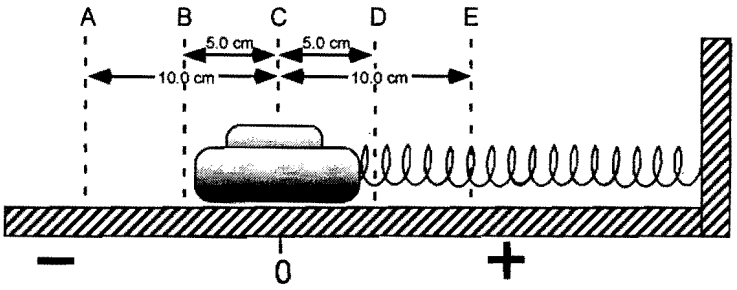
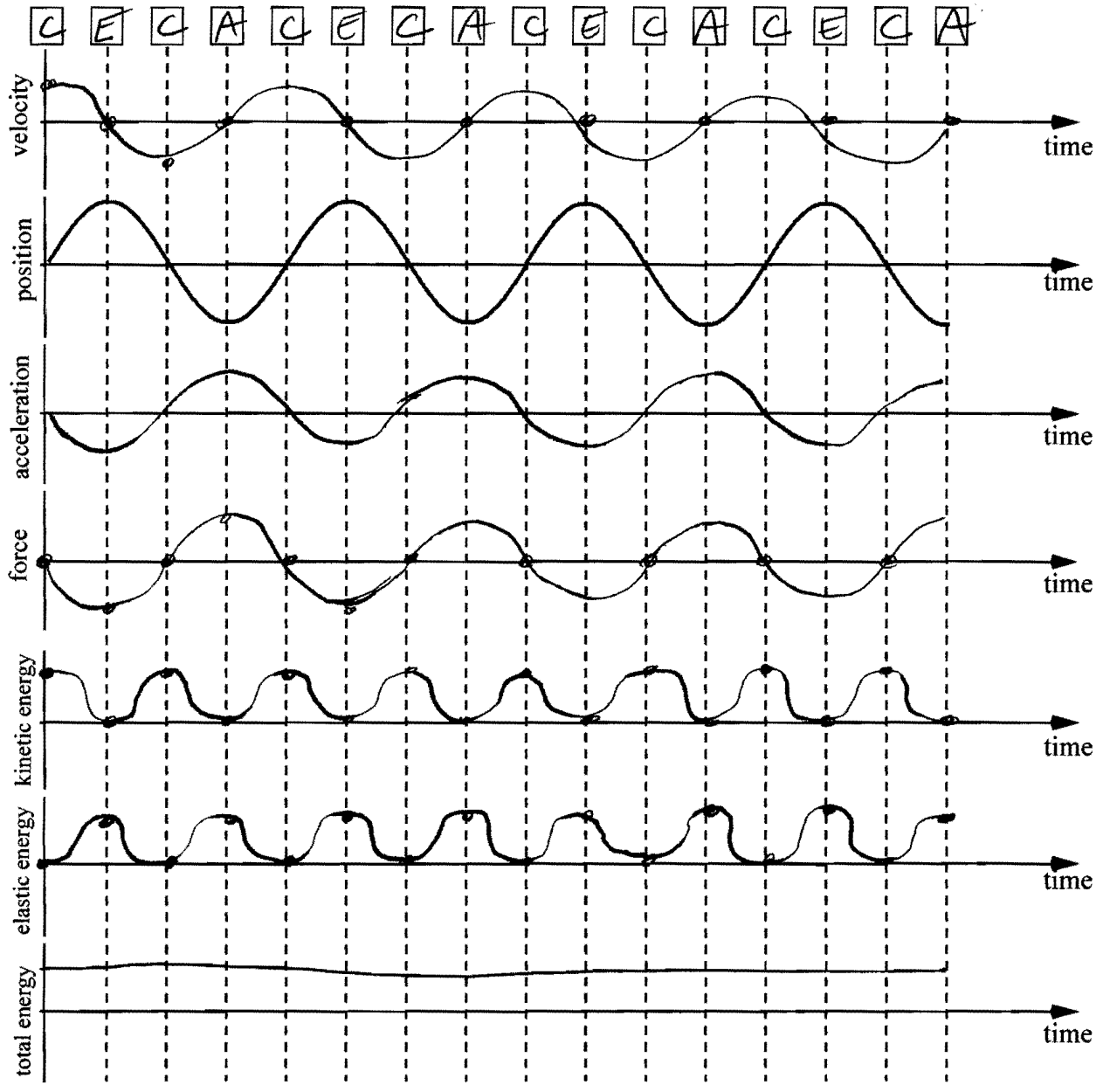
Oscillating Particle Test Review #2

Name: KEY Date: _____ "T": ____

1. In the diagram to the right, a block is attached to a Hookean spring. The spring is neither stretched nor compressed at position C. Assume that frictional effects are negligible. The velocity vs. time graph below represents the motion of the block as it oscillates between positions A and E.

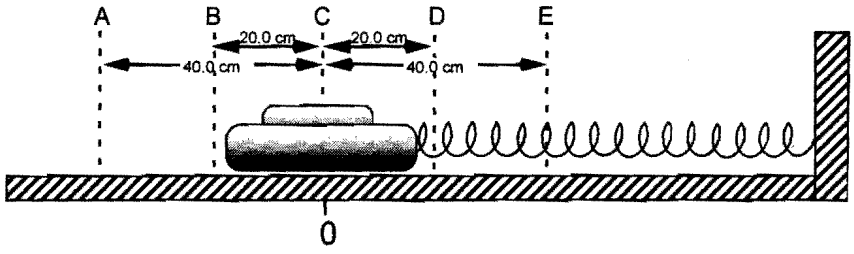


Fill in the boxes with the correct positions corresponding to the graph shown. *Not all the letters will be used.* Then sketch the remaining graphs of position, acceleration, force, kinetic energy, elastic energy, and total energy vs. time.



2.

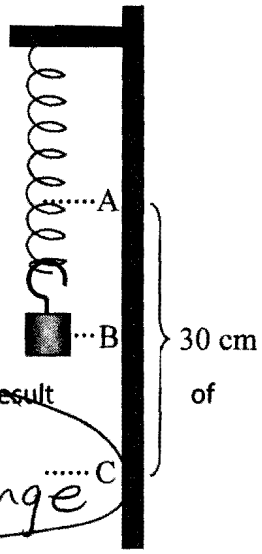
Spring constant = 50 N/m



Complete the table value below for the energy values at the various positions. In each box, show your work.

	Position A	Position C	Position E
$E_{elastic}$	$\frac{1}{2}(50\frac{N}{m})(.4m)^2 = 4J$	0	4 J
$E_{kinetic}$	0	4 J	0
E_{total}	4J	4 J	4 J

In the next 7 questions, a mass is suspended from a spring and oscillating, as pictured below.



3. If the spring constant (k) changes by a factor of 3, then the period changes by a factor of...

$T \propto \sqrt{1/k} \rightarrow T \propto \sqrt{1/3}$

4. If the amplitude (A) changes by a factor of 3, then the period changes by a factor of...

no change (amp. does not affect period)

5. If the oscillating mass (m) changes by a factor of 3, then the period changes by a factor of...

$T \propto \sqrt{m} \rightarrow T \propto \sqrt{3}$

6. If the amplitude, mass, and spring constant each change by a factor of 16, then the combined result of these three changes is that the period will change by a factor of...

mass: $\sqrt{16} = 4$ k: $\sqrt{1/16} = \frac{1}{4}$

$4 \times \frac{1}{4} = 1$ no change

7. If the mass completes 10 oscillations in 17.5 seconds, then the **period** of oscillation, T, is...

$T = \frac{\text{sec.}}{\text{osc.}} = \frac{17.5\text{s}}{10\text{osc.}} = 1.75\text{s}$

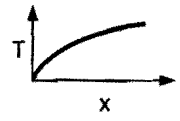
8. What is the **frequency** for the oscillation in question #7?

$f = \frac{1}{T} = 1/1.75\text{s} = 0.57\text{Hz}$

9. What is the **amplitude** of the oscillation?

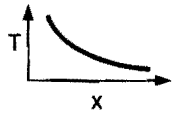
15 cm

10. What is the next step to linearize this graph (must :



change x to $\sqrt{x}$

11. What is the next step to linearize this graph:



change x to $1/x$