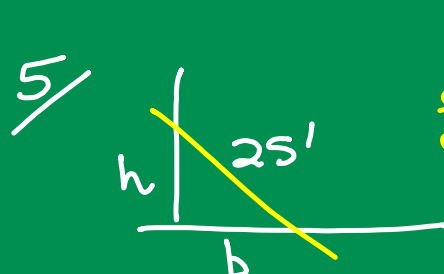


RELATED RATES 2

5/



$$\frac{d}{dt} \left[A = \frac{1}{2} b h \right]$$



$$49 + h^2 = 625$$

$$\sqrt{h^2} = \sqrt{576}$$

$$h = 24$$

$$\frac{dA}{dt} = \frac{1}{2} \left[b \cdot \frac{dh}{dt} + h \cdot \frac{db}{dt} \right]$$

$$\frac{dA}{dt} = \frac{1}{2} \left[\underset{\text{ft}}{7} \cdot \underset{\text{ft}}{0.3} + \underset{\text{ft}}{24} \cdot \underset{\frac{\text{ft}}{\text{sec}}}{\left(\frac{36}{35} \right)} \right]$$

$$\frac{dA}{dt} \approx 11.29 \frac{\text{ft}^2}{\text{sec}}$$

$$\frac{d}{dt} \left[h^2 + b^2 = 25^2 \right]$$

$$2h \frac{dh}{dt} + 2b \frac{db}{dt} = 0$$

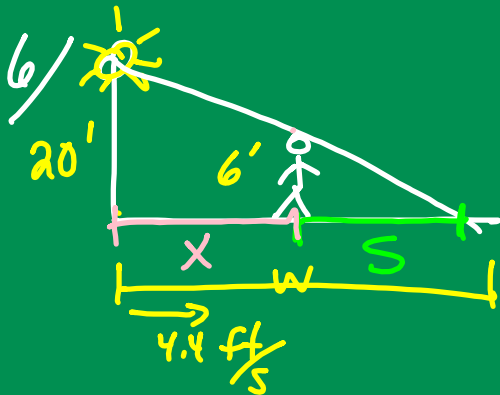
$$2(24)(0.3) + 2(7) \frac{db}{dt} = 0$$

$$-14.4 + 14 \frac{db}{dt} = 0$$

$$14 \frac{db}{dt} = \frac{14.4}{14}$$

$$\frac{db}{dt} = \frac{144}{140}$$

$$= \frac{72}{70} = \frac{36}{35}$$



b) How fast is tip of shadow moving?

$$W = x + S$$

$$\begin{aligned}\frac{dw}{dt} &= \frac{dx}{dt} + \frac{ds}{dt} \\ &= 4.4 + 1.89 \\ &= 6.29 \frac{ft}{s}\end{aligned}$$

Similar Δ 's

$$\frac{h_{big}}{h_{small}} = \frac{b_{big}}{b_{small}}$$

$$\frac{20}{6} = \frac{x+S}{S}$$

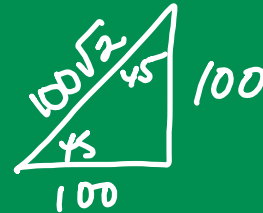
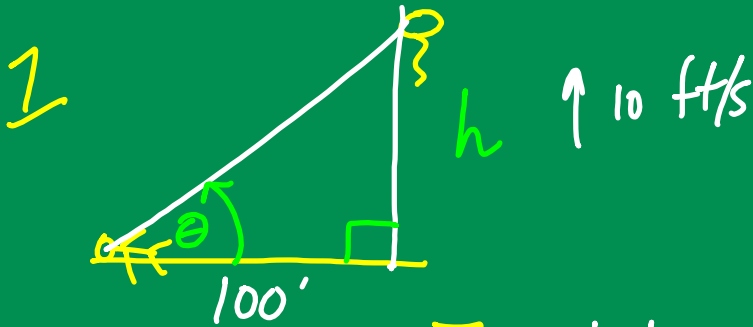
$$20S = 6x + 6S$$

$$\frac{d}{dt} [14S = 6x]$$

$$14 \frac{ds}{dt} = 6 \frac{dx}{dt}$$

$$\frac{14 \cancel{ds}}{\cancel{dt}} = \frac{6(4.4)}{14}$$

$$\frac{ds}{dt} \approx 1.89 \frac{ft}{s}$$



$$\frac{d}{dt} \left[\tan \theta = \frac{h}{100} \right] \quad \frac{1}{100} h$$

$$\sec \theta = \frac{r}{x} = \frac{100\sqrt{2}}{100}$$

$$\sec^2 \theta \frac{d\theta}{dt} = \frac{1}{100} \frac{dh}{dt}$$

$$\frac{\text{ft}}{\text{ft}} \left(\frac{100\sqrt{2}}{100} \right)^2 \frac{d\theta}{dt} = \frac{1}{100 \text{ ft}} (10 \frac{\text{ft}}{\text{sec}})$$

$$\frac{2 \cancel{d\theta}}{2} \frac{d\theta}{dt} = \frac{1}{\cancel{20}} \cdot \frac{1}{2}$$

$$\frac{d\theta}{dt} = \frac{1}{20} \frac{\text{rad}}{\text{sec}}$$