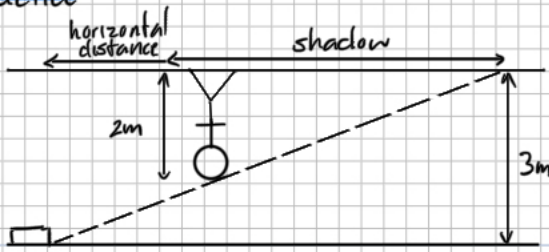
Today: 4/11/23

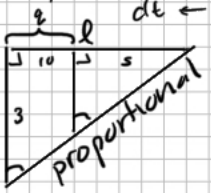
Practice

6.



how is Joe's shadow changing with time?

@ 10m, find $\frac{ds}{dt}$ ← shadow / ← time



$h = 3$

$\ell = 10 + s$

↳ $\ell = q + s$

$\frac{10+s}{3} = \frac{s}{2}$

$2(10+s) = 3s$

$20 + 2s = 3s$

$20 = s$

↳ at that instant but not the rate that it is changing

$\frac{q+s}{3} = \frac{s}{2}$

$2(q+s) = 3s$

$2q = s$

$\frac{dq}{dt} = 10$

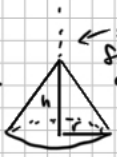
Solving for the derivative

↳ $\frac{d}{dt}(2q = s) = 2 \cdot \frac{dq}{dt} = \frac{ds}{dt}$

$2 \cdot 10 = \frac{ds}{dt}$

$20 \frac{m}{s} = \frac{ds}{dt}$

7.



$h = r$

1. rate of change for the height of the cone

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

differentiating with respect to time

$\frac{d}{dt}(V) = \frac{d}{dt}\left(\frac{\pi r^3}{3}\right) \rightarrow \frac{dV}{dt} = \frac{\pi}{3} \cdot \frac{d}{dt}(r^3)$

$= \frac{\pi}{3} \cdot 3r^2 \cdot \frac{dr}{dt}$

$\frac{dv}{dt} = 0.1 \frac{m^3}{min}$

@ $h = 1m$

$\frac{dv}{dt} \rightarrow 0.1 = \pi (1)^2 \cdot \left(\frac{dr}{dt}\right)$

↑ r

$\frac{dh}{dt} = \frac{dr}{dt} = \frac{0.1}{\pi}$ or $\frac{1}{10\pi} \frac{m}{min}$