Related Rates: Falling ladders

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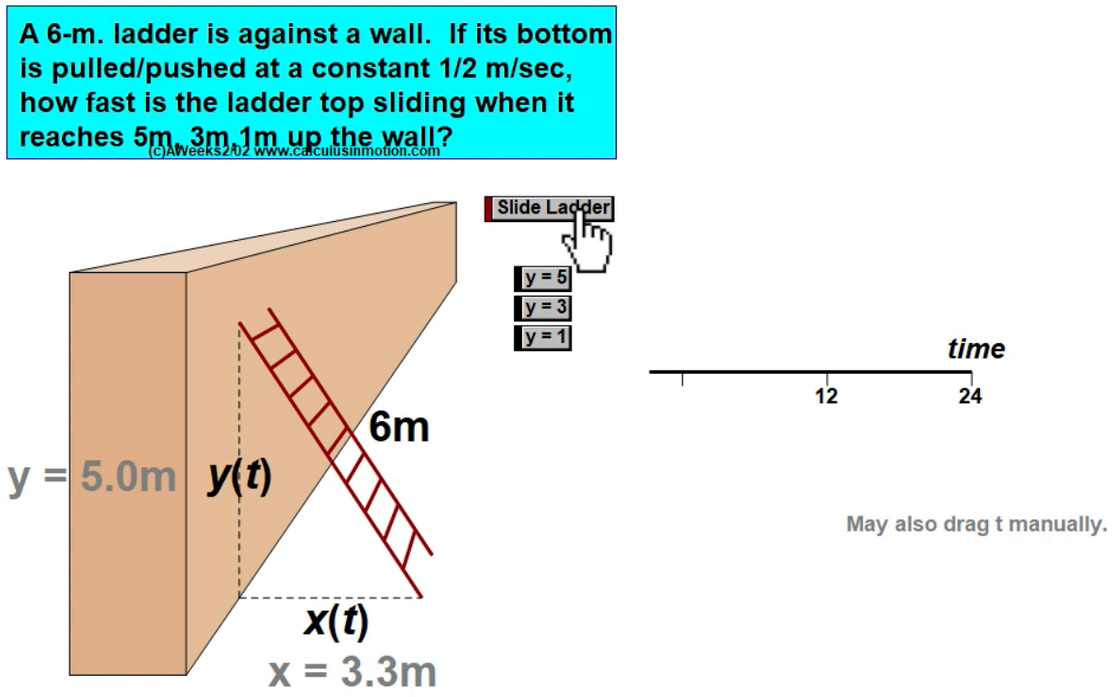
5 Steps to Related Rates:

- 1: Find what? (think of units)
- 2: Given what? (think of units)
- 3: What is the connection between these?
- 4: Implicitly Differentiate something
- 5: Plug in what you know, solve for what you want to find (think of units)

A 6 meter ladder is against a wall. The top end of the ladder is sliding down the wall as the bottom is being moved. When the top end is 5 meters from the ground is is sliding down at 1/2 meter per second. How fast is the ladder top sliding when it is 5 meters from the ground?



- 1: What are you asked for? (think of units)

$$\frac{dy}{dt}|_{y=5}\ (m/sec)$$

- 2: What are you given? (think of units)

$$\frac{dx}{dt} = -\frac{1}{2} m/sec$$

- 3: What equation(s) connect these?

$$x^2 + y^2 = 6^2$$

- 4: Differentiate

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

5: Evaluate @ known value (think of units)

$$2(\sqrt{6^2 - 5^2})\left(-\frac{1}{2}\right) + 2(5)\frac{dy}{dt} = 0$$

A 10 meter ladder is against a wall. The top end of the ladder is sliding down the wall. When the top end is 6 meters from the ground it is sliding down at 2 meters per second. How fast is the bottom moving away from the wall at this moment?

- 1: What are you asked for? (think of units)
- 2: What are you given? (think of units)
- 3: What equation(s) connect these?
- 4: Differentiate
- 5: Evaluate @ known value (think of units)