

**Phy114: Electromagnetism, Waves and Radiation  
for the Sports Science  
Homework Problems  
Set #5: Due Monday, March 10, 2008**

Note: Students are encouraged to work together and discuss the problems. However, each student must arrive at her/his own final answers. Show all your work. Simply copied homework will result in zero.

1. (9 points) (a) How much current flows through an air conditioner that uses 120-V electricity and has a resistance of  $8.5 \Omega$ ? (b) Calculate the resistance of a vacuum cleaner that uses 12 A of current and operates on 220-V electricity. (c) What is the voltage of a battery that produces a 3.0-A current when attached to a  $8.0\text{-}\Omega$  resistance?
2. (5 points) Calculate the electric power of a lightening bolt having a current of 30,000 A and a voltage of  $1.5 \times 10^8$  V.
3. (5 points) Cords of appliances sometimes warm up because of the thermal energy created by their resistance. How much power is used by the  $0.40\text{-}\Omega$  cord of an appliance through which 9.0 A of current flows? (Such a cord is faulty since its resistance should be lower.)
4. (10 points) An unsuspecting American tourist takes an electric razor designed to operate with 120-V electricity to Europe and plugs it into a 220-V outlet, and sees smoke comes out of the razor! The razor is ruined (fried) by overheating. (A special adapter is needed to use it safely.) If the razor normally consumes 25 W of power, how much power does it consume using 220-V electricity?
5. (10 points) (a) How much current flows through the 150-W headlight of an automobile that has a 12-V electrical system? (b) What is the resistance of the light?
6. (10 points) What is the cost of operating a hot-water heater for 1 week if it consumes 7.0 kW of power and is on an average of 3.0 hr/day? The cost of electricity is 0.12 \$/kWh.