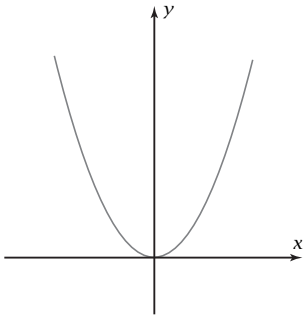
Name: _____ Group Members: _____

Exploration 12-3a: Quadric Surfaces

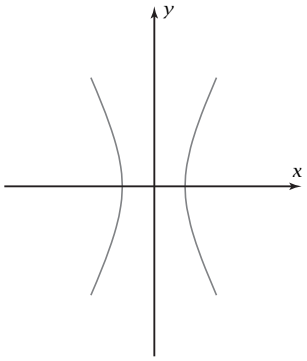
Date: _____

Objective: Sketch a figure formed by rotating a conic section about one of its axes.

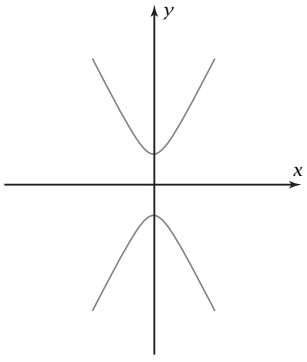
1. The graph shows the parabola $y = x^2$. Sketch the paraboloid formed by rotating this parabola about the y-axis.



2. The graph shows the hyperbola $4x^2 - y^2 = 4$. Sketch the hyperboloid formed by rotating this hyperbola about the y-axis.

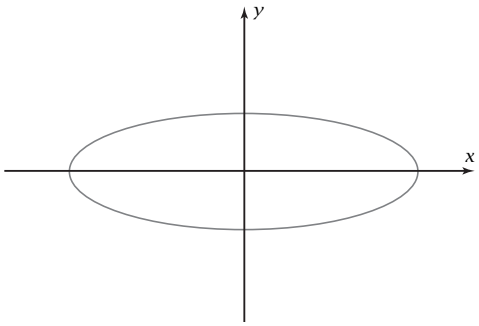


3. The graph shows the hyperbola $-4x^2 + y^2 = 1$. Sketch the hyperboloid formed by rotating this hyperbola about the y-axis.

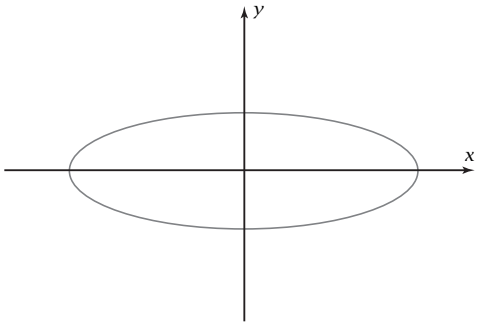


4. Why do you think the surface in Problem 2 is called a **hyperboloid of one sheet** and the surface in Problem 3 a **hyperboloid of two sheets**?

5. The graph shows the ellipse $x^2 + 9y^2 = 9$. Sketch the ellipsoid formed by rotating this ellipse about the x-axis. Do something to make it look three-dimensional.



6. On this copy of the ellipse in Problem 5, sketch the ellipsoid formed by rotating the ellipse about the y-axis.



7. What did you learn as a result of doing this Exploration that you did not know before?