

Goals: Related Rates: Beginning

Hw: "Sample Test" due Tom.

Rel-Rates wkshk - Due Friday.

$$V = s^3$$

Related Rates:

time

$$\frac{d}{dt} V = \frac{d}{dt} s^3$$

$$\frac{dV}{dt} = 3s^2 \frac{ds}{dt}$$

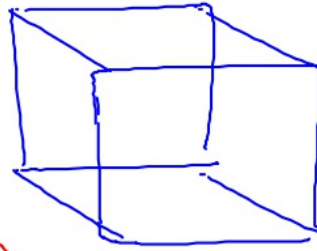
rate

$$\frac{dV}{dt} = 3 \cdot 3^2 \cdot \frac{ds}{dt}$$

$$\frac{dV}{dt} = 27 \frac{ds}{dt}$$

$$-10 = 27 \cdot \frac{ds}{dt}$$

$$-\frac{10}{27} = \frac{ds}{dt}$$



① Surface Area: 54 m^2

$$SA = 6s^2 = 54$$

$$\underline{\underline{s = 3 \text{ m}}}$$

instant

$$-10 \text{ m}^3/\text{hr}$$

$$SA = 6s^2$$

$$\frac{dSA}{dt} = 12s \cdot \frac{ds}{dt}$$

$$12 \cdot 3 \cdot \frac{-10}{27}$$

$$\frac{dSA}{dt} = \frac{-360}{27} \frac{\text{m}^2}{\text{hr}}$$

$$\frac{d}{dt}(x^2 - y^2) = \frac{d}{dt}(39)$$

$$2x \cdot \frac{dx}{dt} - 2y \frac{dy}{dt} = 0$$

$$2x \cdot 2 - 2(5) \frac{dy}{dt} = 0$$

$$2 \cdot 8 \cdot 2 - 10 \frac{dy}{dt} = 0$$

$$\frac{dy}{dt} = \frac{32}{10} = \frac{16}{5}$$

When in doubt,
take the derivative.

$$x^2 - 25 = 39$$

$$x^2 = 64$$

$$\underline{x = 8}$$

$$\frac{dD}{dt} = 10$$

$$\boxed{\frac{dV}{dt} = ?} \quad @ D = 4 \text{ cm}$$

$$V_s = \frac{4}{3} \pi r^3$$

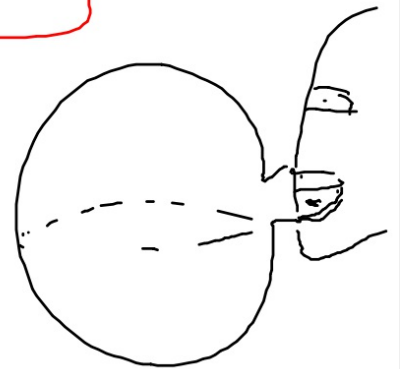
$$V = \frac{4}{3} \pi \cdot \left(\frac{1}{2}D\right)^3$$

$$V = \frac{4\pi}{3} \cdot \frac{D^3}{8}$$

$$V = \frac{\pi D^3}{6}$$

$$\frac{dV}{dt} = \frac{\pi}{6} \cdot 3D^2 \cdot \frac{dD}{dt}$$

$$\frac{dV}{dt} = \frac{\pi}{2} \cdot 8 \cdot (16) \cdot 10$$
$$\underline{800\pi} \text{ cm}^3/\text{s}$$



$$\boxed{\begin{aligned} D &= 2r \\ \frac{D}{2} &= r \end{aligned}}$$

#544, 546
for

Thursday

$$\frac{549)}{25} \quad \text{in/sec}$$
$$\frac{25}{16\pi}$$