

Worksheet #23: Pondering The Orb

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Problem 1. Convert

$$\int_0^3 \int_0^{\sqrt{9-y^2}} \int_{\sqrt{x^2+y^2}}^{\sqrt{18-x^2-y^2}} (x^2 + y^2 + z^2) dz dx dy$$

into spherical coordinates and then evaluate the integral. As always, try to sketch the region of integration.

Problem 2. Consider a right circular cone with constant density, radius a , and height h .

- (a) Find bounds that describe such a cone in cylindrical coordinates.
- (b) Find the moment of inertia of the cone about its axis of symmetry.
- (c) Find the moment of inertia of the cone about a diameter of its base.