

12.8

Sunday, December 3, 2023 3:44 PM

$$\begin{aligned}
 (A) \quad 6. \quad S &= \int_0^{4n} \sqrt{1 + \sin^2 \frac{x}{n}} \, dx \\
 &= \int_0^{\pi} n \sqrt{1 + \sin^2 t} \, dt \\
 &= n \int_0^{\pi} \sin \frac{t}{2} + \cos \frac{t}{2} \, dt \\
 &= 4n
 \end{aligned}$$

$$\begin{aligned}
 8. \quad S &= \int_{-\pi}^{\pi} \sqrt{r^2 + r'^2} \, d\theta \\
 &= \int_{-\pi}^{\pi} 2a \cos \frac{\theta}{2} \, d\theta \\
 &= 8a
 \end{aligned}$$

$$\begin{aligned}
 (B) \quad 2. \quad V &= \int_{-R}^R \sqrt{3} (R^2 - x^2) \, dx \\
 &= 2\sqrt{3} \int_0^R (R^2 - x^2) \, dx \\
 &= \frac{4R^3}{\sqrt{3}}
 \end{aligned}$$

$$\begin{aligned}
 7. \quad y &= \sqrt{R^2 - x^2} \\
 P &= \int_a^{a+h} 2\pi y \cdot \sqrt{1 + y'^2} \, dx \\
 &= 2\pi R h \quad \text{Q.E.D.}
 \end{aligned}$$