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.

<table>
<thead>
<tr>
<th>Equation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focal Length:</td>
</tr>
<tr>
<td>Focal Width:</td>
</tr>
</tbody>
</table>
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.

\[ r = \frac{3}{1 - \sin \theta} \]

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

\[ x = 3 \sin t \quad y = 3 \cos t \]

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.