Name Key

Precalculus: Worksheet 9.1-9.3
Parabolas, Ellipses, and Hyperbolas

1. For the following second degree equations, determine the type of conic represented (i.e. circle, ellipse, hyperbola, or parabola) without simplifying and explain how you know.

   a. $4x^2 + y^2 - 16x + 15 = 0$

   Ellipse

   b. $x^2 - 6x + 2y + 9 = 0$

   Parabola

   c. $16x^2 + 16y^2 - 16x + 24y - 3 = 0$

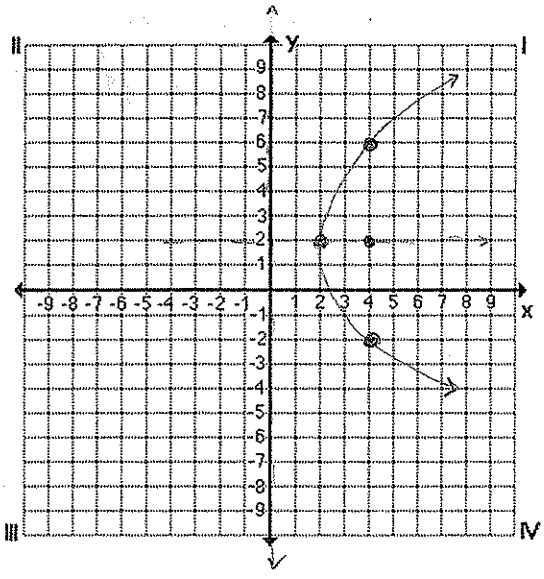
   Circle

2. Put the following second degree equation in standard form, identify the parts asked for, and sketch a graph of the conic.

   a. $y^2 - 4y - 8x + 20 = 0$

   $y^2 - 4y + 4 = 8x - 20 + 4$

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



Directrix: $x = 0$

Vertex: $(2,2)$

Axis: $y = 2$

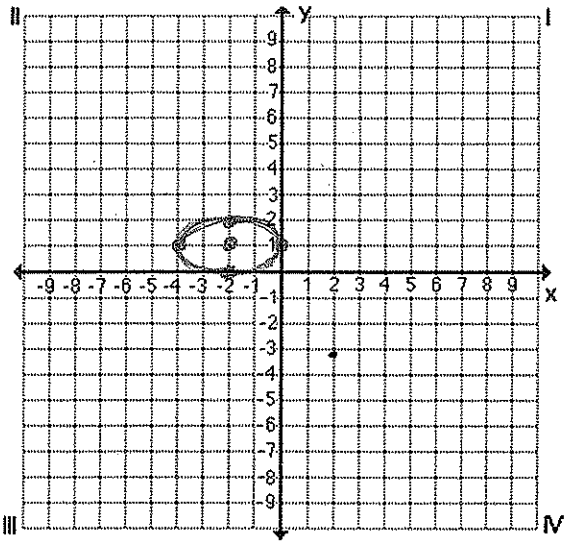
Focus: $(4,2)$

b. $x^2 + 4x + 4y^2 - 8y + 4 = 0$

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

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

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



$4 = 1 + c^2$

$c = \sqrt{3}$

Eccentricity: $\frac{\sqrt{3}}{2}$

Center: $(-2, 1)$

Vertices: $(-4, 1)\ (0, 1)$

Foci: $(-2+\sqrt{3}, 1)\ (-2-\sqrt{3}, 1)$

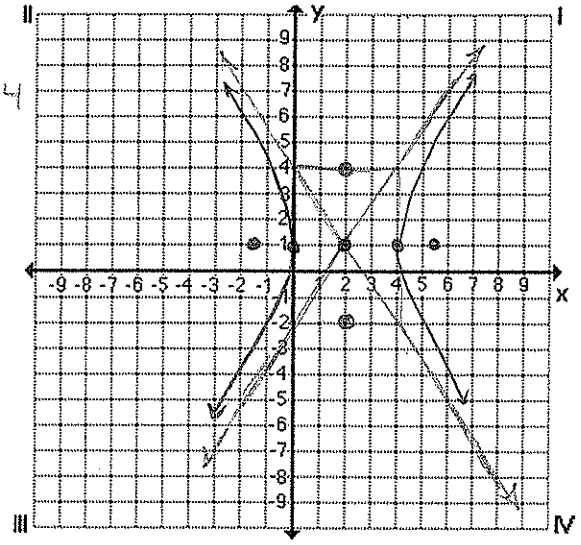
Length of major axis: 4

Length of minor axis: 2

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

$9(x^2-4x+4) - 4(y^2-2y+1) = 4 + 36 - 4$

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



$4 + 9 = c^2$

$c = \sqrt{13}$

Eccentricity: $\frac{\sqrt{13}}{2}$

Center: $(2, 1)$

Vertices: $(0, 1)(4, 1)$

Foci: $(2+\sqrt{13}, 1)\ (2-\sqrt{13}, 1)$

Asymptotes: $y = \frac{3}{2}x - 2$

$y = \frac{-3}{2}x + 4$