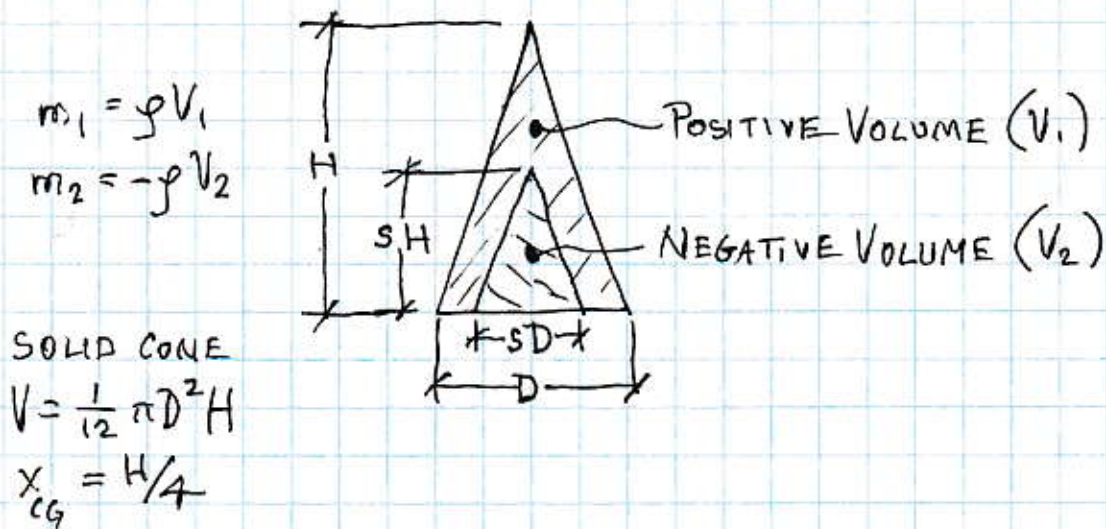


02/2025  
R.N.

## C.G. OF A HOLLOW CONE



$$\text{HOLLOW CONE: } x_{CG} = \frac{m_1 \bar{x}_1 + m_2 \bar{x}_2}{m_1 + m_2} = \frac{V_1 \rho \bar{x}_1 + (-V_2 \rho) \bar{x}_2}{V_1 \rho + (-V_2 \rho)}$$

$$\Rightarrow x_{CG} = \frac{\frac{1}{12} \rho \pi D^2 H \left(\frac{H}{4}\right) + \left[-\frac{1}{12} \rho \pi (sD)^2 (sH) \frac{sH}{4}\right]}{\frac{1}{12} \rho \pi D^2 H + \left[-\frac{1}{12} \rho \pi (sD)^2 sH\right]}$$

$$= \frac{\frac{1}{12} \rho \pi D^2 \frac{H^2}{4} - \frac{1}{12} \rho \pi s^2 D^2 s^2 \frac{H^2}{4}}{\frac{1}{12} \rho \pi D^2 H - \frac{1}{12} \rho \pi s^2 D^2 s H}$$

$$= \frac{\frac{H}{4} - s^4 \frac{H}{4}}{1 - s^3}$$

$$\Rightarrow x_{CG} = \frac{H}{4} \left( \frac{1 - s^4}{1 - s^3} \right)$$