

## Related Rates

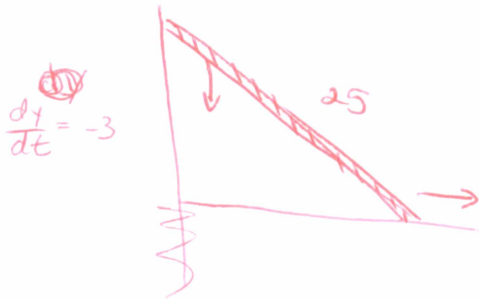
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Set up the related rate problem by:

- 1) Drawing the diagram.
  - 2) Read the problem and write "Find = ", "When = ", and "Given = " with the appropriate information.
  - 3) Write the Relating Equation and find the derivative of both sides of the equation remembering to put  $\frac{d(\text{something})}{dt}$  for the variables that change with respect to time.
  - 4) Substitute in "Given" and "When", then solve for "Find".
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\*\*1. The top of a 25-foot ladder is sliding down a vertical wall at a constant rate of 3 feet per minute. When the top of the ladder is 7 feet from the ground, what is the rate of change of the distance between the bottom of the ladder and the wall?



Find  $\frac{dx}{dt}$

When  $y=7 \rightarrow x=24$

Given  $z=25$

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

$$x^2 + y^2 = (25)^2$$

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

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

$$(24) \frac{dx}{dt} + (7)(-3) = 0$$

$$24 \frac{dx}{dt} = 21$$

$$\frac{dx}{dt} = \frac{21}{24} = \boxed{\frac{7}{8} \text{ ft/min}}$$

$$\begin{aligned} x^2 + y^2 &= 25^2 \\ x^2 + 7^2 &= 25^2 \\ x &= 24 \end{aligned}$$