

$$\frac{dc}{dt} = 40 \text{ ft/s}$$

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

$$\text{when } C = 100\pi$$

$$C = 2\pi r$$

$$\frac{dC}{dt} = 2\pi \frac{dr}{dt}$$

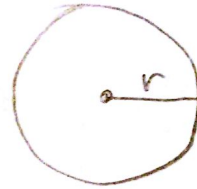
$$40 = 2\pi \frac{dr}{dt} \quad \frac{dr}{dt} = \frac{20}{\pi}$$

$$A = \pi r^2$$

$$\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$$

$$\frac{dA}{dt} = 2\pi(50)\left(\frac{20}{\pi}\right)$$

$$\frac{dA}{dt} = 2000 \text{ ft}^2/\text{s}$$



$$C = 2\pi r$$

$$A = \pi r^2$$

$$100\pi = 2\pi r$$

$$r = 50$$

2

$$\frac{dV}{dt} = 27\pi \text{ in}^3/\text{s}$$

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

$$\text{when } r = 3$$

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

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

$$27\pi = 4\pi(3)^2 \left(\frac{dr}{dt}\right)$$

$$\frac{3}{4} = \frac{dr}{dt}$$

$$\text{in/s}$$



3

$$x^2 + y^2 = z^2$$

$$2x \frac{dx}{dt} + 2y \frac{dy}{dt} = 2z \frac{dz}{dt}$$

$$2(-180)(-60) + 2(-240)(-80) = 2(300) \left(\frac{dz}{dt}\right)$$

$$21600 + 38400 = 600 \frac{dz}{dt}$$

$$\frac{dz}{dt} = 100 \text{ km/hr}$$

x
-60 km/hr

-180

-80 km/hr

y
-240

t = 3 hrs

4

$$\frac{dV}{dt} = 108\pi \text{ m}^3/\text{s}$$

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

$$r = 6$$

$$V = \pi r^2 \cdot h$$

$$V = \pi(6)^2 \cdot h$$

$$V = 36\pi \cdot h$$

$$\frac{dV}{dt} = 36\pi \frac{dh}{dt}$$

$$108\pi = 36\pi \frac{dh}{dt}$$

$$\frac{dh}{dt} = 3 \text{ m/s}$$



*

5

$$\frac{ds}{dt} = 27 \text{ in/sec}$$

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

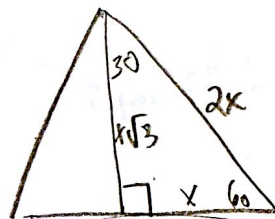
$$\text{when } s = 18$$

$$A = \frac{\sqrt{3}}{4} s^2$$

$$\frac{dA}{dt} = \frac{\sqrt{3}}{2} s \frac{ds}{dt}$$

$$\frac{dA}{dt} = \frac{\sqrt{3}}{2} (18)(27)$$

$$\frac{dA}{dt} = 243\sqrt{3} \text{ in}^2/\text{s}$$



$$A = \frac{s^2\sqrt{3}}{4}$$

6

$$\frac{dV}{dt} = -35\pi \text{ m}^3/\text{s}$$

$$V = \frac{1}{3}\pi r^2 h$$

$$V = \frac{1}{3}\pi \left(\frac{7}{5}h\right)^2 \cdot h$$

$$V = \frac{49}{75}\pi h^3$$

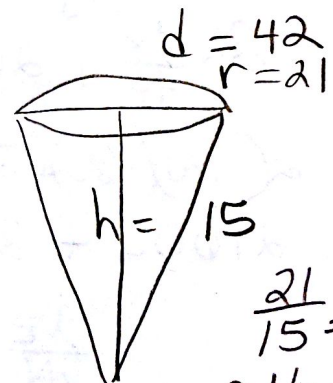
$$\frac{dh}{dt} = ?$$

$$\text{when } h = 5$$

$$\frac{dV}{dt} = \frac{49}{25}\pi h^2 \frac{dh}{dt}$$

$$-35\pi = \frac{49}{25}\pi (5)^2 \left(\frac{dh}{dt}\right)$$

$$-\frac{5}{7} \text{ in/s} = \frac{dh}{dt}$$



$$\frac{21}{15} = \frac{r}{h}$$
$$21h = 15r$$
$$r = \frac{7}{5}h$$

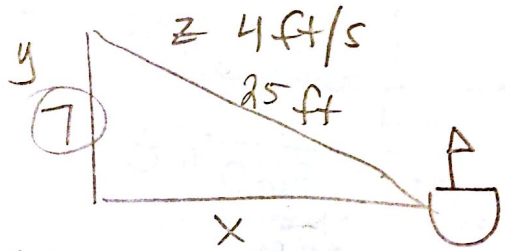
$$x^2 + y^2 = z^2$$

$$x^2 + 7^2 = z^2$$

$$2x \frac{dx}{dt} = 2z \frac{dz}{dt}$$

$$2(24) \left(\frac{dx}{dt} \right) = 2(25)(-4)$$

$$-\frac{25}{6} \text{ ft/s}$$



$$7^2 + x^2 = 25^2$$

$$x = 24$$

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

when

$$z = 25$$

8

$$\frac{6}{24} \times \frac{y}{x+y}$$

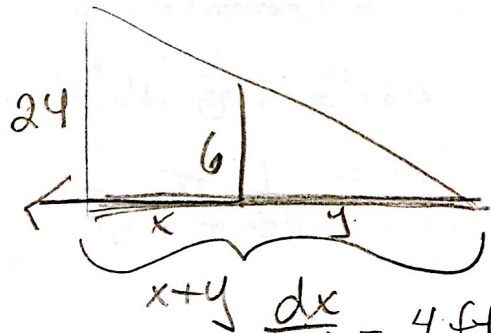
$$6x + 6y = 24y$$

$$6x = 18y$$

$$6 \frac{dx}{dt} = 18 \frac{dy}{dt}$$

$$6(4) = 18 \frac{dy}{dt}$$

$$\frac{dy}{dt} = \frac{4}{3} \text{ ft/s}$$



$$\frac{dx}{dt} = 4 \text{ ft/s}$$

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

9

$$V = IR$$

$$\frac{dV}{dt} = I \frac{dR}{dt} + R \frac{dI}{dt}$$

$$\frac{dV}{dt} = 20(20) + 5(-4)$$

$$\frac{dV}{dt} = 380 \text{ volts/s}$$

$$V = 100$$

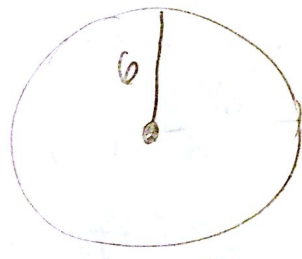
$$I = 20$$

$$R = 5$$

10

$$A = \frac{1}{360} \pi \theta r^2$$

$$\frac{dA}{dt} = \frac{1}{360} \pi \theta \cdot 2r \frac{dr}{dt} +$$



$$r^2 \cdot \frac{1}{360} \pi \frac{d\theta}{dt} \quad A = \frac{\theta}{360} \cdot \pi r^2$$

$r = 6$ fixed
when $\theta = 0$

$$A = \frac{1}{360} \pi \theta (6)^2$$

$$A = \frac{1}{10} \pi \theta$$

$$\frac{dA}{dt} = \frac{1}{10} \pi \frac{d\theta}{dt}$$