Pre-Calc
UNIT 4: Conic Sections – REVIEW #2

Name: Key
Date: _____

THE CIRCLE

STANDARD FORM		GENERAL FORM
$(x-h)^2+(y-k)^2=r^2$		$x^2+y^2+Dx+Ey+F=0$
Center: (h,k)	Radius: r	Complete the square to get Standard Form

THE PARABOLA

GENERAL FORM			
$x^2+Dx+Ey+F=0$		$y^2+Dx+Ey+F=0$	
Complete the square to get Standard Form			
STANDARD FORM			
$(x-h)^2=4p(y-k)$		$(y-k)^2=4p(x-h)$	
Vertex: (h,k)	Opening:	Vertex: (h,k)	Opening:
Focus: $(h,k+p)$	UP if p is positive DOWN if p is negative	Focus: $(h+p,k)$	RIGHT if p is positive LEFT if p is negative
Directrix: $y=k-p$		Directrix: $x=h-p$	

THE ELLIPSE

GENERAL FORM			
$Ax^2+Cy^2+Dx+Ey+F=0$ where $A\neq C$			
Complete the square to get Standard Form (NOTE: Make sure to factor first!)			
STANDARD FORM			
$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$		$\frac{(x-h)^2}{b^2}+\frac{(y-k)^2}{a^2}=1$	
Major Axis: $2a$	Foci: $\pm c$	Major Axis: $2a$	Foci: $\pm c$
Minor Axis: $2b$	$c^2=a^2-b^2$ $a^2>b^2$	Minor Axis: $2b$	$c^2=a^2-b^2$ $a^2>b^2$

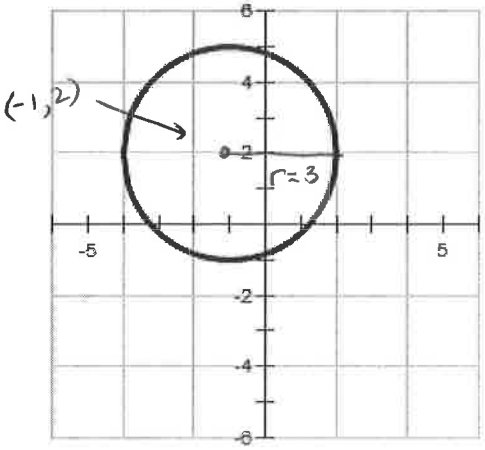
THE HYPERBOLA

GENERAL FORM			
$Ax^2-Cy^2+Dx+Ey+F=0$ where $A\neq C$		$Ay^2-Cx^2+Dx+Ey+F=0$ where $A\neq C$	
Complete the square to get Standard Form (NOTE: Make sure to factor first!)			
STANDARD FORM			
$\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$		$\frac{(y-k)^2}{a^2}-\frac{(x-h)^2}{b^2}=1$	
Asymptotes:	$y-k=\pm\frac{b}{a}(x-h)$	Asymptotes:	$y-k=\pm\frac{a}{b}(x-h)$
Transverse Axis: $2a$	Foci: c	Transverse Axis: $2a$	Foci: c
Conjugate Axis: $2b$	$c^2=a^2+b^2$	Conjugate Axis: $2b$	$c^2=a^2+b^2$
a^2 is not necessarily larger than b^2		a^2 is not necessarily larger than b^2	

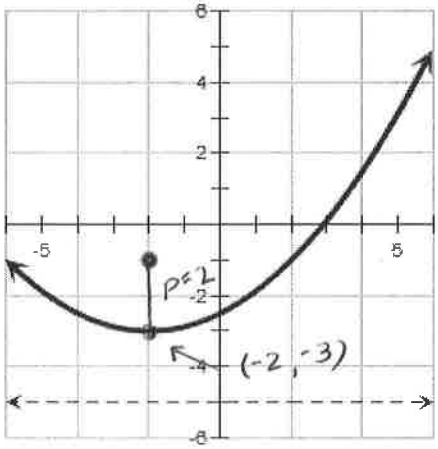
Directions: State the conic section of the graph

1.) $16x^2 - y^2 + 96x + 8y = -112$	Circle	Parabola	Ellipse	**Hyperbola**
2.) $7x^2 + 3y^2 - 28x - 12y = -19$	Circle	Parabola	**Ellipse**	Hyperbola
3.) $x^2 + y + 4x - 2 = 0$	Circle	**Parabola**	Ellipse	Hyperbola
4.) $x^2 + y^2 - x + 2y - 12 = 0$	**Circle**	Parabola	Ellipse	Hyperbola
5.) $y^2 - 4x^2 - 2y - 16x + 1 = 0$	Circle	Parabola	Ellipse	**Hyperbola**
6.) $x^2 - 3y^2 + 6y + 6x = 18$	Circle	Parabola	Ellipse	**Hyperbola**
7.) $x^2 + 3y^2 + 2x - 5y - 129 = 0$	Circle	Parabola	**Ellipse**	Hyperbola
8.) $2x^2 - 5x + y - 19 = 0$	Circle	**Parabola**	Ellipse	Hyperbola
9.) $5x^2 + 2y^2 - 2x - 9y - 22 = 0$	Circle	Parabola	**Ellipse**	Hyperbola

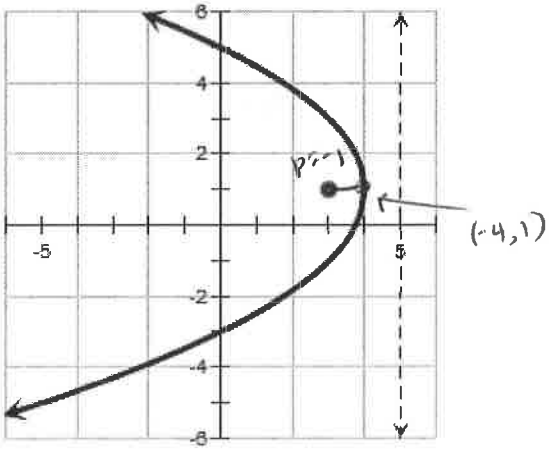
Directions: Write the equation of each graph in standard form.



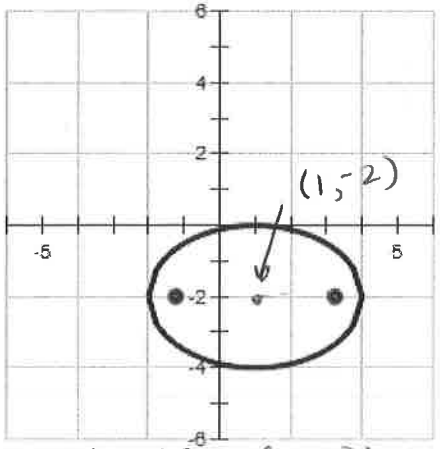
10.) $(x+1)^2 + (y-2)^2 = 9$



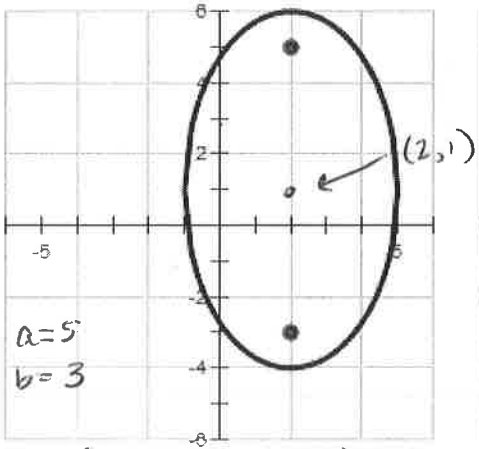
11.) $(x+2)^2 = 8(y+3)$



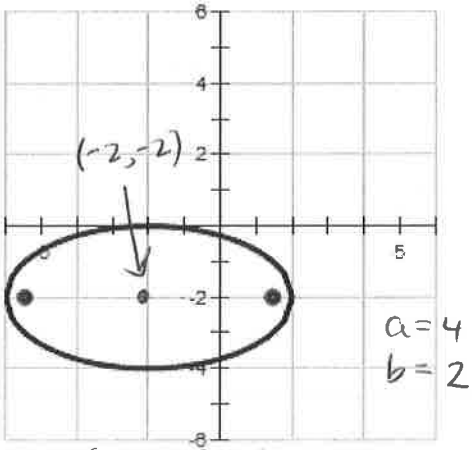
12.) $(y-1)^2 = -4(x+4)$



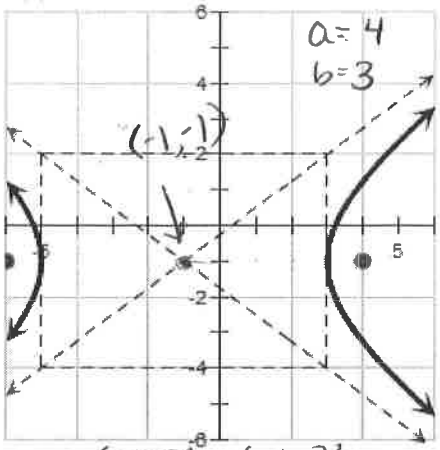
13.) $\frac{(x-1)^2}{9} + \frac{(y+2)^2}{4} = 1$



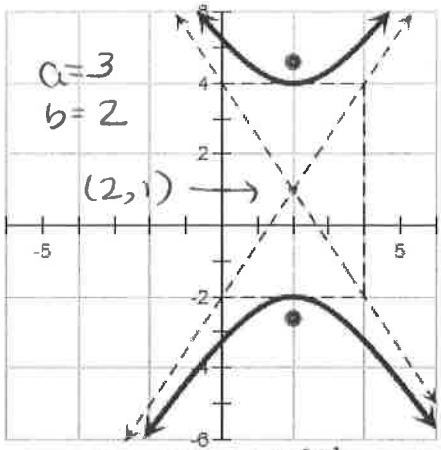
14.) $\frac{(x-2)^2}{9} + \frac{(y-1)^2}{25} = 1$



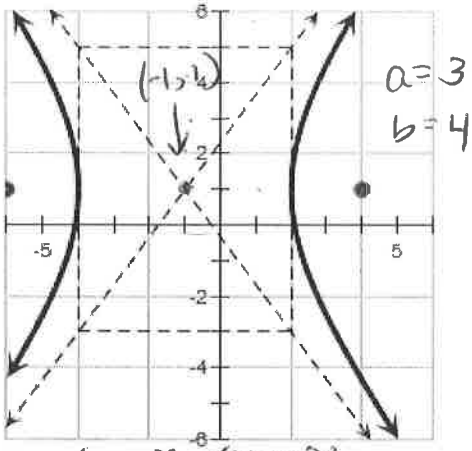
15.) $\frac{(x+2)^2}{16} + \frac{(y+2)^2}{4} = 1$



16.) $\frac{(x+1)^2}{16} - \frac{(y+1)^2}{9} = 1$



17.) $\frac{(y-1)^2}{9} - \frac{(x-2)^2}{4} = 1$



18.) $\frac{(x+1)^2}{9} - \frac{(y-1)^2}{16} = 1$

Directions: Find the center and the radius of each circle:

19.) $(x-2)^2 + y^2 = 49$

Center: $(2,0)$

Radius: 7

20.) $(x+3)^2 + (y-5)^2 = 48$

Center: $(-3,5)$

Radius: $\sqrt{48}$

21.) $(x-7)^2 + (y+2)^2 = 45$

Center: $(7,-2)$

Radius: $\sqrt{45}$

Directions: Find the vertex, focus, directrix and p value for each parabola. Then graph each parabola.

22.) $(x+2)^2 = 16(y-1)$ ↑↓

Vertex: $(-2,1)$ Focus: $(-2,5)$

Directrix: $y=-3$ $p =$ 4

23.) $(y+1)^2 = 8(x+4)$ →

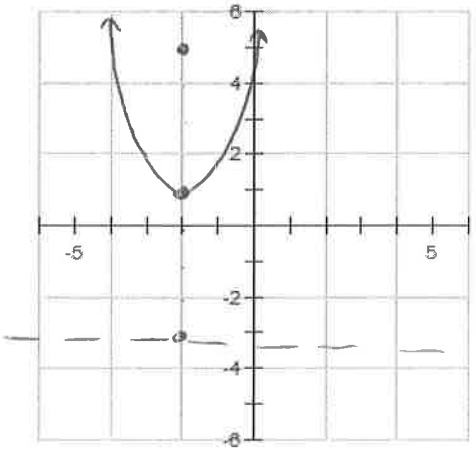
Vertex: $(-4,-1)$ Focus: $(-2,-1)$

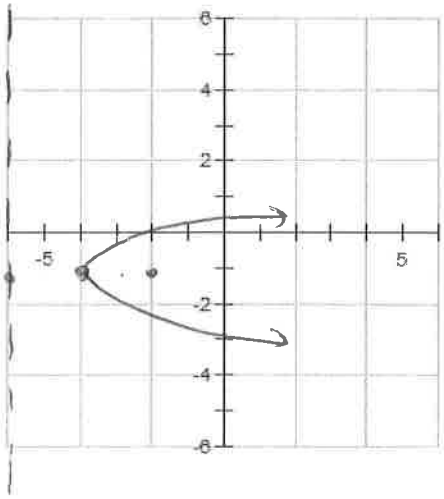
Directrix: $x=-6$ $p =$ 2

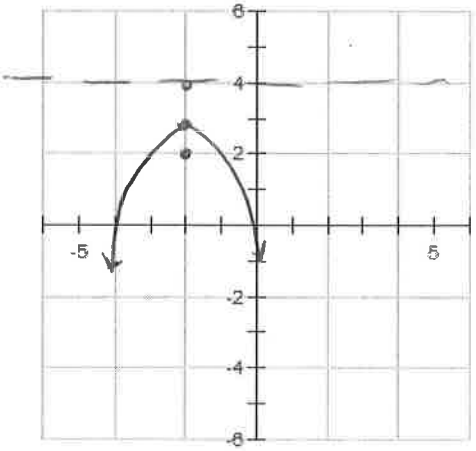
24.) $(x+2)^2 = -4(y-3)$ ↓

Vertex: $(-2,3)$ Focus: $(-2,2)$

Directrix: $y=4$ $p =$ -1







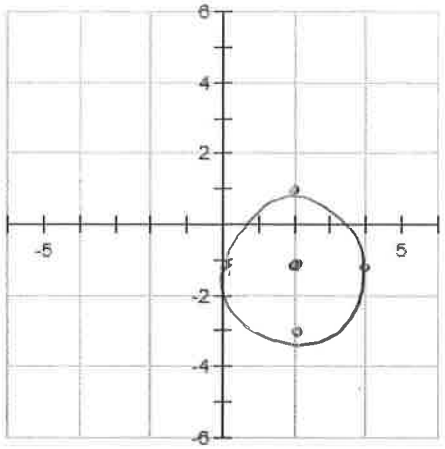
Directions: **Change the following from General Form to Standard Form and find the center and radius.**

25.) $x^2 + y^2 - 4x + 2y + 1 = 0$

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

$x^2 - 4x + \underline{4} + y^2 + 2y + \underline{1} = -1 + \underline{4} + \underline{1}$

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



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

Center: $(2, -1)$ Radius: 2

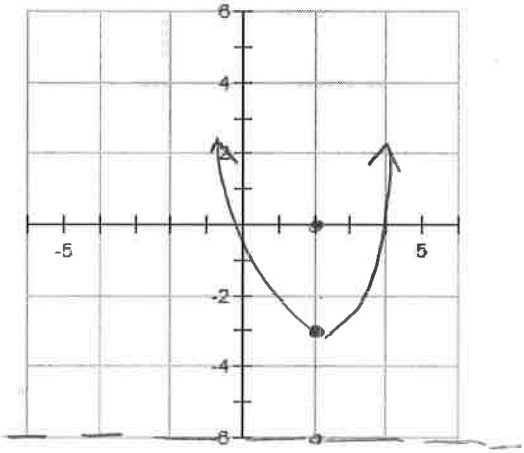
Directions: **Find the coordinates of the vertex and the focus. Then find the equation of the directrix and sketch a graph for the following parabolas.**

26.) $(x-2)^2 = 12y + 36$

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

$4p = 12$

$p = 3$



Vertex: $(2, -3)$ Focus: $(2, 0)$

$p =$ 3 Directrix: $y = -6$

Directions: **Convert the general form of the equation of the ellipse into standard form.**

27.) $9y^2 + 108y + 4x^2 - 56x + 484 = 0$

$9y^2 + 108y + 4x^2 - 56x = -484$

$9(y^2 + 12y + \underline{36}) + 4(x^2 - 14x + \underline{49}) = -484 + \underline{324} + \underline{196}$

$9(y+6)^2 + 4(x-7)^2 = 36$

$\frac{(y+6)^2}{4} + \frac{(x-7)^2}{9} = 1$

Standard form: $\frac{(y+6)^2}{4} + \frac{(x-7)^2}{9} = 1$

Directions: **Convert the general form of the equation of the hyperbola into standard form.**

28.) $25x^2 - 9y^2 - 100x - 72y - 269 = 0$

$25x^2 - 100x - 9y^2 - 72y = 269$

$25(x^2 - 4x + \underline{4}) - 9(y^2 + 8y + \underline{16}) = 269 + \underline{100} + \underline{-144}$

$25(x-2)^2 - 9(y+4)^2 = 225$

$\frac{(x-2)^2}{9} - \frac{(y+4)^2}{25} = 1$

Standard form: $\frac{(x-2)^2}{9} - \frac{(y+4)^2}{25} = 1$

Directions: Find the coordinates of the center, foci, and vertices of the ellipse and the length of the major and minor axis. Then graph the equation.

29.) $25x^2 + 100x + 4y^2 + 8y + 4 = 0$

$25x^2+100x+4y^2+8y=-4$

$25(x^2+4x+\underline{4}\,)+4(y^2+2y+\underline{1}\,)=-4+\underline{100}+\underline{4}$

$25(x+2)^2+4(y+1)^2=100$

$\frac{(x+2)^2}{4}+\frac{(y+1)^2}{25}=1$

Center: $(-2,-1)$

$a=5$

$b=2$

$c=\sqrt{21}$

$2^2+c^2=5^2$

$c^2=21$

$c=\sqrt{21}$

Center: $(-2,-1)$

Foci: $(-2,-1+\sqrt{21})$

$(-2,-1-\sqrt{21})$

Length of major axis: 10

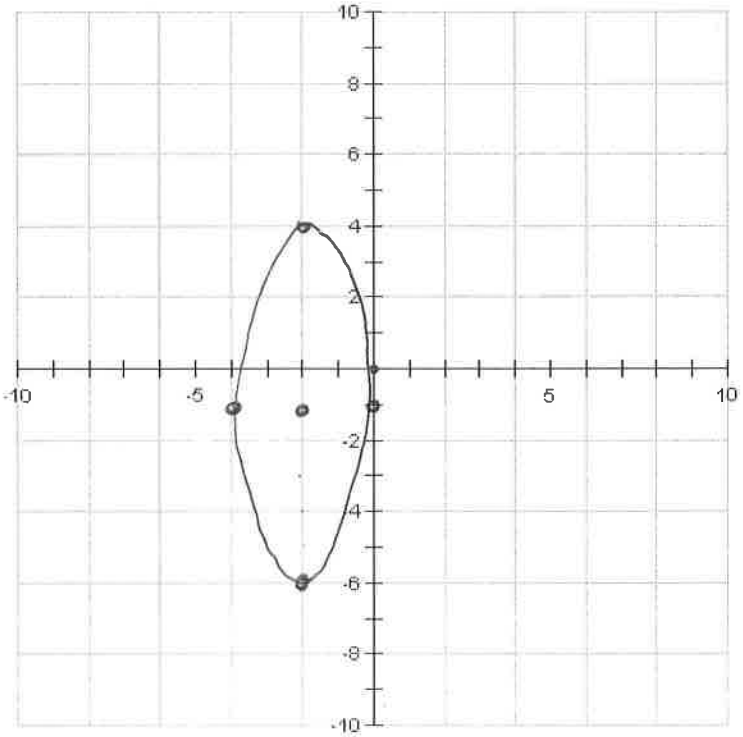
Length of minor axis: 4

Major axis vertices: $(-2,4)$

$(-2,-6)$

Minor axis vertices: $(0,-1)$

$(-4,-1)$



Directions: Find the coordinates of the center, the foci, and the vertices, the length of the transverse and conjugate axis, and the equations of the asymptotes of the hyperbola. Then graph the equation.

30.) $y^2 - 4y - 4x^2 + 40x - 100 = 0$

$y^2 - 4y - 4x^2 + 40x = 100$

$y^2 - 4y + \underline{4} - 4(x^2 - 10x + \underline{25}) = 100 + \underline{4} + \underline{-100}$

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

$\frac{(y-2)^2}{4} - \frac{(x-5)^2}{1} = 1$

Center: $(5, 2)$

$a = 2$

$b = 1$

$c = \sqrt{5}$

Center: $(5, 2)$

Foci: $(5, 2+\sqrt{5})$

$(5, 2-\sqrt{5})$

Vertices: $(5, 4)$

$(5, 0)$

Asymptotes: $(y-2) = \pm \frac{2}{1}(x-5)$

Length of Transverse Axis: 4

Length of Conjugate Axis: 2