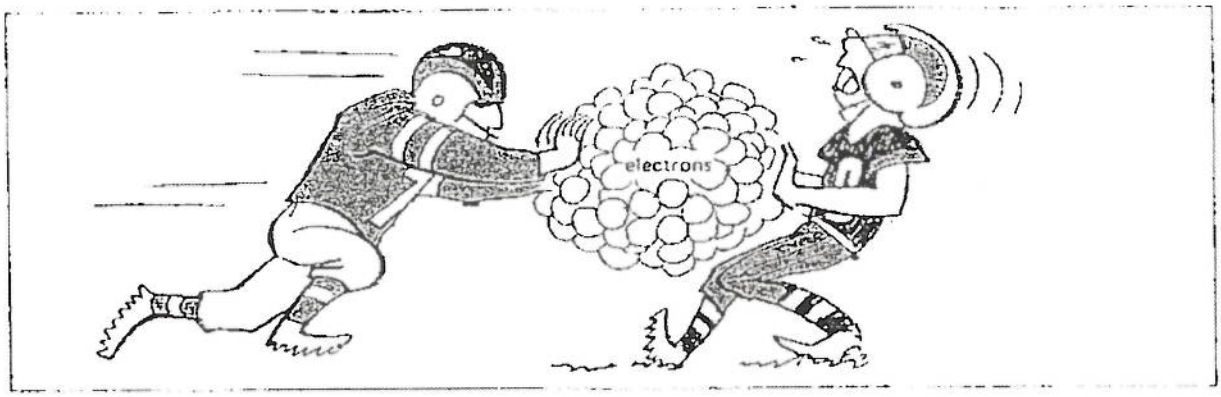

Figure A

The force that moves electrons in a circuit

The number of electrons that are moving

Resistance-the force that tries to stop or slow the electrons

Fill-in Questions

Fill in the correct answer for each of the following.

1. Another name for electric current is Amperes.
2. Amperes tell us how many electrons move past a point in a circuit every second.
3. EMF stands for electromagnetic force.
4. Electrical force or pressure is measured in units called volts.
5. Electrical resistance is measured in units called ohms.

Matching

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A		Column B
d	1. Volts	a) electrical resistance
e	2. Amps	b) path for moving electrons
b	3. Circuit	c) relationship between volts, amps, and ohms
c	4. Ohm's Law	d) electrical pressure
a	5. Ohms	e) number of electrons passing a point in a wire

True or False

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

F 1. EMF stands for a number of electrons.

F 2. Another name for resistance is ampere.

T 3. Volts measure electrical pressure or force.

T 4. Different circuits have different amps, volts, and ohms.

F 5. If volts change, then amps and ohms stay the same.

Completing Sentences

Choose the correct word or term for each statement. Write you choice in the spaces provided.

1. Most current electricity comes from generators. (generators, dry cells)
2. The size of an electric current is measured in amperes. (amperes, volts, ohms)
3. Electrical pressure is measured in volts. (amperes, volts, ohms)
4. Electrical resistance is measured in ohms. (amperes, volts, ohms)

Questions to Answer

Electricity "happens" because there is a constant flow of electrons through conductors and resistors. A generator or cell keeps the electricity flowing from a negatively charged terminal to a positively charged one. This action of "pumping" electrons is called *voltage* or *electrical potential difference*. Compare this action with the action of a waterfall.

Gravity keeps water flowing in a waterfall. Gravity is constant. This is just like the voltage in a system.

Ohm's Law states that as long as the temperature remains constant:

- Ω The resistance of a conductor stays constant
- Ω Current is directly proportional to the voltage applied (if you increase voltage, the current will also increase the current)

5. Use this law to describe how an incandescent light bulb functions:

A lightbulb has a constant resistance and doesn't flicker. As you increase the voltage and therefore the current, the brightness of the bulb increases.

Ohm's Law

Show the formula used, your units in the formula and answer, and all of your work in the following problems.

6. A 12V battery powers a circuit. If a current of 3A is drawn from the battery, what is the resistance in the circuit?

$V = I \times R$ $R = \frac{V}{I}$

Voltage = 12V

Current = 3A

Resistance = ?

$= \frac{12}{3}$

$= 4\ \Omega$

7. What is the current of a circuit with 150Ω of resistance and is powered by a 25V source?

$V = I \times R$ $I = \frac{V}{R}$

Voltage = 25V

Current = ?

Resistance = 150 Ω

$= \frac{25}{150}$

$= 0.16\bar{6}A$

8. What is the voltage of a battery that supplies 4A of current to 5Ω of resistance?

$V = ?$

$I = 4A$

$R = 5\ \Omega$

$V = I \times R$

$= 4 \times 5$

$= 20V$

9. A 30Ω and 50Ω resistor are connected in series with a battery. The current from the battery is 0.25A. What is the voltage of the battery?

$V = ?$

$I = 0.25A$

$R = 50\Omega + 30\ \Omega = 80\ \Omega$

$V = I \times R$

$= 0.25 \times 80$

$V = 20V$

10. Three identical resistors are connected in series with a power source. What is the resistance of one resistor if there is a current of 2.5A from a 50V power source?

$V = 50V$

$I = 2.5A$

$R = ?$

$V = I \times R$

$\frac{20\ \Omega}{3} = 6.\bar{3}\ \Omega$

$R = \frac{V}{I}$

$= \frac{50}{2.5}$

$= 20\ \Omega$

11. A bulb of 25Ω resistance is in a circuit powered by a 4.5-V battery.

a. What is the current in the circuit?

$V = 4.5V$ $I = ?$ $R = 25\Omega$

$V = I \times R$ $I = \frac{V}{R}$

$= \frac{4.5}{25}$

$= 0.18A$

b. What would be the current if the resistance were 30Ω?

$I = \frac{V}{R} = \frac{4.5}{30} = 0.15A$

12. A current of 0.2A flows through your electric toothbrush and it is plugged into a 120V outlet in the bathroom. What is the resistance inside the toothbrush?

$V = 120$ $I = 0.2A$ $R = ?$

$V = I \times R$ $R = \frac{V}{I}$

$= \frac{120}{0.2}$

$= 600\Omega$

13. ~~In Figure 2.16 (page 307) would you expect the potential difference (V) of the light #2 to be greater than or less than light #1 (circle one). What is the difference attributed to?~~

OMIT

14. Current is *the rate of flow* of electricity in a circuit. It is a measure of the number of electrons that move past any particular point in a circuit every second. What are the two devices called that we use to measure this "flow"?

i) Ammeter

ii) Galvanometer

Connect a battery, light bulb and ammeter in a loop. Record the reading on the ammeter. Now add another bulb to the loop. Record that ammeter reading. Repeat this until you get to three light bulbs.

Title: _____

Number of Bulbs	Reading on Ammeter (Amps)

Depends on your experiment.

Explain your observations:

The more bulbs the less the current because the resistance is increasing. $V = I \times R$ ... if R ↑ and V is unchanged ... then I ↓

Suppose you repeated this activity with **two electrical cells** connected end to end (positive to negative). Predict what the ammeter readings would be. Explain your answer. Repeat the experiment to see if your prediction is correct.

Title: _____

Number of Bulbs	Reading on Ammeter (Amps)

Explain your observations: