

Physics 101: The Science of Sound

MiniTest 1a, 9/27/06

Name _____

For questions with numerical answers, draw a box around your final answer.

Except as noted, correct answers get full credit. Incorrect answers get partial credit based on the work shown.

If any problem relies on a previous answer, scoring on that problem will be based on YOUR previous answer, whether or not it is correct.

Potentially useful equations

acceleration due to gravity = 9.81 m/s^2

$$\pi = 3.141593$$

$$F = ma$$

$$F = -k \Delta x$$

$$\Delta \phi \propto \Delta t$$

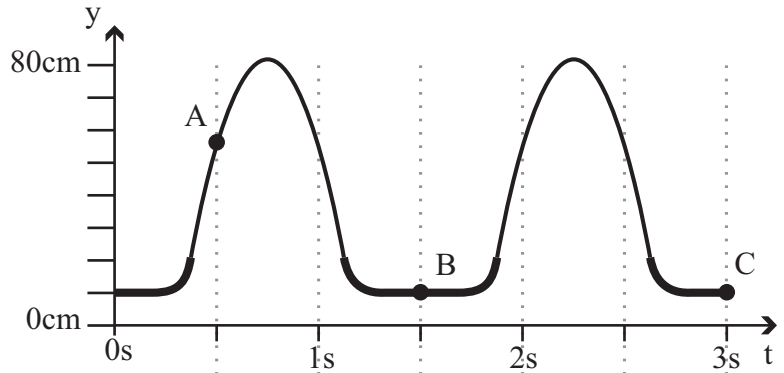
Scoring:

Raw Total: _____/100 pts

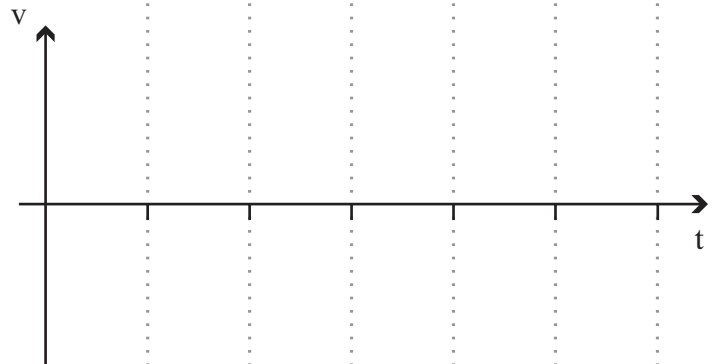
Adjusted Score: _____%

1) [20 pts] This graph shows the vertical position versus time of a baseball which is being tossed into the air and caught with a regular rhythm. Up has been chosen as the positive direction, and the times when the ball is in the thrower's hand have a heavier line.

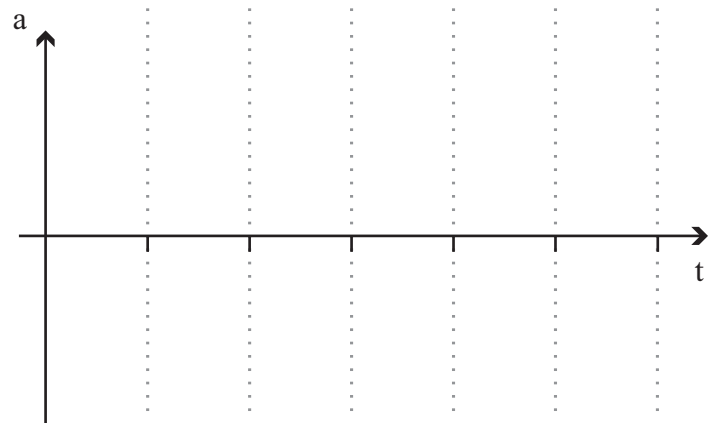
Sketch the velocity and acceleration versus time. Make sure I can tell how things line up in time.



2a) [5 pts] What is the *average velocity* of the object while traveling between points B and C?



2b) [5 pts] What is the *average speed* of the object while traveling between points A and B?



2c) [5 pts] What is the *average velocity* of the object while traveling between points A and B?

3) [15 pts] What is the frequency of the baseball motion in the graph?

- 4) [15 pts] A rubber band stretches by 3cm if you hang an object on it that has a mass of 250g. What is the spring constant that describes this rubber band? (Circle one)
- (A) 81.7 N/m (B) 0.120 m/kg (C) 8.33 N/m (D) 0.0122 m/N
(E) 817 N/m (F) 0.0120 m/kg (G) 83.3 N/m (H) 0.00122 m/N

- 5) [20 pts] While rescuing a damsel in distress who is tied to a railroad track, you hear the approaching train blow its whistle. Actually, 1.7s before you hear the whistle, you feel the vibration of the whistle sound in the steel rails. How much time do you have left to complete the rescue, before the train arrives? (The speed of sound in steel is 5960 m/s. Assume that the track is straight between you and the train, and that the train is traveling at a speed of 30 m/s.)

- 6) [15 pts] List and very briefly describe three independent parameters that can be used to describe a particular sinusoidal graph.

