PHYS 101

Homework # 2
DUE DATE: October 07, 2008

Please do not submit copycat answers from the solutions book or some other solution you have in hand. You should at least show your understanding of the problem. Otherwise, this will be considered as cheating.

1) To measure the gravitational acceleration the following experiment is performed: A particle is thrown vertically upward next to a high building. At two balconies that are vertically separated by a distance H, two students (Alice and Bob) individually recorded the times elapsed between the particle's passage from their level in up and down directions (ΔT_{Alice}, and ΔT_{Bob}). Express g in terms of H, ΔT_{Alice}, and $\Delta T_{Bob.}$

2) The depth of a well is such that an object dropped into the well hits the water going far slower than the speed of sound. Show that under these conditions, the depth of the well is given approximately by

$d=(gt^2/2)(1-gt/v_s)$

where t is the time when you drop the object until you hear the splash, and v_s is the speed of the sound.

3) Question 2.4, 2.8, 2.10, 2.15 in the text. Chapter 2.

4) Problem 2-64 in the text. Chapter 2.

5) Problem 2-66 in the text. Chapter 2.

6) Problem 2-74 in the text. Chapter 2.

7) Problem 2-76 in the text. Chapter 2.

8) One test for the effects of the acceleration of the gravity is to tie a set of weight to a string, with the second separated from the lowest by L_0, the third lowest from the second lowest by L_1, and so forth, and then to drop the string. Supposing that free fall corresponds to motion with constant acceleration, how should the separation L_1, L_2, L_3…, L_n (where n is the number of weights) be related to L_0 if the sounds made by the weights as they land form a steady beat (constant frequency)? The lowest weight starts at the surface onto which the other weights fall.