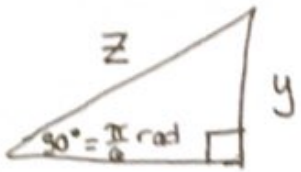
1.



Find $\frac{dy}{dz}$ given $\frac{dz}{dt} = 500 \frac{mi}{hr}$.

$$\sin\left(\frac{\pi}{6}\right) = \frac{y}{z}$$

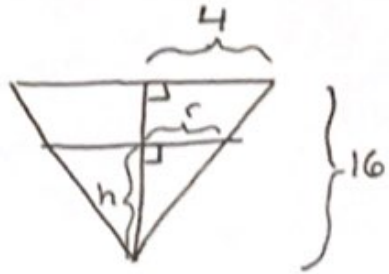
$$\frac{1}{2} = \frac{y}{z}$$

$$z = 2y$$

$$\frac{dz}{dt} = 2\frac{dy}{dt}$$

$$\frac{dy}{dt} = 250.$$

2.



Find $\frac{dh}{dt}$ when $h = 8$, given that $\frac{dV}{dt} = -2$.

Similar triangles gives

$$\frac{4}{r} = \frac{16}{h}$$

or $$r = \frac{h}{4}.$$

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

$$= \frac{\pi}{48} h^3$$

$$\frac{dV}{dt} = \frac{\pi}{16} h^2 \frac{dh}{dt}$$

$$\frac{dh}{dt} = \frac{-1}{2\pi}$$