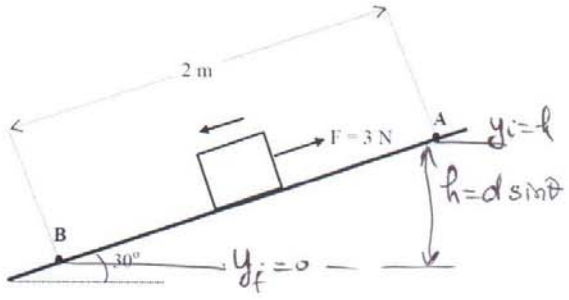
QUIZ#7- CHAPTER8
DATE: 29/10/18

Name: Key Id#: Sect.#:

A 2.0-kg block slides 2.0 m down a frictionless incline from point A to point B. A force of magnitude F =3.0 N acts on the block between A and B, as shown in the figure.

(a) Calculate the change in gravitational potential energy of the block-earth system as the block moves from A to B.



$$\Delta U_g = mg(y_f - y_i)$$
$$= mg(0 - h) = -mgd\sin\theta$$
$$= \boxed{-19.6\ J}$$

(b) Calculate the work done by the applied force F as the block moves from A to B.

$$W_F = \vec{F} \cdot \vec{d} = +Fd\cos 180^\circ$$
$$= -Fd = \boxed{-6\ J}$$

(c) If the kinetic energy of the block at A is 10 J, what is its kinetic energy at B?

$$\Delta K + \Delta U_g + \cancel{\Delta U_s}^{\,0} = W_{app} + \cancel{W_{fk}}^{\,0}$$

$$(K_f - K_i) - 19.6 = -6$$

($K_i = 10$)

$$K_f = -6 + 19.6 + 10 = \boxed{23.6\ J}$$

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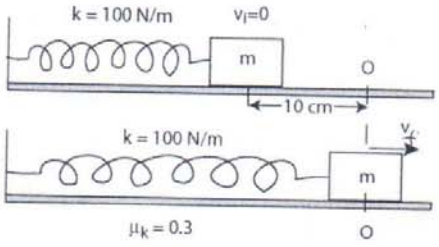
A 0.50 kg block attached to a spring with a spring constant of 100 N/m moves on a horizontal surface having a coefficient of kinetic friction = 0.3. The spring is initially compressed by 10 cm from the unstretched position and then released from rest. What is the speed of the block when it passes through the point O?



$$\Delta K + \Delta U_g + \Delta U_s = W_{app} + W_{f_k}$$

$$\Delta K = K_f - K_i$$

$$\Delta U_s = 0 - \frac{1}{2} k x_i^2 = -\frac{1}{2}(100)(0.1)^2 = -0.5\,J$$

$$W_{f_k} = -f_k d = -\mu_k F_N d = -\mu_k m g d$$

$$= -(0.3)(0.5)(9.8)(0.1) = -0.147\,J$$

$$K_f - 0.5 = -0.147$$

$$K_f = 0.353\,J = \frac{1}{2} m v_f^2$$

$$\boxed{v_f = 1.2\ m/s}$$

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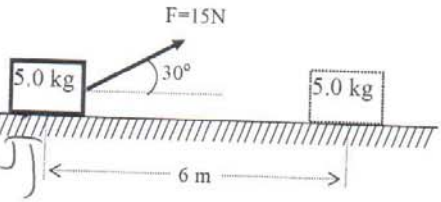
A 5.0-kg object is pulled along a rough horizontal surface at constant speed by a 15 N force acting 30^0 above the horizontal as seen in the figure.

(a) How much work is done by the applied force as the object moves 6.0 m?

$W_{app} = \vec{F} \cdot \vec{d} = F d \cos\theta$

$= 15 \times 6 \times \cos 30^\circ = \boxed{77.9\ J}$



(a) What is the change in gravitational potential energy of the block-floor system?

$\Delta U_g = 0$ motion is horizontal

(b) What is the change in kinetic energy of the block?

$\Delta K = 0$ $\quad v = \text{constant}$

(c) How much work is done by the friction force as the object moves 6.0 m?

$\Delta K + \Delta U_g + \Delta U_s = W_f + W_{app}$

$W_f = -W_{app} = \boxed{-77.9\ J}$