Circuits/Electromagnetics - Worksheet 1

1. A charge of 12.7 µC is placed 18.5 cm from a second charge. If the force between the charges is 25.5 N, what is the magnitude of the second charge?

2. 7.45×10^{17} electrons take 0.810 seconds to flow past a point in the circuit. What is the current?

3. If the current in a circuit is 0.250 A, how many electrons are flowing past a set point in 0.155 second?

4. What is the direction of current flow in a circuit? Why can this question be confusing?

5. A hair dryer draws 1.12 A when plugged into a 120 V circuit. What is its resistance?

6. A light bulb has stamped upon it the following information, "60 W 120 V". How much current will flow through the bulb?

7. What is the resistance of a copper wire, diameter of 1.50 mm and length 25.0 m?

8. If a kilowatt-hour costs 0.055 dollars (i.e., $ 0.055 or five and a half cents), how long could $10.00 worth of electricity operate an 1850 W toaster?

9. A roller coaster starts at some height that you do not know. It goes down this hill and then goes up a second hill that is 21.5 m above the first drop at a speed of 19.7 m/s. So how high was the initial hill?

10. An 85 g wooden block is set up against a spring. The block rests on a smooth surface. The block is pushed into the spring, compressing it a distance of 2.0 cm and then released. The spring constant is k = 78 N/m. What is the speed of the block when it reaches its initial position (where the spring was not compressed)?

11. A 5.0 kg crate slides down a smooth ramp that is elevated at an angle of 38°. The length of the ramp is 2.0 m. What will be the speed of the crate at the bottom of the ramp?

12. A 3.00 kg mass, m_1, slides up a ramp. The angle for the ramp is 28.0°. The 3.00 kg mass is connected to a second mass, m_2, of 3.25 kg as shown by a light string with a frictionless pulley, &c. Coefficient of kinetic friction is 0.285. Find (a) the acceleration of m_1, (b) the kinetic energy of m_1 after it has traveled 25.0 cm up the ramp, and (c) the work done on m_1 to move it the 25.0 cm.