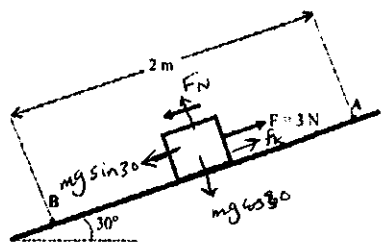
Phys101 – Sec # 40 **Quiz # 5 (Chapter 7)**

Name: Key **ID #** _____

1) A 4-kg block slides 2 m down a rough incline ($\mu_k = 0.1$) from point A to point B. A 3-N force acts on the block between A and B as shown in the figure. If the kinetic energy of the block at A is 20 J, What is its kinetic energy at B?



$W_g = (mg\sin 30)\,d = 4(9.8)\sin 30\,(2) = 39.2$ J

$W_F = \vec{F}\cdot\vec{d} = 3(2)\cos 180 = \boxed{-6\ \text{J}}$

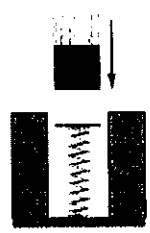
$W_{f_k} = -f_k d = -\mu_k m g \cos 30\, d = -6.8$ J

$W_{net} = K_B - K_A$

$39.2 - 6 - 6.8 = K_B - 20$ J

$K_B = 26.4 + 20 = \boxed{46.4\ \text{J}}$

2) A 1-kg block is dropped onto a relaxed vertical spring that has a spring constant of k = 250 N/m. The block becomes attached to the spring and compresses the spring 12 cm before momentarily stopping.



a. Calculate the work done on the block by the gravitational force.

$W_g = mgh = 1\,(9.8)(0.12) = 1.18$ J

b. Calculate the work done on the block by the spring force.

$W_s = \frac{1}{2}k\left(\cancel{x_i^2}^{\,0} - x_f^2\right) = \frac{1}{2}(250)(-0.12^2)$

$= -1.8$ J

c. What is the speed of the block just before hitting the spring?

$W_{net} = \frac{1}{2}m\left(\cancel{v_f^2}^{\,0} - v_i^2\right)$

$1.18 - 1.8 = \frac{1}{2}(1)(-v_i^2)$

$-2(0.62) = -v_i^2$

$v_i = \sqrt{2(0.62)} = 1.1\ \frac{m}{s}$