PHY 100S – THE MAGIC OF PHYSICS
Spring Term, 2013

HOMEWORK #2

DUE: **By 11:00 AM, Thursday, February 14, 2013 in the Drop Boxes**
Late penalty = 5% per day (which also applies to weekend days) for a maximum of 7 days, after which homework will not be accepted. The final late due date is thus 11:00 AM, Thursday, February 21 – this is during Reading Week – you are responsible for finding a way to get late submissions to your tutors (e.g., by email) if they are not here to check the Drop Boxes that week.

DROP BOXES: The completed homework assignment should be submitted in the *Drop Box* for your tutorial section. There are six Drop Boxes – one for each tutorial section, clearly labelled. The Drop Boxes are located in the basement of the Burton tower of the McLennan Physics building.

TEXTBOOK: All questions are taken from the textbook, *Physics: Concepts and Connections, Fifth Edition*, by Art Hobson, Pearson Education (2010).

INSTRUCTIONS: (1) Make sure your name and student number, and the name of your tutor are on your submitted homework, preferably on all pages in case a page comes loose. Staple all pages together.
(2) Show all your reasoning and work legibly, and draw a box around the final answer where applicable.

MARKING: Marks will be given for reasoning, as well as for final answers. Each question is worth 2 marks. Total marks = 20.

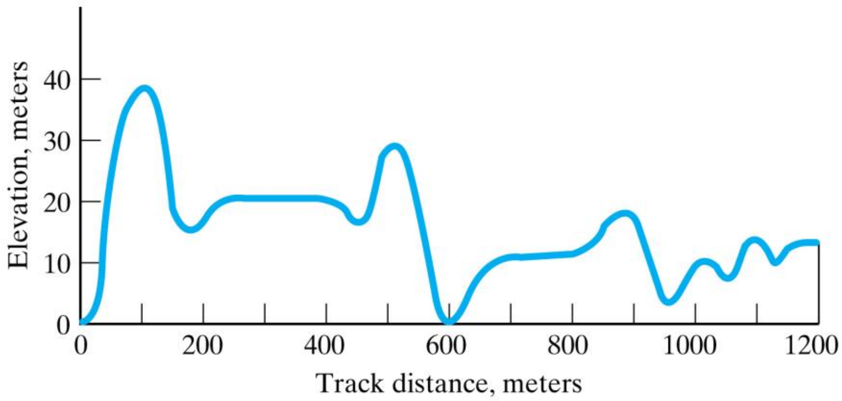
QUESTIONS:

Chapter 6, Conceptual Exercises 16, 20/22, 36

16. You throw a baseball. What quantities could you measure in order to determine how much work you did during the throw?

20/22. If you halve your altitude, how is your gravitational energy (relative to the ground) affected? If you halve your speed, how is your kinetic energy affected?

36. The figure below is a graph of a roller coaster's height above the ground versus the length of track it covers. The coaster is powered up to its high point at 100 m from the starting point. From the high point, the coaster coasts freely all the way to the end. Assume that the coaster starts from rest at the high point and encounters no friction or air resistance. Between 200 m and the finish, where is it moving slowest? Fastest?



Chapter 8, Conceptual Exercises 18, 30, 38

18. Some science fiction stories portray atoms as true miniature solar systems populated by tiny creatures. What are some differences, other than size, between our solar system and the planetary model of an atom?

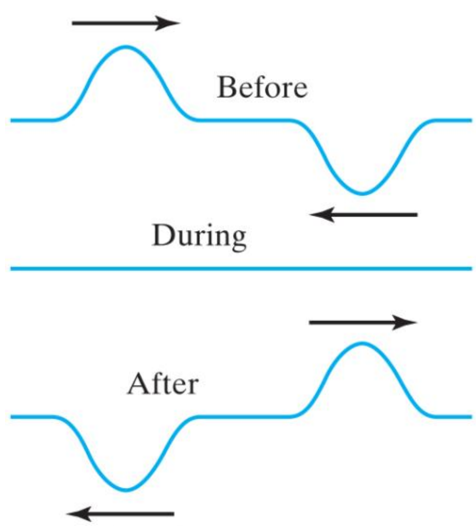
30. Do the electric circuits in your home produce magnetic fields? Suggest a measurement that could check your answer.

38. How would a proton's motion differ from the motion of an electron placed at the same point in the same electric field?

Chapter 9, Conceptual Exercises 4, 8, 12, 32

4. A cork floats on the water as a water wave passes by. What happens to the cork? Will the cork's vibrational frequency be related to the water wave's frequency, and if so, how?

8. What happens to the energy of the two waves shown in the figure to the right when they interfere destructively, as shown in the second of the three sketches? Did the energy vanish? (*Hint:* What are the parts of the rope doing as the wave moves? Which type of energy is the wave carrying?)



12. You shine two flashlights on a wall. Why don't you see an interference pattern?

32. What energy transformation occurs (from what type to what type?) when solar radiation warms your skin? In a flashlight? When microwaves heat your food?