

# Complicated Work Problems

A 12 kg muskrat is asleep in the middle of the CV cafeteria. A sloth (aka CV 9th grader) starts pushing the muskrat across the floor with a constant force. After 75 seconds, the sloth has pushed the muskrat 18 meters. At the end of this time, the muskrat is moving @4.2 m/s. **How much work** did the sloth do on the muskrat?

To FIND  $W \rightarrow$  WE NEED  $\textcircled{D}$  &  $F$  *KNOW THIS*

To FIND  $F \rightarrow$  WE NEED  $\textcircled{m}$  &  $a$  *KNOW THIS*

To FIND  $a \rightarrow$  WE NEED  $\textcircled{v_0}$ ,  $\textcircled{v_1}$  &  $\textcircled{t}$

FIND a)

$$(1a) \quad v_0 = 0 \text{ m/s}, \quad v = 4.2 \text{ m/s}, \quad t = 75 \text{ sec}$$

$$(1b) \quad a = ?$$

$$(2) \quad a = \frac{v - v_0}{t}$$

$$(3) \quad a = \frac{4.2 - 0}{75}$$

$$(4) \quad a = .056 \text{ m/s}^2 \text{ Across THE CAFETERIA}$$

$$(5) \quad a = \frac{v - v_0}{t}$$

$$\underline{.056} = \frac{4.2 - 0}{t}$$

$$\begin{array}{l} \cancel{.056} t = \frac{4.2}{\cancel{.056}} \\ t = 75 \end{array} \quad \checkmark$$

FIND F:

①a  $m = 12 \text{ kg}$ ,  $a = .056 \text{ m/s}^2$

①b  $F = ?$

②  $F = ma$

③  $F = (12)(.056)$

④  $F = .672 \text{ N Across THE CAFETERIA}$

⑤  $F = ma$

$$\frac{.672}{12} = \frac{12(a)}{12}$$

$$a = .056 \text{ m/s}^2$$

Find W :

$$(1a) \quad F = .672 \text{ N} \quad D = 18 \text{ m}$$

$$(1b) \quad W = ?$$

$$(2) \quad W = F \cdot D$$

$$(3) \quad W = (.672)(18)$$

$$(4) \quad W = \boxed{12.096 \text{ J}}$$

$$(5) \quad W = F \cdot D$$

$$\frac{12.096}{18} = F \frac{18}{18}$$

$$F = \frac{12.096}{18} = .672 \quad \checkmark$$