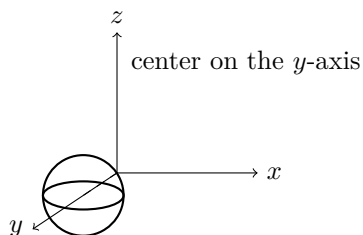


Question 5

Convert $\rho = 2 \sin \phi \sin \theta$ to rectangular coordinates and identify the surface. Which coordinate axis contains its center?

Question 5 – Solution

Strategy Recognize $\rho \sin \phi \sin \theta = y$, multiply the equation by ρ , and complete a square.



Conversion

$$\rho^2 = 2\rho \sin \phi \sin \theta = 2y.$$

Thus

$$x^2 + y^2 + z^2 = 2y \iff \boxed{x^2 + (y - 1)^2 + z^2 = 1}.$$

Geometry This is a sphere of radius 1 centered at $\boxed{(0, 1, 0)}$, so its center lies on the positive y -axis. The sphere is tangent to the origin.