Conic Sections Review name Key

1) Match each equation to the corresponding letter.

A. Circle
B. Ellipse
C. Hyperbola
D. Parabola

B $24x^2 + 9x - 12y = -4y^2 + 102$

D $4y + x^2 + 3x = 0$

A $6x^2 - 7x + 6y^2 = -4y + 3$

C $14x^2 - 9y^2 = 5x - y + 39$

2) Write the vertex form equation for a parabola with the given characteristics.

$y = a(x-h)^2 + k$ *or* $x = a(y-k)^2 + h$ **focal length "c"** $|a| = \frac{1}{4c}$

A. Opens down, vertex (3,4) with a focal length of 5 units

$a = \frac{1}{4(5)} = \frac{1}{20}$ $y = -\frac{1}{20}(x-3)^2 + 4$

B. Opens left, vertex (2,-2) with a focal length of $\frac{1}{4}$ unit

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

3) For each circle, identify the center and radius.

A. $x^2 + y^2 - 9 = 0$ Center (0,0) $r = 3$

B. $(x-2)^2 + (y-6)^2 = 4$ Center (2,6) $r = 2$

4) For each hyperbola, tell whether it is vertical/horizontal, identify the center, and the coordinates of the two vertices.

A. $\frac{x^2}{9} - \frac{y^2}{4}$ Center (0,0) Horizontal (x comes first) V (3,0)(-3,0)

B. $\frac{(y+2)^2}{25} - \frac{(x+4)^2}{36}$ Center (-4,-2) Vertical (y comes first) V (-4, 3)(-4,-7)

5) Write the equation for an ellipse in standard form.

1. Center (-9,-2)
   Length of major axis 12
   Length of minor axis 4
   Horizontal major axis

$\frac{(x+9)^2}{36} + \frac{(y+2)^2}{4} = 1$

B. Center (3,1)
   Length of major axis 18
   Length of minor axis 4
   Vertical Major Axis

$\frac{(x-3)^2}{4} + \frac{(y-1)^2}{81} = 1$

Conic Sections Review name_____

Name the conic and its orientation (horizontal/vertical) find the vertex, find the foci and the equation in standard form. Then sketch a graph.

6) $2x^2 + 2y^2 - 4x + 12y - 18 = 0$

$2(x^2-2x+1) + 2(y^2+6y+9) = 18 + 2 + 18$

$2(x-1)^2 + 2(y+3)^2 = 38$ Circle

$(x-1)^2 + (y+3)^2 = 19$ $r = \sqrt{19}$

Center $(1,-3)$

7) $\frac{(y-3)^2}{25} + \frac{(x+4)^2}{9} = 1$ Vertical Ellipse

Center $(-4,3)$

Vertices $(-4,8)(-4,-2)$

Since $c = 4$ Foci $(-4,7)(-4,-1)$

8) $9x^2 - 4y^2 - 54x - 40y - 55 = 0$

$9(x^2-6x+9) - 4(y^2+10y+25) = 55+81-100$

$9(x-3)^2 - 4(y+5)^2 = 36$ Horizontal Hyperbola

$\frac{(x-3)^2}{4} - \frac{(y+5)^2}{9} = 1$ Center $(3,-5)$

Vertices $(5,-5)(1,-5)$

Foci $(3+\sqrt{13}, -5)(3-\sqrt{13}, -5)$

Write in vertex form: then find the vertex, directrix, and focal length.

9) $y = 3x^2 - 18x + 26$

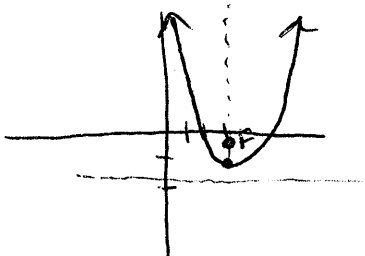
$y = 3(x^2-6x+\_\_) + 26$

$= 3(x^2-6x+9) + 26 - 27$

$y = 3(x-3)^2 - 1$

Vertex $(3,-1)$

opens up



$a = \frac{1}{4c}$ $3 = \frac{1}{4c}$ $12c = 1$ Focus $(3, -11/12)$ Directrix $y = \frac{-13}{12}$

$c = 1/12$ (Focal Length)

10) $x = 2y^2 + 20y + 47$

$x = 2(y^2+10y+25) + 47 - 50$

$x = 2(y+5)^2 - 3$ Horizontal Parabola

$a = \frac{1}{4c}$ Vertex $(-3,-5)$

$2 = \frac{1}{4c}$ Focus $(-\frac{23}{8}, -5)$

$c = 1/8$ Directrix $x = \frac{-25}{8}$