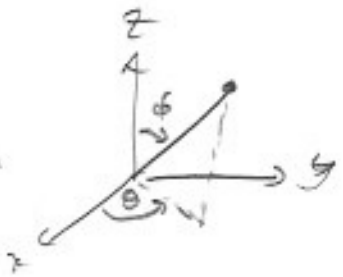
INSTRUCTED to use *Spherical*

$x = r\cos\theta\sin\phi$
$y = r\sin\theta\sin\phi$
$z = r\cos\phi$

$\left.\begin{array}{l}\phi = \text{polar}\\ \theta = \text{azimuth}\end{array}\right\}$



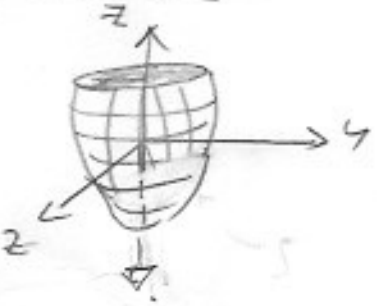
sphere $r^2 = 16 \Rightarrow r = 4$

cone $z = \frac{1}{\sqrt{3}}\sqrt{x^2+y^2}$

$r = 4$, ule SPHERICAL

$\rightarrow r\cos\phi = \frac{1}{\sqrt{3}}\sqrt{r^2\cos^2\theta\sin^2\phi + r^2\sin^2\theta\sin^2\phi}$

$\Rightarrow 4\cos\phi = \frac{4}{\sqrt{3}}\sin\phi \Rightarrow \tan\phi = \sqrt{3} \Rightarrow \boxed{\phi = \frac{\pi}{3}}$



In spherical

À la carte $\longrightarrow dS = r^2\sin\phi\, d\phi\, d\theta$

$$\therefore S = 16\int_0^{2\pi} d\theta \int_{\pi/3}^{\pi} d\phi \sin\phi$$

$$= 16 \times 2\pi \times \left[\cos\phi\right]_{\pi}^{\pi/3}$$

$$\boxed{S = 48\pi}$$

Correct?!