Review Exercises

Chapter 9 - Analytic Geometry - Conic Sections

1. Find the equation in standard form for a circle with center at (1,0) and containing the point (-3,2).

2. Find the center and radius of the circle whose equation is $x^2 + y^2 + 4x - 4y - 1 = 0$.

3. Consider each equation below. Without graphing or completing the square, identify whether the graph will be a circle, parabola, ellipse, or a hyperbola. Using the characteristics of the equation, justify your answer.

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

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

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

   d. $x^2 + 3y^2 + 8x – 6y + 4 = 0$

4. Identify the equation. If it is a parabola, give its vertex, focus, and directrix; if it is an ellipse, give its center, vertices, and foci; if it is a hyperbola, give its center, vertices, foci, and asymptotes.

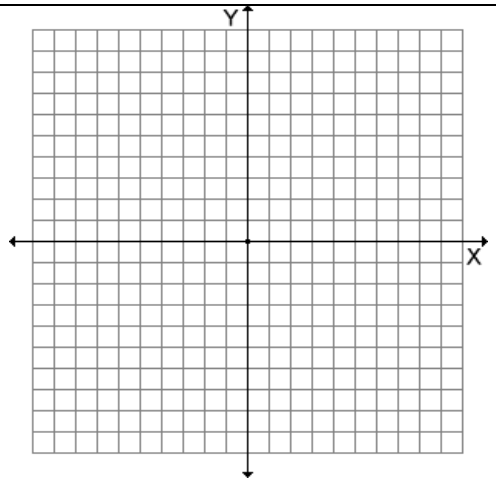
   a. $x^2 + 4y^2 + 4x - 8y + 4 = 0$ This is a(n) _____.

b. $y^2 = 8x$ This is a(n) _____.

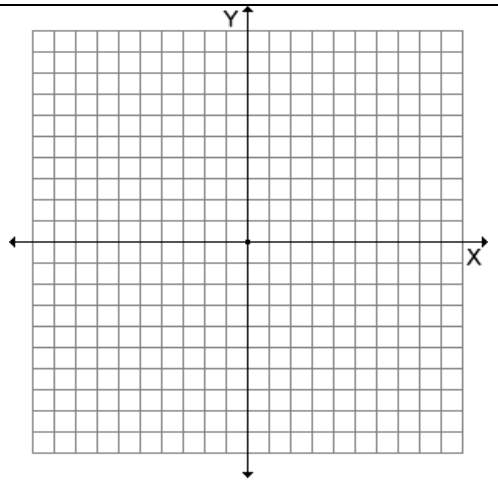
c. $\frac{x^2}{25} - \frac{y^2}{9} = 1$ This is a(n) _____.

5. Obtain the equation of the conic described. Graph the equation by hand.

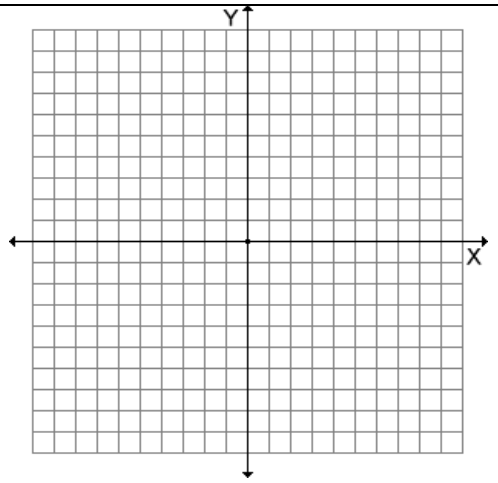
a. Parabola; focus at (-3,4); directrix the line y = 2. Also, give the focal length and focal width.

Equation: Focal Length: Focal Width:	

b. Ellipse; center at (-1,2), focus at (0,2); vertex at (2,2). Also, give the minor vertices.

Equation: Minor Vertices:	

c. Hyperbola; vertices at (0,-2) and (0,2); focus at (0,6). Also, give the equations of the asymptotes:

Equation: Asymptotes:	

6. A cable TV receiving dish is in the shape of a **paraboloid** of revolution. Find the location of the receiver, which is placed at the focus, if the dish is 4 feet across at its opening and 2 feet deep.

7. Jim is standing at one focus of a whispering gallery, 6 feet from the nearest wall. His friend is standing at the other focus, 100 feet away from him. What is the length of the whispering gallery? How high is its **elliptical** ceiling at the center?

8. Convert the polar equation to rectangular form and identify the conic section that it describes.

$r = \dfrac{3}{1-\sin\theta}$

9. Eliminate the parameter in the parametric equations and identify the conic section that it describes.

x = 3sint y = 3cost

BONUS

A bridge is built in the shape of a parabolic arch. The bridge has a span of 60 feet and a maximum height of 20 feet. Find the height of the arch at distances of 5, 10, and 20 feet from the center.