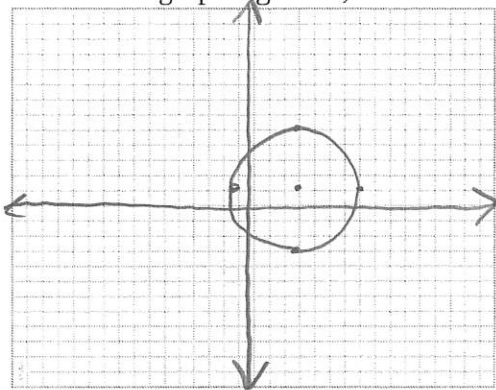


- ✓ 1. Rewrite in graphing form, state the center and radius, and graph: $x^2 + y^2 - 6x - 2y - 6 = 0$

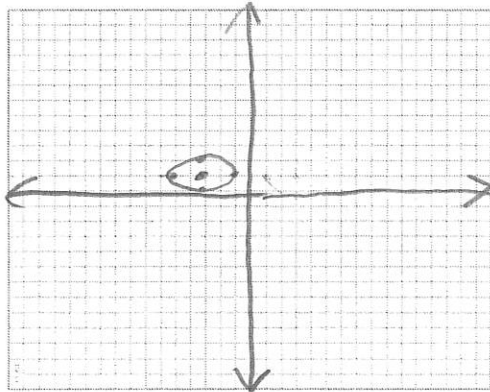


$$x^2 - 6x + 9 + y^2 - 2y + 1 = 6 + 9 + 1$$

$$(x - 3)^2 + (y - 1)^2 = 16$$

center $(3, 1)$
radius 4

- ✓ 2. Rewrite in graphing form, state the center, foci and eccentricity, and graph:
 $x^2 + 4y^2 + 6x - 8y + 9 = 0$



$$x^2 + 6x + 9 + 4y^2 - 8y + 4 = -9 + 9 + 4$$

$$(x + 3)^2 + 4(y - 1)^2 = 4$$

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

center $(-3, 1)$ foci $(-3 \pm \sqrt{3}, 1)$

$$c^2 = a^2 - b^2 = 4 - 1$$

$$c = \sqrt{3}$$

eccentricity

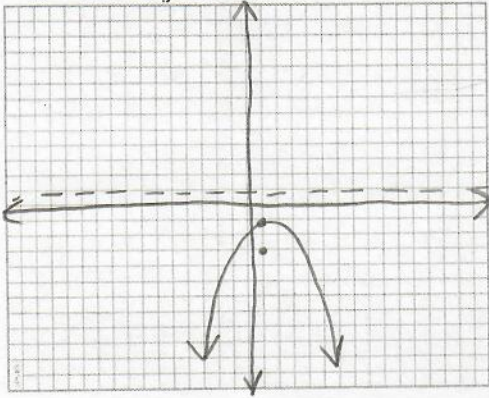
$$e = \frac{c}{a} = \frac{\sqrt{3}}{2}$$

- ✓ 3. What is the constant sum between the foci and any point on the ellipse?

The length of the major axis

4. Rewrite in graphing form, state the vertex, focus and directrix, and graph:

$$x^2 - 2x + 8y + 9 = 0$$



$$x^2 - 2x = -8y - 9$$

$$x^2 - 2x + 1 = -8y - 9 + 1$$

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

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

vertex $(1, -1)$ focus $(1, -3)$

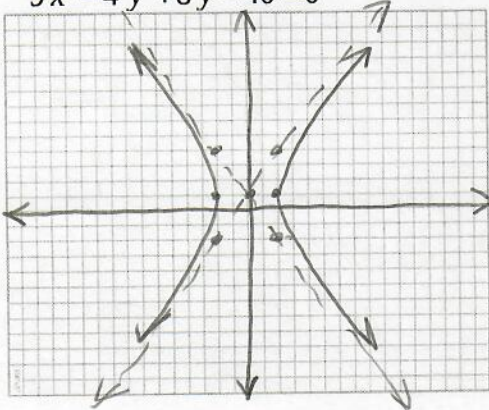
$$4p = -8$$

$$p = -2$$

directrix $y = 1$

5. Rewrite in graphing form, state the center, foci and asymptotes, and graph:

$$9x^2 - 4y^2 + 8y - 40 = 0$$



$$9x^2 - 4(y^2 - 2y) = 40$$

$$9x^2 - 4(y^2 - 2y + 1) = 40 - 4$$

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

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

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

center $(0, 1)$

$$c^2 = a^2 + b^2$$

$$c^2 = 13 \quad c = \sqrt{13}$$

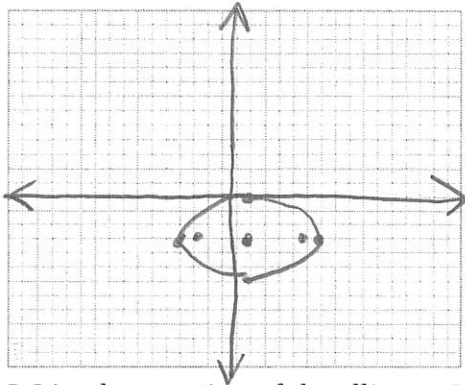
foci $(\pm\sqrt{13}, 1)$

asymptotes $y-1 = \pm\frac{3}{2}(x-0)$

6. What is the constant difference between the foci and any point on the hyperbola?

The distance between the vertices

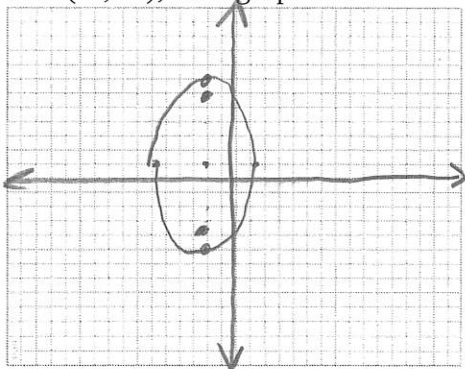
7. Graph (identifying center and foci): $\frac{(x-1)^2}{25} + \frac{(y+3)^2}{9} = 1$



center $(1, -3)$

foci $(1 \pm \sqrt{16}, -3)$
 $(5, -3)$
 $(-3, -3)$

8. Write the equation of the ellipse with a center at $(-2, 1)$, a major axis length of 12, and foci at $(-2, 6)$ and $(-2, -4)$, then graph.

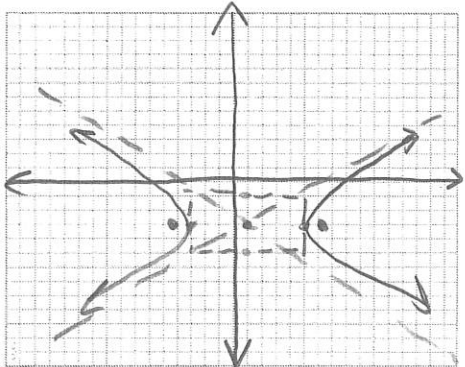


$$\frac{(x+2)^2}{11} + \frac{(y-1)^2}{36} = 1$$

$$25 = 36 - b^2$$

$$b^2 = 11$$

9. Graph (identifying center, foci, and asymptotes): $\frac{(x-1)^2}{16} - \frac{(y+3)^2}{4} = 1$



center $(1, -3)$

foci $(1 \pm 2\sqrt{5}, -3)$

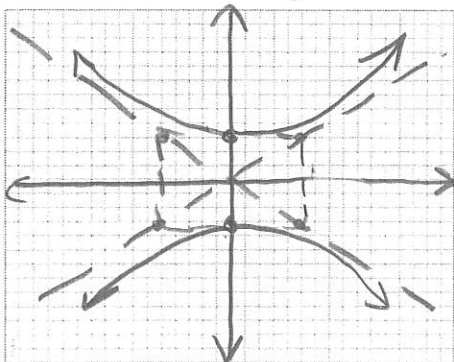
asymptotes $y+3 = \pm \frac{1}{2}(x-1)$

$$c^2 = 16 + 4$$

$$c^2 = 20$$

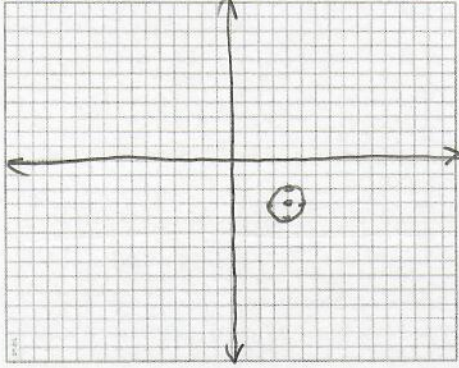
$$c = 2\sqrt{5}$$

10. Write the equation of a hyperbola with a center at $(0, 0)$, y-intercepts at $(0, 3)$ and $(0, -3)$, and asymptotes at $y = \pm \frac{3}{5}x$, then graph.



$$\frac{y^2}{9} - \frac{x^2}{25} = 1$$

11. Graph and find the center and radius: $x^2 + y^2 - 8x + 6y + 24 = 0$



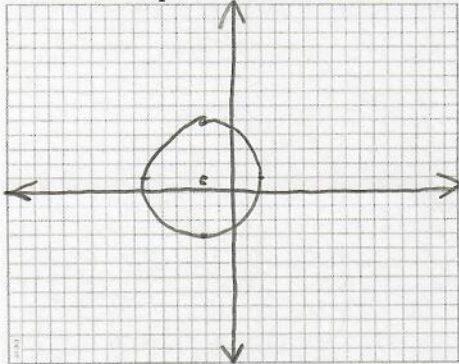
$$x^2 - 8x + 16 + y^2 + 6y + 9 = -24 + 16 + 9$$

$$(x-4)^2 + (y+3)^2 = 1$$

center (4, -3)

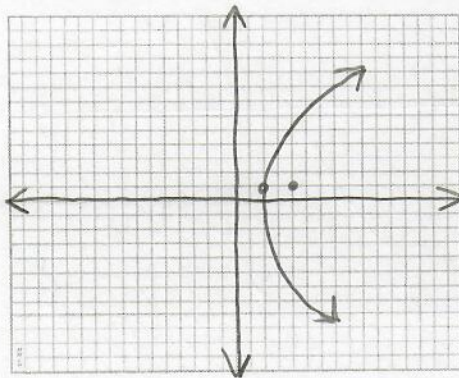
radius 1

12. Write the equation of a circle with a center of (-2, 1) and a radius of 4, then graph.



$$(x+2)^2 + (y-1)^2 = 16$$

13. Graph and find the vertex, focus, and directrix: $x = \frac{1}{8}(y-1)^2 + 2$



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

$$4p = 8$$

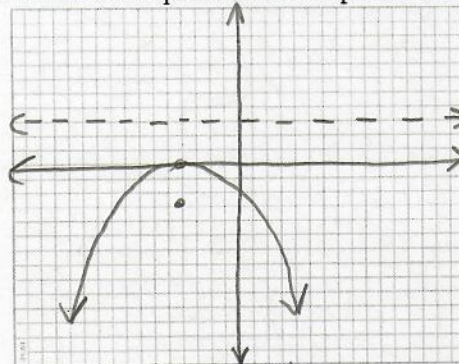
vertex (2, 1)

$$p = 2$$

focus (4, 1)

directrix $x = 0$

14. Write the equation of the parabola with a directrix of $y = 3$ and a focus at (-4, -3), then graph.



vertex (-4, 0)

$$p = -3$$

$$4p = -12$$

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

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

or