

PHYS 101

Homework # 7

DUE DATE: November 18, 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) A rocket is propelled vertically upward from the earth which has a radius R_0 . After its fuel has become exhausted, the rocket reaches its highest point at a height of $2R_0$ above the surface of the earth and then falls vertically down back to the earth. With what speed does the rocket strike the surface of the earth? Air resistance is negligible. Express in terms of R_0 and g at the surface of the earth. Show clearly your reasoning.

2) (a) When an object's kinetic energy is increasing, must its potential energy be decreasing? Explain. (b) If a rocket engine delivers a constant thrust (force on the rocket), does it deliver more power as the rocket speeds up? Explain.

3) With what speed would an object need to be shot radially outward from the surface of the sun so that it escapes from the sun without falling back into it? Express your answer in terms of the speed v_0 with which the earth moves in its nearly circular orbit around the sun, the radius R_0 of its orbit, and the radius R_s of the sun.

4) Problem 7-42 in the text. Chapter 7.

5) Problem 7-64 in the text. Chapter 7.

6) Problem 7-72 in the text. Chapter 7.

7) Problem 7-78 in the text. Chapter 7.

8) Discussion question Q7.17 in the text. Chapter 7.