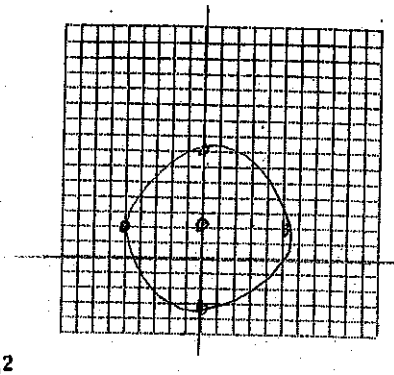
Name _____ Period ____

Graphing Conic Sections

Graph each conic section, name it, then label its vertices and center/and all other characteristics we've studied.

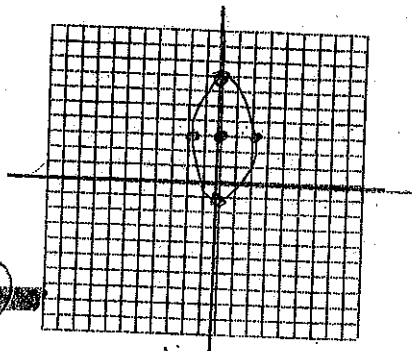
1. $x^2 + (y-2)^2 = 25$

circle
$C(0,2)$
$r = 5$



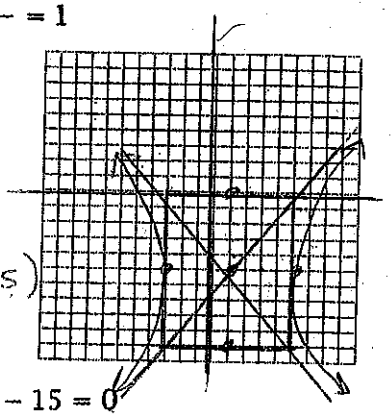
2. $\frac{x^2}{4} + \frac{(y-3)^2}{16} = 1$

ellipse
$C(0,3)$
$a=4$ major: $x=0$
$b=2$
$V(0,7)(0,-1)$
$cV(-2,3)(2,3)$
$F(0,3+\sqrt{12})(0,3-\sqrt{12})$



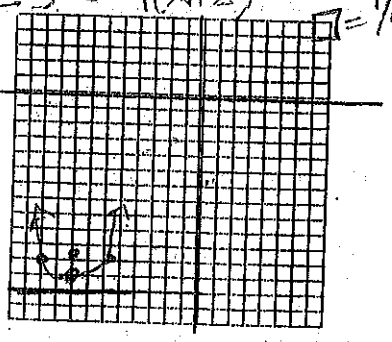
3. $\frac{(x-1)^2}{16} - \frac{(y+5)^2}{25} = 1$

hyperbola
$a=4$ $b=5$ $c=\sqrt{41}$
$V(5,-5)(-3,-5)$
$cV(1,0)(1,-10)$
$F(1+\sqrt{41},-5)(1-\sqrt{41},-5)$
A: $y = \frac{5}{4}x - \frac{25}{4}$
$y = -\frac{5}{4}x - \frac{15}{4}$



4. $y = (x+2)^2 - 3$ $\quad y+3 = (x+2)^2$ $\quad = 1/4$

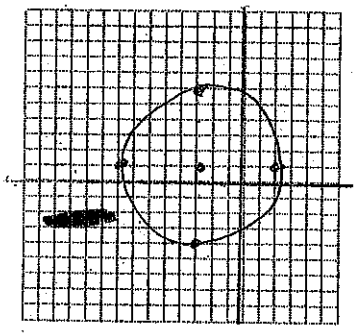
$V(-2,-3)$ parab.
$p = 1/4$
$F(-2, -2\frac{3}{4})$ $\quad -13/4$
EPLR: $(-\frac{5}{2}, -\frac{11}{4})$ $(-\frac{3}{2}, -\frac{11}{4})$
Axis of Symm: $x = -2$



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

5. $x^2 + y^2 + 6x - 2y - 15 = 0$

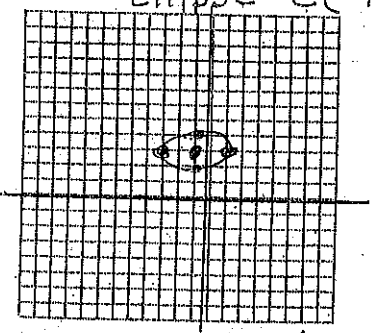
$(x+3)^2 + (y-1)^2 = 25$
Circle $C: (-3,1)$
$r = 5$



6. $x^2 + 4y^2 + 2x - 24y + 33 = 0$

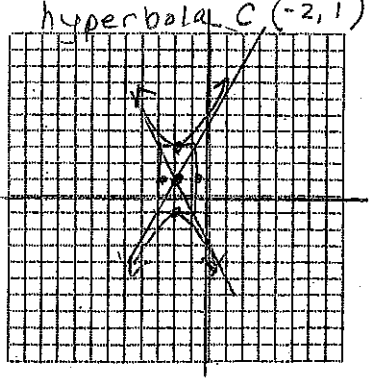
$\frac{(x+1)^2}{4} + \frac{(y-3)^2}{1} = 1$
maj. ax: $y = 3$
min ax: $x = -1$
$a = 2$ $c = \sqrt{3}$
$b = 1$
$F(-1-\sqrt{3},3)(-1+\sqrt{3},3)$

Ellipse $C(-1,3)$



7. $y^2 - 4x^2 - 2y - 16x - 19 = 0$

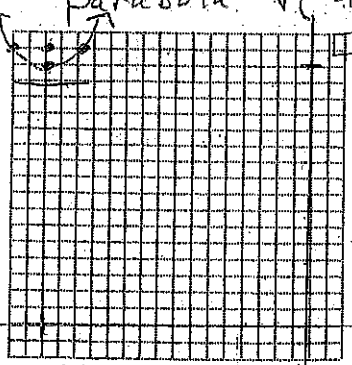
$\frac{(y-1)^2}{4} - \frac{(x+2)^2}{1} = 1$
hyperbola $C(-2,1)$
$a = 2$
$b = 1$
$c = \sqrt{5}$
V: $(-2,3)$ $(-2,-1)$
cV: $(-3,1)(-1,1)$
$F(-2,1+\sqrt{5})(-2,1-\sqrt{5})$
A:



8. $y = x^2 + 8x + 20$

$y - 4 = (x+4)^2$
$p = 1/4$
$F(-4, \frac{17}{4})$
dir: $y = 15/4$
axis of symm: $x = -4$
EPLR: $(-7/2, \frac{17}{4})(-\frac{9}{2}, \frac{17}{4})$

Parabola $V(-4,4)$ $\quad = 1/4$



Deempl

$\frac{1}{2}$ each for accuracy = 5 +15 compl
rd in favor

Name Key Period

Identifying Different Types of Conic Sections

Complete the square, then identify the type of conic section and its center.

Example: $y = 16x^2 - 9y^2 - 32x - 72y - 272 = 0$

1. Isolate the x and y terms. $16x^2 - 32x - 9y^2 - 72y = 272$
2. Divide by the coefficients of the squared terms. $16(x^2 - 2x) - 9(y^2 - 8y) = 272 + 16(\quad) + -9(\quad)$
3. Divide the coefficient of the x and y term by two, then square them, and add them to both sides of the equation. $16(x^2 - 2x + 1) - 9(y^2 - 8y + 16) = 272 + 16(1) + -9(16$
4. Factor the right side of the equation. $16(x-1)^2 - 9(y-4)^2 = 272 + 16(1) + -9(16)$
5. Simplify. $16(x-1)^2 - 9(y-4)^2 = 272 + 16 + -144$
   $16(x-1)^2 - 9(y-4)^2 = 144$
6. Divide by the product of the leading coefficients. $\frac{16(x-1)^2}{144} - \frac{9(y-4)^2}{144} = \frac{144}{144}$

This is the equation of a hyperbola with center at (1, 4). $\frac{(x-1)^2}{9} - \frac{(y-4)^2}{16} = 1$

Write your answers in complete sentences.

1. $x^2 + y^2 - 4x + 6y + 4 = 0$
   $(x-2)^2 + (y+3)^2 = 9$
   circle w/ radius 3
   ctr @ (2, -3)

$x^2 - 4x + y^2 + 6y = -4$
$(x^2 - 4x + 4) + (y^2 + 6y + 9) = -4 + 4 + 9$
$(x-2)^2 + (y+3)^2 = 9$

2. $9x^2 + 4y^2 + 54x + 8y + 49 = 0$
   $\frac{(x+3)^2}{4} + \frac{(y+1)^2}{9} = 1$
   ellipse w/ ctr (-3, -1)

$9x^2 + 54x \quad 4y^2 + 8y = -49$
$9(x^2 + 6x + 9) + 4(y^2 + 2y + 1) = -49 + 81 + 4$
$\frac{9(x+3)^2}{36} + \frac{4(y+1)^2}{36} = \frac{36}{36}$

3. $25x^2 + y^2 - 300x + 8y + 891 = 0$
   $\frac{(x-6)^2}{1} + \frac{(y+4)^2}{25} = 1$
   ellipse w/ ctr @ (6, -4)

$(25x^2 - 300x) + (y^2 + 8y) = -891$
$25(x^2 - 12x) + (y^2 + 8y) = -891$
$25(x^2 - 12x + 36) + (y^2 + 8y + 16) = 9 + 16$
$\frac{25(x-6)^2}{25} + \frac{(y+4)^2}{25} = \frac{25}{25}$

4. $16x^2 - y^2 + 96x + 8y + 112 = 0$
   $\frac{(x+3)^2}{1} - \frac{(y-4)^2}{16} = 1$
   hyperb. ctr @ (-3, +4)

$16x^2 + 96x - y^2 - 8y = -112$
$16(x^2 + 6x + 9) - (y^2 - 8y + 16) = -112 + 144 - 16$
$\frac{16(x+3)^2}{16} - \frac{(y-4)^2}{16} = \frac{16}{16}$

5. $x^2 + y^2 + 8x + 20y + 112 = 0$
   $(x+4)^2 + (y+10)^2 = 4$
   circle rad = 2
   ctr @ (-4, -10)

5 compl