

## Energy Quiz - 1.0 (Use energy methods only.)

1. Given a mass of 5 kg and an initial vertical velocity of 8 m/s, find the maximum height obtained by the object.

$$W = F \cdot d \text{ or } W = F \cos \theta \cdot d$$

$$K \equiv \frac{1}{2}mv^2$$

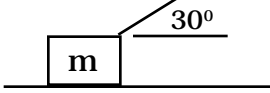
$$W_{NET} = \Delta K$$

$$E = K + U_g + U_e$$

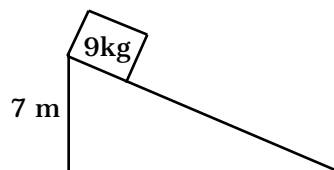
$$U_g = mgh$$

$$U_e = \frac{1}{2}kx^2$$

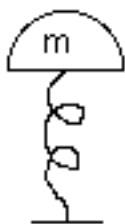
$$[W] = N \cdot m = J(\text{joule}) = [K]$$

2.  A block with  $m = 4 \text{ kg}$  is pulled along a floor (no friction) by a rope which makes a  $30^\circ$  angle with the horizontal. If  $T=20\text{N}$  and the block starts from rest and is pulled 6 m, (a) find the work done by the rope, and (b) find the final speed of the block.

3. The block shown here is initially at rest. It then slides down the frictionless inclined plane. How fast is it going at the bottom of the ramp?

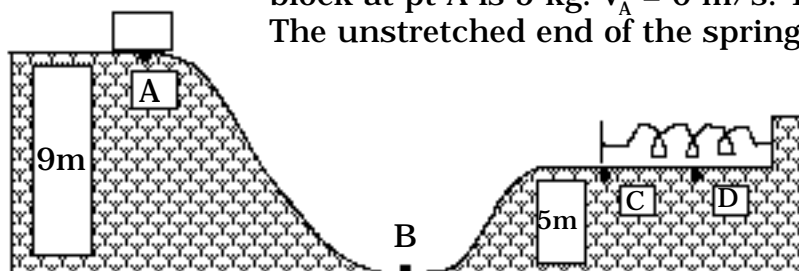


4.



The mass of the pop-up toy is 2 kg. The spring constant is 4000 N/m. If the toy is compressed 10 cm, how high will it rise from that compressed position?

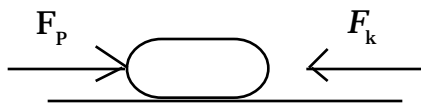
5.



This toy amusement park ride has no friction. The mass of the block at pt A is 5 kg.  $v_A = 0 \text{ m/s}$ . The spring constant is  $k = 2 \text{ N/m}$ . The unstretched end of the spring is at pt C. The block

compresses the spring till it momentarily comes to rest at pt D. (a) Make a table showing  $E, U_g, U_e,$  &  $K$  at pts A, B, C, and D. (b) How fast is the block moving at pt C?

6.



The block shown here is being pushed in a straight line across the floor. Its mass is 6 kg and its initial speed is 3 m/s. It is pushed for 5 m and the kinetic coefficient of friction is  $\mu_k = .2$ . The pushing force,  $F_p$ , is 20 N in magnitude.

(a) Find  $W_{\text{Friction}} = ?$

(b) Find  $v_f = ?$