Name: _____ (Key) _____   ID # _____

1) A 0.5-kg block attached to a spring with a spring constant of 200 N/m, moves on a horizontal surface having a coefficient of kinetic friction of 0.3 as shown in the figure. The spring is initially compressed by 10 cm from the un-stretched position O and then released from rest. What is the speed of the block when it passes through the point O?

$$\Delta K + \Delta U_s + \Delta E_{th} = 0$$

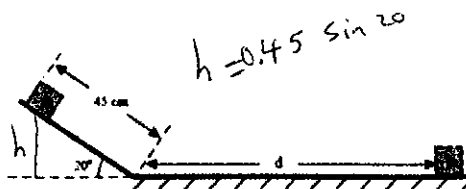$$\frac{1}{2} m (v_f^2 - \cancel{v_i^2}^0) + \frac{1}{2} k (\cancel{x_f^2}^0 - x_i^2) + \mu_k m g d = 0$$

$$\frac{1}{2} (0.5) v_f^2 = \frac{1}{2} (200)(0.1)^2 + (0.3)(0.5)(9.8)(0.1) = 0$$
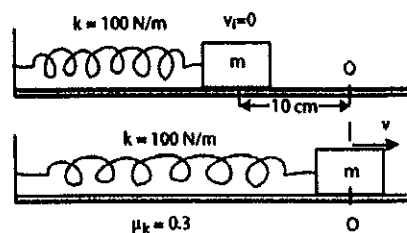
$$\frac{1}{4} v_f^2 = 1 - 0.147$$

$$v_f = \sqrt{4(1 - 0.147)} = 1.8 \ \frac{m}{s}$$

2) The figure shows an object of mass = 1 kg starting from rest. It first slides a distance of 45 cm down a frictionless inclined surface, and then slides across a rough horizontal surface whose coefficient of kinetic friction is 0.2. What is the maximum distance d travelled by the object across the horizontal surface?

$$h = 0.45 \sin 20$$

$$\Delta K + \Delta U_g + \Delta E_{th} = 0$$

$$\frac{1}{2} m (\cancel{v_f^2}^0 - \cancel{v_i^2}^0) - m g h + \mu_k m g d = 0$$

$$- \cancel{m} \cancel{g} (0.45 \sin 20) + 0.2 \cancel{m} \cancel{g} d = 0$$

$$d = \frac{0.45 \sin 20}{0.2} = 0.77 \ m$$