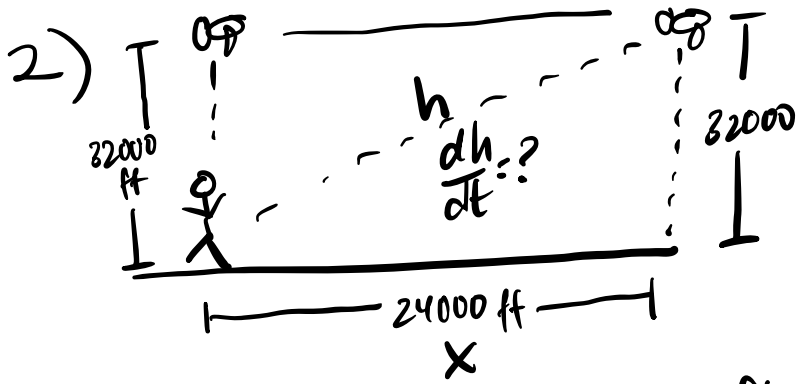


Homework 14

120 mph



$$\frac{dx}{dt} = 633600 \frac{\text{ft}}{\text{hr}}$$

$$24000^2 + 32000^2 = h^2$$

$$h = 40,000$$

$$120 \frac{\text{mi}}{\text{hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} = 633600 \frac{\text{ft}}{\text{hr}}$$

$$y \frac{dy}{dt} = 0$$

$$x^2 + y^2 = h^2$$

$$x^2 + (32000)^2 = h^2$$

$$2x \frac{dx}{dt} = 2h \frac{dh}{dt}$$

$$2 \cdot 24000 (633600) = 2 \cdot 40000 \frac{dh}{dt}$$

$$\frac{dh}{dt} = 380160 \frac{\text{ft}}{\text{hr}}$$

8)



$$h = d$$

$$\frac{dh}{dt} = 5 \frac{\text{ft}}{\text{min}}$$

$$\frac{dV}{dt} = ?$$

$$h = 10 \text{ ft}$$

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

$$r = \frac{1}{2} d$$

$$r = \frac{1}{2} h$$

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

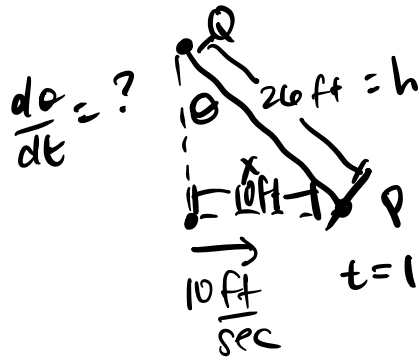
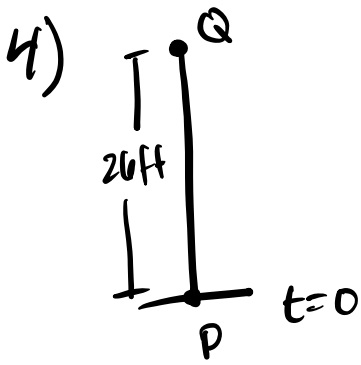
$$V = \frac{1}{3} \pi \cdot \frac{1}{4} h^2 h$$

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

$$\frac{dV}{dt} = \frac{\pi}{12} \cdot 3h^2 \frac{dh}{dt}$$

$$\frac{dV}{dt} = \frac{\pi}{4} \cdot 10^2 \cdot 5$$

$$\frac{dV}{dt} = 125\pi \text{ ft}^3/\text{min}$$



$$\sin \theta = \frac{x}{h}$$

$$\sin \theta = \frac{x}{26}$$

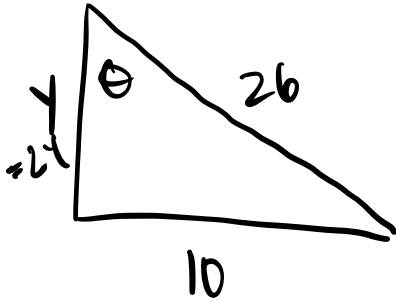
$$x = 26 \sin \theta$$

$$\frac{dx}{dt} = 26 \cos \theta \frac{d\theta}{dt}$$

$$10 = 26 \left(\frac{24}{26} \right) \frac{d\theta}{dt}$$

$$10 = 24 \frac{d\theta}{dt}$$

$$\frac{d\theta}{dt} = \frac{10}{24} = \frac{5}{12} \text{ rad/sec}$$

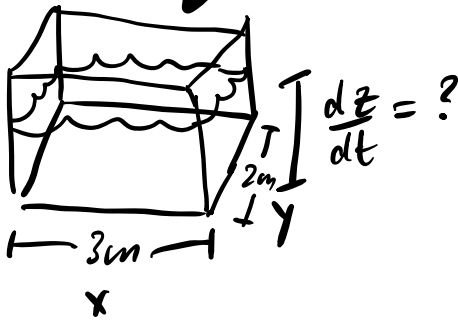


$$26^2 - 10^2 = y^2$$

$$y = 24$$

$$\frac{dV}{dt} = 0.3 \text{ m}^3/\text{min}$$

6)



$$V = xyz$$

$$V = 2 \cdot 3 \cdot z$$

$$V = 6z$$

$$\frac{dV}{dt} = 6 \frac{dz}{dt}$$

$$0.3 = 6 \frac{dz}{dt}$$

$$\frac{dz}{dt} = .05 \text{ m/sec}$$