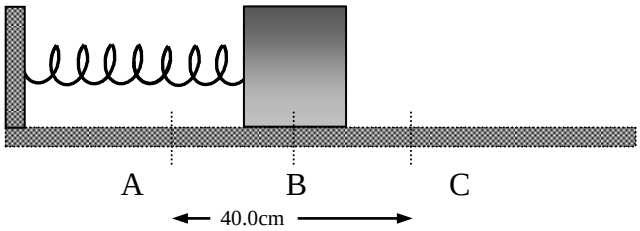
Name_____ **Date**_____ **Period**_____

AP Waves: Worksheet 5

The diagram to the right shows a block attached to a Hookean spring on a frictionless surface. The block experiences no net force when it is at position B. When the block is to the left of point B the spring pushes it to the right. When the block is to the right of point B, the spring pulls it to the left.



The mass is pulled to the left from point B to point A and released. The block then oscillates between positions A and C. Assume that the system consists of the block and the spring and that no friction or dissipative forces act.

1. The block undergoes simple harmonic motion with constant amplitude. What 3 conditions must be met for simple harmonic motion?

2. The block takes 40.0 s to make 20 oscillations. What is the "period of oscillation" for this system?

3. When the block is moving from B to A, what direction is it accelerating? How do you know?

4. When the block is moving from A to B, what direction is it accelerating? How do you know?

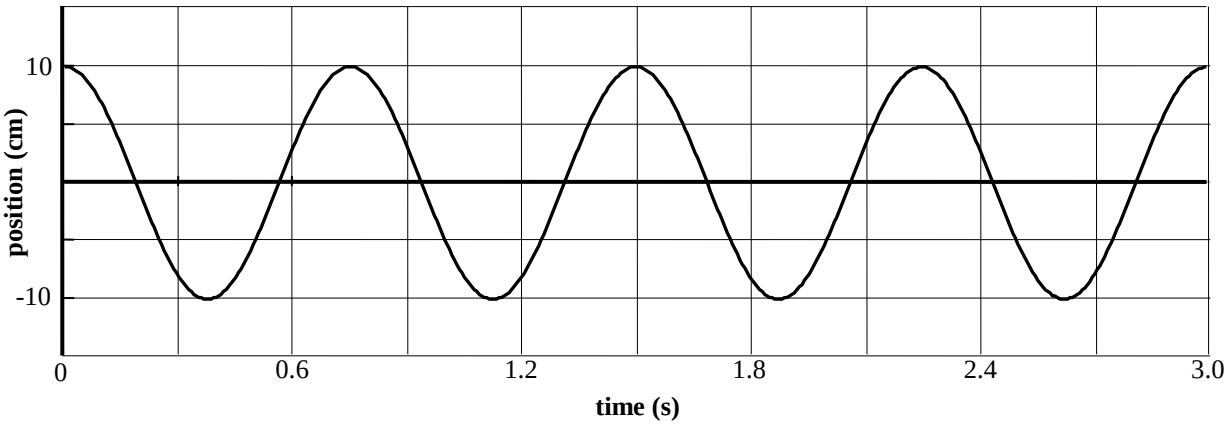
5. What is the frequency of this oscillating system? Note: Frequency is the name given to the quantity that measures the number of complete cycles that a periodic system makes per unit time.

6. What is the amplitude of vibration of this system?

7. What would happen to the period and frequency of this system if you were to double the amplitude while keeping the mass and spring constant the same. If the period and frequency would change, give the factor by which they would change.

8. What would happen to the period and frequency of this system if you were to double the mass while keeping the amplitude and spring constant the same. If the period and frequency would change, give the factor by which they would change.

9. What would happen to the period and frequency of this system if you were to double the spring constant while keeping the amplitude and mass constant. If the period and frequency would change, give the factor by which they would change.



10. The graph above was created by placing a motion detector below a 100.0g mass oscillating up and down while hanging on a spring of unknown spring constant.

    a. What is the frequency of oscillation for the spring/mass system?

    b. Solve for the value of the spring constant for the spring.

11. The position vs. time graph below describes the motion of the system on page 1 for four cycles. Complete sketches for the other graphs shown based on this position vs. time graph.