PHYS 101

Homework # 12
DUE DATE: December 30, 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) Gravitational acceleration and a pendulum
a)What is the change ΔT in the period of a simple pendulum when the acceleration of gravity g changes by Δg?
b) What is the fractional change in period $\Delta T/T$ in terms of the fractional change $\Delta g/g$?
c) Explain how one can use a pendulum to determine the gravitational constant at different elevations using the above result.
d) A pendulum clock, which keeps correct time at a point where g=9.800 m/s2, is found to lose 10.0 s each day at a higher elevation. Use the result of part b to find approximately the value of g at this new location.

2) Brisk walking and the physical pendulum
Many people find that they have a natural walking pace, a number of steps per minute that is more comfortable than a faster or slower pace. Suppose this natural pace is equal to the period of the leg, views as a uniform rod pivoted at the hip point.
a) For a person with 1.0 m long, what is the natural pace in steps per minute?
b) Compare this number with your natural pace (you can measure it by using a clock, and counting your steps) Using your natural pace data, identify the possible center of mass of a human's leg. Estimate the moment of inertia of a real human leg in terms of L, and M (mass of the leg).
c) Compare the natural walking speed of a tall man with that of a short man.

3) Problem 13-86   in the text. Chapter 13.

4) Problem 13-88   in the text. Chapter 13.

5) Problem 12-94 in the text. Chapter 13.

6) Discussion Question Q13.12 in the text. Chapter 13.

7) Discussion Question Q13.15 in the text. Chapter 13.