

4.6 Day 1

1. A. $V = \frac{4}{3}\pi r^3$

$r = 3$ $\frac{dr}{dt} = 2$

$\frac{dV}{dt} = ?$

$\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$

$\frac{dV}{dt} = 4\pi (3)^2 (2) = 72\pi \text{ in}^3/\text{sec.}$

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B. $\frac{dr}{dt} = 2$ $S = 4\pi r^2$

$r = 3$

$\frac{dS}{dt} = 8\pi r \frac{dr}{dt}$

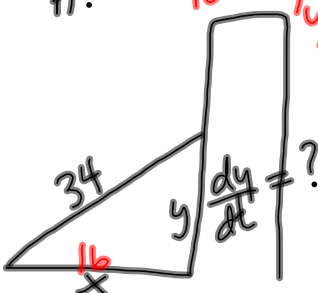
$= 8\pi (3)(2)$

$\frac{dS}{dt} = ?$

$\frac{dS}{dt} = 48\pi \text{ in}^2/\text{sec}$

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3. A.



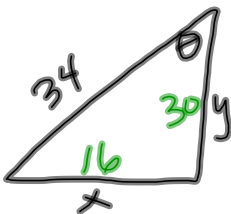
$16^2 + y^2 = 34^2$
 $y = 30$

$x^2 + y^2 = 34^2$
 $2x \frac{dx}{dt} + 2y \frac{dy}{dt} = 0$
 $2(16)(3) + 2(30) \frac{dy}{dt} = 0$
 $96 + 60 \frac{dy}{dt} = 0$
 $\frac{dy}{dt} = \frac{-96}{60} = -1.6 \text{ ft/sec}$
 falling 1.6 ft/sec.

$\frac{dx}{dt} = 3$
 $x = 16$

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B

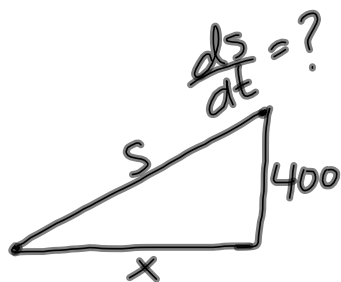


$\tan \theta = \frac{x}{y}$
 $\sec^2 \theta \frac{d\theta}{dt} = \frac{y \frac{dx}{dt} - x \frac{dy}{dt}}{y^2}$
 $\left(\frac{34}{30}\right)^2 \frac{d\theta}{dt} = \frac{30(3) - 16(-1.6)}{30^2}$
 ~~$\frac{900(1156)}{1156} \frac{d\theta}{dt} = \frac{115.6}{900} \frac{900}{1156}$~~
 $\frac{d\theta}{dt} = \frac{115.6}{1156} = .1 \text{ rad/sec.}$

$\frac{dx}{dt} = 3$
 $x = 16$
 $\frac{d\theta}{dt} = ?$
 $y = 30$
 $\frac{dy}{dt} = -1.6$

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4.



$$\frac{dx}{dt} = 20$$

$$s = 500$$

$$x^2 + 400^2 = 500^2$$

$$x = 300$$

$$x^2 + 400^2 = s^2$$

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

$$2(300)(20) = 2(500) \frac{ds}{dt}$$

$$12000 = 1000 \frac{ds}{dt}$$

$$\frac{ds}{dt} = 12 \text{ ft/sec}$$

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