Name: Period: Date:

Currents & Circuits- Problem Packet

1. A 4.0 Ω resistor is connected to a 6.0 V battery. What is the current in the circuit?

2. A 90.0 V battery does 2.7 J of work in transferring some charge during a 2.0 second period.
   a. Calculate the amount of charge transferred.

   b. Calculate the current flow.

   c. Calculate the power.

3. An iron is rated at 1680 W and is connected to a 120 V outlet.
   a. Calculate the current that the iron draws.

   b. Calculate the energy that is consumed by the iron in one hour.

4. A 1.5 V dry cell is connected to a 4500 Ω resistor. Calculate the current in this circuit.

5. A 60.0 W light bulb is connected to a 120 V outlet.
   a. Calculate the current flowing through the bulb.

   b. What is the resistance of the bulb?

6. Eighty percent of the energy used by a sunlamp is converted into heat. When the sunlamp is plugged into a 120 V outlet, it draws 2.0 A. How much thermal energy is released by this lamp in 30 minutes?

7. A transistor radio operates by means of a 9.0 V battery that supplies it with 50 mA (0.0500 A) current.
    a. If the cost of the battery is $0.90 and it lasts for 300 hours, what is the cost per kWh to operate the radio in this manner?

    b. The same radio, by means of a converter, is plugged into a household circuit by a homeowner who pays $0.08 per kWh. What does it now cost to operate the radio for 300 h?

8. A 20.0 Ω resistor and a 30.0 Ω resistor are connected in series and placed across a 120 V potential difference.
    a. Draw a quick sketch of this circuit.

    b. What is the equivalent resistance of the circuit?

    c. What is the current in the circuit?

    d. What is the voltage drop across each resistor?

    e. What is the voltage drop across the two resistors together?

9. Three resistors of 3.0 kΩ, 5.0 kΩ, and 4.0 kΩ are connected in series across a 12 V battery.
    a. Draw a quick sketch of this circuit.

    b. What is the equivalent resistance of the circuit?

    c. What is the current through the resistors?

    d. What is the voltage drop across each resistor?

    e. Find the total voltage drop across the three resistors.

10. A 120 Ω resistor, a 60 Ω resistor, and a 40 Ω resistor are connected in parallel and placed across a 12 V battery.
    a. Draw a quick sketch of this circuit.

    b. What is the equivalent resistance of the parallel circuit?

    c. What is the current through the entire circuit?

    d. What is the current through each branch of the circuit?

11. Three 15 Ω resistors are connected in parallel and placed across a 30 V battery.
    a. Draw a quick sketch of the circuit.

    b. What is the equivalent resistance of the parallel circuit?

    c. What is the current though the entire circuit?

    d. What is the current through each branch of the circuit?

12. Suppose one of the 15.0 Ω resistors in problem #11 is replaced by a 10.0 Ω resistor.
    a. Does the equivalent resistance change? If so, how?

    b. Does the amount of current through the entire circuit change? If so, in what way?

    c. Does the amount of current through the other 15.0 Ω resistors change? If so, in what way?

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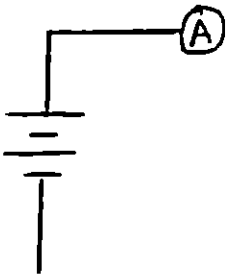

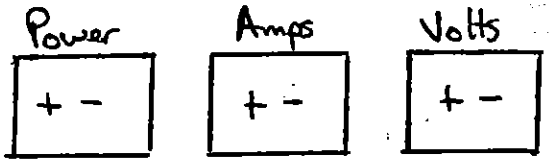

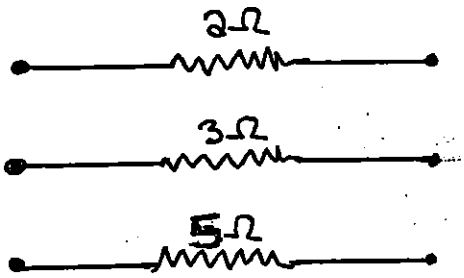

Resistor R_1 is connected in series with the parallel combination of R_2 and R_3. The ampmeter measures current out of the power supply and a voltmeter is reading the voltage across R_1. Complete the schematic diagram and complete the chart below according to the circuit.

Resistor	Resistance (ohms)	Current (amps)	Voltage (Volts)	Power (Watts)
1	2 Ω			
2	3 Ω			
3	5 Ω			
Total			31 V	

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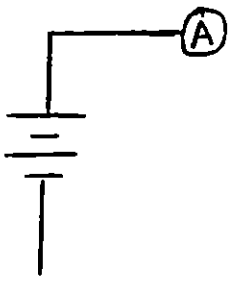

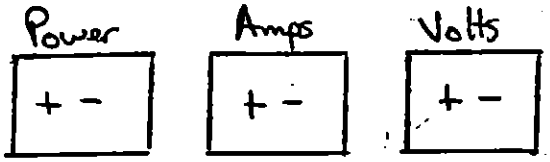

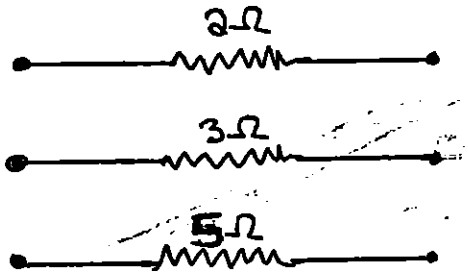

Resistor R_1 is connected in series with R_2 and the combination is parallel with R_3. The ampmeter measures current out of the power supply and a voltmeter is reading the voltage across R_3. Complete the schematic diagram and complete the chart below according to the circuit.

Resistor	Resistance (ohms)	Current (amps)	Voltage (Volts)	Power (Watts)
1	2 Ω			
2	3 Ω			
3	5 Ω			
Total			31 V	