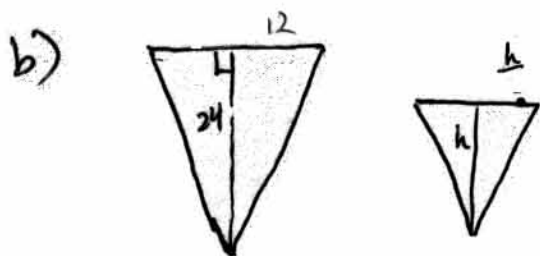


#11 a) $V = \frac{1}{3} \pi r^2 h$

$$\frac{dV}{dt} = \frac{1}{3} \pi r^2 \frac{dh}{dt} + h \left(\frac{2}{3} \pi r \right) \frac{dr}{dt}$$



(similar triangles)
radius $\frac{h}{2}$

$$V = \frac{1}{3} \pi r^2 h$$

$$= \frac{1}{3} \pi \left(\frac{h}{2} \right)^2 h$$

$$= \frac{1}{12} \pi h^3$$

c) $\frac{dV}{dt} = 5 \frac{\text{in}}{\text{hr}}$

$$V = \frac{\pi}{12} h^3$$

$$\frac{dV}{dt} = \frac{\pi}{12} (3h^2) \frac{dh}{dt} = \frac{\pi}{4} h^2 \frac{dh}{dt}$$

when height 10 inches

$$5 = \frac{\pi}{4} (10)^2 \frac{dh}{dt}$$

$$\frac{5}{25\pi} = \frac{dh}{dt}$$

when height 4 inches

$$5 = \frac{\pi}{4} (4)^2 \frac{dh}{dt}$$

$$\frac{5}{4\pi} = \frac{dh}{dt}$$

As cone gets thinner
the height decreases
faster