The equation for any conic section can be written in the form

where $A,$ $B,$ and C are not all zero.

Parabola   Circle and   Hyperbola
Ellipse

This general form can be converted to standard forms by _____
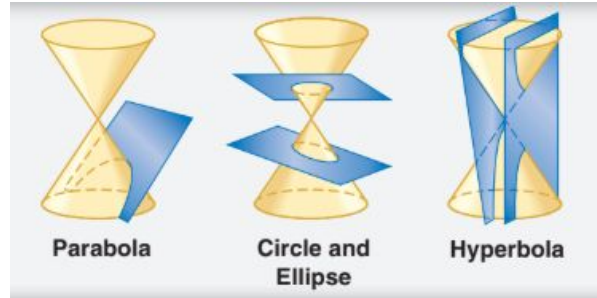
Conic Section	Standard Form of Equations
Circle	
Parabola	
Ellipse	
Hyperbola	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

1. Write $4x^2 + y^2 - 16x + 8y - 4 = 0$ in standard form. State whether the graph of the equation is a parabola, circle, or ellipse. Then graph the equation.
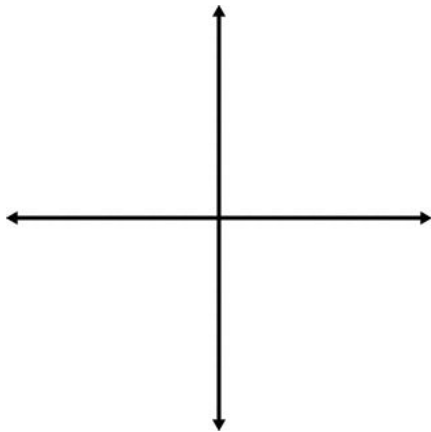
2. Write $y^2 = 18 - 2x^2$ in standard form. State whether the graph of the equation is a parabola, circle, or ellipse. Then graph the equation.
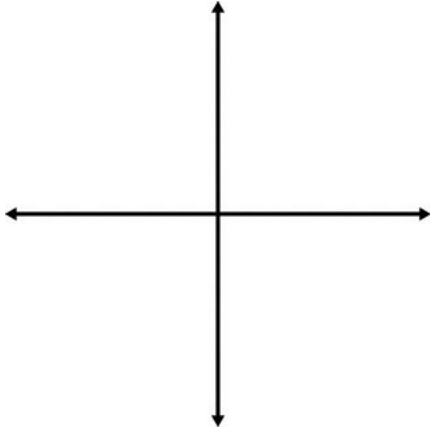
Can determine the type of conic without writing the equation
$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ in standard form if there is an xy term. So _____

Discriminant

Discriminant	Conic Section
$B^2 - 4AC < 0$; $B = 0$ and $A = C$	
$B^2 - 4AC < 0$; $B \neq 0$ and $A \neq C$	
$B^2 - 4AC = 0$	
$B^2 - 4AC > 0$	

3. Without writing in standard form, state whether the graph of each equation is a parabola, circle, ellipse, or hyperbola.
   a. $y^2 + 4x^2 - 3xy + 4x - 5y - 8 = 0$

b. $3x^2 - 6x + 4y - 5y^2 + 2xy - 4 = 0$

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

c. $4y^2 - 8x + 6y - 14 = 0$

e. $2x^2 + 2y^2 + 16x - 20y = -32$