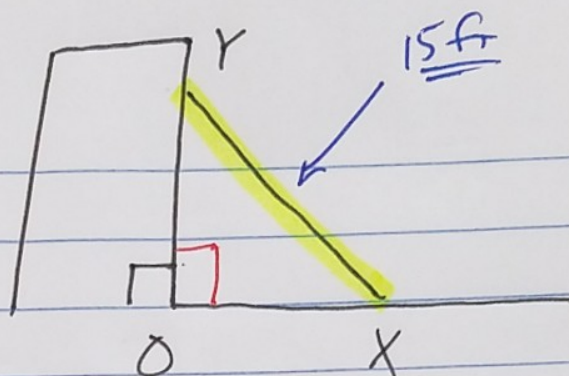


1982 AB4



$$\frac{dx}{dt} = \frac{1 \text{ ft}}{2 \text{ sec}}$$

A) When $x=9$ $\frac{dx}{dt} = \frac{1}{2} \frac{\text{ft}}{\text{sec}}$

$$15^2 = x^2 + y^2$$

$$0 = 2x \left(\frac{dx}{dt} \right) + 2y \left(\frac{dy}{dt} \right)$$

$$0 = 2(9) \left(\frac{1}{2} \right) + 2(12) \left(\frac{dy}{dt} \right)$$

$$0 = 9 + 24 \frac{dy}{dt}$$

$$-9 = 24 \frac{dy}{dt}$$

$$\frac{-9}{24} = \frac{dy}{dt}$$

B) $A = \frac{1}{2}bh$

$$A' = \frac{1}{2} \left[h \frac{db}{dt} + b \frac{dh}{dt} \right]$$

$$A' = \frac{1}{2} \left[12 \left[\frac{1}{2} \right] + 9 \left[-\frac{9}{24} \right] \right]$$

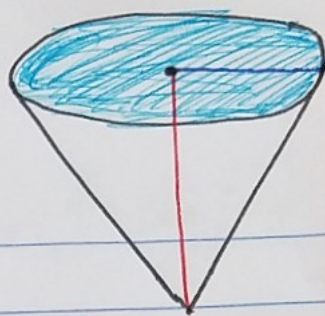
$$A' = \frac{1}{2} \left[6 + -\frac{81}{24} \right]$$

$$A' = \frac{1}{2} \left[\frac{21}{8} \right]$$

$$A' = \frac{21}{16} \frac{\text{ft}}{\text{sec}}$$

1984

$$\frac{dV}{dt} = 28\pi \frac{\text{units}^3}{\text{sec}}$$



$$V = 12\pi \text{ units}^3 \text{ @ } r = 3 \text{ units}$$

$$\frac{dr}{dt} = \frac{1}{2} \text{ unit/sec}$$

A) Find $\frac{dA}{dt}$ @ radius = 3 units

$$A = \pi r^2$$

$$A' = \pi(2)(r) \left(\frac{dr}{dt} \right)$$

$$A' = \pi(2)(3) \left(\frac{1}{2} \right)$$

$$A' = 3\pi \text{ units}^2/\text{sec}$$

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

$$12\pi = \frac{1}{3} (\pi) (3)^2 (h)$$

$$\underline{4 = h}$$

B) Find $\frac{dh}{dt}$ @ radius = 3 units

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

$$V' = \frac{1}{3} (\pi) \left[2rh \frac{dr}{dt} + r^2 \left(\frac{dh}{dt} \right) \right]$$

$$V' = \frac{\pi}{3} \left[2(3)(4) \left(\frac{1}{2} \right) + 3^2 \left(\frac{dh}{dt} \right) \right]$$

$$28\pi \cdot \frac{3}{\pi} = 12 + 9 \left(\frac{dh}{dt} \right)$$

$$84 = 12 + 9 \left(\frac{dh}{dt} \right) \quad \frac{dh}{dt} = \underline{8 \frac{\text{units}}{\text{sec}}}$$

C) Find $\frac{dA}{dh}$ when $r = \frac{3}{1}$ units

$$\frac{\frac{dA}{dt}}{\frac{dh}{dt}} = \frac{\frac{dA}{dt} \rightarrow \cancel{dt}}{\cancel{dt} \rightarrow dh} = \frac{dA}{dh}$$

Solve

$$\frac{3\pi}{8} \text{ units}$$

1978 ABS/BC1

$$x^2 - xy + y^2 = 9$$

$$2x - \left[y + x \frac{dy}{dx} \right] + 2y \left(\frac{dy}{dx} \right) = 0$$

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

Do this before

$$y = \frac{x}{2}$$

$$x^2 - (x) \left(\frac{x}{2} \right) + \left(\frac{x}{2} \right)^2 = 9$$

$$x^2 - \frac{x^2}{2} + \frac{x^2}{4} = 9$$

$$4x^2 - 2x^2 + x^2 = 36$$

$$3x^2 = 36$$

$$x^2 = 12$$

$$x = \pm 2\sqrt{3}$$

$$(2\sqrt{3}, \sqrt{3}) (-2\sqrt{3}, -\sqrt{3})$$