School:		**Grade Level:**	**7**
Teacher:		**Learning Area:**	**TLE**
Teaching Dates and Time:		**Quarter:**	**Fourth**
		Week:	**Week 6-Day 3**

I. CONTENT, STANDARDS AND LEARNING COMPETENCIES		***ANNOTATIONS***
A. CONTENT STANDARDS	The learners demonstrate an understanding of the concepts and principles in performing mensuration and calculations.	
B. PERFORMANCE STANDARDS	The learners perform mensuration and calculations following safety precautions	
C. LEARNING COMPETENCIES	**Learning Competency** Interpret the readings in different measuring instruments.	
D. LEARNING OBJECTIVES	**Learning Objectives** At the end of the lesson, the students are expected to: 1. Explain the function and uses of volt-ohm-milliammeter, tachometer, oscilloscope, and ampere meter. 2. Identify the parts of the volt-ohm-milliammeter, tachometer, oscilloscope, and ampere meter. 3. Interpret the readings of volt-ohm-milliammeter, tachometer, oscilloscope, and ampere meter.	
I. CONTENT		
Scale Reading		
II. LEARNING RESOURCES		

A. REFERENCES	
B. OTHER LEARNING RESOURCES	Analog multi meter parts and functions (Part 1). (2021, October 25). YouTube. https://youtu.be/6UhX893En6A?si=vsmfbMV2TCQFeFBL Analog multimeter AC & DC voltage reading Part 3. (2021, October 26). YouTube. https://youtu.be/j9jxh8Hjm-8?si=HLCLHrjaIyK5pN2Z Analog multimeter DC current reading Part4. (2021, October 26). YouTube. https://youtu.be/YRmeMa5j1qI?si=zfbgd6ngcwwmfXOk Analog multimeter resistance reading Part 2. (2021, October 25). YouTube. https://youtu.be/rBPw5zC1qCQ?si=s2LT_GVMFkuhXqJO Computer Lesson 101 - Tagalog. (2021). How to Measure Current (Amperes) using Analog Multi-meter [Video]. YouTube. https://www.youtube.com/watch?v=CcfQFqcMa7U Fluke. (n.d.). What is a digital multimeter? https://www.fluke.com/enin/learn/blog/electrical/what-is-a-digital-multimeter# James Gatlin. (2024). How to use a multimeter like a Pro, the ultimate guide [Video]. YouTube. https://www.youtube.com/watch?v=0loXukB302Q Joy, A. T. (2024). How to use a multimeter, types, components and more. Tameson.com. https://tameson.com/pages/multimeter Kuhlman, J. (2024). How to Read a Multimeter (with Pictures) - wikiHow. wikiHow. https://www.wikihow.com/Read-a-Multimeter Source of Skills. (2023). How to use analog multimeter | Analog multimeter tutorial | Check AC volt with analog multimeter [Video]. YouTube. https://www.youtube.com/watch?v=z8U9ny6ZPKg T, A. (2017). Volt-Ohm-Milli-Ammeter (VOM). Circuit Globe. https://circuitglobe.com/volt-ohm-milli-ammeter-vom.html

III. TEACHING AND LEARNING PROCEDURE

BEFORE/PRE-LESSON PROPER

ACTIVATING PRIOR KNOWLEDGE	**Directions:** • Read each question carefully and answer it based on your understanding of how different measuring instruments work. • Draw circuit diagrams where necessary to support your answers. • Provide the correct units for the measurements. **Questions:** 1.You are using a voltmeter to measure the voltage across a 10-ohm resistor in a circuit powered by a 12V battery. The voltmeter reads 8V. • What does the reading of 8V indicate about the circuit? • What could be the cause of the lower-than-expected voltage reading? 2.You set up a simple circuit with a 100-ohm resistor and a 9V battery. You place an ammeter in series with the resistor and measure the current. The ammeter reads 0.09 A. • What is the current flowing through the circuit? • Is this value what you would expect from Ohm's Law? (Use Ohm's Law: I=VRI = \frac{V}{R}I=RV) 3.You use a multimeter to measure the resistance of a 220-ohm resistor. The multimeter shows a resistance value of "OL." • What does the reading "OL" mean? • What could be the possible reasons for this reading? 4.In a simple circuit, you measure the voltage across a resistor and get a reading of 0V, even though the power supply is working. The ammeter reads 0A. ○ What could be the reason why the voltage and current are both 0? ○ What should you check in the circuit to troubleshoot the issue? 5.You are measuring the current in a circuit using an ammeter. The reading shows 0.5 A when the circuit is supposed to be carrying 1 A based on the components and the power supply. ○ What could be the reason for the lower-than-expected current reading? ○ How would you troubleshoot to resolve the issue?	Check the Students Homework

LESSON PURPOSE/INTENTION	1. **Understand the function** of key measuring instruments used in electrical and mechanical systems, including the volt-ohm-milliammeter, tachometer, oscilloscope, and ampere meter. 2. **Explain the specific uses** of each instrument in real-world applications, emphasizing their importance in troubleshooting, diagnostics, and measurement in various fields like electrical engineering, physics, and mechanics. 3. **Differentiate the types of measurements** each instrument takes (voltage, resistance, current, frequency, etc.) and recognize the appropriate situations for using each one. 4. **Develop skills in using these instruments** effectively in practical scenarios. 1. **Introduction to Measuring Instruments** ○ Overview of different measuring instruments used in electrical and mechanical systems. ○ Importance of these tools in providing accurate measurements to ensure system functionality and safety. 2. **Volt-Ohm-Milliammeter (VOM)** ○ **Function**: A combined device used to measure voltage (V), resistance (Ω), and current (A) in a circuit. ○ **Uses**: ▪ Voltage measurement across two points. ▪ Current measurement in series with the circuit. ▪ Resistance measurement to check for continuity or faults in a component. 3. **Tachometer** ○ **Function**: Measures the speed of rotation (revolutions per minute or RPM) of a rotating object or machine. ○ **Uses**: ▪ Used in automotive, industrial machinery, and electric motors to monitor the speed of rotation. ▪ Helps ensure machinery operates within the safe speed limits. 4. **Oscilloscope** ○ **Function**: Displays a visual representation of electrical signals, showing how voltage changes over time. ○ **Uses**: ▪ Used to analyze the waveform of signals in electrical circuits.	

	▪ Diagnoses issues with signal integrity, frequency, and amplitude in electronics. 5. **Ampere Meter (Ammeter)** ○ **Function**: Measures the current (in amperes) flowing through a circuit. ○ **Uses**: ▪ Helps monitor the flow of current in circuits to prevent overloads and ensure components are functioning properly. 6. **Conclusion** ○ Summary of each instrument's functions and uses. ○ Real-world examples of how these tools are used in various fields such as electronics, automotive industries, and physics experiments.	
LESSON LANGUAGE PRACTICE	**Vocabulary** 1. **Volt-Ohm-Milliammeter (VOM)** ○ **Definition**: A versatile instrument that combines three functions: measuring voltage (V), resistance (Ω), and current (A). It is used in various forms to test circuits and components. ○ **Key Terms**: ▪ **Voltage**: The electric potential difference between two points in a circuit. ▪ **Resistance**: The opposition to the flow of electric current, measured in ohms (Ω). ▪ **Current**: The flow of electric charge, measured in amperes (A). 2. **Tachometer** ○ **Definition**: A device used to measure the rotational speed of an object, typically in revolutions per minute (RPM). ○ **Key Terms**: ▪ **RPM (Revolutions Per Minute)**: The unit of rotational speed, indicating how many complete revolutions an object makes per minute. ▪ **Speed**: The rate at which an object moves or rotates. ▪ **Rotational Motion**: Movement around a central point or axis. 3. **Oscilloscope**	

- **Definition**: An electronic test instrument that graphically displays varying signal voltages, showing how the voltage changes over time.
- **Key Terms**:
  - **Waveform**: A graphical representation of a signal's variation with time.
  - **Amplitude**: The height of the waveform, representing signal strength or voltage level.
  - **Frequency**: The number of wave cycles per second, measured in Hertz (Hz).
  - **Signal**: A varying electrical current or voltage that carries information.

4. **Ampere Meter (Ammeter)**
   - **Definition**: A device used to measure the electric current (in amperes) flowing through a circuit.
   - **Key Terms**:
     - **Current**: The flow of electric charge through a conductor.
     - **Amperes (A)**: The unit of measurement for electric current.
     - **Series Connection**: A type of circuit connection where components are arranged in a single path, and current flows through them one after another.

General Vocabulary Related to Measuring Instruments

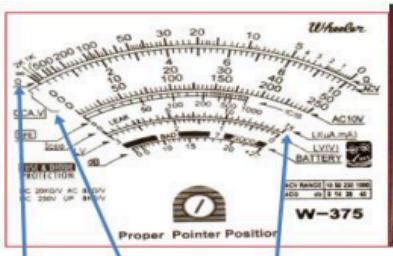
1. **Calibration**: The process of adjusting a measuring instrument to ensure its accuracy.
2. **Measurement**: The process of obtaining a value (e.g., voltage, current, speed) using an instrument.
3. **Accuracy**: The degree to which a measurement agrees with the true or standard value.
4. **Resistance**: A property of a material or component that resists the flow of electric current.
5. **Frequency**: The rate at which something occurs, particularly used to describe wave cycles in signals or sound waves.

DURING/LESSON PROPER

READING THE KEY IDEA/STEM

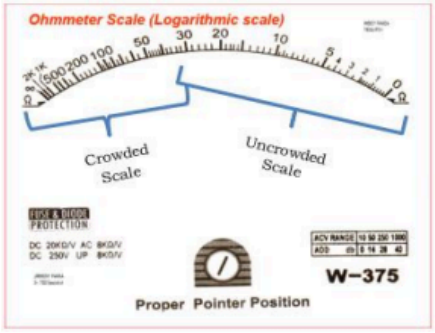
E. RESISTANCE (OHMMETER) SCALE

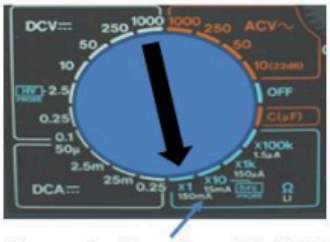
Reading Ohmmeter Scale



Ohmmeter Voltmeter Milliammeter Scale

Ohmmeter Scale Voltmeter Milliammeter Scale





Ohmmeter Function of the VOM. The selector knob is pointed to the X1 to the highest multiplier.

How to read the ohmmeter scale of the multi tester?

To read the multi tester's resistance range, consult the table below. Ohms are the unit of measurement for resistance.

Range	0-2	2-10	10-20	20-50	50-100	100-200
X1	0.2	0.5	1	2	5	20
X10	2	5	10	20	50	200
X100	20	50	100	200	500	2000
X1 K	200	500	1000	2000	5000	20000
X10 K	2000	5000	10000	20000	500000	200000
X100K	20000	50000	100000	20000	500000	2000000

PREPARATION FOR MEASUREMENT

1. Before making any measurements, make sure that the meter pointer is in

The picture presented does not promote any brand but is just used for educational purposes.

The teacher should limit his/her coverage on the Voltmeter, Ohmmeter and Milli-ammeter function of the tester.

The teacher should highlight the logarithmic ohmmeter scale. He/she should also illustrate the crowded and uncrowded scales of the ohmmeter.

Scale	Purpose
Crowded Scale	Used for reading high resistance values
Uncrowded Scale	Used for reading low resistance values

The teacher should also demonstrate how to use the VOM's ohmmeter function and range multipliers.

The teacher must thoroughly clarify the processes for reading the multi-tester scale. Putting the range and scale in relation to the range multiplier.

	the zero position. If not, you may turn the zero adjuster so that the pointer may align right to zero position. **Wrong Pointer Setting** If this occurs, you should turn the **adjustment screw** (zero corrector screw) in counterclockwise direction until the pointer at zero voltage range. Turn adjustment screw to counterclockwise.  If the pointer points not exactly to the infinity at ohmmeter reading, this causes inaccuracy to the measured value. Turn adjustment screw to clockwise rotation 2. Check the accuracy of the ohmmeter by touching two test probes. Set VOM to x1 ohm or x10 ohm selector resistance range. Hold the two sets probes simultaneously.	The teacher always reminds the learner that ohmmeter function is only for passive circuit and is connected across the circuit or in parallel with the circuit or component to be measured. The teacher should have a specific number of available VOM to demonstrate the resistance reading. The teacher may utilize this video link to enhance the lesson or for review by the learner. Analog multimeter resistance reading Part 2. (2021, October 25). YouTube. https://youtu.be/rBPw5zC1qCQ?si=8nfOUBsuJpMN1gZt

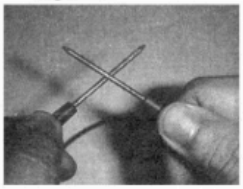
The pointer should not deflect when holding two test probes at x1 or x10 ohm range

The pointer deflects (as shown) while holding the two-test probe at x1 or x10 ohm selector range indicating that the multi-tester in ohmmeter is defective.

Check the probes if they are ok, (ohmmeter calibration)

a. Set the multi-tester to corresponding selector resistance range

b. Short the two test probes lead together.

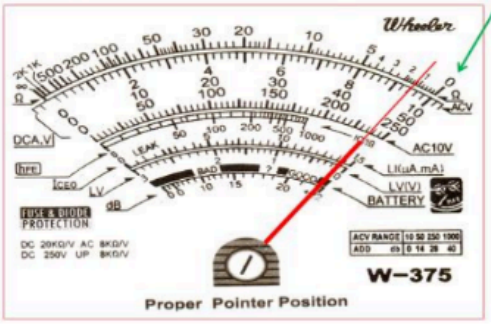


Ohmmeter Adjuster

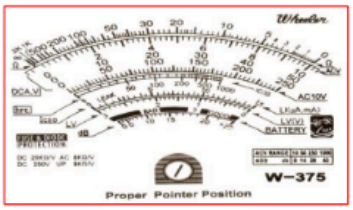
The pointer should deflect towards ohm reading

Turn this knob into clockwise rotation

Zero Ohm



Adjust the ohm adjustment if the pointer could not rest exactly at "0" ohm reading. If nothing happened after adjusting ohm adjustment, the most possible cause is, low powered battery inside the tester. Replaced the battery.



If the pointer did not deflect at all, check the probes, there's a possibility that one is broken or open at some point. If probes are good, there is also a possibility that the fuse is busted, otherwise tester is defective.

(Using VOM in Measuring Resistance)

V. Synthesis/Extended Practice/Differentiation:

After the activity is done, t teacher may ask his/her learners, what insights the have gained while doing th measuring activity with the partner or peer.

- *Learners must realize the importance of helping relationship with peers (or collaboration) make things accomplished work easier.*
- *Learner maybe introduces measure the resistance of electrical circuit whether it open or closed.*

	Interpreting Resistance Reading   If the pointer stays at infinite resistance even after using the highest ohm range, then circuit is open.   If the pointer deflects to zero resistance when the selector switch is at Rx1 range, then circuit is shorted.   If the pointer deflects in between infinite and zero resistance that is equivalent to the load resistance using any range, then device, circuit is in good condition.	
DEVELOPING and DEEPENING UNDERSTANDING OF THE KEY IDEA/STEM	**Materials Needed:** • Whiteboard or flip chart • Markers • Paper and pens for writing • Internet or reference books (optional) • Measuring instruments (if available, for demonstration) • Computers or tablets (optional) **Instructions:** 1. **Form Groups**: Divide the class into four groups, each assigned one of the following instruments: ○ Group 1: **Volt-Ohm-Milliammeter (VOM)** ○ Group 2: **Tachometer** ○ Group 3: **Oscilloscope** ○ Group 4: **Ampere Meter (Ammeter)** 2. **Research and Discussion**: Each group should research the assigned instrument. They need to answer the following questions: ○ **What is the function of the instrument?** ○ **How is it used in practical applications?** ○ **What are the specific measurements it provides (e.g., voltage, current, speed)?** ○ **Where can this instrument be commonly found? (e.g., automotive, laboratory, industrial settings)** ○ **How does it contribute to troubleshooting or diagnostics?** Encourage students to use online resources, textbooks, or reference materials to gather information.	

	3. **Prepare a Presentation**: After researching, each group will create a presentation. This can be in the form of: ○ A **poster** that visually explains the function and uses of the instrument. ○ A **skit** or **demonstration** showing the instrument in use (e.g., demonstrating how to measure voltage with a voltmeter or how to check the speed of a fan with a tachometer). ○ A **short presentation** using slides (if available) that details the main points. 4. **Present the Findings**: Each group will present their findings to the class. The presentation should cover: ○ A description of the instrument and its purpose. ○ How it works (basic principles behind it). ○ Real-life examples of its use in different fields. ○ A visual aid (poster, demonstration, or slides). 5. **Q&A Session**: After each presentation, allow the other groups to ask questions. The presenting group should answer based on their research.	
AFTER AFTER/POST-LESSON		
MAKING GENERALIZATIONS AND ABSTRACTIONS	Worksheet Synthesis/Extended What you have learned In a one sheet of paper write something you understand about the lesson we discussed today.	
EVALUATING LEARNING	**Directions**: Read each question carefully and choose the correct answer from the options provided. **1.Which of the following instruments is used to measure voltage, resistance, and current in a circuit?** • A) Tachometer • B) Volt-Ohm-Milliammeter (VOM) • C) Oscilloscope • D) Ampere Meter **2.What is the primary use of a tachometer?** • A) To measure the electrical resistance in a circuit. • B) To measure the speed (RPM) of a rotating object. • C) To measure the voltage in an electrical circuit. • D) To display the waveform of a signal.	ANSWER 1.B 2.B 3.D 4.B 5.C

	3.Which instrument is used to display the waveform of electrical signals over time? • A) Volt-Ohm-Milliammeter (VOM) • B) Ampere Meter • C) Tachometer • D) Oscilloscope **4.An ammeter is used to measure which of the following?** • A) Speed of a rotating object • B) Electrical current in a circuit • C) Voltage across two points in a circuit • D) Frequency of electrical signals **5.Which of these instruments is commonly used in automotive applications to monitor engine speed (RPM)?** • A) Ampere Meter • B) Oscilloscope • C) Tachometer • D) Volt-Ohm-Milliammeter (VOM)	
ADDITIONAL ACTIVITIES FOR APPLICATION OR REMEDIATION (IF APPLICABLE)		
REMARKS		
REFLECTION		

Prepared by:

_____

Subject Teacher

Reviewed by:

_____

Master Teacher/Head Teacher

Created by Teacher Manuel ***Fb Account: Teacher Manuel***