Work and Energy I-1

Work-Kinetic Energy (1): Convert units to kJ.

$$E_k = \frac{1}{2} \, m \, v^2 \, .$$

Should E_k be entered as a positive or negative quantity?

Horse Power (2): Convert units to kJ and W (Watt, not to be confused with W for work).

$$W = F_x \, L \, , \quad P_{av} = \frac{W}{t} \, .$$

Cartesian dot product (3):

$$W = F_x \, \triangle R_x + F_y \, \triangle R_y + F_z \, \triangle R_z \, .$$

Work done by a variable force (4): $\int_0^{x_0} F \, dx \, .$

Work and Energy I-2

Force from a position graph (5).

One segment $x_i \rightarrow x_{i+1}$:

$$W_i = F_i \left(x_{i+1} - x_i \right) + \frac{1}{2} \left(F_{i+1} - F_i \right) \left(x_{i+1} - x_i \right) \text{ and } W = \sum_i W_i \,.$$

Velocity:

$$W = \frac{1}{2} \, m \left(v_f^2 - v_i^2 \right) \,.$$

Block-spring (6):

$$W = \frac{k}{2} \, x^2 = F_{\mu_k} \, \triangle x \,.$$

Bungee Cord (7):

$$W = - \int_0^{L_0} F \, dx \,.$$