

Quiz 07 – Solutions

1. For a square, $A = s^2$. Differentiate with respect to t :

$$\frac{dA}{dt} = 2s \frac{ds}{dt}.$$

When $s = 5$ and $\frac{ds}{dt} = 3$,

$$\frac{dA}{dt} = 2(5)(3) = 30 \text{ cm}^2/\text{min}.$$

2. Let x be the distance from the wall to the bottom of the ladder and y the height of the top of the ladder. Then

$$x^2 + y^2 = 20^2 = 400.$$

Differentiate with respect to t :

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

Solve for $\frac{dy}{dt}$:

$$y \frac{dy}{dt} = -x \frac{dx}{dt} \Rightarrow \frac{dy}{dt} = -\frac{x}{y} \frac{dx}{dt}.$$

When $x = 12$, we find y from $x^2 + y^2 = 400$:

$$12^2 + y^2 = 400 \Rightarrow y^2 = 256 \Rightarrow y = 16.$$

With $\frac{dx}{dt} = 2$,

$$\frac{dy}{dt} = -\frac{12}{16}(2) = -\frac{3}{2} \text{ ft/s}.$$