

Physics Problem Set #7

Show your work if you want partial credit.

Due Thursday, Jan. 28

1. What is the energy required to move +2.0 coulombs of charge between the negative and positive terminals of a 12-volt battery?
2. A copper wire has a cross-sectional area of 3.5 square centimeters. Every 2.0 seconds, 10 C of charge flows past a point on the wire. What is the current in the wire in amperes?
3. What is the current of a 60-watt light bulb plugged into a 120-volt outlet?
4. What is the power of a toaster that draws 8 amps of current when plugged into a 120-volt outlet?
5. Your 60-watt light bulb is plugged into a 110-volt household outlet and left on for 6 hours. The utility company charges you \$0.11 per kiloWatt•hr. Explain how you can calculate the cost of such a mistake.
6. The resistivity of copper is 1.7×10^{-8} ohm-meters. What is the resistance of a copper wire 1 mile long with a diameter of 0.41 cm?
7. Use the Ohm's law equation to provide numerical answers to the following questions:
 - a. An electrical device with a resistance of 3.0 ohms will allow a current of 4.0 amps to flow through it if a voltage drop of _____ Volts is impressed across the device.
 - b. When a voltage of 120 V is impressed across an electric heater, a current of 10.0 amps will flow through the heater if the resistance is _____ .
 - c. A flashlight that is powered by 3 Volts and uses a bulb with a resistance of 60 ohms will have a current of _____ Amps.
8. Calculate the resistance and the current of a 7.5-Watt night light bulb plugged into a US household outlet (120 V).
9. The sticker on a compact disc player says that it draws 288 mA of current when powered by a 9 Volt battery. What is the power (in Watts) of the CD player?
10. Three resistors with resistance values of 2-ohm , 4-ohm , and 6-ohm are placed in series in a circuit with a 12-volt power supply. These would provide a resistance which is equivalent to one _____-ohm resistor.
What is the voltage drop at each resistor? What is the current at each resistor?
- 11 Three resistors with resistance values of 2-ohm , 4-ohm , and 6-ohm are placed in parallel in a circuit with a 12-volt power supply. These would provide a resistance which is equivalent to one _____-ohm resistor.
What is the voltage drop at each resistor? What is the current at each resistor?