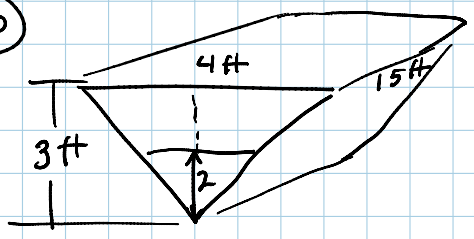
HW 4.6 p. 252 20-22, 25, 29

Saturday, December 13, 2014
2:30 PM

(20)



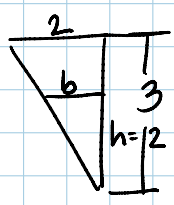
$\frac{dV}{dt} = 2.5\ ft^3/min$

$V = \frac{1}{2}(2b)h(15)$

$V = 15bh$

$V = 15(\frac{2}{3}h)h$

$V = 10h^2$



similar Δs

$\frac{h}{b} = \frac{3}{2}$

$3b = 2h$

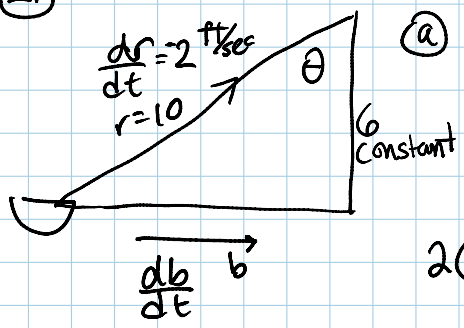
$b = \frac{2}{3}h$

$\frac{dV}{dt} = 10(2h)\frac{dh}{dt}$

$2.5 = 20(2)\frac{dh}{dt}$

$\boxed{\frac{dh}{dt} = \frac{1}{16}\ ft/min}$

(21)



(a) when $r = 10$, $b = 8$

$b^2 + 6^2 = r^2$

$2b\frac{db}{dt} + 0 = 2r\frac{dr}{dt}$

$2(8)(\frac{db}{dt}) = 2(10)(-2)$

$\boxed{\frac{db}{dt} = -\frac{5}{2}\ ft/sec}$

Boat is approaching dock at rate of 5/2 ft/sec.

(b) $\cos\theta = \frac{6}{10}$

$\theta = \cos^{-1}(\frac{6}{10})$

$\cos\theta = \frac{6}{r}$

$-\sin\theta \cdot \frac{d\theta}{dt} = -6r^{-2}\frac{dr}{dt}$

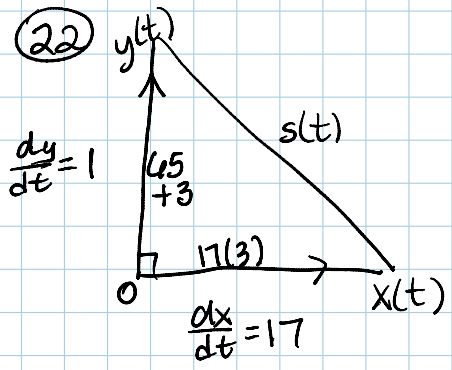
$-\sin(\cos^{-1}(\frac{6}{10}))\frac{d\theta}{dt} = -6(10)^{-2}(-2)$

$-\frac{8}{10}\frac{d\theta}{dt} = \frac{12}{100}$

$\boxed{\frac{d\theta}{dt} = -\frac{3}{20}\ rad/sec}$

Angle is decreasing at a rate of $\frac{-3}{20}$ rad/sec

(22)



$68^2 + 51^2 = s^2$

$85 = s$

find $\frac{ds}{dt}$

$x^2 + y^2 = s^2$

$2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 2s\frac{ds}{dt}$

$2(51)(17) + 2(68)(1) = 2(85)\frac{ds}{dt}$

$$2(51)(17)+2(68)(1)=2(85)\frac{ds}{dt}$$

$$\boxed{\frac{ds}{dt}=11 \text{ ft/sec}}$$

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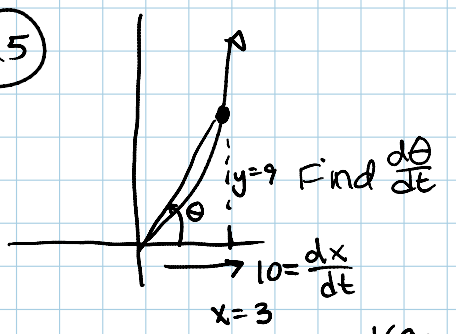

Find $\frac{d\theta}{dt}$

$$\tan\theta=\frac{y}{x}$$

$$\tan\theta=\frac{x^2}{x}=x$$

$$\sec^2\theta\frac{d\theta}{dt}=\frac{dx}{dt}$$

$$\sec^2(\tan^{-1}(3))\frac{d\theta}{dt}=10$$

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

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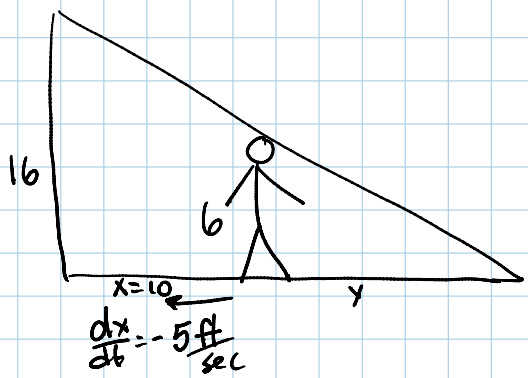

Similar Δs $\quad \frac{y}{x+y}=\frac{6}{16}$

Find $\frac{dy}{dt}$

$$16y=6x+6y$$

$$10y=6x$$

$$\frac{5}{3}y=x$$

$$\frac{5}{3}\frac{dy}{dx}=\frac{dx}{dy}$$

$$\frac{5}{3}\frac{dy}{dx}=-5$$

$$\boxed{\frac{dy}{dx}=-3 \text{ ft/sec}}$$