

Name \_\_\_\_\_

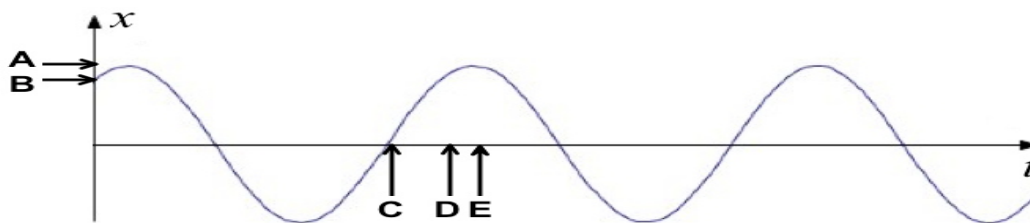
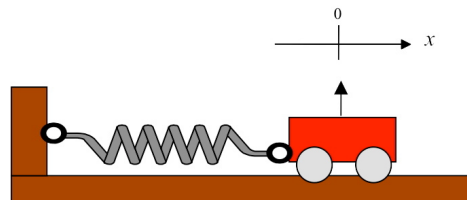
Physics 132  
Spring 2017

Quiz #8  
(10 points)

Prof. Redish  
3.April.17

For each problem give all the correct answers for each in the space or box at the right. But be careful! You can lose partial credit on a problem if you include a wrong answer (but it will not affect any other problems). If none of the answers are correct, put N.

A nearly frictionless cart of mass  $m$  is attached to a nearly ideal Hooke's law spring of spring constant  $k$  as is shown in the figure at the right. The cart is pulled a bit out to the right and released. The cart then oscillates back and forth. At a later time (shown as  $t = 0$  on the graph) a sonic ranger starts taking data of the cart's position. The 0 of the position axis is readjusted so that it occurs when the spring is at its rest length. The resulting graph of the cart's motion looks like this.



1. (6 points) If the zeros of both  $x$  and  $t$  are where the axes cross, identify the following characteristics of the motion.

- 1.1. Which instant of time has a value equal to the period of oscillation of the cart? (C, D, E, or N)
- 1.2. Which value of position has a value equal to the amplitude of oscillation of the cart? (A, B, or N)
- 1.3. At time  $t = 0$ , in which direction does the force that the cart is exerting on the spring point? (L, R, or 0)

2. (4 points) A pair of equations are needed to relate the physics to a mathematical model that describes the curve shown:

$$x(t) = A \cos(\omega t + \phi) \quad \omega = \sqrt{\frac{k}{m}}$$

2.1 If the parameter  $k$  were doubled, what would happen to the period of the oscillation?

- A. It would double.
  - B. It would half.
  - C. It would increase, but by less than a factor of 2.
  - D. It would decrease, but by not as much as to  $\frac{1}{2}$ .
  - E. Something else.
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2.2 If the parameter  $\phi$  were increased by a small amount, how would the displacement shown on the graph at time  $t = 0$  change?

- A. It would increase a bit.
  - B. It would stay the same.
  - C. It would decrease a bit.
  - D. There is no way to tell given the information given.
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