SPECIAL PROGRAM IN TECHNICAL VOCATIONAL EDUCATION (SPTVE)
TECHNICAL DRAFTING 9
QUARTER 3- WEEK 1

  I. Topic: Electric Charge and Ohm's Law
  II. Objectives:
    At the end of this module, the learner should be able to:

    1. identify the quantities of electricity.
    2. discuss Ohm's law; and
    3. perform problem-solving using the correct equation.

  III. Brief Introduction of the Lesson

Electric Charge

The matter is made up of atoms. Atoms contain positively charged protons, negatively charged electrons, and neutral neutrons. Opposite charges exert a force of attraction on each other. Similar charges exert a force of repulsion.

Materials that permit electric charges to move within them are called conductors while those that do not are called insulators. Most metals are good conductors and most non-metals are good insulators.

A neutral object can acquire charge by friction, conduction, or induction. The build-up of electric charge is called static electricity.

The flow of electricity

Electric charges can be made to flow from a source such as the battery, photocell, or electric generator.

Electrical Quantities

1. **Current** is the movement of charged particles in a wire in a specific direction. The charged particles may be a positive ion or a negative ion. The symbol used is (**A**) and is named ampere. One ampere of current flows in a conductor when 6.251×10^{18} electrons pass a given cross-section in 1 second.
2. **Voltage** is also known as electromotive force (*emf*) or potential difference. It is the electric pressure that causes current to flow. The potential difference is the potential energy divided by charge. It is the work needed to move a charged body against the electric force, toward or away from another charged body. The symbol for voltage is (**V**) which is *joule per coulomb.* There are several methods of producing an emf. The most common is electromagnetic induction in generators and chemical reaction in batteries.
3. **Resistance** is the opposition to the flow of charge. The symbol for resistance is (**R**). The unit used to specify the amount of resistance is the ohm, represented by the symbol (**Ω**).
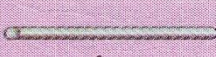
All materials offer some resistance to current but the amount of resistance differs from each other. In direct current (d-c) this unit is called resistance; in an alternating current (a-c) it is called impedance.

The resistance of the object depends on four factors: 1) length, 2) cross-sectional area, 3) resistivity of the material, and 4) temperature.

Factors that Affect Resistance

	Less Resistance	Greater Resistance
Length	L_1	L_2
Cross-sectional area	A_1	A_2
Material	Copper	Aluminum
Temperature	T_1	T_2

Ohm's Law

Although the three electrical quantities: current, voltage, and resistance, are used differently, they are related to each other. This relationship is known as Ohm's Law. It is stated as ***current is directly proportional to the voltage and inversely proportional to the resistance.*** It is expressed by the equation:

$$I = \frac{V}{R} \text{ from this equation , } V = IR \text{ and } R = \frac{V}{I}$$

IV. Activities:

Activity 1. Directions: Identify the answer to the following statement. Write the answer on a separate sheet of paper.

1. It is the movement of charged particles in a wire to a specific direction. _____
2. The symbol used for current and is named ampere. _____
3. It is also known as electromotive force (emf) or potential difference. _____
4. It is the symbol for the voltage which is joule per coulomb. ____
5. It is the opposition to the flow of charge. _____
6. The symbol for the resistance. _____
7. It is the symbol represented by ohm. _____

Activity 2. Directions: Solve the following using ohms' law equation.

1. Find the current through a resistor of resistance R=2 Ω if the voltage across the resistor is 6V.

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2. Find the voltage if the resistance is equal to 12 Ω and the current is 5A.
3. Find the resistance if the voltage is equal to 20V and the current is 5A.
4. Find the voltage if the resistance is equal to 14 Ω and the current is 7A.
5. Find the resistance if the voltage is equal to 40V and the current is equal to 5A.

Activity 3. Directions: Given the diagram below solve for the current using the Ohm's law equation.
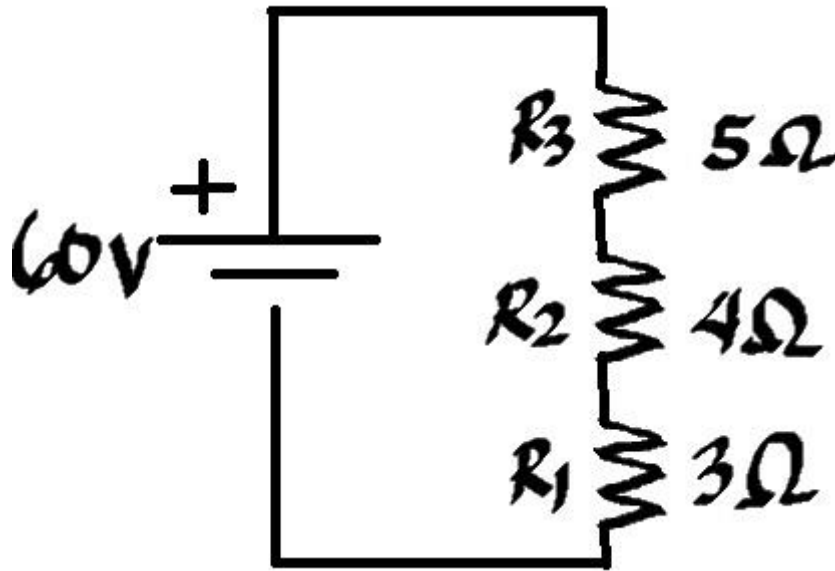
IV. Assessment:
Directions: Write the letter of the BEST answer on a separate sheet of paper.

1. It is the movement of charged particles in a wire in a specific direction.
   A. current   C. resistance
   B. voltage   D. impedance
2. It is the opposition to the flow of charge.
   A. current   C. voltage
   B. resistance   D. impedance
3. It is the electric pressure that causes the current to flow.
   A. current   C. voltage
   B. resistance   D. impedance
4. It is another term for resistance in an alternating current.
   A. current   C. voltage
   B. resistance   D. impedance
5. Given the resistance of 5 Ω and current of 4A. What is the voltage?
   A. 10   B. 20   C. 30   D. 40

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VI. Reflection: Give your thoughts on the question below.

1. How would you relate the flow of electricity in architectural drafting? _____
_____
_____
_____

2. How important electrical calculation in architectural drafting? _____
_____
_____
_____

References:

Textbook: Drafting Electrical and Electronic Layout and Details, Authors: Mario S. Gregorio, Alexander M. Latoga, Mirasol F. Dasig, Ariel F. Maglalang, Conrado C. Casulla, Rolando V. Inay

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