 4 Axis of Symmetry: y = -2

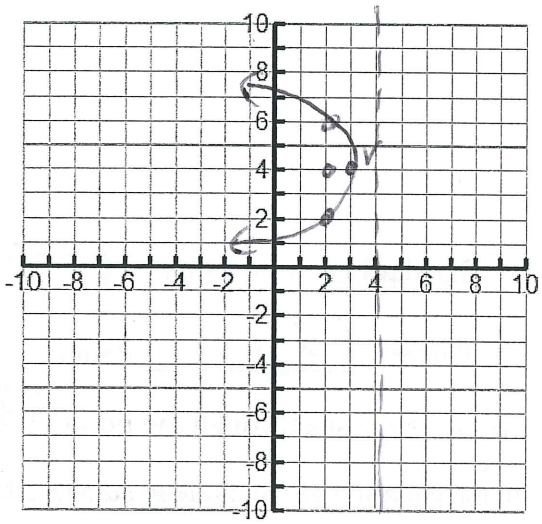
2. $4x+y^2-8y=-4$ $\left(\frac{b}{2}\right)^2=\left(\frac{-8}{2}\right)^2=(-4)^2=16$

$y^2-8y+16=-4x-4+16$

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

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





Opens: left

Vertex: (3, 4) p = -1

Focus: (2, 4) Directrix: x = 4

Focal Width: 4 Axis of Symmetry: y = 4

Write the equation for each circle in standard form. Then identify the center and radius.

3. The endpoints of a diameter are at (3, 4) and at (−7, −12).

*use midpt: $\left(\frac{3-7}{2}, \frac{4-12}{2}\right)=(-2,-4)$

h k

center (-2, -4)

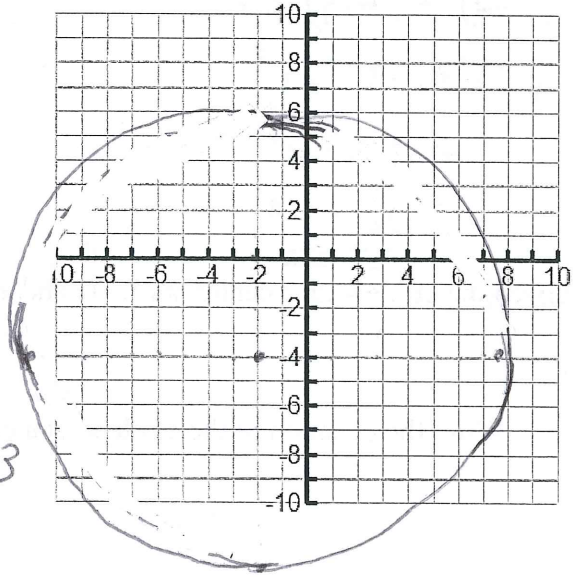
x y

point: (3, 4)

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

$(3+2)^2+(4+4)^2=r^2$

$89=r^2$



Equation: $(x+2)^2+(y+4)^2=89$

Center: (-2, -4) Radius: $\sqrt{89}\approx 9.43$

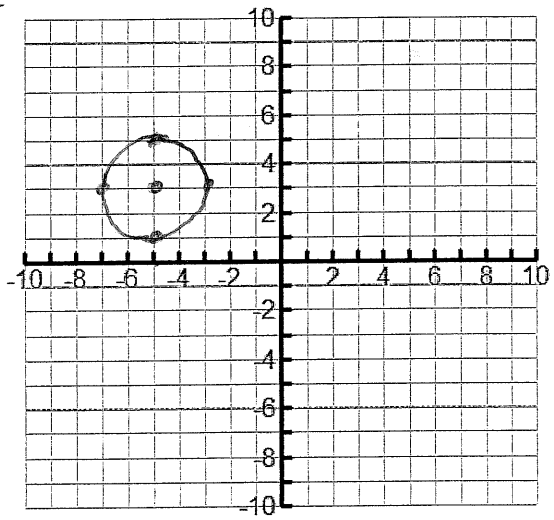
$\left(\frac{b}{2}\right)^2=\left(\frac{10}{2}\right)^2=(5)^2=25$

4. $x^2+y^2+10x-6y+30=0$

$x^2+10x+\underline{25}+y^2-6y+\underline{9}=-30+\underline{25}+\underline{9}$

$\left(\frac{-6}{2}\right)^2=(-3)^2=9$

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



Standard Form Equation : $(x+5)^2+(y-3)^2=4$

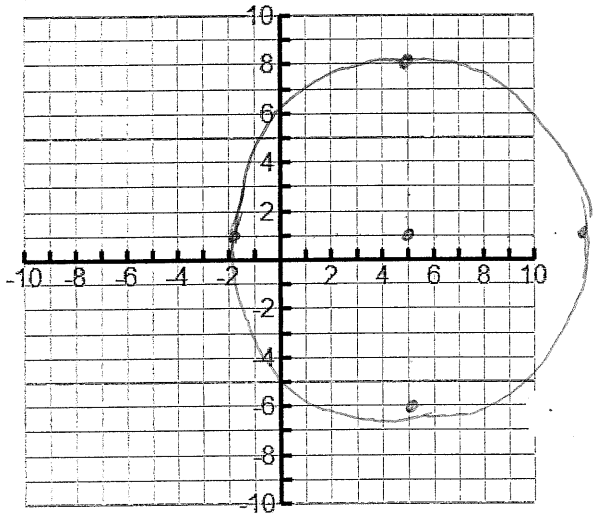
Center: $(-5,3)$ Radius: 2

$\left(\frac{-2}{2}\right)^2=(-1)^2=1$

5. $x^2+y^2-10x-2y+1=24$ $\left(\frac{b}{2}\right)^2=\left(\frac{-10}{2}\right)^2=(-5)^2=25$

$x^2-10x+\underline{25}+y^2-2y+\underline{1}=23+\underline{25}+\underline{1}$

$(x-5)^2+(y-1)^2=49$



Standard Form Equation : $(x-5)^2+(y-1)^2=49$

Center: $(5,1)$ Radius: 7

x y h k

6. The circle passes through the point (1, 4) and has its center at (2, 9).

Write the equation of the circle in standard form: $(x-2)^2+(y-9)^2=26$

$(x-h)^2+(y-k)^2=r^2$ *plug in points to find r^2

$(1-2)^2+(4-9)^2=r^2$

$(-1)^2+(-5)^2=r^2$

$1+25=r^2$

$26=r^2$

h k

7. Given the circle with a center at (4, -1) and a radius of $2\sqrt{13}$. $r^2=(2\sqrt{13})^2=52$

Write the equation of the circle in standard form: $(x-4)^2+(y+1)^2=52$

8. Solve the system algebraically, and then prove your solution graphically.

$y^2 - 4y - 8x - 2 = 10$

$2x + y + 2 = 0$

$y = -2x - 2$

$(-2x-2)^2 - 4(-2x-2) - 8x - 12 = 0$

$(-2x-2)(-2x-2) + 8x + 8 - 8x - 12 = 0$

$4x^2 + 8x + 4 + 8x - 4 - 8x = 0$

$4x^2 + 8x = 0$

$4x(x+2) = 0$

$x = 0, \; x = -2$

$(0, -2)$ $y = -2$

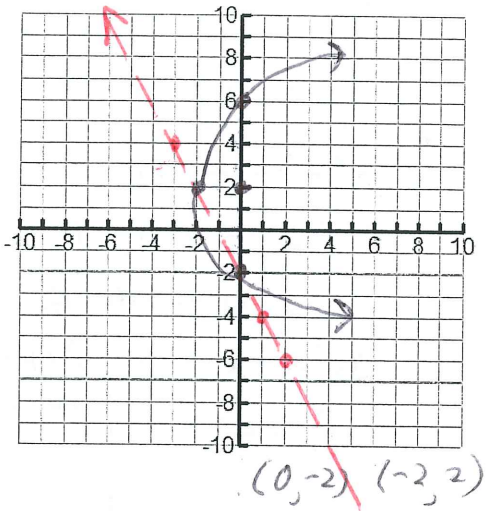
$(-2, 2)$ $y = 2$

$y^2 - 4y + 4 = 8x + 12 + 4$

$(y-2)^2 = 8x + 16$

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

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



Parabola Equation: $(y-2)^2 = 8(x+2)$ Vertex: $(-2, 2)$ Focus: $(0, 2)$ $p =$ Focal Width: 8

9. Find the standard form of the equation for the parabola with a focus located at (-4, –3) and directrix at $y = 5$.

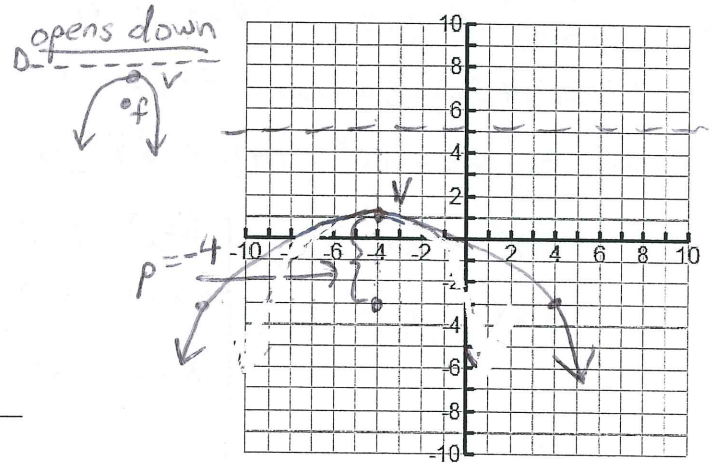
$(x-h)^2 = 4p(y-k)$

opens down

h k

vertex: $(-4, 1)$ $p = -4$

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



Standard form equation $(x+4)^2 = -16(y-1)$

10. Find the standard form of the equation for the parabola with Axis of Symmetry at y = -4 and Directrix at x = 3, and p = 2

opens right

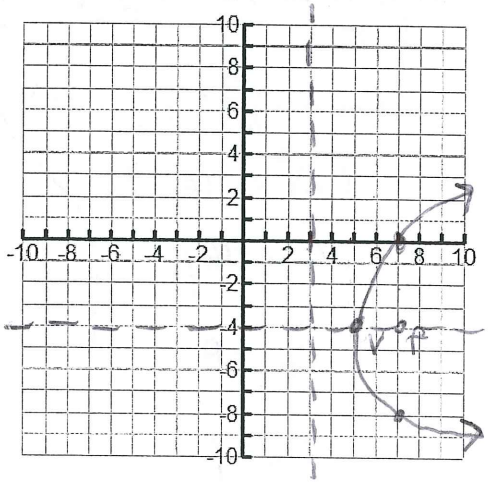
$(y-k)^2 = 4p(x-h)$

h k

vertex: $(5, -4)$

$p = 2$

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



Standard form equation $(y+4)^2 = 8(x-5)$

11. Solve the system $\begin{cases} x^2 + y^2 = 16 \\ x + y + 4 = 0 \end{cases}$ using algebra. SHOW ALL WORK.

$y = -x - 4$

$x^2 + (-x-4)^2 = 16$

$x^2 + (-x-4)(-x-4) = 16$

$x^2 + x^2 + 4x + 4x + 16 = 16$

$2x^2 + 8x = 0$

$2x(x+4) = 0$

$(2x)(x+4) = 0$

$2x = 0 \quad | \quad x+4 = 0$

$x = 0 \quad | \quad x = -4$

$(0, \_) \quad | \quad (-4, \_)$

$x + y + 4 = 0 \quad | \quad x + y + 4 = 0$

$0 + y + 4 = 0 \quad | \quad -4 + y + 4 = 0$

$y = -4 \quad | \quad y = 0$

$\boxed{(0, -4)} \quad | \quad \boxed{(-4, 0)}$

12. Solve the system $\begin{cases} y^2 - 6y - 27 = -12x \\ 2x + y = 9 \end{cases}$ using algebra. SHOW ALL WORK.

$y = 9 - 2x$

$(9-2x)^2 - 6(9-2x) - 27 + 12x = 0$

$(9-2x)(9-2x) - 54 + 12x - 27 + 12x = 0$

$81 - 18x - 18x + 4x^2 - 54 + 12x - 27 + 12x = 0$

$4x^2 - 12x = 0$

$4x(x-3) = 0$

$(4x)(x-3) = 0$

$4x = 0 \quad | \quad x - 3 = 0$

$x = 0 \quad | \quad x = 3$

$(0, \_)$ and $(3, \_)$

$2x + y = 9 \quad | \quad 2x + y = 9$

$2(0) + y = 9 \quad | \quad 2(3) + y = 9$

$y = 9 \quad | \quad 6 + y = 9$

$\boxed{(0, 9)} \quad | \quad y = 3$

$\boxed{(3, 3)}$

13. Find the standard form of the equation for the parabola that passes through the point (-5, -6) and has vertex at (-1, -4) and opens left or right.

h k x y

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

$(-6+4)^2 = 4p(-5+1)$

$(-2)^2 = 4p(-4)$

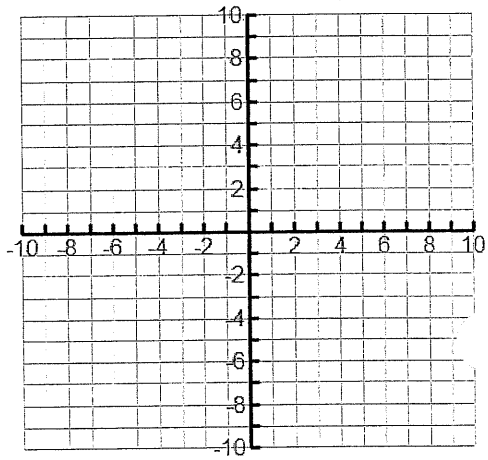
$4 = -16p$

$\frac{4}{-16} = p$

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

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

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



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