

MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
Department of Physics

Physics 8.01

Spring 2005

**PROBLEM SET 5**

**Friday, February 25, 2005**

**Due Date: Thursday, March 3, 2005, 3:00 p.m.**

Corrected Version, 2/27/05, 11:00 am: Problem 8 changed.\*

**Reading Assignment:** Young and Freedman, Chapter 6; Busza, Cartwright, and Guth: pp. 116-119 of Chapter 4, through the paragraph that begins on p. 118.

**Topics for the week:** Kinetic energy, work, power, and the work-energy theorem. (Conservative forces and potential energy will not be discussed until next week.)

**Instructions:**

If a problem is marked **DO**, you should write a solution to hand in to be graded. The graders will read your answers to one or two questions on each problem set, and they will check whether the other problems have at least been handed in.

The quiz on this material, to be given at 10:05 am on Friday, March 4, will include at least one problem that is at most a slight modification of one of the problems (**DO** or **STUDY**) on this problem set.

Your written solutions are due by 3:00 pm in room 4-339B on Thursday, March 3. Please indicate the number, instructor, and time of your recitation section, and be sure to submit your paper to the correct bin. Solutions will be made available on the 8.01 website shortly afterward, so that you will be able to use them in studying for the quiz.

*Kinetic Energy:*

- 1) **DO:** SG:4A.1 Kinetic energy and velocity
- 2) **DO:** SG:4A.2 Kinetic energy of a projectile

*Work:*

- 3) **STUDY:** SG:4C.2 (S) Work done in hauling a barge
- 4) **DO:** Y&F:6.28 Work in compressing a spring
- 5) **DO:** SG:4C.3 (H) Vector description of work
- 6) **STUDY:** SG:4C.4 (S) Swinging a pail in a circle

— Problem Set continues on next page —

---

\* The original version of this Problem Set listed Problem 8 as Y&F:6.19. It was my mistake, so if you have already done that problem, you can hand it in for full credit without doing Y&F:6.15. However, you may still find Y&F:6.15 interesting, since it gives an introduction to the conservation of energy, which we will talk about next week.

*Work and Kinetic Energy:*

- 7) **DO:** Y&F:6.21 Kicking a soccer ball
- 8) **DO:** Y&F:6.15 Work, kinetic energy, and inclined planes
- 9) **DO:** Y&F:6.81 Maximum compression of a spring
- 10) **DO:** Y&F:6.70 A proton and a uranium nucleus

*Power:*

- 11) **DO:** Y&F:6.43 Light bulbs and running: what is a joule?
- 12) **DO:** Y&F:6.46 Electrical power consumption and solar power