



THE SPHERE ABOVE HAS RADIUS R WITH CIRCULAR HOLE $2a$ DRILLED THROUGH IT ALONG AN AXIS OF SYMMETRY.

Q. SHOW THAT VOLUME V OF THE DRILLED SPHERE IS $V = \frac{4}{3}\pi [R^2 - a^2]^{3/2}$.

I NEED TO USE MULTIPLE INTEGRALS TO CALCULATE.

DO I USE CYLINDRICAL POLAR COORDINATES OR SPHERICAL POLAR COORDINATES?

USE: VOL. INTEGRAL IN CYLINDRICAL POLAR COORDINATES:

$$\int_B f(\rho, \theta, z) = \rho \, dz \, d\theta \, d\rho = \int_{\rho=0}^{\rho=a} \left(\int_{\theta=-\pi}^{\theta=\pi} \left(\int_{z=0}^{z=h} f \, \rho \, dz \right) d\theta \right) d\rho$$

OR VOL. INTEGRAL IN SPHERICAL POLAR COORDINATES:

$$\int_B f \, dV = \int_B f(r, \theta, \phi) r^2 \sin \theta \, d\phi \, d\theta \, dr$$

$$= \int_{r=R_1}^{r=R_2} \left(\int_{\theta=0}^{\theta=\pi} \left(\int_{\phi=-\pi}^{\phi=\pi} f(r) r^2 \sin \theta \, d\phi \right) d\theta \right) dr$$

PLEASE HELP!!!