

**9R Conic Sections Review**

1. Graph the Conic Section & State the Requested Info:

a.  $(y + 4)^2 = 8(x + 3)$

Vertex:  $(-3, -4)$

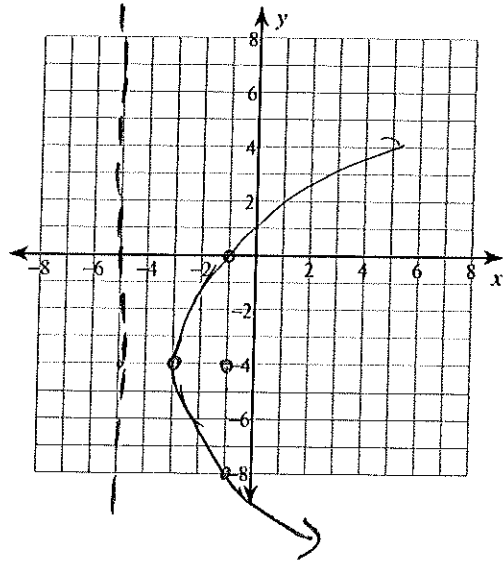
Focus:  $(-1, -4)$

Focal width:  $8$

Points on focal width:  $(-1, 0)$   $(-1, -8)$

Directrix:  $x = -5$

AOS:  $y = -4$



b.  $x^2 + y^2 + 10x - 2y + 11 = 0$   
 Typo. should be  $-2y$  but  $-y$

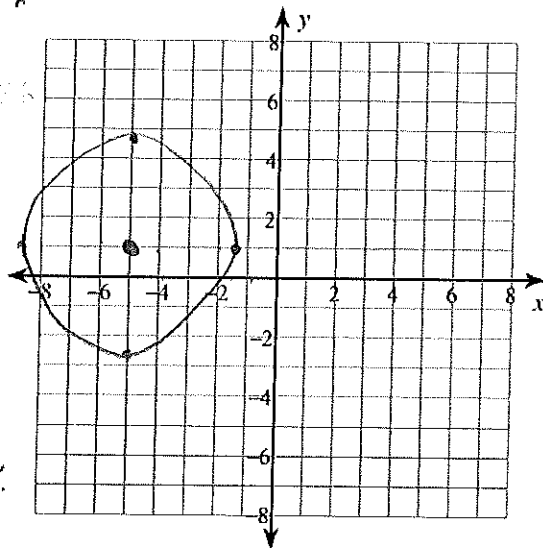
Standard Form:  $x^2 + 10x + y^2 - 2y = -11$   
 $+25 +1$   $+25 +1$

$(x+5)^2 + (y-1)^2 = 15$

Center:  $(-5, 1)$

Radius:  $\sqrt{15}$

$\approx 3.87$



would be ok:

$x^2 + 8x + y^2 = -11$   
 $+16 +16$

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

c.  $\frac{(x-1)^2}{4} - \frac{(y-2)^2}{36} = 1$

Center:  $(1, 2)$

Vertices:  $(-1, 2)$   $(3, 2)$

Points on CA:  $(1, 8)$   $(1, -4)$

Foci:  $(1+2\sqrt{10}, 2)$   $(1-2\sqrt{10}, 2)$

TA length:  $4$

CA length:  $12$

Asymptotes: slope =  $\pm 3$

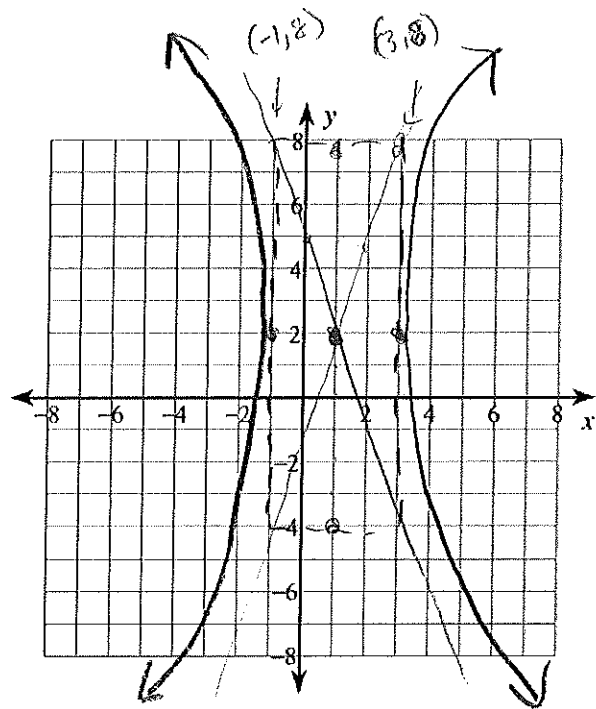
$(y-8) = 3(x-3)$   $(y-8) = -3(x+1)$

$y = 3x - 9 + 8$

$y = -3x - 3 + 8$

$y = 3x - 1$

$y = -3x + 5$



$a^2 + b^2 = c^2$   
 $4 + 36 = c^2$   
 $c^2 = 40$   $c = 2\sqrt{10}$

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

Center:  $(1, -2)$

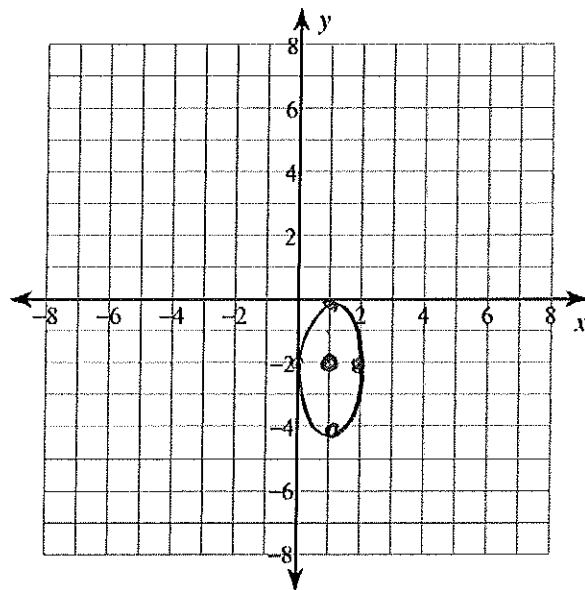
Vertices:  $(1, 0)$   $(1, -4)$

Covertices:  $(0, -2)$   $(2, -2)$

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

Maj. Axis length:  $4$

Min. Axis length:  $2$



$a^2 - b^2 = c^2$   
 $4 - 1 = \sqrt{3}$

2. Write the equations of the following conic sections:

- a. Ellipse; Center (5, -2), Vertex (9, -2) and minor axis of length 6

$$\frac{(x-5)^2}{16} + \frac{(y+2)^2}{9} = 1$$

- b. Hyperbola; Center (-7, 6), transverse axis (TA) length 10, and Focus (-7, -1)

$$\frac{(y-6)^2}{25} - \frac{(x+7)^2}{24} = 1$$

$$\begin{aligned} a^2 + b^2 &= c^2 & b^2 &= 24 \\ 5^2 + b^2 &= 7^2 \\ 25 + b^2 &= 49 \end{aligned}$$

- c. Circle; Endpoints of diameter are (-9, 8) and (3, 12)

$$(x+3)^2 + (y-10)^2 = 40$$

(-3, 10)

- d. Ellipse; Center (0, -4), Vertex (0, 2) and Focus (0, -1)

$$\frac{x^2}{27} + \frac{(y+4)^2}{36} = 1$$

$$\begin{aligned} a^2 - b^2 &= c^2 \\ 36 - b^2 &= 9 \\ b^2 &= 27 \end{aligned}$$

- e. Parabola; Vertex (-4, -9) and directrix  $x = -1$

$$(y+9)^2 = -12(x+4)$$

- f. Parabola; Vertex (3, 6) and Focus (3, 9)

$$(x-3)^2 = 12(y-6)$$

- g. Hyperbola; Center (-2, 3), Vertices (-2, 9) and (-2, -3), and Foci (-2, 11) and (-2, -5)

$$\frac{(y-3)^2}{36} - \frac{(x+2)^2}{28} = 1$$

$$\begin{aligned} a^2 + b^2 &= c^2 & b^2 &= 28 \\ 36 + b^2 &= 64 \end{aligned}$$

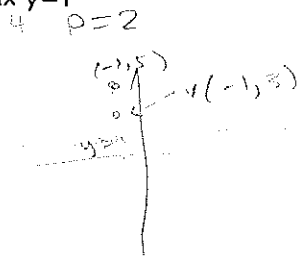
- h. Hyperbola; Vertices (-5, 5) and (5, 5) and foci (-7, 5) and (7, 5)

$$\frac{x^2}{25} - \frac{(y-5)^2}{24} = 1$$

$$\begin{aligned} a^2 + b^2 &= c^2 & b^2 &= 24 \\ 25 + b^2 &= 49 \end{aligned}$$

- i. Write the equation for a parabola with focus (-1, 5) and directrix  $y=1$

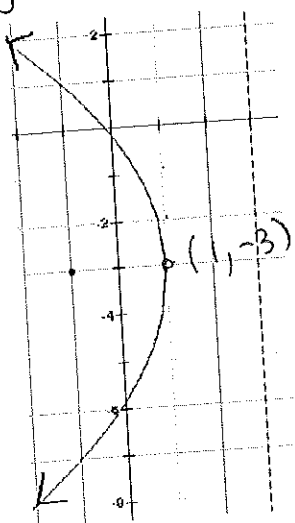
$$(x+1)^2 = 8(y-3)$$



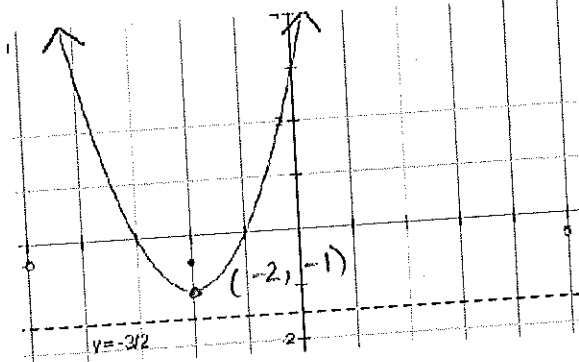
$$\frac{1}{2} \cdot 4$$

3. Write the equations of the following graphs:

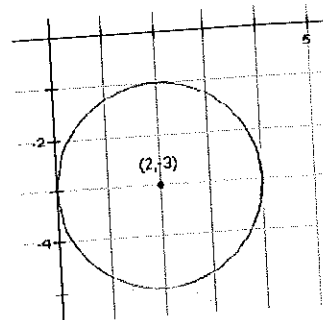
a.  $(y+3)^2 = -8(x-1)$



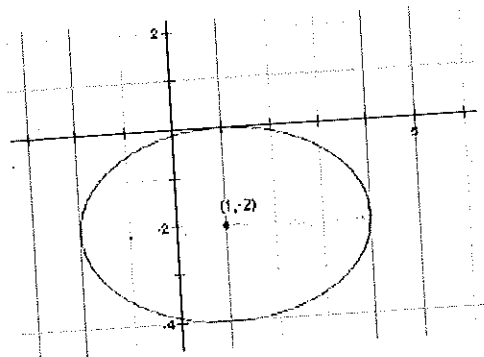
b.  $(x+2)^2 = 2(y+1)$



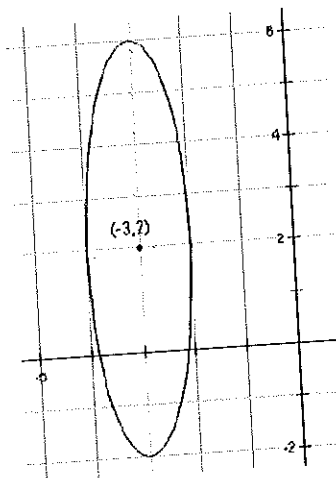
c.  $(x-2)^2 + (y+3)^2 = 4$



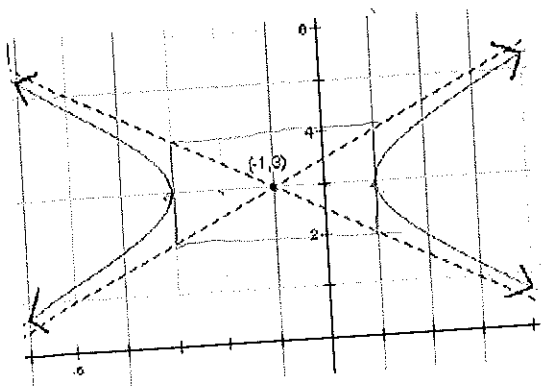
d.  $\frac{(x-1)^2}{9} + \frac{(y+2)^2}{4} = 1$



e.  $\frac{(x+3)^2}{1} + \frac{(y-2)^2}{16} = 1$



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



g.  $\frac{(y+2)^2}{9} - \frac{(x-3)^2}{16} = 1$

