# CALCULATING VOLTAGE

Name _____

| V | = | I | x | R |
|---|---|---|---|---|
| Voltage (volts) | = | Current (amperes) | x | Resistance (ohms) |

Solve the following problems.

1. What voltage produces a current of 50 amps with a resistance of 20 ohms?

_____

2. Silver has a resistance of $1.98 \times 10^{-4}$ ohms. What voltage would produce a current of 100 amps?

_____

3. A current of 250 amps is flowing through a copper wire with a resistance of $2.09 \times 10^{-4}$ ohms. What is the voltage?

_____

4. What voltage produces a current of 500 amps with a resistance of 50 ohms?

_____

5. What voltage would produce a current of 100 amps through an aluminum wire which has a resistance of $3.44 \times 10^{-4}$ ohms?

_____

# CALCULATING RESISTANCE

Name _____

$$R = \frac{V}{I} \qquad \text{Resistance (ohms)} = \frac{\text{Voltage (volts)}}{\text{Current (amperes)}}$$

Solve the following problems.

1. What resistance would produce a current of 200 amperes with a potential difference of 2,000 volts?

_____

2. A 12-volt battery produces a current of 25 amperes. What is the resistance?

_____

3. A 9-volt battery produces a current of 2.0 amperes. What is the resistance?

_____

4. An overhead wire has a potential difference of 2,000 volts. If the current flowing through the wire is one million amperes, what is the resistance of the wire?

_____

5. What is the resistance of a light bulb if a 120-volt potential difference produces a current of 0.8 amperes?

_____

# CALCULATING CURRENT

Name _____

Ohm's Law states that $I = \frac{V}{R}$

where I = current (amperes)
V = voltage (volts)
R = resistance (ohms)

Solve the following problems.

1. What is the current produced with a 9-volt battery through a resistance of 100 ohms?

_____

2. Find the current when a 12-volt battery is connected through a resistance of 25 ohms.

_____

3. If the potential difference is 120 volts and the resistance is 50 ohms, what is the current?

_____

4. What would be the current in Problem 3 if the potential difference were doubled?

_____

5. What would be the current in Problem 3 if the resistance were doubled?

_____

# OHM'S LAW PROBLEMS

Name _____

Using Ohm's Law, solve the following problems.

1. What is the current produced by a potential difference of 240 volts through a resistance of 0.2 ohms?

_____

2. What resistance would produce a current of 120 amps from a 6-volt battery?

_____

3. What voltage is necessary to produce a current of 200 amperes through a resistance of $1 \times 10^{-3}$ ohms?

_____

4. What is the current produced by a 9-volt battery flowing through a resistance of $2 \times 10^{-4}$ ohms?

_____

5. What is the potential difference if a resistance of 25 ohms produces a current of 250 amperes?

_____

# CALCULATING POWER

Name _____

$P = V \times I$

**Power (watts) = Voltage (volts) x current (amperes)**

Solve the following problems.

1. A 6-volt battery produces a current of 0.5 amps. What is the power in the circuit?

_____

2. A 100-watt light bulb is operating on 1.2 amperes current. What is the voltage?

_____

3. A potential difference of 120 volts is operating on a 500-watt microwave oven. What is the current being used?

_____

4. A light bulb uses 0.625 amperes from a source of 120 volts. How much power is used by the bulb?

_____

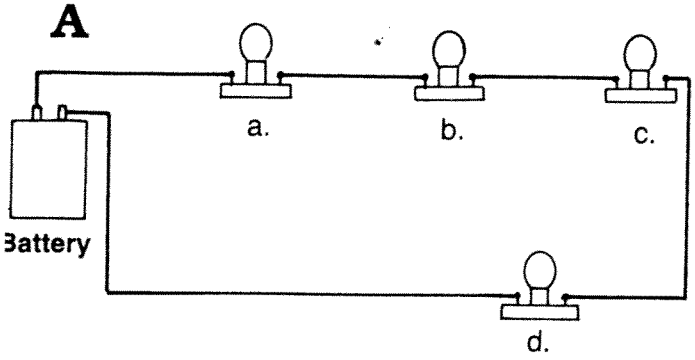
5. What voltage is necessary to run a 500-watt motor with a current of 200 amperes?

_____

# SERIES AND PARALLEL CIRCUITS

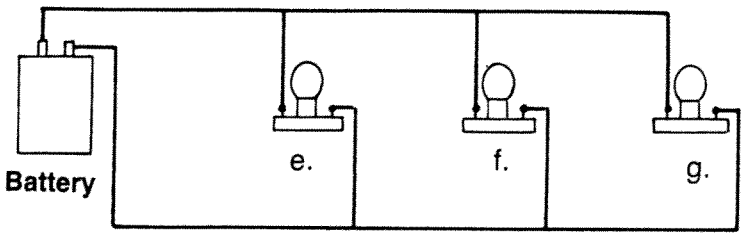
Name _____

**A**




_____

**B**




_____

Answer the following questions regarding circuits A and B above.

1. Label circuits A and B as series or parallel.
2. If bulb a burns out, will bulb d still light? _____
3. If bulb f burns out, will bulb g still light? _____
4. If bulbs b, c and d are burned out, will bulb a still light? _____
5. If bulbs f and g are missing, will bulb e still light? _____
6. Draw a diagram of a parallel circuit having 3 light bulbs, 3 switches and a battery. Each light bulb is on a separate switch.

7. Draw a diagram of a series circuit having 3 light bulbs, one switch and a battery.

8. Would series or parallel circuits be better for wiring light in a house? _____

   Why? _____

   _____

# CALCULATING ELECTRICAL ENERGY AND COST

Name _____

One kilowatt hour is 1,000 watts of power for one hour of time. The abbreviation for kilowatt hour is kWh.

**Example:** A coffee pot operates on 2 amperes of current on a 110-volt circuit for 3 hours. Calculate the total kWh used.

1. Determine power: $P = V \times I$
   $= 110 \text{ volts} \times 2 \text{ amps}$
   $= 220 \text{ watts}$

   $kWh = P \times \text{hours}$

   $kWh = \frac{V \times I \times \text{hours}}{1{,}000}$

2. Convert watts to kilowatts:

   $220 \text{ watts} \times \frac{1 \text{ kilowatt}}{1{,}000 \text{ watts}} = 0.22 \text{ kW}$

3. Multiply by the hours given in the problem:

   $0.22 \text{ kW} \times 3 \text{ hrs} = 0.66 \text{ kWh}$

Solve the following problems.

1. A microwave oven operates on 5 amps of current on a 110-volt circuit for one hour. Calculate the total kilowatt hours used. _____

2. How much would it cost to run the microwave in Problem 1 if the cost of energy is $0.10 per kWh? _____

3. An electric stove operates on 20 amps of current on a 220-volt circuit for one hour. Calculate the total kilowatt hours used. _____

4. What is the cost of using the stove in Problem 3 if the cost of energy if $0.10 per kWh? _____

5. A refrigerator operates on 15 amps of current on a 220-volt circuit for 18 hours per day. How many kilowatt hours are used per day? _____

6. If the electric costs are 15¢ per kWh, how much does it cost to run the refrigerator in Problem 5 per day? _____

7. The meter reading on June 1 was 84502 kWh. On July 1, the meter read 87498 kWh. If the cost of electricity in the area was 12¢ per kWh, what was the electric bill for the month of June? _____

8. A room was lighted with three 100-watt bulbs for 5 hours per day. If the cost of electricity was 9¢ per kWh, how much would be saved per day by switching to 60-watt bulbs? _____