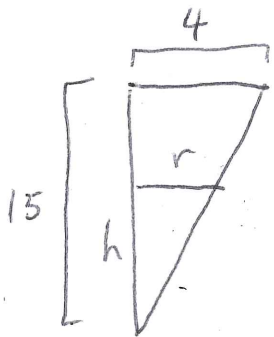


Dimensions: (15 cm deep and 8 cm across)

c) Boy sipping water from <sup>conical</sup> cup at rate of  $20 \text{ cm}^3/\text{s}$  when water is 10 cm deep.

Find rate of radius of water level changing.



$$\frac{r}{4} = \frac{h}{15}$$

$$15r = 4h$$

$$\frac{15r}{4} = h$$

$$\frac{dV}{dt} = -20$$

$$h = 10$$

$$\frac{dr}{dt} = \underline{\hspace{2cm}}$$

Since  $h = 10$ ,

$$15r = 4h$$

$$15r = 4(10)$$

$$r = \frac{40}{15} = \frac{8}{3}$$

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

$$V = \frac{\pi}{3} r^2 \left( \frac{15r}{4} \right)$$

$$V = \frac{15\pi}{12} r^3$$

$$V = \frac{5\pi}{4} r^3$$

$$\frac{dV}{dt} = \frac{5\pi}{4} \cdot 3r^2 \left( \frac{dr}{dt} \right)$$

$$\frac{dV}{dt} = \frac{15\pi}{4} r^2 \left( \frac{dr}{dt} \right)$$

$$-20 = \frac{15\pi \left( \frac{8}{3} \right)^2}{4} \left( \frac{dr}{dt} \right)$$

$$-20 = \frac{15\pi (64)}{4(9)} \frac{dr}{dt}$$

$$\frac{-20(4)(9)}{15\pi(64)} = \frac{dr}{dt}$$

$$\frac{-3}{4\pi} = \frac{dr}{dt}$$

$$\frac{dr}{dt} = \frac{-3}{4\pi} \text{ cm/s}$$