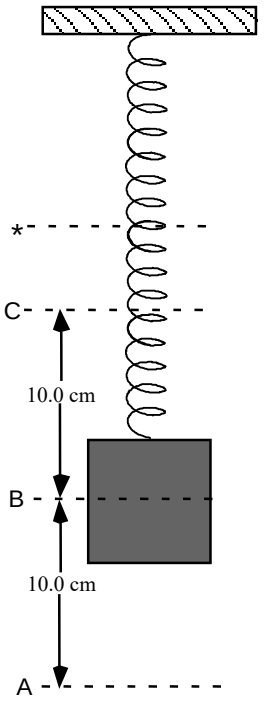
Name_____ **Date**_____ **Period**_____

AP Waves: Worksheet 4

1. An ideal Hookean spring of spring constant 20.0 N/m is connected to a 0.500 kg block in the arrangement shown to the right. The (*) represents the position of the center of the block when the spring is unstretched. (Positions are not to scale.) From this position the experimenter slowly lowers the block from (*) until it reaches point B where the system is at rest.



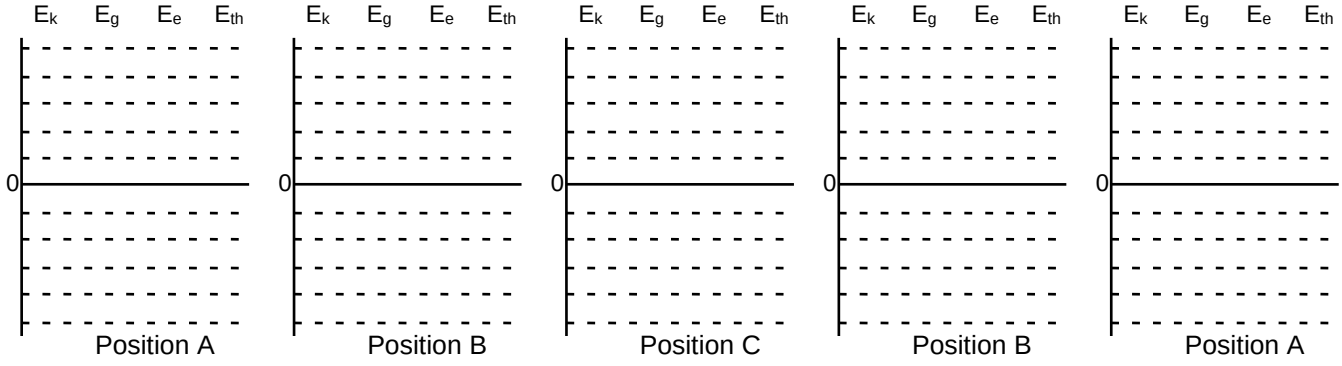
   For this problem use position B as your zero height for the measurement of gravitational energy. Assume there is no friction.

   a. How far does the spring stretch when the 0.500 kg block is slowly lowered to position B?

   b. The block is then pulled to position A, 10.0 cm below position B. It is released and allowed to oscillate between positions A and C. In the space below calculate the elastic energy, gravitational energy, and kinetic energy of the system at positions A, B, and C.

   c. How fast is the block moving at the instant the center is even with position B?

   d. Create quantitative energy bar graphs for the system at the positions indicated for one complete cycle of the system starting when it is released at position A until it returns to position A the first time.



(over)

e. What change could you make that would eliminate this negative portion? What does this indicate about the nature of gravitational energy?

f. Determine the period of oscillation for the mass/spring system.

2. The mass is changed and the spring is replaced with another that has a spring constant of 15.2 N/m. The period with this new mass and spring is 0.66 s. How much mass is hanging on the new spring?