

UNIVERSITY OF ALABAMA
Department of Physics and Astronomy

PH 125 / LeClair

Spring 2009

Problem Set 10: Gravity

Instructions:

1. Answer all questions below. Follow the problem-solving template provided.
2. Some problems have different due dates!
3. You may collaborate, but everyone must turn in their own work

The following problems are due 24 March 2009 at the end of the day.

1. Halliday, Resnick & Walker Problem 10.54
2. Halliday, Resnick & Walker Problem 10.67
3. Halliday, Resnick & Walker Problem 11.13

The following problems are due 26 March 2009 at the end of the day.

4. Halliday, Resnick & Walker Problem 13.13
5. Halliday, Resnick & Walker Problem 13.16
6. Halliday, Resnick & Walker Problem 13.23

The following problems are due 27 March 2009 at the end of the day.

7. Halliday, Resnick & Walker Problem 13.68
8. Halliday, Resnick & Walker Problem 13.99
9. An object of mass m is dropped from a height h above the surface of a planet of mass M and radius R . Assume the planet has no atmosphere so that friction can be ignored. Further assume the planet has no life that may be harmed by subsequent portions of this problem.
 - (a) What is the speed of the mass just before it strikes the surface of the planet? Do *not* assume that h is small compared with R .
 - (b) Show that the expression from (a) reduces to $v = \sqrt{2gh}$ for $h \ll R$.
 - (c) How long does it take for the object to fall to the surface for an arbitrary value of h ? Use any means necessary to evaluate the integral required. Bonus points (10%) for code submissions.