Answer on Question 69218, Physics, Other

Question:

A body of mass 1.5 kg and initial velocity 15 m/s is sliding on a horizonlal surface. The coefficient of kinetic friction between the body and the surface is 0.5. Determine the work done by friction when the body has traversed a distance of 10 m along the surface. Also find the initial and final kinetic energies of the body. Take $g = 10\ m/s^2$. Draw diagram.

Solution:

a) By the definition of the friction force we have:

$$F_{fr} = \mu_k N = \mu_k mg = 0.5 \cdot 1.5\ kg \cdot 10\ \frac{m}{s^2} = 7.5\ N.$$

Then, we can find the work done by the friction force when the body has traversed a distance of 10 m along the surface:

$$W_{fr} = F_{fr} s = 7.5\ N \cdot 10\ m = 75\ J.$$

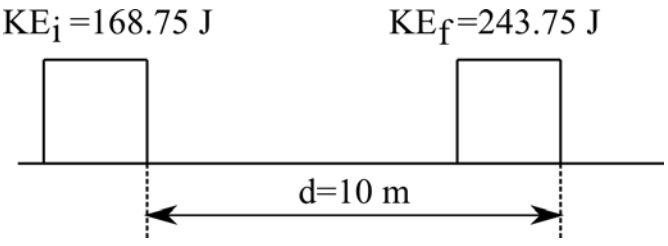
b) By the definition of the kinetic energy of the body we have:

$$KE_i = \frac{1}{2} m v_i^2 = \frac{1}{2} \cdot 1.5\ kg \cdot \left(15\ \frac{m}{s}\right)^2 = 168.75\ J.$$

We can find the final kinetic energy of the body from the work-kinetic energy theorem:

$$W = \Delta KE = KE_f - KE_i,$$

$$KE_f = W + KE_i = 75\ J + 168.75\ J = 243.75\ J.$$



Answer:

a) $W_{fr} = 75\ J$.

b) $KE_i = 168.75\ J$, $KE_f = 243.75\ J$.