

PHYS-2010: Dr. Luttermoser's General Physics I Course

Problem Set 2, Fall 2010

There are 10 problems you are to complete via the web at

<http://capa.etsu.edu/>

You will gain access to this set by typing in your CAPA Student Number and CAPA ID which will be supplied to you. These problems will be graded and must be completed by 6:00 p.m. on Friday, October 22, 2010. **Start working on these problems immediately! Don't wait until the last day to start them. One never knows when the network will go down, and you will not be able to use this as an excuse for not doing your CAPA problems.** As a matter of fact, there will be no allowed excuses for not doing your CAPA homework.

The following problems will not be graded, but should be done for review. These problems are from your textbook (College Physics, 8th Edition, Serway & Vuille). The solutions are posted on the course web page. **Try to work these problems out by yourself before looking at the solutions I have supplied for you.**

1. Problem 5.16, Page 154.
2. Problem 5.32, Page 155.
3. Problem 5.52, Page 157.
4. Problem 6.21, Page 185.
5. Verify that the kinetic energy of the Earth can be ignored when considering the energy of the system consisting of the Earth and a dropped ball of mass m_b . Verify this statement by first setting up a ratio of the kinetic energy of the Earth (note that \oplus is the astronomical symbol for the Earth) to that of the ball as they collide. Then use the conservation of momentum to show that

$$\frac{v_{\oplus}}{v_b} = -\frac{m_b}{M_{\oplus}} \quad \text{and} \quad \frac{\text{KE}_{\oplus}}{\text{KE}_b} = \frac{m_b}{M_{\oplus}} .$$

Find the order of magnitude of the ratio of the kinetic energies, using a mass for the ball of 1 kg and an approximate mass of the Earth of 10^{25} kg.

6. A 10.0 g object moving to the right at 20.0 cm/s makes an elastic head-on collision with a 15.0 g object moving in the opposite direction at 30.0 cm/s. Find the velocity of each object after the collision.
7. Problem 7.5, Page 221.
8. Problem 7.24, Page 222.
9. During a solar eclipse, the Moon, Earth, and Sun all lie on the same line, with the Moon between the Earth and the Sun. (a) What force is exerted by the Sun on the Moon? (b) What force is exerted by Earth on the Moon? (c) What force is exerted on Earth by the Sun? (See Table 7.3 in the textbook for data.)
10. Problem 7.44, Page 223.