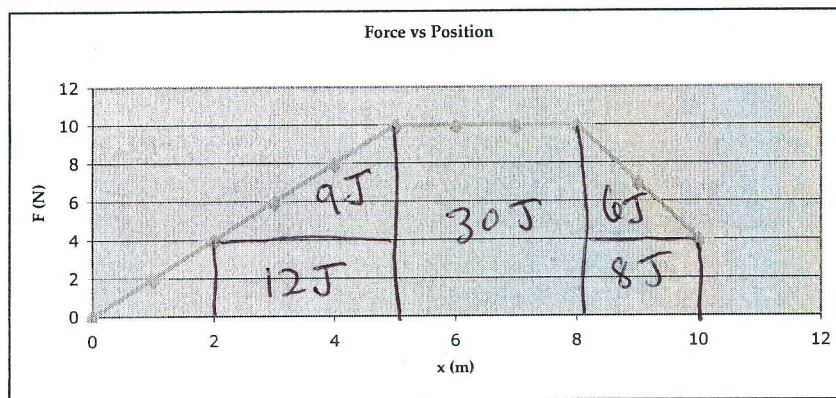


Quiz 3
Physics 141
06/18/2010

Name Solutions

Show all work clearly and justify all answers mathematically/logically. You have 15 minutes to complete this 10 point quiz.

- 1.) (7 pts) The graph below shows how the force on a 0.500 kg particle varies with position. If the particle has speed $v = 2.23 \frac{m}{s}$ at $x = 2.00$ m, what is its speed in m/s when $x = 8.00$ m? When $x = 10.00$ m?



Remember that the change in ~~kinetic energy~~ an object's kinetic energy is equal to the amount of work done on it.

$$\Delta KE = W$$

We can find the amount of work done from the area under the Force-time curve. (See relevant areas above)

So, the change in kinetic energy from 2 m to 8 m is

$$\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2 = (12J) + (9J) + (30J) = 51J$$

$$\frac{1}{2}mv_f^2 - \frac{1}{2}(0.5 \text{ kg})(2.23 \text{ m/s})^2 = 51J$$

$$\frac{1}{2}mv_f^2 = 51J + 1.24J = 52.24J$$

$$v_f = \sqrt{\frac{2}{m} 52.24J}$$

$$= \sqrt{\frac{2(52.24J)}{0.5 \text{ kg}}}$$

$$v_f \approx 14.5 \text{ m/s}$$

- 2.) (3 pts) Two masses, M_A and M_B , with $M_B = 2M_A$, are released at the same time and allowed to fall straight down. Neglect air resistance. When we compare their kinetic energies after they have fallen for equal times, we find that

a. $K_B = K_A$.

b. $K_B = 2K_A$.

c. $K_B = 4K_A$.

d. $K_A = 2K_B$.

e. $K_A = 4K_B$.

After equal times,

$$v_A = v_B \text{ since the}$$

acceleration is -9.8 m/s^2 in each case. Therefore

$$K_A = \frac{1}{2}m_A v^2 \quad K_B = \frac{1}{2}m_B v^2$$

(same v)

Since $m_B = 2m_A$, $K_B = 2K_A$

At $x = 10 \text{ m}$

just add the area from 8 m to 10 m to the work done. so

$$\Delta KE = 51J + 14J$$

$$= 65J$$

using the same logic

$$v_f = \sqrt{\frac{2(66.24J)}{0.5 \text{ kg}}}$$

$$v_f \approx 16.3 \text{ m/s}$$