

FA #19 - Related Rates

$$1. \quad V = \frac{4}{3}\pi r^3$$

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

$$100 = 4\pi(25)^2 \frac{dr}{dt}$$

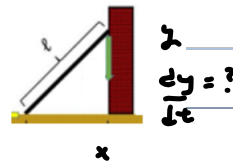
$$\frac{100}{4\pi(25)^2} = \frac{dr}{dt}$$

$$\frac{dr}{dt} = 1.3 \times 10^{-2}$$

The radius of the balloon is increasing at a rate of 1.3×10^{-2} cm/s.

2. The length of the ladder is constant.

Substitute the value of the length into the equation BEFORE you take the derivative.



$$x^2 + y^2 = 12^2$$

$$x^2 + y^2 = 144$$

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

$$x \frac{dx}{dt} + y \frac{dy}{dt} = 0$$

$$4(0.50) + (11.31) \frac{dy}{dt} = 0$$

$$\frac{dy}{dt} = \frac{-2}{11.31}$$

$$\frac{dy}{dt} = -0.18$$

$$\frac{dx}{dt} = 0.50$$

$$x^2 + y^2 = 144$$

When $x = 4$...

$$16 + y^2 = 144$$

$$y^2 = 144 - 16$$

$$y^2 = 128$$

$$y = 11.31$$

The top of the ladder is moving down the wall at a rate of 0.18 m/min.

(The height of the ladder is decreasing at a rate of 0.18 m/min.)