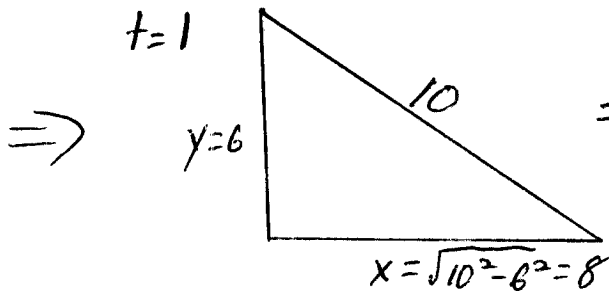
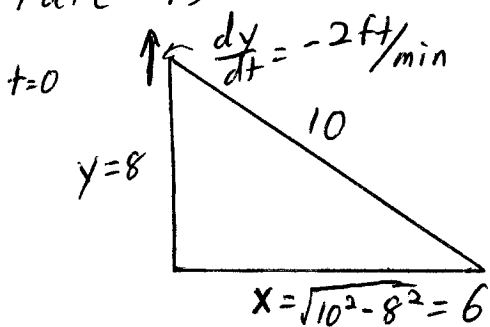
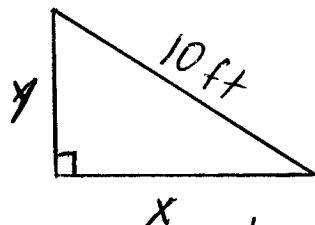


Math 21A
Vogler

Related Rate Example

Consider following triangle:

Assume edge y is decreasing
@ rate of $2\text{ft}/\text{min}$. At what
rate is the area of triangle changing when $y = 8\text{ft}$?



$\Rightarrow$ y & x are
functions
of time

Let $A := \text{Area of Triangle}$

Goal: Find $\frac{dA}{dt}$ when $y = 8\text{ft}$ & $\frac{dy}{dt} = -2\text{ft}/\text{min}$

Assume $x(t), y(t), \& A(t)$

$$A = \frac{1}{2}xy \Rightarrow \frac{d}{dt}[A = \frac{1}{2}xy] \Rightarrow \frac{dA}{dt} = \frac{1}{2}x \frac{dy}{dt} + \frac{1}{2}\frac{dx}{dt}y \quad (*)$$

Problem ??? Need to find x & $\frac{dx}{dt}$

Recall: $x^2 + y^2 = 10^2 \Rightarrow x^2 = 100 - 64 = 36 \Rightarrow x = 6\text{ft}$

Also, $\frac{d}{dt}[x^2 + y^2 = 10^2] \Rightarrow 2x \frac{dx}{dt} + 2y \frac{dy}{dt} = 0$

$$\Rightarrow \frac{dx}{dt} = \frac{-y \frac{dy}{dt}}{x} = \frac{-8(-2)}{6} = \frac{8}{3} \text{ft}/\text{min}$$

Hence, (*) becomes $\frac{dA}{dt} = \frac{1}{2}(6)(-2) + \frac{1}{2}\left(\frac{8}{3}\right)8 = \boxed{\frac{14}{3} \text{ft}/\text{min}}$