

20080215-2221

A Force of 1.000 newtons is applied to a mass of 2.000 kilograms for a time of 3.000 seconds.

A) What is the final speed of the object if the object starts at rest

Find acceleration using  $F = ma$  so  $a = \frac{F}{m}$

$$a = \frac{F}{m} = \frac{1.000 \text{ n}}{2.000 \text{ kg}} = 0.5000 \text{ m/s}^2$$

Then find  $v_f$  using  $v_f = v_i + at$

$$v_f = v_i + at = 0 \text{ m/s} + (0.5000 \text{ m/s}^2)(3.000 \text{ s}) = 1.500 \text{ m/s}$$

B) How far did the object move?

$$\Delta x = v_i t + \frac{1}{2} a t^2 \quad \text{or} \quad v_f^2 = v_i^2 + 2a\Delta x$$

$$= (0) + \frac{1}{2} (0.5000 \frac{\text{m}}{\text{s}^2}) (3.000 \text{ s})^2$$

$$\Delta x = 2.250 \text{ meters}$$

$$\Delta x = \frac{v_f^2 - v_i^2}{2a} = \frac{(1.5 \frac{\text{m}}{\text{s}})^2 - 0}{2(0.5 \text{ m/s}^2)}$$

$$\Delta x = 2.250 \text{ meters}$$

C) How much work was done?

$$W = F \Delta x = (1.000 \text{ n})(2.250 \text{ m}) = 2.250 \text{ joules}$$

D) Determine the average power

$$P = \frac{W}{t} = \frac{2.250 \text{ joules}}{3 \text{ sec}} = 0.7500 \text{ watts}$$