Chap. 2.4, 11.1 – 11.4 Test Review **Name**____________________________________

Do 1-8 on a separate sheet of paper.

a) Identify the conic (circle, parabola, ellipse, or hyperbola).

b) If it is a circle, identify the center and radius.
If it is a parabola, identify the vertex, focus, directrix, and points that define the latus rectum.
If it is an ellipse, identify the center, vertices, and foci.
If it is a hyperbola, identify the center, transverse axis, vertices, foci, and asymptotes.

c) Graph the conic.

1. $2x^2 - y^2 + 4x + 4y - 4 = 0$
2. $9x^2 + 4y^2 - 18x + 16y - 11 = 0$
3. $(x-2)^2 = 4(y-3)$
4. $2x^2 + 2y^2 - 12x + 8y - 24 = 0$
5. $(y+1)^2 = -4(x-2)$
6. $(x+5)^2 + 4(y-4)^2 = 16$
7. $x^2 + 8x = 4y - 8$
8. $(y-3)^2 - (x+2)^2 = 4$

Write the equation(s) of the circle with the given characteristics:

9. Center (-4, 3) tangent to the x – axis.
10. Radius 5 tangent to the line x = 2.

Write the standard form equation of the parabola with the given characteristics:

11. Vertex (3, 1) Focus: (1, 1)
12. Vertex (-4, 2) containing pt. (-2, 3)

Write the standard form equation of the ellipse with the given characteristics:

13. Focus (-4, 0) Vertices (±5,0)
14. Center (-1, 1) Vertices (-1, 0) & (-1, 2) Foci: $(-1, \frac{1}{4})$

Write the standard form equation of the hyperbola with the given characteristics:

15. Focus (0, 6) Vertices (0, -2) & (0, 2)
16. Foci (3, 7) & (7, 7) Vertex (6, 7)

17. A satellite dish is in the shape of a paraboloid. Find the location of the receiver, which is placed at the focus, if the dish is 6 feet across at its opening and 2 feet deep.

1. $2x^2 - y^2 + 4x + 4y - 4 = 0$

$2x^2 + 4x \quad - y^2 + 4y - 4 = 0$

$2(x^2 + 2x + \underline{1}) - (y^2 - 4y + \underline{4}) - 4 - \underline{2} + \underline{4} = 0$

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

$$\frac{(x+1)^2}{1} - \frac{(y-2)^2}{2} = 1 \Rightarrow \boxed{\text{hyperbola}}$$

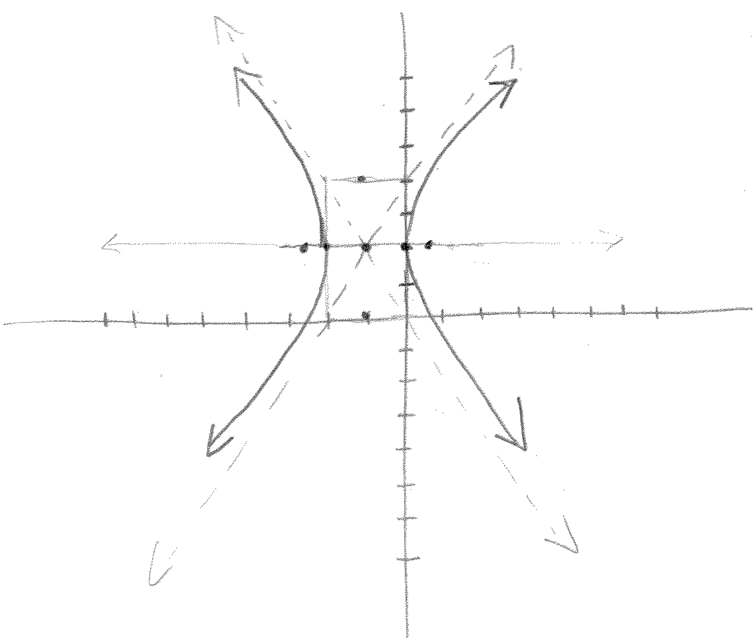
$\boxed{\text{center } (-1, 2)}$

$a = 1 \quad b = \sqrt{2}$

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

$\sqrt{2}^2 = c^2 - 1^2$

$c = \sqrt{3} \approx 1.7$



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

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

asymptotes:
$y - 2 = \sqrt{2}(x+1)$
$y - 2 = -\sqrt{2}(x+1)$

transverse axis: $y = 2$

2. $9x^2+4y^2-18x+16y-11=0$

$9x^2-18x+4y^2+16y-11=0$

$9(x^2-2x+\underline{1})+4(y^2+4y+\underline{4})-11\,\underline{-9}\,\underline{-16}=0$

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

$\boxed{\frac{(x-1)^2}{4}+\frac{(y+2)^2}{9}=1} \Rightarrow \boxed{\text{ellipse}}$

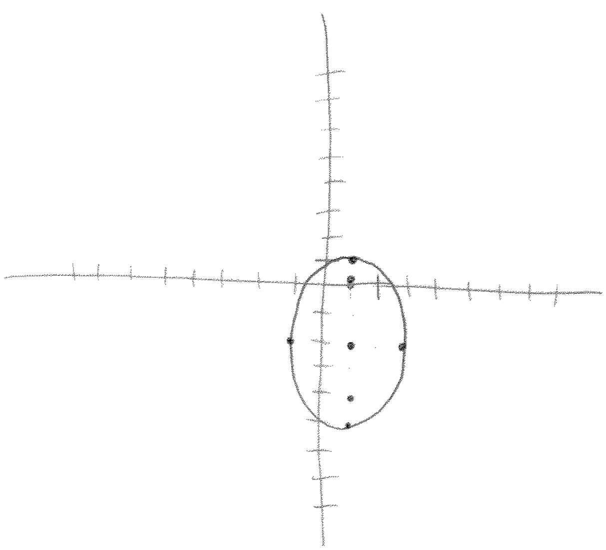
$\boxed{\text{center } (1,-2)}$

$a=3 \quad b=2$

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

$2^2=3^2-c^2$

$c=\sqrt{5}$



vertices: $(1,1)$
$(1,-5)$

foci: $(1,-2+\sqrt{5})$
$(1,-2-\sqrt{5})$

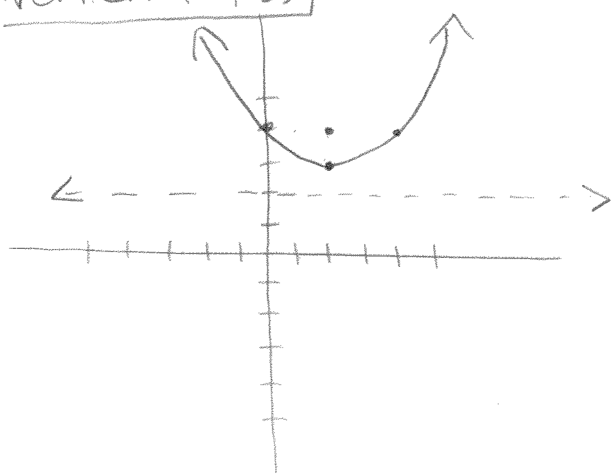
3. $(x-2)^2 = 4(y-3)$

$\boxed{\text{parabola}}$

$4a = 4$

$a = 1$

$\boxed{\text{vertex: } (2,3)}$



$\boxed{\begin{array}{l}\text{foci: } (2,4) \\ \text{directrix: } y=2\end{array}}$

4. $2x^2+2y^2-12x+8y-24=0$

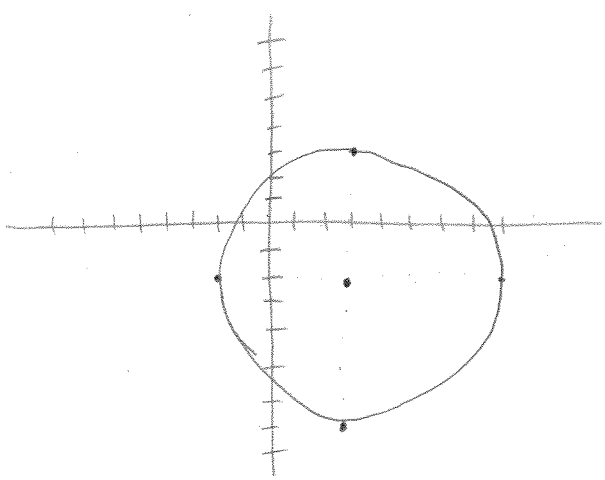
$2x^2-12x+2y^2+8y-24=0$

$2(x^2-6x+\underline{9})+2(y^2+4y+\underline{4})-24-\underline{18}-\underline{8}=0$

$\frac{2(x-3)^2}{2}+\frac{2(y+2)^2}{2}=\frac{50}{2}$

$\boxed{(x-3)^2+(y+2)^2=25} \Rightarrow \boxed{\text{circle}}$

$\boxed{\text{center: } (3,-2)}$ radius: 5



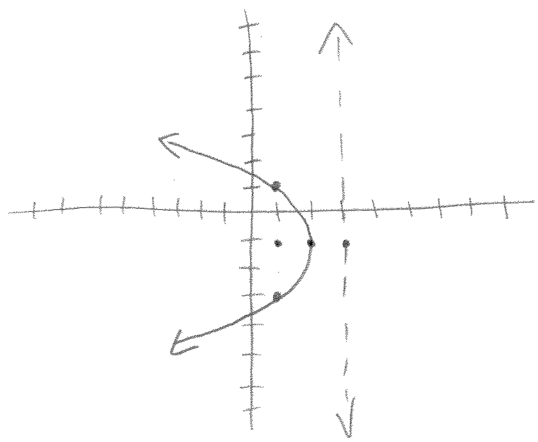
5. $(y+1)^2 = -4(x-2)$

$\boxed{\text{parabola}}$

$-4a = 4$

$a = -1$

$\boxed{\text{vertex: } (2,-1)}$



$\boxed{\begin{array}{l}\text{foci: } (1,-1) \\ \text{directrix: } x=3\end{array}}$

6. $\frac{(x+5)^2}{16} + \frac{4(y-4)^2}{16} = \frac{16}{16}$

$$\boxed{\frac{(x+5)^2}{16} + \frac{(y-4)^2}{4} = 1} \Rightarrow \boxed{\text{ellipse}}$$

$a = 4$

$b = 2$

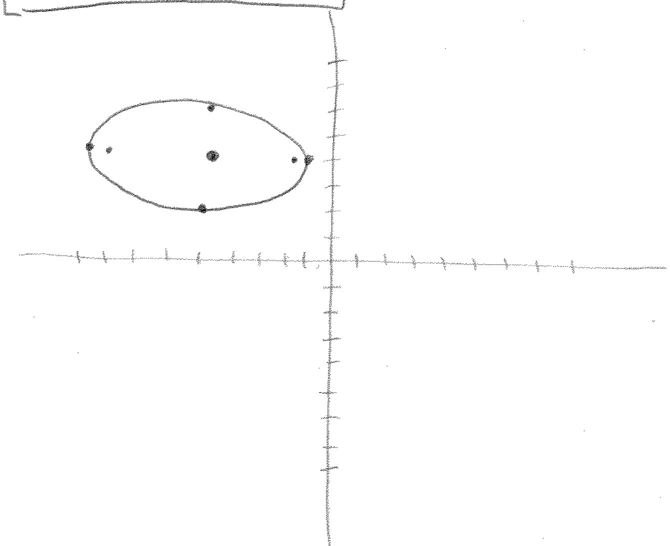
$b^2 = a^2 - c^2$

$2^2 = 4^2 - c^2$

$c^2 = 16 - 4$

$c = \sqrt{12} \approx 3.5$

$\boxed{\text{center: } (-5, 4)}$



$$\boxed{\begin{array}{l} \text{vertices: } (-1, 4) \\ \qquad\qquad (-9, 4) \\ \text{foci: } (-5+\sqrt{12}, 4) \\ \qquad\quad (-5-\sqrt{12}, 4) \end{array}}$$

7. $x^2+8x=4y-8$

$(x^2+8x+\underline{16})-\underline{16}=4y-8$

$(x+4)^2-16=4y-8$
$\quad\quad +16 \quad\quad +16$

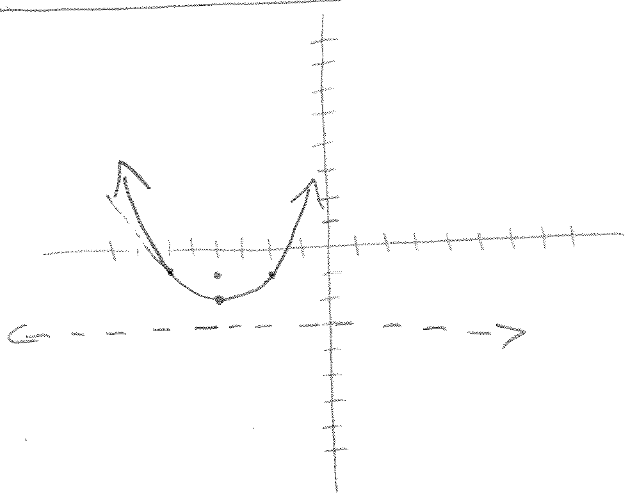
$(x+4)^2=4y+8$

$\boxed{(x+4)^2=4(y+2)} \Rightarrow \boxed{\text{parabola}}$

$4a=4$

$a=1$

$\boxed{\text{vertex: } (-4,-2)}$



$\boxed{\begin{array}{l}\text{foci: } (-4,-1)\\ \text{directrix: } y=-3\end{array}}$

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

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

$a = 4$

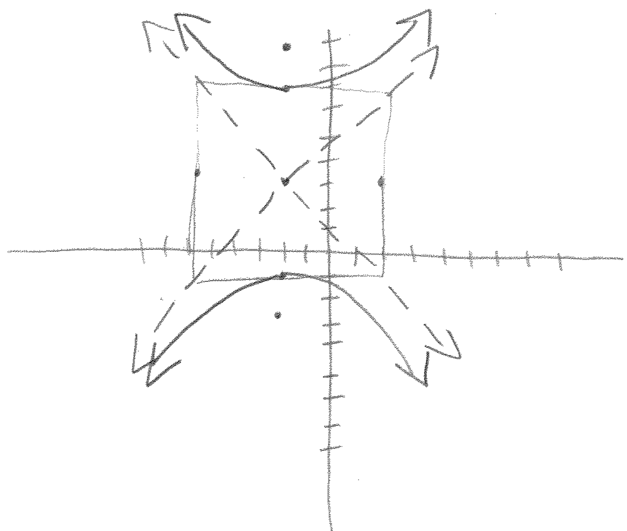
$b = 4$

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

$4^2 = c^2 - 4^2$

$c = \sqrt{32} \approx 5.7$

$\boxed{\text{center: } (-2, 3)}$



vertices: $(-2, 7)$
$(-2, -1)$

foci: $(-2, 3+\sqrt{32})$
$(-2, 3-\sqrt{32})$

asymptotes:
$y - 3 = 1(x+2)$
$y - 3 = -1(x+2$

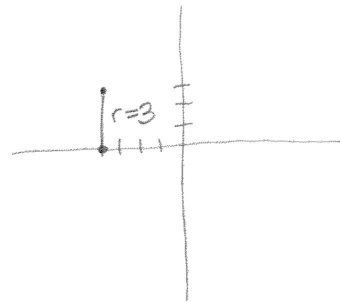
Circle

9. center $(-4,3)$, tangent to x-axis

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

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

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

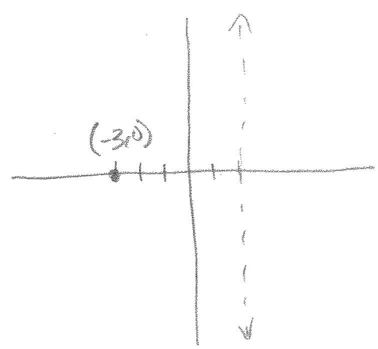


10. radius $=5$, tangent to line $x=2$

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

one option:

$$(x+3)^2+y^2=25$$



11. vertex: $(3,1)$ focus: $(1,1)$

parabola

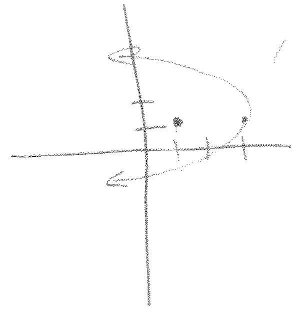
$$4a(x-h)=(y-k)^2$$

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

$$a=-2$$

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

$$\boxed{-8(x-3)=(y-1)^2}$$



12. vertex: $(-4,2)$ containg pt. $(-2,3)$

$$4a(x-h)=(y-k)^2$$

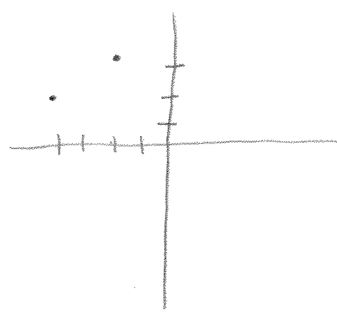
$$4a(x+4)=(y-2)^2$$

$$4a(-2+4)=(3-2)^2$$

$$\frac{8a}{8}=\frac{1}{8}$$

$$a=\frac{1}{8}$$

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



- or -

$$4a(y-k)=(x-h)^2$$

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

$$4a(3-2)=(-2+4)^2$$

$$4a=4$$

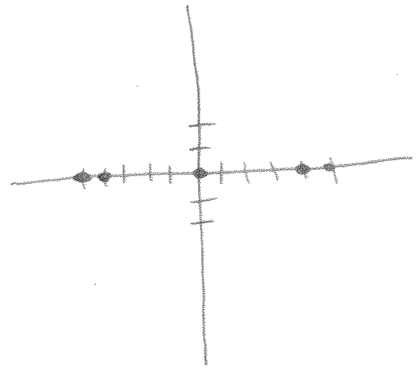
$$a=1$$

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

13. Focus $(-4,0)$ Vertices $(\pm5,0)$

Ellipse

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



$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$

$a=5$

$c=4$

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

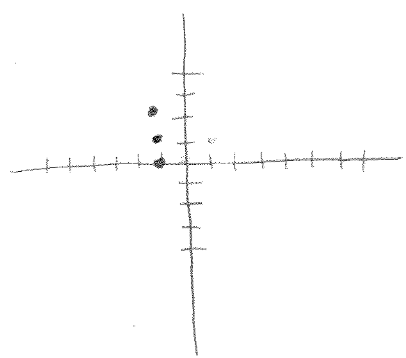
$b^2=5^2-4^2$

$b=3$

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

14. Center $(-1,1)$ Vertices $(-1,0)+(-1,2)$

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



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

$a=1$

$c=\frac{3}{4}$

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

$b^2=1^2-\left(\frac{3}{4}\right)^2$

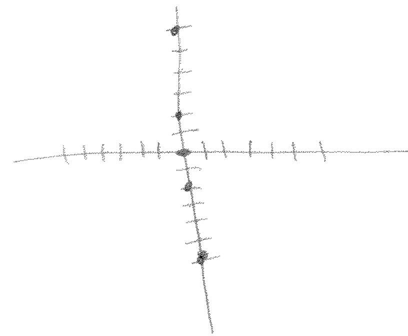
$b^2=\frac{16}{16}-\frac{9}{16}$

$b=\sqrt{\frac{7}{16}}$

$$\boxed{\frac{(x+1)^2}{\frac{7}{16}}+\frac{(y-1)^2}{1}=1}$$

15. focus: (0,6) vertices: (0,-2) + (0,2) | Hyperbola

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

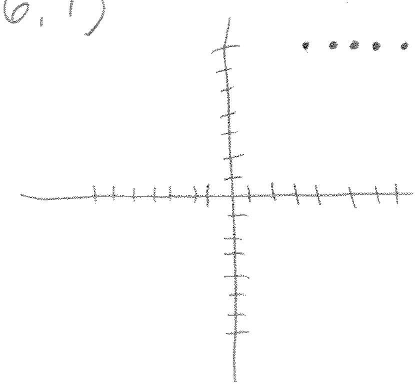


$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

$a = 2$
$c = 6$
$b^2 = c^2 - a^2$
$b^2 = 6^2 - 2^2$
$b = \sqrt{32} \approx 5.7$

$$\boxed{\frac{y^2}{4} - \frac{x^2}{32} = 1}$$

16. foci (3,7) + (7,7) and vertex (6,7)



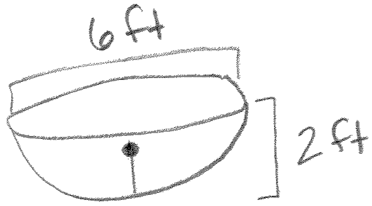
$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$

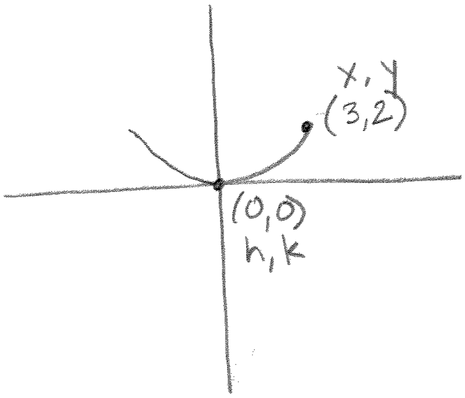
$$\frac{(x-5)^2}{a^2} - \frac{(y-7)^2}{b^2} = 1$$

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

$$\boxed{\frac{(x-5)^2}{1} - \frac{(y-7)^2}{3} = 1}$$

17.





$$(x-h)^2 = 4a(y-k)$$

$$x^2 = 4ay$$

$$3^2 = 4a(2)$$

$$9 = 8a$$

$$a = \frac{9}{8}$$

The receiver should be placed $9/8$ ft from the center of the paraboloid.