Standard Forms of Conic Sections

Parabola

$$y = a \cdot (x - h)^2 + k$$
$$x = a \cdot (y - k)^2 + h$$

Ellipse

$$\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$$

Circle

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

Hyperbola

$$\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$$

$$\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1$$

Classify the following conics that each equation represents

$$\frac{(x - 2)^2}{36} + \frac{(y + 1)^2}{49} = 1$$

$$(x + 2)^2 + (y + 1)^2 = 81$$

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

$$\frac{(x + 3)^2}{4} - \frac{(y - 4)^2}{9} = 1$$

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

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

Classify the following conics that each equation represents

Tips for Classifying Conics (Analyze the Squared Terms)			
Parabola	1 squared term		
Circle	2 squared terms	same sign	same coefficient
Ellipse	2 squared terms	same sign	different coefficient
Hyperbola	2 squared terms	different signs	

$2x^2 - 8x - 4y + 10 = 0$ $2x^2 + 8x + 2y^2 + 6y + 10 = 0$

$9x^2 + 36x + 4y^2 - 24y + 36 = 0$ $y^2 - 2y + 8x + 9 = 0$

$4x^2 + 3x - 9y^2 + 18y + 36 = 0$ $36x^2 + 16y^2 - 25x + 22y + 2 = 0$

Classify the following conics that each equation represents

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$9y^2 - 4x^2 + 36x - 24y - 36 = 0$ $x^2 - 4x + y^2 - 2y - 4 = 0$

$16x^2 + 24x + 9y^2 - 36y + 23 = 0$ $y^2 - 2y - 9x^2 - 54x + 62 = 0$

$x^2 - 4x + 16y + 17 = 0$ $4y^2 + 5y - 5x - 13 = 0$

Classify the following conics that each equation represents

Parabola	Circle	Ellipse	Hyperbola

$$y = a \cdot (x - h)^2 + k \quad (x - h)^2 + (y - k)^2 = r^2 \quad \frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1 \qquad \frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$$

$$x = a \cdot (y - k)^2 + h$$

$$\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1$$

Tips for Classifying Conics (Analyze the Squared Terms)			
Parabola	1 squared term		
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