25 Sept 2009

18) $x^2 + y^2 - 4x + 6y + 9 = 0$

$y^2 + 6y + \underline{x^2 - 4x + 9} = 0$

$$y = \frac{-6 \pm \sqrt{36 - 4(1)(x^2 - 4x + 9)}}{2}$$

$$y = \frac{-6 \pm \sqrt{16x - 4x^2}}{2} = \frac{-6 \pm 2\sqrt{4x - x^2}}{2}$$

$$y = -3 \pm \sqrt{4x - x^2}$$

$$y' = \frac{\pm(4 - 2x)}{2\sqrt{4x - x^2}} = \frac{2 - x}{\sqrt{4x - x^2}}$$

$$2x + 2y\frac{dy}{dx} - 4 + 6\frac{dy}{dx} + 0 = 0$$

$$\frac{dy}{dx} = \frac{4 - 2x}{2y + 6} = \frac{2 - x}{y + 3}$$

$2 \; ft^3/sec$

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

how fast is radius increasing when $r = 2$

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

$$\frac{2}{4\pi(2)^2} = \frac{dr}{dt}$$

$$\frac{1}{8\pi} = \frac{dr}{dt}$$

the radius is increasing at a rate of $\frac{1}{8\pi}$ ft/sec

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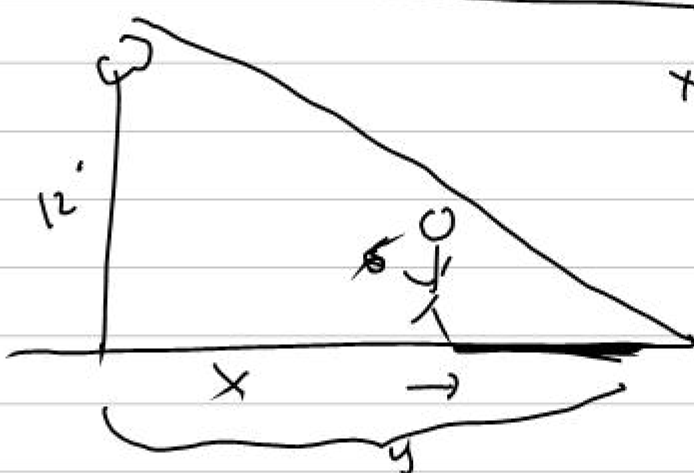


$$\frac{y}{12} = \frac{y-x}{6}$$

$$y = 2y - 2x$$

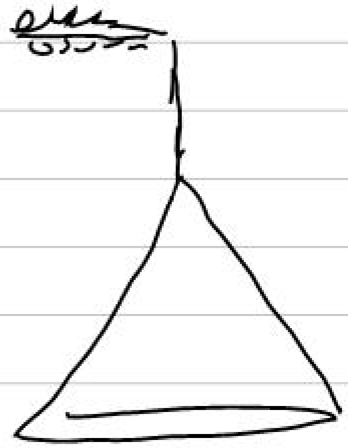
$$2x = y$$

$$2\frac{dx}{dt} = \frac{dy}{dt}$$

rate of 3 ft/sec
6 ft man

how fast is tip of shadow moving when he is 10 ft from the lamp post?

$$\frac{dy}{dt} = 6 \; ft/sec$$



Sand is flowing off the conveyor belt at a rate of $10\ ft^3/min$

forming a conical pile whose height equals its diameter.

When the pile is 3 ft high how fast is the height changing?

$$\frac{dV}{dt} = 10 \qquad V = \frac{1}{3}\pi r^2 h$$

to be continued ....