Name_____

U4: Homework Questions #1

Conservation of Energy

1. A 60 kg diver jumps from a 10 meter platform into a pool below.

   a. What is her velocity at impact?

   _____ m/s

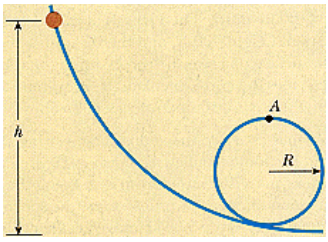
   b. If she were to come to rest 5.0 meters below the water's surface, how much of a resistance force was present on the diver by the water?

   _____ N

2. A bead slides without friction around a loop-the-loop. If the bead is released from a height $h = 3.40R$, what is its speed at point A?

   a. Solve speed in terms of g and R.

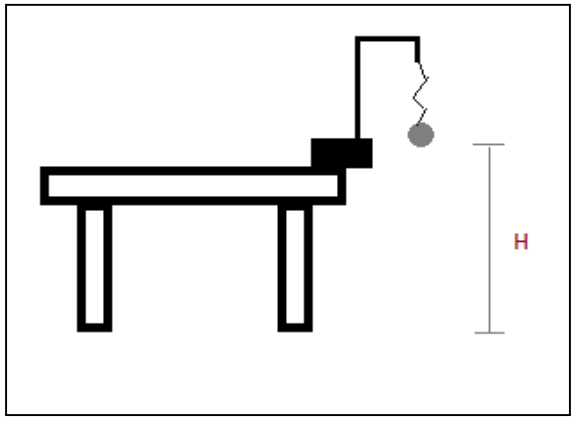
   _____ $\sqrt{(gR)}$



   How large is the normal force on it if its mass is 4.80 g?

   _____ N (downward)

3. A lab group is tasked with experimentally solving for the spring constant k of a spring at their lab station. Their initial idea is written below:

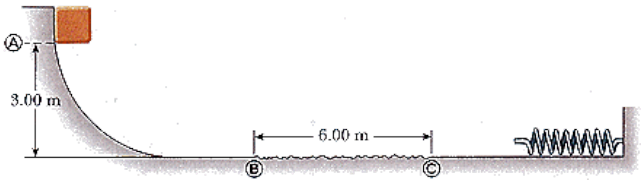


Hang an object of known mass from a vertical spring and measure both how much the spring is stretched (x) and the height of the object above the floor (h). Set Ug = Us and solve for k!

A - What is incorrect about this lab process?

B – Develop your own procedure for experimentally solving for the spring constant of a spring that would work.

4. A 10.0 kg block is released from point *A*. The track is frictionless except for the portion *BC*, with a length of 6.00 m. The block travels down the track, hits a spring of force constant k = 2100 N/m, and compresses it 0.400 m from its equilibrium position before coming to rest momentarily. Determine the coefficient of kinetic friction between surface *BC* and the block.



5. A 3.00 kg block starts from rest and slides a distance *d* down a frictionless 30.0° incline. While sliding, it comes into contact with an unstressed spring of negligible mass. The mass slides an additional 0.194 m as it is brought momentarily to rest by compression of the spring (k = 400 N/m). Find the initial separation *d* between mass and spring.

m