

Homework 11/14 solutions

16. $\frac{ds}{dt} = 6$ Surface area of cube = $6s^2$

Find $\frac{dA}{dt}$

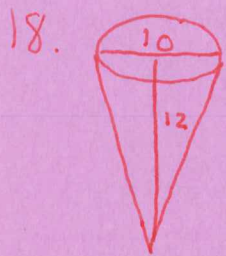
~~A = 6s^2~~

$A = 6s^2$

$\frac{dA}{dt} = 12s \frac{ds}{dt}$

$\frac{dA}{dt} = 12(2)(6) = 144 \text{ cm}^2/\text{sec}$

$\frac{dA}{dt} = 12(10)(6) = 720 \text{ cm}^2/\text{sec}$



$\frac{dv}{dt} = 8$

When $h = 8$

diameter = 10, $r = 5$

height = 12

$\frac{r}{h} = \frac{5}{12}$, so $12r = 5h$

$r = \frac{5}{12}h$

Volume = $\frac{1}{3} \pi r^2 h = \frac{1}{3} \pi \left(\frac{5}{12}h\right)^2 h$

$= \frac{1}{3} \pi \left(\frac{25}{144} h^2\right) h$

$= \frac{1}{3} \pi \left(\frac{25}{144}\right) h^3$

~~$\frac{dv}{dt} = \frac{25}{3} \pi$~~

$V = \frac{25}{432} \pi h^3 \quad \frac{dv}{dt} = \frac{75}{432} \pi h^2 \frac{dh}{dt}$

$10 \pi = \frac{75}{432} \pi (8)^2 \frac{dh}{dt}$

$10 \pi = \frac{75}{432} \pi (64) \frac{dh}{dt}$

$10 \pi = \frac{4800 \pi}{432} \frac{dh}{dt}$

$\frac{10 \pi \cdot 432}{4800 \pi} = \frac{4320}{4800 \pi} = \frac{9}{10 \pi} \text{ ft/min}$