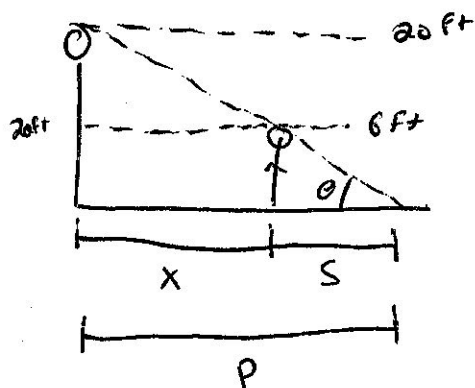


# Shadow length problem

\* Not drawn to scale

pg. 188 #30  
calc 6E

★



$$\frac{dx}{dt} = -5 \frac{\text{ft}}{\text{sec}}$$

$$P = x + s$$

$$\frac{dP}{dt} = \frac{dx}{dt} + \frac{ds}{dt} = \frac{-15}{7} \frac{\text{ft}}{\text{sec}} + \frac{-5}{1} \frac{\text{ft}}{\text{sec}} = -\frac{50}{7} \frac{\text{ft}}{\text{sec}} \approx -7.14 \frac{\text{ft}}{\text{sec}}$$

change in shadow point

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{20 \text{ ft}}{x+s} = \frac{6 \text{ ft}}{s}$$

$$(20 \text{ ft})(s) = 6 \text{ ft}(x+s)$$

$$20s \text{ ft} = 6x \text{ ft} + 6s \text{ ft} \quad \leftrightarrow \text{Drop units}$$

$$20s = 6x + 6s$$

$$14s = 6x$$

$$s = \frac{6}{14} x$$

$$s = \frac{3}{7} x$$

~~ds/dt = 1/7 [3/7 x]~~

$$\frac{ds}{dt} = \frac{1}{dt} \left[ \frac{3}{7} x \right]$$

$$\frac{ds}{dt} = \frac{3}{7} x' = \frac{3}{7} \left( \frac{dx}{dt} \right) \quad \text{substitute}$$

$$\frac{ds}{dt} = \frac{3}{7} (-5) = \frac{-15}{7} \frac{\text{ft}}{\text{sec}} \quad \text{change in shadow length}$$

$$\textcircled{A} \quad \frac{ds}{dt} = \frac{-15}{7} \frac{\text{ft}}{\text{sec}}$$

$$\textcircled{B} \Rightarrow \frac{dP}{dt} = \frac{-50}{7} \frac{\text{ft}}{\text{sec}} \approx -7.14 \frac{\text{ft}}{\text{sec}}$$