Name:______________________________

$W = Fd\cos\theta_{\vec{F},\vec{d}}$ $K = \frac{1}{2}mv^2$ $U_g = mgh$ $U_s = \frac{1}{2}kx^2$ $g = 9.8\ \text{m/s}^2 = 9.8\ \text{N/kg}$

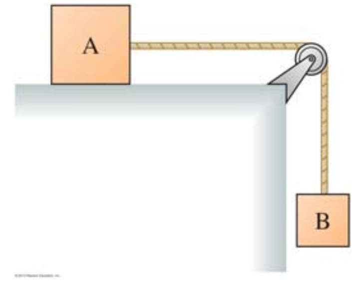
1) At position 1, a spring is compressed and used to launch a heavy object on a frictionless surface. At position 2, the spring has returned to its uncompressed length and the box has lost contact with the spring. The box continues along the frictionless track and moves up a ramp. At position 3, the box reaches its maximum height and begins to turn around. See the figure.

a) Fill in the table to indicate whether each of the quantities are **+**, **–**, or **0** during the intervals 1→2, 2→3, and 1→3.

	1→2	2→3	1→3
ΔK			
ΔU_g			
ΔU_s			

b) Briefly explain your reasoning for your choices.

2) The figure shows box A (mass 10 kg) and box B (mass 5.0 kg) connected by a light-weight rope over an ideal, massless pulley. The boxes are released from rest. You have designed the system such that at the point when box B has fallen an unknown distance *h*, it moves with speed 4.9 m/s. You've assumed that friction between box A and the table can be neglected.



a) Determine *h*.

b) If the masses were switched so that Box A were 5.0 kg and Box B were 10 kg, what can you say about *h*? (circle one)

It would be larger | It would be the same | It would be smaller | Not enough info.

c) Consider the original scenario. You test out your design, and find that when Box B has fallen the distance *h*, it only moves at 2 m/s. You realize that this is because there is friction between Box A and the table. Determine the work done by friction.