Physics 101: The Science of Sound
MiniTest 1a, 9/21/05

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 quantities

acceleration due to gravity = 9.81 m/s^2

for a circle: circumference = π(diameter)

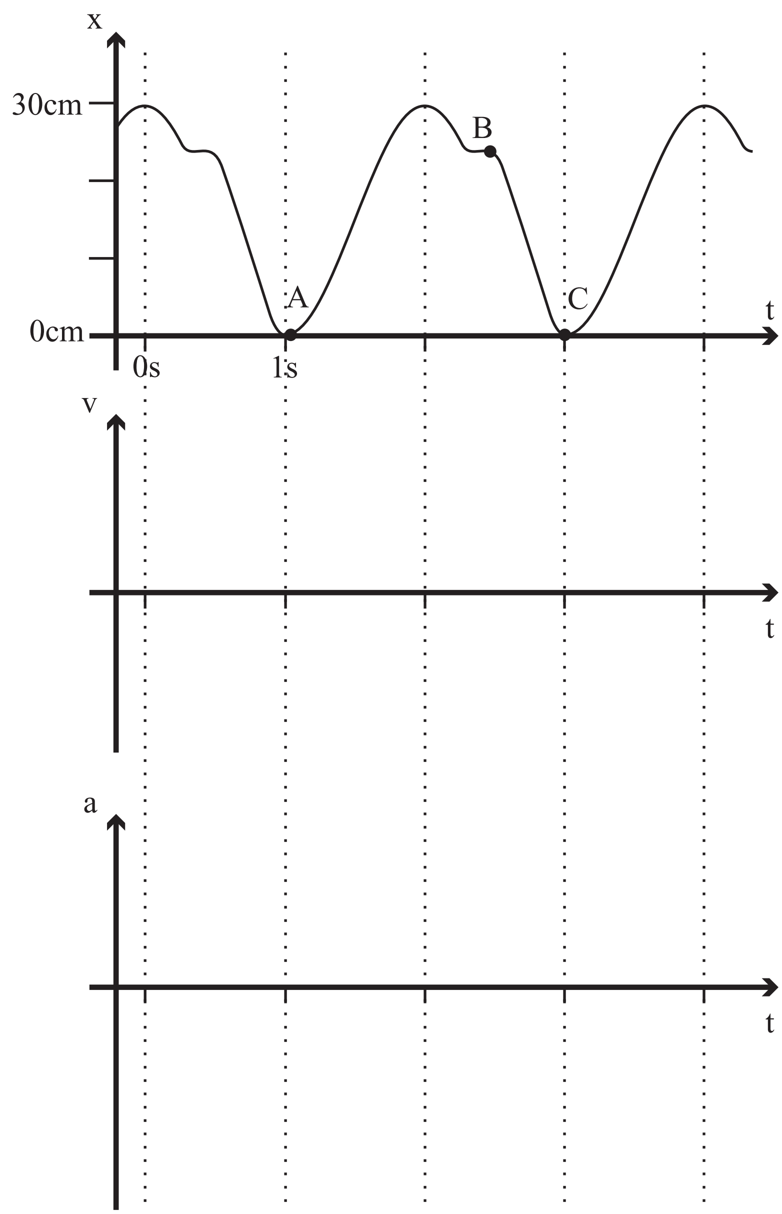
$\pi = 3.141593$

Scoring:

Raw Total: _____/100 pts

Adjusted Score: ______%

1) [20 pts] This graph shows the position versus time of an object being swung on a string. In one direction of the swing, it keeps getting caught on something, leading to the kink in the graph.
Sketch the velocity and acceleration versus time. Make sure I can tell how things line up in time.



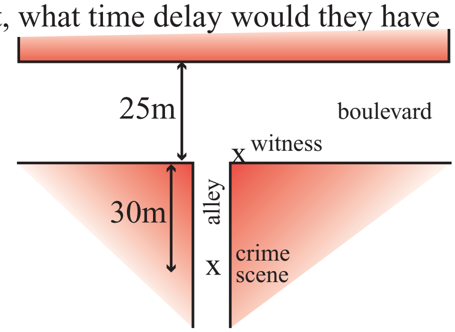
2a) [5 pts] What is the *average velocity* of the object while traveling between points A and B?

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

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

3) [15 pts] An advertisement says that a German sports car can accelerate from a standstill to 120 km/hr in 7s. What average acceleration does that require? Give your answer in units of m/s^2.

4) [15 pts] As a crime scene investigator, you are investigating a murder in a city alley. A passerby on the boulevard reports hearing 2 gun shots, but you suspect that one might have been an echo off the buildings on the opposite side. To compare with the witness's report, what time delay would they have heard between the direct sound and the echo?



5) [20 pts] If a sound arrives at a person's two ears at slightly different times, it affects the direction that the person thinks the sound came from. You can test this by delivering the sound to the ears through two tubes (through which sound travels at the usual speed). Suppose the tube from the sound source to the left ear is 50cm long. If you want the sound to arrive at the right ear 1.2ms later, how long should you make the tube from the sound source to the right ear?

6) [15 pts] Give one difference between the concepts of speed and velocity? If a motion has different values for average speed and average velocity, what can you conclude about the motion?