

## Questions of the Day

Oscillating Particle (OP)  
*Simple Harmonic Motion*

### Question of the Day

- A mass is oscillating as it is suspended from a spring. If the amplitude,  $A$ , of the oscillation was twice as much, then the period of oscillation,  $T$ , would be...?
- This means that amplitude and period are \_\_\_\_\_ proportional.
- Answer: ***unchanged*** since amplitude and period are ***not*** proportional

## Question of the Day

- A mass is oscillating as it is suspended from a spring. If the mass is changed to be twice as much, then the period of oscillation will change by a factor of...?
- Answer: *Since  $T$  is directly proportional to  $\sqrt{m}$ ,  $T$  would change by a factor of  $\sqrt{2}$ .*

## Question of the Day



- On each of the axes above, sketch a graph that shows the relationship between  $T$  and  $A$ ,  $T$  and  $m$ ,  $T$  and  $k$ ?
- Answer:  *$T$  and  $A$  is flatline,  $T$  vs.  $\sqrt{m}$  is linear,  $T$  vs.  $\sqrt{1/k}$  is linear.*

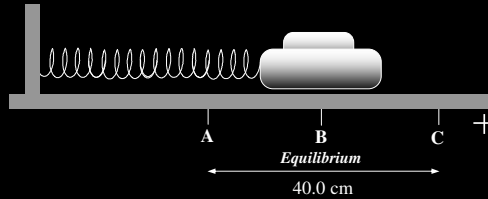
## Question of the Day

- Sketch a graph that shows the relationship between period and mass for an oscillating particle.
- If the mass is changed from 50g to 500g, by what factor will the period change?
- Answer:  *$T$  vs.  $\sqrt{m}$  is a linear graph, if  $m$  changes by a factor of 10, then  $T$  will change by a factor of  $\sqrt{10}$ .*

## Question of the Day

- Sketch a graph that shows the relationship between period and spring constant for an oscillating particle.
- If the spring constant is changed from 2.5 N/m to 25 N/m, by what factor will the period change?
- Answer:  *$T$  vs.  $\sqrt{1/k}$  is a linear graph, if  $k$  changes by a factor of 10, then  $T$  will change by a factor of  $\sqrt{(1/10)}$ .*

## Question of the Day

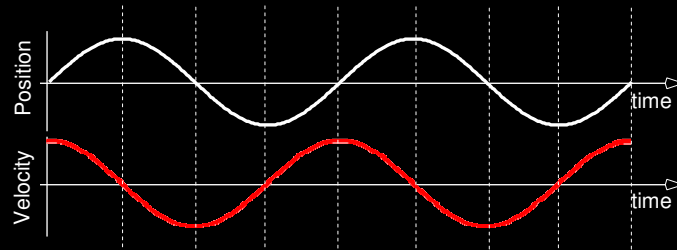


- As the hovercraft is oscillating between A & C, where is the...
  - hovercraft going the fastest?
  - hovercraft going the slowest?
  - spring stretched/compressed the most?
  - spring stretched/compressed the least?
- Answer: *fastest at B, slowest at A & C, stretched most at A & C, stretched least at B*

## Question of the Day

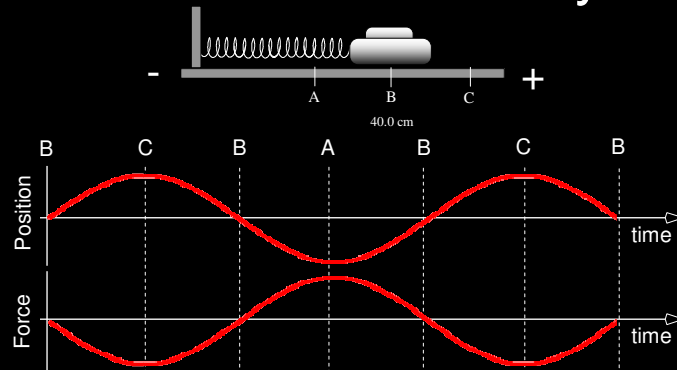
- In your oscillating particle lab, you determined that it took 12.7 seconds in order to complete 10 oscillations.
  - What is the period of oscillation?
  - What is the frequency of oscillation?
- Answer:  $T = 12.7 \text{ s} / 10 \text{ osc} = 1.27 \text{ s}$ ;  $f = 10 \text{ osc} / 12.7 \text{ s} = .787 \text{ osc/sec} = .787 \text{ Hz}$

## Question of the Day



- Based upon the position vs. time graph for an oscillating particle, draw the corresponding velocity vs. time graph.
- Answer:  $\frac{1}{4}$  cycle (oscillation) out of phase

## Question of the Day



- Draw the position vs. time and force vs. time graphs that correspond with the oscillating particle.
- Answer: *see above*