


W1	Learning Area	TLE – Computer Systems Servicing	Grade Level	9
	Quarter	Fourth	Date	
I. LESSON TITLE		TERMINATING AND CONNECTING ELECTRICAL WIRING AND ELECTRONICS CIRCUIT (TCEW)		
II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)		LO 3: Test termination/connections of electrical wiring/electronics circuits <b>TLE_IACSS9-12TCEW-III-j23</b>		
III. CONTENT/CORE CONTENT		Proper procedure in conducting testing of termination/connection of electrical wiring/electronics circuits		
IV. LEARNING PHASES AND LEARNING ACTIVITIES				
I. Introduction (Time Frame: 30 minutes)				
<p><b>Troubleshooting</b> is a systematic approach to problem solving that is mostly used to identify and repair failed processes in electricity and electronics. It involves identification or diagnosis of "trouble" caused by a failure in wires and circuits, and to providing a solution to them.</p> <p>Directions: Observe the picture below. Answer the guide questions.</p> <div></div> <p>Image retrieved from: <a href="https://www.lynda.com/Windows-tutorials/Windows-10-Advanced-Troubleshooting-Enterprise-IT/740410-2.html">https://www.lynda.com/Windows-tutorials/Windows-10-Advanced-Troubleshooting-Enterprise-IT/740410-2.html</a></p> <p>Guide Questions:</p> <ol style="list-style-type: none"><li>1. What can you say about the picture being shown?</li><li>2. What does the flashlight symbolizes?</li><li>3. Is identifying symptoms and determining the cause important in solving a problem? Why?</li></ol>				
D. Development (Time Frame: 1 hour & 30 minutes)				
<p>Read and understand the <b>CSS 9 - Proper procedure in conducting testing of termination/connection of electrical wiring/electronics circuits</b> through this link: <a href="https://drive.google.com/drive/folders/1avMN7M9Bl2mLt6xh6VQn81oYj283zGtf">https://drive.google.com/drive/folders/1avMN7M9Bl2mLt6xh6VQn81oYj283zGtf</a></p> <p><b>Proper Procedure in Conducting Testing of Termination/Connection of Electrical Wiring and Electronics Circuit</b></p> <ol style="list-style-type: none"><li>1. <b>Conduct a visual inspection</b> -Conduct an inspection of installation and its wiring and components to ensure correct installation methods have been used and that there is no sign of damage. Take a look at the surroundings, before connecting any wires and circuits. Take note of the following:<ol style="list-style-type: none"><li>a. Sensitive and non-sensitive equipment having the same branch circuit.</li><li>b. Overloaded outlet strips. This may lead to electrical noise conditions.</li><li>c. Uninterruptible Power Supply Unit have the same branch circuit as electronic equipment.</li><li>d. Electric fans or fluorescent lighting near electronic equipment or monitors causing a wavy computer screens.</li></ol></li><li>2. <b>Identify the measurement</b> - of the items that are outside the acceptable range. Test the continuity of the protective conductor if it is not broken and gives a low resistance path. Take also the voltage measurement of other equipment.</li><li>3. <b>Test for the correct wiring polarity</b> - Test the receptacle by using a ground impedance tester. This type of tester will accurately determine the polarity of the wiring as well as other wiring conditions.</li><li>4. <b>Measure neutral impedance</b> - High impedance along the neutral conductor path causes two problems. These are overheated conductors and their connections that can cause fires and the increase of common-mode noise levels between the neutral and the ground.</li><li>5. <b>Insulation resistance</b> – is a test to ensure that there are no short circuits or faults.</li><li>6. <b>Take electrical noise measurements</b> - It confirms or eliminates the cause of equipment malfunction. Use an oscilloscope with a line viewer, which can de-separate normal-mode electrical noise from the hot-neutral voltage waveform.</li><li>7. <b>Functionality</b> – Check everything if it is functioning safely and correctly.</li><li>8. Correct/repair the damaged component.</li><li>9. <b>Verify the repair after completion</b> - After the repair has been done, check the system to ensure that it is functioning. This is important to know if they may have other underlying problems.</li><li>10. <b>Perform root cause analysis</b> - It determines the cause of the problem. Since one of the objectives of troubleshooting is to ensure the problem will not happen again, it is important to determine what really caused the malfunction and take action to ensure a permanent solution is found.</li></ol>				

## IV. LEARNING PHASES AND LEARNING ACTIVITIES

### How to Test Electrical and Electronics Components with Multimeter?




Checking electrical and electronics components, devices, tools and instruments using digital and analog multimeter:

1. **Cable and Wires** - Perform the continuity test to check the cable and wires are in good condition. Take the multimeter, select the resistance, in analog multimeter, and rotate the knob to the " $\Omega$ " or resistance. Connect the ports in the terminals. If the meter reading shown " $\Omega$ ", it means cable/wire is in "good condition".
2. **Switch/Push Buttons** - Apply the method in (ON & OFF positions) on switches and push buttons or on switches/push buttons and then "Push" the push button and perform the same method again. At first attempt, if meter reading is "Zero" and in the second attempt, the meter reading is infinite, it means Switch/Push button is in good condition. If multimeter reading is "Zero" or "infinite" in both attempts, the switch is in short circuit or continuity connection is broken and must replace it with a new one.
3. **Fuse** - To verify, perform the same method like in continuity test as mentioned above. If the meter reading is "Zero" this means fuse is in good condition. If multimeter reading is infinite, it means Fuse continuity may be broken or blown.
4. **Resistor and Burnt Resistors** - To check if it is in good condition or broken, use a multimeter. Select "Resistance" rotate the knob to the " $\Omega$ " or Resistance. Connect both ends of resistor with the multimeter terminals. If the meter reading shows the exact value of resistance or with a percentage tolerance, it means resistor is in "Good Condition".

A. Put a check (✓) if the personal protective equipment listed below can be helpful in conducting testing of electrical wiring and circuits the put a cross (X) if not. Write a brief explanation below why we need those PPE.

Personal Protective Equipment	Helpful	Not Helpful
Hand Gloves		
Helmet		
Safety goggles		
Foot Protection		
Chemical Suit		
Face Mask		
Protective Clothing		

B. Directions: Identify which testing procedure is shown below. Write an important reminder doing the testing.



	Testing Procedure	Reminder
 <p><a href="https://www.plantengineering.com/articles/electrical-test-instruments-safety-is-still-the-first-tool/">https://www.plantengineering.com/articles/electrical-test-instruments-safety-is-still-the-first-tool/</a></p>		
 <p><a href="https://www.youtube.com/watch?v=GZX3MyBkMvA">https://www.youtube.com/watch?v=GZX3MyBkMvA</a></p>		
 <p><a href="https://carelabz.com/what-polarity-test-why-conduct-polarity-test/">https://carelabz.com/what-polarity-test-why-conduct-polarity-test/</a></p>		

### IV. LEARNING PHASES AND LEARNING ACTIVITIES

#### E. Engagement (Time Frame: 1 hour)







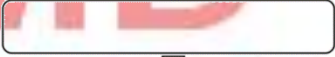




Let us practice your testing skill by using a multimeter. Watch this video: <https://www.youtube.com/watch?v=rFN6m7Mc7iY>

**Directions:** Measure the voltage and resistance of a battery using a multimeter. Take a photo of your activity and paste it to a short bond paper. Follow the format below.

Name: _____	Date: _____
Section: _____	Score: _____
Activity A (Engagement)	
Testing Electrical component with Multimeter	
	
Result:	
Voltage: _____	
Resistance: _____	

#### A. Assimilation (Time Frame: 1 hour)

**Directions:** Write in the box at least 5 testing procedures of termination and connections of electrical wiring and electronic circuits.

TESTING PROCEDURES OF TERMINATION AND CONNECTION OF ELECTRICAL WIRING AND ELECTRONIC CIRCUITS	
	
	
	
	
	
	

### V. ASSESSMENT (Time Frame: \_\_\_\_\_)

(Learning Activity Sheets for Enrichment, Remediation, or Assessment to be given on Weeks 3 and 6)

#### A. IDENTIFICATION

**Directions:** Read the statement carefully. Write the correct letter on the space provided. Choices are listed inside the box.

- |                 |                   |                    |
|-----------------|-------------------|--------------------|
| a. Multimeter   | c. Functionality  | e. Broken          |
| b. Oscilloscope | d. Good condition | f. Troubleshooting |

- \_\_\_\_\_ 1. A form of problem solving, to repair failed processes in electricity and electronics.
- \_\_\_\_\_ 2. If the meter reading is "Zero" this means fuse is in good \_\_\_\_\_.
- \_\_\_\_\_ 3. It is used to check if the resistor is in good condition or broken.
- \_\_\_\_\_ 4. It can de-separate normal-mode electrical noise from the hot-neutral voltage waveform.
- \_\_\_\_\_ 5. The test to be sure that there are no short circuits or faults.



### IV. LEARNING PHASES AND LEARNING ACTIVITIES

#### B. TRUE OR FALSE

Direction: Write TRUE if the statement regarding general precaution in using multimeter is correct and FALSE if not.

- \_\_\_\_\_ 1. Identify the circuit to be switched off and disconnected by removing or operating the protective device.
- \_\_\_\_\_ 2. It is alright working on electricity without proper guidance and care.
- \_\_\_\_\_ 3. The higher value in multimeter must be chosen then gradually reduce to the proper valve.
- \_\_\_\_\_ 4. Disconnect all power source before checking, servicing, repairing or installing electrical equipment and devices.
- \_\_\_\_\_ 5. The higher value in multimeter must be chosen then gradually reduce to the proper valve.

#### VI. REFLECTION (Time Frame: \_\_\_\_\_)

- Communicate your personal assessment as indicated in the Learner's Assessment Card.

##### Personal Assessment on Learner's Level of Performance

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

? - I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

Learning Task	LP	Learning Task	LP	Learning Task	LP	Learning Task	LP
Number 1		Number 3		Number 5		Number 7	
Number 2		Number 4		Number 6		Number 8	

#### VII. REFERENCES


TLE – Computer System Servicing 9 Module from Division of Pasig City  
 Quarter 3 – Module 16: Proper Storing of hand tools/instruments, First Edition, 2020  
 Link: <https://drive.google.com/drive/folders/1avMN7M9BI2mLt6xh6VQn81oYj283zGtf>  
 Video: <https://www.youtube.com/watch?v=rFN6m7Mc7iY>

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W2	Learning Area	TLE – Computer Systems Servicing	Grade Level	9
	Quarter	Fourth	Date	
I. LESSON TITLE		TERMINATING AND CONNECTING ELECTRICAL WIRING AND ELECTRONICS CIRCUIT (TCEW)		
II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)		LO 3: Test termination/connections of electrical wiring/electronics circuits <b>TLE_IACSS9-12TCEW-IIIi-j23</b>		
III. CONTENT/CORE CONTENT		Proper procedure in checking wirings and circuits using specified testing procedures. Protocol in responding to unplanned conditions		
IV. LEARNING PHASES AND LEARNING ACTIVITIES				
I. Introduction (Time Frame: 1 hour)				
<p>The <b>electrical maintenance</b> involves the fault diagnosis, routine servicing, and repair of electrical components of the electrical wirings and electronics circuits. Electricity is a necessary and useful part of our daily lives; however, safety precautions should not be taken for granted.</p> <p><b>A.</b> Directions: Read the quotation below and reflect. Answer the guide questions.</p> <div></div> <p>Image retrieved from: <a href="https://northstreet.dental/dental-and-implants/prevention-is-better-than-cure/">https://northstreet.dental/dental-and-implants/prevention-is-better-than-cure/</a></p> <p>Guide Questions:</p> <ol style="list-style-type: none"><li>1. What does the quotation mean to you?</li><li>2. How can you relate this to the maintenance of electrical wirings and circuits?</li></ol>				
D. Development (Time Frame: 1 hour)				
<p>Read and understand the CSS 9 - Proper Procedure in Checking Wirings and Circuits Using Specified Testing Procedures and Protocol in Responding to Unplanned Conditions through this link: <a href="https://drive.google.com/drive/folders/1avMN7M9BI2mLt6xh6VQn81oYj283zGtf">https://drive.google.com/drive/folders/1avMN7M9BI2mLt6xh6VQn81oYj283zGtf</a> and do the activities below in a separate sheet.</p> <p><b>Proper Procedure in Checking Wirings and Circuits Using Specified Testing Procedures</b></p> <p><b>Types of electrical maintenance</b></p> <ol style="list-style-type: none"><li>1. <b>Preventive Maintenance</b>- catches and fix problems before these will happen. It is carried out in the form of regular inspections, usually occurring multiple times per year. In inspecting a system or a piece of technology, check all signs of wear, tear, or eminent breakdown. The damage parts should be replaced immediately.</li><li>2. <b>Condition-Based Maintenance</b>- this is more advanced alternative to preventive maintenance. Rather than being inspected according to a schedule, machines and systems are carefully observed for changes that could.<ol style="list-style-type: none"><li>1. indicate upcoming failure. The technicians observe the system running and identify factors that may affect the functioning such as temperature, vibration speed, power, the presence, or absence of moisture, and more.</li></ol></li><li>2. <b>Predictive Maintenance</b>- it is a specific type of condition-based maintenance in which systems are observed via sensor devices. These devices are attached to components of the system and feed constant, real-time data to software. The software then interprets this data and warns maintenance technicians of approaching danger.</li><li>4. <b>Corrective Maintenance</b>-these are the problems that are discovered while working on another work order. There are issues that are caught 'just in time'. Just like a scheduled maintenance check or fixing another problem, a maintenance technician notices that a pipe system is not working as it is.</li><li>5. <b>Predetermined Maintenance</b>- this uses rules and suggestions created by the original manufacturer rather than the maintenance team. The suggestions are based on experiments and gathered data. Statistics and guidelines are provided by the manufacturer during the equipment purchased and will include data providing the average lifespan of both the entire system and its various parts. The manufacturer is the one that will tell how often parts should be inspected, serviced and replaced.</li></ol>				

**Four key action items of preventive maintenance**

1. **Inspection**- is a necessary part that aids organizations in two ways. First, it ensures that equipment is safe to use. Regular inspections help prevent workplace injuries and provide increased liability protection. Second, this protects property. This ensures that equipment is functioning as the manufacturer intended.
2. **Detection**- this ends up costing significant money because it detects the problems early while the problems are relatively easy and inexpensive to fix.
3. **Correction**-it takes a proactive approach towards equipment care and corrects issues before they occur. If the problem is detected, promptly address the problem before it worsens or shuts down operations.
4. **Prevention**-combine inspection records and maintenance notes to learn from past mistakes and correct repeated issues with equipment. Prevention of asset failure reduces stress and increases productivity.

**Protocol in Responding to Unplanned Conditions**

Most electrical accidents result from one of the following three factors:

- a. Unsafe equipment or installation
- b. Unsafe environment or
- c. Unsafe work practices

**Most Common Causes of Electrical Accidents and Injuries: A Health Electrical Guide**

- a. **Electric shock**- this will happen when an arm, hand or finger is placed on an electric current and causes the current to run through the body. An electric shock can be mild, moderate, or severe; it depends on what you are wearing, other factors.
- b. such as surrounding water and the strength of the electrical current.
- c. **Electrical burn**-this can be considered a moderate or severe electric shock that causes the tissue to burn. Electric burns are not just on the skin and can leave scarring, but also, burns can be internal as the electric current travels through the bone and burns surrounding deep tissue.
- d. **Electrical fires**- it can cause severe damage to any property, health, and safety hazard. This can occur when a current ignites a flammable material; it can be extremely dangerous when it is a piece of cloth. The danger of electrical fires is that the natural reaction for onlookers is to put out the fire with water.

Direction: Identify which type of electric maintenance is being describe in each situation.

- \_\_\_\_\_ 1. Your father periodically goes to a car care shop to check the electrical wirings of his SUV to prevent malfunctions when he is driving.
- \_\_\_\_\_ 2. Every three months the air conditioner at home is cleaned by a technician because it was recommended by the manufacturer.
- \_\_\_\_\_ 3. The technician checked the condition of the refrigerator because its temperature is not normal due to overloaded restoring of food.
- \_\_\_\_\_ 4. Another problem was detected by the technician while he is repairing the wiring of the computer.
- \_\_\_\_\_ 5. Your anti-virus detected a malware and popped up in your screen.

**B. Directions.** Enumerate what is being asked. Write your answer on a separate sheet.

I. Advantages of having regular electrical preventive maintenance.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

II. Consequences of not conducting periodic electrical maintenance.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

### IV. LEARNING PHASES AND LEARNING ACTIVITIES

E. Engagement (Time Frame: 1 hour)

A. Directions: Fill in the table below. List down 5 electrical problems and its solution.

ELECTRICAL PROBLEMS	SOLUTIONS
1.	
2.	
3.	
4.	
5.	

B. Directions: List down safety precautions that you follow to prevent electrical accidents inside your home. Write your answers on a separate sheet.

#### SAFETY PRECAUTIONS


A. Assimilation (Time Frame: 1 hour)

A. Directions: Write the missing letters to complete the word or group of words.

1. The necessary part and aid organizations in two ways in preventive maintenance

I \_ s \_ e \_ c \_ t \_ \_ n

2. It detects the problems early while the problems are relatively easy and inexpensive to fix.

\_ e \_ t \_ e \_ t \_ i \_ \_

3. This combines inspection records and maintenance notes to learn from past mistakes and correct repeated issues with equipment.

P \_ r \_ \_ \_ t \_ i \_ o \_ n

4. It takes a proactive approach towards equipment care and corrects issues before they occur.

C \_ o \_ r \_ \_ \_ \_ o \_ n

5. The optimal energy efficiency will occur when equipment is functioning within design parameters and is well maintained.

E \_ \_ \_ g \_ y    \_ s \_ a \_ v \_ \_ \_



### IV. LEARNING PHASES AND LEARNING ACTIVITIES

#### V. ASSESSMENT (Time Frame: 1 hour)

(Learning Activity Sheets for Enrichment, Remediation, or Assessment to be given on Weeks 3 and 6)

##### A. IDENTIFICATION

Read the statement carefully. Choices are listed inside the box. Write your answer on a separate sheet.

- |                                |                           |
|--------------------------------|---------------------------|
| A. Protection                  | E. Corrective maintenance |
| B. Predetermined maintenance   | F. Preventive maintenance |
| C. Correction                  | G. Predictive maintenance |
| D. Condition-based maintenance | H. Inspection             |

1. This is inspected according to a schedule, machines and systems are carefully observed for changes that could indicate upcoming failure.
2. The most advanced and intensive type of maintenance.
3. It can eliminate unplanned shutdown to know the problems before it happened.
4. These are problems that is discovered while working on another work order.
5. If the problem is detected, promptly address the problem before it worsens or shuts down operations.

##### B. IDENTIFICATION: Identify the following sentence. Write your answer on the space provided before the number.

1. The ON/OFF switches are not functioning as you expect, the switch may have been overridden.
2. Connections do not have a grounding system.
3. Wires that have cuts or holes.
4. This is used to detect and prevent low voltage circuit if there is a current leak.
5. This may happen with the frayed wiring when it is windy outside that may cause a short when the cables move.

#### VI. REFLECTION (Time Frame: \_\_\_\_\_)

- Communicate your personal assessment as indicated in the Learner's Assessment Card.

##### Personal Assessment on Learner's Level of Performance

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

? - I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

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#### VII. REFERENCES

Division of Pasig City – Self-Learning Module First Edition 2020

[https://docs.google.com/document/d/1ipPqGxcYh\\_SecfwwffagB1zGuGtE4GI414AdaHbNKg/edit](https://docs.google.com/document/d/1ipPqGxcYh_SecfwwffagB1zGuGtE4GI414AdaHbNKg/edit)

[https://docs.google.com/document/d/1eOwgwZs\\_bhPFtLu5xj-e1lh9x838bO54thTT6pr0iaw/edit](https://docs.google.com/document/d/1eOwgwZs_bhPFtLu5xj-e1lh9x838bO54thTT6pr0iaw/edit)

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<b>W3</b>	<b>Learning Area</b>	TLE – Computer Systems Servicing	<b>Grade Level</b>	9
	<b>Quarter</b>	Fourth	<b>Date</b>	

<b>I. LESSON TITLE</b>	TESTING ELECTRONIC COMPONENTS (TEC)
<b>II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)</b>	Determine criteria for testing electronics components. <b>TLE_IACSS9-12TEC-IVa-c-24</b>
<b>III. CONTENT/CORE CONTENT</b>	Work instructions Work coordination process

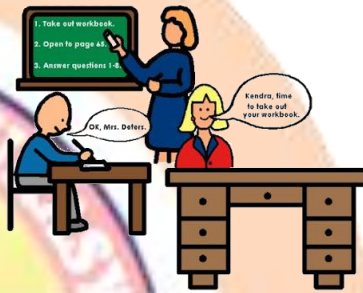
#### IV. LEARNING PHASES AND LEARNING ACTIVITIES

I. Introduction (Time Frame: 1 hour)

##### Presentation

Work instruction, business process and work coordination have a vital role in achieving the goal of an organization. In this lesson you will learn the flow of work and how it is being done by the people in an organization.

A. Directions: Look at the clipart the read the following questions carefully. Write your answer on a separate sheet of paper.



Guide Questions:

1. What do you think the teacher is doing?
2. How can you easily understand the instructions given to you?
3. Why is it important to listen well while someone is giving you instruction?

B. Directions: List down at least five (5) jobs you do in school and at home. Then write the instructions given by your teacher and parents.

School Work/Household chores	Instructions Given

1

D. Development (Time Frame: 1 hour)

Read and understand the teacher-made learning materials through this link: CSS 9\_Information Sheet for Week 3

Link: <https://docs.google.com/document/d/1XVqa2-xniSabDq8STzUExNgZuTdqcQz/edit>

##### Work Instruction

Many of us have heard the terms "Policies and Procedures" or "Standard Operating Procedures", but another term that is often used in this regard is a "Work Instruction". A work instruction will provide more detail in a step-by-step form, what exactly the worker should perform in order to execute that process. By removing ambiguity, work instructions are often more helpful, more efficient, and more valuable for an organization to have documented.

## Characteristics of a Work Instruction

**Clarity** - Any written instructions for operating procedures should be clear to all those who will be following them. Additions of links to explain the use of technical terms can be useful, especially if trainees may have to follow the instructions. The length of the instruction is important too. If the instruction contains too much content, readers will likely skip parts and scan it for the important content.

**Consistency** - The layout should be consistent from one procedure to another. That way the reader will not be confused, or left wondering where they should start.

**Accessibility** - It is not very useful to document work instructions if nobody can find them. Not only should they be readily available, in a well-advertised location, ideally there should also be only one copy of the procedure in existence. This is the best reason to have all your procedures stored digitally, in one central location.

## Techniques of an Effective Coordination Process

1. **Participatory** - The coordinator must secure and maintain the confidence of the others, fostering an atmosphere of respect and good will.
2. **Transparent** - coordination requires trust and trust requires transparency – the willing flow of information, open decision-making processes and publicly stated, sincere and honest rationales for decisions.
3. **Useful** - The coordination process must produce, share and disseminate useful products, processes and outcomes.
4. **Establish a purpose** - The challenge in any coordination process is to ensure a comprehensive approach to the design of the coordination mechanism, based on a mutual understanding of an overall purpose of the coordination activities.
5. **Develop trust** - In a multi-organizational environment trust is essential to create the good working relationships needed to collaborate.
6. **Respect people's time and schedules** - Don't let the coordination meetings become just another meeting. Ensure that the meetings need to occur and that there is vital and important work to be done.
7. **Address small problems before they grow** - A small problem, be it a misunderstanding, a hurt feeling, or a perception of insensitivity, may grow and fester resulting in a much bigger barrier to communication.
8. **Build on strengths** - It is important to ask people to do things they can do. Too often people agree to a task that they cannot or will not perform under the threat of consensus or as part of wanting to be a team player.
9. **Thank people and acknowledge their contribution** - Rewarding participation is an important technique in building commitment to the coordination process.

**A. Directions:** Based on what you have read, list down the difference between work instruction and work process in your own words.

Work Instruction	Work Process

**B. Directions:** Write the top three (3) techniques of an effective coordination process for you. Share your insights about your chosen coordination process.

Top three (3) coordination process

1.
2.
3.

## IV. LEARNING PHASES AND LEARNING ACTIVITIES

### E. Engagement (Time Frame: 1 hour)

As a Grade 9 students, you have a lot of schoolwork instructions from your teachers and parents. Now that we are in the midst of pandemic, access to school and community is very limited. Work instructions from your teachers were sent through different platform.

**A. Direction:** Get at least five (5) schoolwork instruction from your teachers and evaluate its characteristics. Write 5 – 10, ten (10) as the highest and five (5) as the lowest. Do this on a separate sheet.

SUBJECT	CLARITY	CONSISTENCY	ACCESSIBILITY

**B. Direction:** Think of the most memorable group activity or project you have done with your classmates. Write an essay about how you and your groupmates coordinated and its outcome. Share your groups' failures and how you overcome it. Relate your experience to the effective coordination process.

### Rubric

	10	7	5
<b>Focus/ Main Point</b>	The essay is focused, purposeful, and reflects clear insight and ideas	The essay is focused on the topic and includes relevant ideas	The essay is focused on topic and includes few loosely related ideas
<b>Support</b>	Persuasively supports main point with well-developed reasons and/or examples	Supports main point with developed reasons and/or examples	Supports main point with some underdeveloped reasons and/or examples
<b>Organization &amp; Format</b>	Effectively organizes ideas to build a logical, coherent argument	Organizes ideas to build an argument	Some organization of ideas to build an argument
<b>Language Use, Style &amp; Conventions</b>	Effective and creative use of elements of style to enhance meaning	Appropriate use of elements of style	Some use of elements of style

<https://www.kpu.ca/sites/default/files/NEVR/High%20School%20Rubrics.pdf>

### A. Assimilation (Time Frame: 1 hour)

**A. Directions:** Read and answer the following questions. Write your answer on a separate sheet.

1. What are the good characteristics of a work instruction?

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2. How is an effective work coordination help the work process to succeed?

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3. What are the main difference of work instruction, procedure, and process?

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**B. Directions:** Make a slogan relating a successful organization through with effective work coordination and good work instruction. Do the activity on a separate sheet.



### IV. LEARNING PHASES AND LEARNING ACTIVITIES

#### Rubrics

	10	7	5
<b>Creativity</b>	Slogan is exceptionally creative. A lot of thought and effort was used to make the banner.	Slogan is creative and a good amount of thought was put into decorating it.	Slogan is creative and some thought was put into decorating it.
<b>Originality</b>	Exceptional use of new ideas and originality to create slogan.	Good use of new ideas and originality to create slogan.	Average use of new ideas and originality to create slogan.
<b>Grammar</b>	There are no grammatical mistakes on the poster.	There is 1 grammatical mistake on the poster.	There are 2 grammatical mistakes on the poster.

### V. ASSESSMENT (Time Frame: 1 hour)

(Learning Activity Sheets for Enrichment, Remediation, or Assessment to be given on Weeks 3 and 6)

Directions: Write **True** if the underlined word is correct if it is **False** change the underlined word to make the statement correct.

1. The main reason why companies document their work is because of their importance in safety.
2. Coordination requires trust and transparency.
3. The coordination process must produce, share, and disseminate non-useful products, processes and outcomes.
4. Trust is essential to create the good working relationships needed to collaborate.
5. Address small problems before they grow.
6. It is unimportant to ask people to do things they can do.
7. Rewarding participation is an important technique in building commitment to the coordination process.
8. Procedure is flow of sequences of activities that transform input elements into results.
9. Work instructions describe the correct steps to perform a specific task.
10. Business process is a set of related or interacting activities, which transform inputs into outputs.

### VI. REFLECTION (Time Frame: \_\_\_\_\_)

- Communicate your personal assessment as indicated in the Learner's Assessment Card.

#### Personal Assessment on Learner's Level of Performance

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

? - I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

Learning Task	LP	Learning Task	LP	Learning Task	LP	Learning Task	LP
Number 1		Number 3		Number 5		Number 7	
Number 2		Number 4		Number 6		Number 8	

### VII. REFERENCES

#### References:

CSS 9\_Information Sheet for Week 3

Link: <https://docs.google.com/document/d/1Xlr-ClkG3vJgzh5SynSeJgJiOon5zJ-L/edit?rtfpof=true>

[https://staff.wiki/239\\_Page,what\\_is\\_a\\_Work\\_Instruction,KB.aspx](https://staff.wiki/239_Page,what_is_a_Work_Instruction,KB.aspx)

<https://bit.ly/2SNTXUa>

<https://bit.ly/3w3xm4v>

<https://crowston.syr.edu/sites/crowston.syr.edu/files/PROS-134.pdf>

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<b>W4</b>	<b>Learning Area</b>	TLE – Computer Systems Servicing	<b>Grade Level</b>	9
	<b>Quarter</b>	Fourth	<b>Date</b>	

<b>I. LESSON TITLE</b>	TESTING ELECTRONIC COMPONENTS (TEC)
<b>II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)</b>	Determine criteria for testing electronics components. <b>TLE_IACSS9-12TEC-IVa-c-24</b>
<b>III. CONTENT/CORE CONTENT</b>	Documentations and interpretations of data/testing criteria Testing criteria

#### IV. LEARNING PHASES AND LEARNING ACTIVITIES

##### I. Introduction (Time Frame: 1 hour)

###### Presentation

Documentations and interpretations of data/testing criteria has a vital role in an organization. As an aspiring computer technician, you must learn the different types of documentation in computer science and how to interpret it. You will also learn the criteria for testing electronic components based on manufacturer standard procedure and based on skills of computer hardware/network technician.

**A. Directions:** Read the questions carefully. Write your answer on a separate sheet.

1. Share your personal insights about the word "documentation".  
\_\_\_\_\_
2. How do you document your project? Do you have considerations in writing your project documentation?  
\_\_\_\_\_
3. Have you interpreted a data in your Math or Science subject? Share your experience and learnings.  
\_\_\_\_\_

##### D. Development (Time Frame: 1 hour & 30 minutes)

Read and understand the teacher-made learning materials through this link: CSS 9\_Information Sheet for Week 4

Link: <https://bit.ly/3yiU9LN>

###### Types of Documentation in Computer Science (ICT)

The following are typical software documentation types:

**Request for Proposal (RFP)** – a business document that announces a project, describes it, and solicits bids from qualified contractors to complete it.

**Statement of work/ Scope of Work (SOW)** - is a document routinely employed in the field of project management. It is the narrative description of a project's work requirement.

**Software Design** - the process by which an agent creates a specification of a software artifact intended to accomplish goals, using a set of primitive components and subject to constraints.

**System Design** - the process of defining the components, modules, interfaces, and data for a system to satisfy specified requirements.

**Functional Specification**- is a formal document used to describe a product's intended capabilities, appearance, and interactions with users in detail for software developers.

**User Acceptance Testing** - it consists of a process of verifying that a solution works for the user.

**Manpages** - is a form of software documentation usually found on a Unix or Unix-like operating system

The following are typical hardware and service documentation types:

**Network diagrams** - is a schematic depicting the nodes and connections amongst nodes in a computer network or, more generally, any telecommunications network.

**Network maps** - a visualization of devices on a network, their inter-relationships, and the transport layers providing network services.

**Datasheet for IT systems** - a document that summarizes the performance and other characteristics of a product, machine, component, material, subsystem, or software in sufficient detail that allows a buyer to understand what the product is and a design engineer to understand the role of the component in the overall system.

**Data interpretation** is the process of reviewing data through some predefined processes which will help assign some meaning to the data and arrive at a relevant conclusion. It involves taking the result of data analysis, making inferences on the relations studied, and using them to conclude.

**Four Steps to Data interpretation**

Step 1: Assemble the Information You'll Need

Step 2: Develop Findings

Step 3: Develop Conclusions

Step 4: Develop Recommendations

**Electronic Components** are essential elements of circuit which helps in its functioning. These elements are found in the tangible aspect of computer system which is commonly known as the computer hardware, most of these elements are found especially in the inside box of the system unit.

**Criteria for Testing Electronic Components based on Manufacturer Standard Procedure**

**Functionality** - Can be performed on hardware or software products to verify that your product functions exactly as designed. The general purpose of hardware functionality testing is to verify if the product performs as expected and documented, typically in technical or functional specifications.

**Compatibility** - Is performed to make sure your product functions in its targeted use environment (e.g., different platforms, operating systems, chipsets, peripherals, manufacturers, etc.).

**Performance** - Validates that your product functions acceptably for the market in which you are releasing your product. No one wants a product that they have to wait for or that feels sluggish.

**Usability** - Is performed to provide an independent analysis of a product in terms of how easy or difficult it is to use. This may cover documentation, installation, and product use cases. In addition, a range of different user experience levels may be evaluated.

**Automation** - Allows you to perform repetitive testing quickly and easily by scripting your product with one of many different industry tools.

**Competitive Analysis** - Compares your product to similar products already in the marketplace. These may be products that you have previously released or competitive products, so that you can highlight your advantages – whether performance or usability.

**Criteria for Testing Electronic Components Based on Skills of Computer Hardware / Network Technician**

**Interacting with computers.** Using a computer or computing system for a computer hardware field technician means speaking the machine's language.

**Collecting data and information.** Being a computer hardware field technician is not unlike being a private eye. Much of your job involves diagnosing and repairing a problem; this task has a lot in common with solving a mystery.

**Problem-solving and decision-making.** Problem-solving is vital to being a computer hardware field technician. Connecting the dots to determine the problem and then deciding the correct course of action to take in order to solve the problem is a very important part of the job.

**Communication.** Communication is a key skill in almost any job. Every day we communicate with others, whether it's face to face, on the phone, or via email or instant message.

**Consulting and advising others.** A computer hardware field technician often ends up advising others on a variety of tasks. A good field technician can foresee the outcomes and effects of various IT strategies and advise management as to the best course of action accordingly.

**Inspecting equipment, structures, or material.** A computer hardware field technician must ensure that the equipment is operating properly within its environment. In order to determine what is not working properly, a technician must have a firm understanding of the equipment and all its components and how they work together to perform properly.

**Documenting and recording information.** There are baseline metrics that computer hardware field technicians must keep track of in order to properly diagnose a healthy network or computer system. This information is essential to ensuring the system is running properly.

**Developing objectives and strategies.** In order to create a smooth working network, a good IT technician must maintain a proactive strategy that involves maintenance, frequent virus scans, and creating safeguards. These activities will help to prevent any major issues or problems.

**Training and teaching others.** There are two main tiers of training for a computer hardware field technician. The first is creating a best-practices environment by offering continual training that keeps staff members up to date on new developments in the IT field. The other is training users on how to correct or prevent any problems or issues that may arise.

### IV. LEARNING PHASES AND LEARNING ACTIVITIES

**A.** Directions: Complete the following words with the correct letters and identify this element if belongs to active or passive component. Write your answer on a separate sheet of paper.

ELECTRONIC COMPONENTS	TYPE OF COMPONENT
1. C _ _ _ _ TO _	
2. _ T _ RY	
3. I _ _ C _ _ R	
4. C _ _	
5. _ E _ S _ O	

**B.** Directions: Choose an alternative word or words of the following criteria of testing electronic components. Select your answer found inside the box and write your answer on a separate sheet of paper.

Coaching	Productiveness	Scrutinize	Ease of Use
Purpose	Marketing	Mentoring	Warranty
Appropriate	Data Collection	Transmission	Planning
Task Critical	Thinking	Human-computer interaction	

CRITERIA	ALTERNATIVE WORD/S
1. Functionality	
2. Compatibility	
3. Performance	
4. Usability	
5. Automation	
6. Competitive Analysis	
7. Interacting with computers	
8. Collecting data and information	
9. Problem-solving and decision-making	
10. Communication	
11. Consulting and advising others	
12. Inspecting equipment, structures or material	
13. Documenting and recording information	
14. Developing objectives and strategies	
15. Training and teaching others	

**E.** Engagement (Time Frame: 1 hour & 30 minutes)

Electronic components are not only found in the computer hardware but also in various appliances that can be found in your household.

Direction: Complete the table with a list of electronic components be found in your household. Write your answer on a separate sheet of paper.

Things that can be run by electricity	Things that can be run either by battery or electricity

**A.** Assimilation (Time Frame: 30 minutes)

Directions: Read and answer the following questions. Write your answer on a separate sheet.

1. What is your understanding about the computer hardware and electronic components? How do they differ?
2. Why do you think that recognizing electronic components is important?
3. How these criteria for testing electronic components can be related to your previous lesson in safety procedure in the workplace or occupational health and safety (OHS )?



### IV. LEARNING PHASES AND LEARNING ACTIVITIES

#### V. ASSESSMENT (Time Frame: 1 hour)

(Learning Activity Sheets for Enrichment, Remediation, or Assessment to be given on Weeks 3 and 6)

**A. Directions:** Identify which type of document is being describe in the statement.

- \_\_\_\_\_ 1. It is a form of software documentation usually found on a Unix or Unix-like operating system.
- \_\_\_\_\_ 2. A document routinely employed in the field of project management.
- \_\_\_\_\_ 3. A document that summarizes the performance and other characteristics of a product
- \_\_\_\_\_ 4. It is a formal document used to describe a product's intended capabilities, appearance, and interactions.
- \_\_\_\_\_ 5. A visualization of devices on a network, their inter-relationships, and the transport layers providing network services.

**B. Directions:** Choose only the letter of the correct answer. Write your answer on a separate sheet of paper.

1. This refers to making sure your product functions correctly with other products in the "real world" when released.
  - a. Automation
  - b. Compatibility
  - c. Functionality
  - d. Usability
2. Pertains to keeping the staff members up-to-date on new developments in the IT field.
  - a. Interacting with computers
  - c. Performance
  - b. Coaching
  - d. Training ang teaching others
3. It describes the product's capabilities and limitations.
  - a. Competitive Analysis
  - b. Functionality
  - c. Automation
  - d. Communication
4. It pertains to sharing information and solving the problems that arise in their everyday life.
  - a. Communication
  - b. Automation
  - c. Functionality
  - d. Compatibility
5. Allows you to perform repetitive testing quickly and easily by scripting your product with one of many different industry tools.
  - a. Consulting and advising others
  - c. Automation
  - b. Training and teaching others
  - d. Usability

#### VI. REFLECTION (Time Frame: \_\_\_\_\_)

- Communicate your personal assessment as indicated in the Learner's Assessment Card.

##### Personal Assessment on Learner's Level of Performance

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

? - I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

Learning Task	LP	Learning Task	LP	Learning Task	LP	Learning Task	LP
Number 1		Number 3		Number 5		Number 7	
Number 2		Number 4		Number 6		Number 8	

#### VII. REFERENCES

References:

CSS 9\_Information Sheet for Week 4

Link: <https://bit.ly/3yiU9LN>

<https://en.wikipedia.org/wiki/Documentation>

<https://en.wikipedia.org/wiki/Documentation#Types>

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<https://www.techopedia.com/definition/4993/network-map>

[https://en.wikipedia.org/wiki/Data\\_sheet](https://en.wikipedia.org/wiki/Data_sheet)

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W5-W6	Learning Area	Computer Systems Servicing	Grade Level	9
	Quarter	Fourth	Date	
I. LESSON TITLE		TESTING ELECTRONIC COMPONENT (TEC)		
II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)		Plan an approach for components testing TLE_IACSS9-12TEC-IVc-e-25		
III. CONTENT/CORE CONTENT		<ul style="list-style-type: none"><li>• Testing strategies for electronic components (Using Multimeter)</li><li>• Procedure in checking and testing operation in accordance with established procedures .</li></ul>		
IV. LEARNING PHASES AND LEARNING ACTIVITIES				
<b>A. Introduction (Time Frame: 30 minutes)</b> In the previous lesson, you have learned Documentations and interpretations of data/testing criteria and It has a vital role in an organization. As an aspiring computer technician, you have learned the different types of documentation in computer science and how to interpret it. Also, in criteria for testing electronic components based on manufacturer standard procedure and based on skills of computer hardware/network technician. Aside from these, you need to learn about planning an approach or strategies in testing computer devices is vital. It is the key to make your computer systems run effectively and efficiently. In this lesson, you will learn what tool to be used in testing electronic components. Also, how to use this tool, in the proper way in testing the electronic components.  To test what you know, answer this:  <b>Directions:</b> Identify the word or phrase being described in the sentence. Write your answers on a separate sheet of paper.  _____ 1. It is an electronic measuring instrument that combines several measurement functions in one unit. _____ 2. These are used to connect to whatever device you're planning on testing and measuring. _____ 3. This is a small knob usually located near the dial that is labeled "Ohms Adjust," "0 Adj," or something similar. _____ 4. This allows you to change the function between volts, ohms, and amps, and to change the scale of the meter. _____ 5. This has the arc-shaped scales visible through the window and a pointer which will indicate the values read from the scale. _____ 6. In a multimeter, at what position does the needle of pointer be located if the test leads are not in contact with anything. _____ 7. What are you going to measure in order to determine whether or not the circuit is Alternating Current or Direct Current? _____ 8. In a multimeter, what color of the test probe is associated with positive charge? _____ 9. What is the meaning of VOM? _____ 10. In a multimeter, at what position does the needle of pointer be located if the test leads are in contact with anything.  After going through this lesson, you are expected to:  1. identify the parts of an analogue multi tester; 2. measure some electronic components; and 3. practice safety while measuring electronic components.				
<b>B. Development (Time Frame: 2 hours &amp; 30 minutes)</b>  <b>ELECTRONICS</b>  <b>Electronics</b> deals with behavior of electron in semi-conductor.  <b>Materials or the electronic Components.</b> <b>SEMI-CONDUCTOR</b> serves as a good insulator or good conductor at certain instances. -Silicon, gallium and germanium are the most common materials to manufacture semi-conductors' electronic components by adding or "doping" impurities like indium or antimony. <b>N-type</b> is semi-conductors which charge carries are electrons which are negatively charge. <b>P-type</b> is semi-conductors which charge carries are holes have positive charge.  <b>COMMON ELECTRONIC COMPONENTS</b>  <b>PASSIVE</b> are components or device which doesn't generate voltage but controls the current in an electronic circuit. <b>EXAMPLES:</b> RESISTORS, CAPACITORS, INDUCTORS, ETC. <b>ACTIVE</b> are the components which generate, amplify, and control the voltage and current in an electronic circuit. <b>EXAMPLE:</b> DIODE, TRANSISTOR, AND IC (INTEGRATED CIRCUITS) AND ETC. Are the elements or components that interactively work in an electronic circuit to produce the desired result. Basic electronic components are resistors, capacitors, transistors, and other semi-conductor materials.				

## USING MULTIMETER

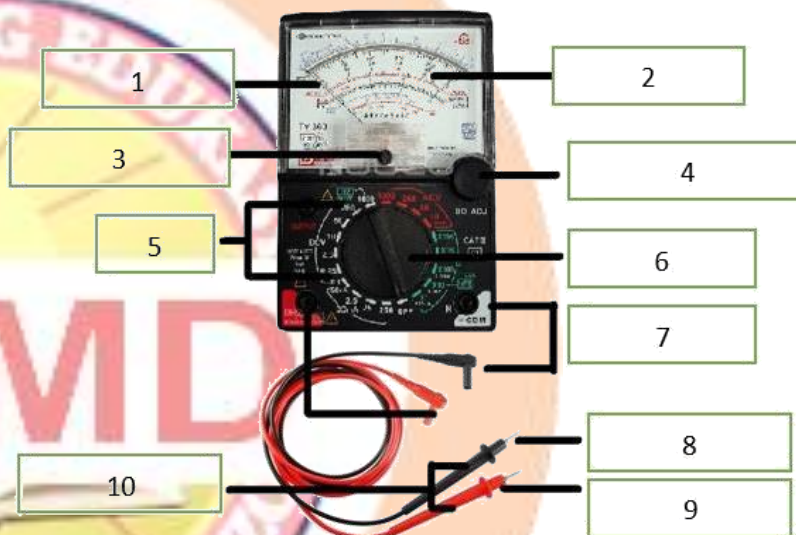
A **multimeter** or a **multi-tester**, also known as a volt/ohm meter or VOM, is an electronic measuring instrument that combines several measurement functions in one unit. A typical multimeter may include features such as the ability to measure voltage, current and resistance. Multimeters may use analog or digital circuits— analog multimeters and digital multimeters (often abbreviated DMM or DVOM.)

In order to test some basic electronics components, one must use a multimeter either analogue or digital.

### Learning Task 1.

**Directions:** Identify the parts of the analogue tester by choosing from the words inside the box. Write your answers on a separate sheet of paper.

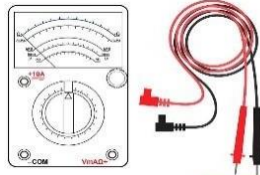
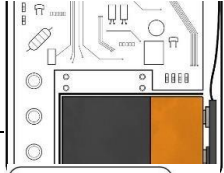
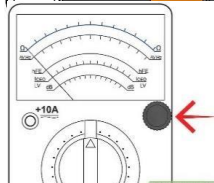
Scale	Range Selector	Positive Probe	Test Probes
Dial/Infinity Knob	Range	Needle/Pointer	
Zero Ohm Adjuster	Negative Probe	Ports	




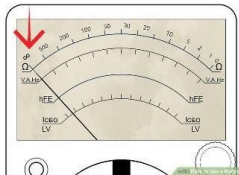
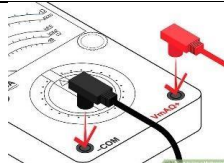

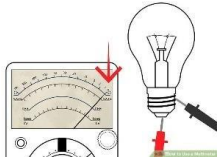
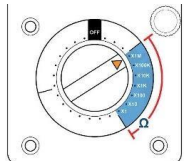
### Initial Steps in Using Analog Multi-tester

1. <b>Locate the dial of your multimeter.</b> This has the arc-shaped scales visible through the window and a pointer which will indicate the values read from the scale.	
2. <b>Find the selector switch, or knob.</b> This allows you to change the function between volts, ohms, and amps, and to change the scale (x1, x10, etc.) of the meter.	
3. <b>Locate the openings in the case where you'll insert the test leads.</b> Most multimeters have several jacks used for this purpose.	

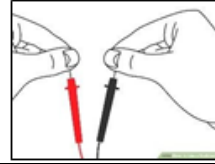


<p>4. <b>Locate the test leads.</b> There should be two test leads or probes. Generally, one is black and the other red. These are used to connect to whatever device you are planning on testing and measuring.</p>	
<p>5. <b>Find the battery and fuse compartment.</b> This is usually found on the back but is also sometimes on the side of some models. This holds the fuse (and possibly a spare), and the battery that supplies power to the meter for resistance tests.</p>	
<p>6. <b>Find the Zero Adjustment knob.</b> This is a small knob usually located near the dial that is labeled "Ohms Adjust," "0 Adj.," or something similar. This is used only in the ohms or resistance range, while the probes are shorted together (touching each other).</p>	

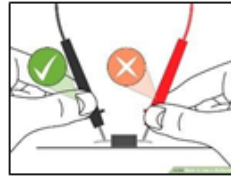
### Measuring Resistance

<p>1. <b>Set the multimeter to Ohms or Resistance.</b> Turn the meter on if it has a separate power switch. When multimeter measures resistance in ohms, it cannot measure continuity because resistance and continuity are opposites. When there is little resistance, there will be a great deal of continuity, and vice versa.</p>	
<p>2. <b>Observe the meter indication.</b> If the test leads are not in contact with anything, the needle or pointer of an analog meter will rest at the left-most position. This represents an infinite amount of resistance, or an "open circuit." It's safe to say there is the no continuity, or path between the black and red probes.</p>	
<p>3. <b>Connect the test leads.</b> Connect the black test lead to the jack marked "Common" or "C". Then, connect the red test lead to the jack marked with the Omega (Ohm symbol) or letter "R" near it.</p>	
<p>4. <b>Hold the probes at the end of the test leads together.</b> The meter pointer should move fully to the right. Locate the "Zero Adjust" knob and rotate it so that the meter indicates "0" (or as close to "0" as possible).</p>	
<p>5. <b>Measure the resistance of something like a light bulb that you know is good.</b> Locate the two electrical contact points of the bulb. They will be the threaded base and the center of the bottom of the base.</p>	
<p>6. <b>Try different ranges.</b> Change the range of the meter to R x 1. Zero the meter again for this range and repeat the step above. Observe how the meter did not go as far to the right as before.</p>	

7. **Test resistance between hands.** Set the meter to the highest R x value possible and zero the meter.

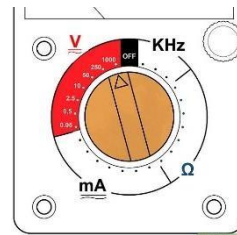


8. **Make sure your reading is accurate.** It is very important that the probes not touch anything other than the device being tested. A device that has burned out will not show "open" on the meter when testing if your fingers provide an alternate path around the device, like when they are touching the probes.

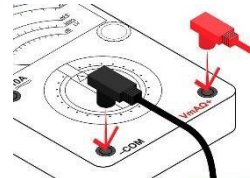


### Measuring Voltage

1. **Set the meter for the highest range provided for AC Volts.** Many times, the voltage to be measured has a value that is unknown. For this reason, the highest range possible is selected so that the meter circuitry and movement will not be damaged by voltage greater than expected.



2. **Insert your test probes.** Insert the black probe in the "COM" or "-" jack. Next, insert the red probe in the "V" or "+" jack.

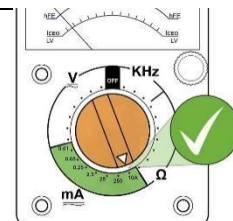


3. **Locate the voltage scales.** There may be several Volt scales with different maximum values. The range chosen by the selector knob determines which voltage scale to read.

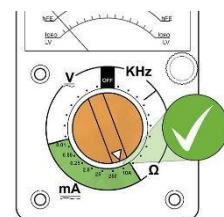


### Measuring Amperes

1. **Make sure you have measured the voltage first.** You need to determine whether the circuit is AC or DC by measuring the voltage of the circuit as described in previous steps.



2. **Set the meter to the highest AC or DC Amp range supported.** If the circuit to be tested is AC but the meter will only measure DC amps (or vice versa), stop. The meter must be able to measure the same mode (AC or DC) amps as the voltage in the circuit, otherwise it will indicate 0.



### Learning Task 2.

**Direction:** Unscramble the letters below to form significant words learned in this lesson. Write your answers on a separate sheet of paper.

1. SPAMERE \_\_\_\_\_
2. STORESIR \_\_\_\_\_
3. EGLOVAT \_\_\_\_\_



- PIVOT 4A

### TASK SHEET

**Title** : Testing Resistor

**Performance Objective:**

Given required supplies and materials you should be able to:

1. Test resistor.

**Supplies/Materials** : Resistors with different values.

**Equipment** : Analog and Digital Multimeter

**Steps/Procedure:**

1. Ask your teacher to provide you with supplies and materials and equipment needed in testing resistor.
2. Prepare practical work area for practicum.
3. Apply OH&S Policies and Procedure.
4. Set-up equipment and supplies in designated areas.
5. Test the resistors.
6. Perform 5S.

**Assessment Method:**

- Demonstration / Oral questioning

### PERFORMANCE CRITERIA CHECKLIST

CRITERIA Did you....	YES	NO
1. Prepare practical work area for practicum?		
2. Apply OH&S Policies and Procedure?		
3. Set-up equipment and supplies in designated areas?		
4. Test the resistors?		
5. Perform 5S?		

### V. ASSESSMENT (Time Frame: 30 minutes)

**A. Directions:** Identify the word or phrase being described in the sentence. Write your answers on your answer sheet.

1. It is an electronic measuring instrument that combines several measurement functions in one unit.
2. These are used to connect to whatever device you are planning on testing and measuring.
3. This is a small knob usually located near the dial that is labeled "Ohms Adjust," "0 Adj," or something similar.
4. This allows you to change the function between volts, ohms, and amps, and to change the scale of the meter.
5. This has the arc-shaped scales visible through the window and a pointer which will indicate the values read from the scale.
6. In a multimeter, at what position does the needle of pointer be located if the test leads are not in contact with anything.
7. What are you going to measure to determine whether the circuit is Alternating Current or Direct Current?
8. In a multimeter, what color of the test probe is associated with positive charge.
9. What is the meaning of VOM?
10. In a multimeter, at what position does the needle of pointer be located if the test leads are in contact with anything.

**B. Directions:** Choose from any of the following activities and make a flowchart of it. Do this on your notebook.

1. Steps in measuring voltage.
2. Steps in measuring amperes.
3. Initial Steps in Using Analog Multi-tester

### VI. REFLECTION (Time Frame: 20 minutes)

- Communicate your personal assessment as indicated in the Learner's Assessment Card.

#### Personal Assessment on Learner's Level of Performance

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

? - I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

Learning Task	LP	Learning Task	LP	Learning Task	LP	Learning Task	LP
Number 1		Number 3		Number 5		Number 7	
Number 2		Number 4		Number 6		Number 8	

### VII. REFERENCES

[https://drive.google.com/drive/folders/1e6HF47T-H1DjpXMWxuVlovs5\\_3hqtGDm?fbclid=IwAR3s5CWbycthsFPZn7q\\_KRgAX2eNnzOJH8rr\\_jjVsATD-BUWluJ\\_A1vd\\_Po](https://drive.google.com/drive/folders/1e6HF47T-H1DjpXMWxuVlovs5_3hqtGDm?fbclid=IwAR3s5CWbycthsFPZn7q_KRgAX2eNnzOJH8rr_jjVsATD-BUWluJ_A1vd_Po)

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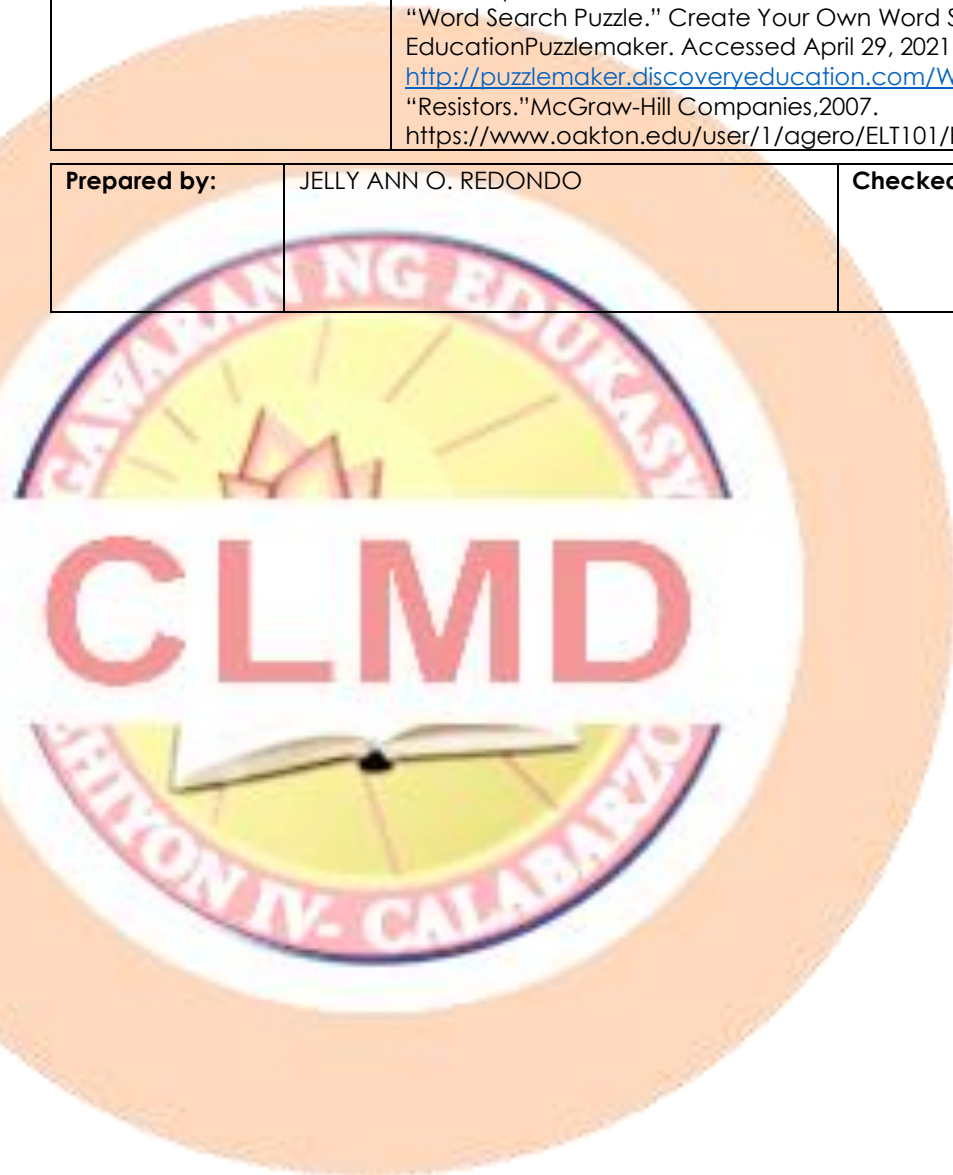
<https://www.oakton.edu/user/1/agero/ELT101/Presentations/Chapte r02.pdf>.

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<b>W7-W8</b>	<b>Learning Area</b>	Computer Systems Servicing	<b>Grade Level</b>	9
	<b>Quarter</b>	Fourth	<b>Date</b>	

<b>I. LESSON TITLE</b>	TESTING ELECTRONIC COMPONENT (TEC)
<b>II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)</b>	LO 3: Test components (TLE_IACSS9-12TECO-IVf-h-26) LO 4: Evaluate the testing process (TLE_IACSS9-12TECO-IVh-j-27)
<b>III. CONTENT/CORE CONTENT</b>	<ul style="list-style-type: none"> <li>Component testing process evaluation</li> <li>Components of testing methods</li> <li>Testing process and records</li> </ul>

#### IV. LEARNING PHASES AND LEARNING ACTIVITIES

##### A. Introduction (Time Frame: 30 minutes)

Today's **electronic** devices are made up of a wide variety of **components**. Some, like resistors and capacitors, are simple and passive, while others, such as advanced central processing unit (CPU) chips, are extremely complex and can contain over 20 billion transistors. In this lesson, **Testing of components** involves the process of finding the terminals of the components and knowing whether a certain component is good or defective. **Evaluation** on the process of testing components centered on work evaluation with regards to preparation and validity of testing procedures.

To test what you know, answer this:

**Directions:** Identify the word or phrase being described in the sentence. Write your answers in your answer sheet.

1. It is an electronic measuring instrument that combines several measurement functions in one unit.
2. In diodes, what do the silver stripe represents?
3. This is an Electronic/Electrical component that stores energy in the form of Electric Charge.
4. This allows you to change the function between volts, ohms, and amps, and to change the scale of the meter.
5. In testing capacitor, if the multimeter shows very low resistance, it means that the capacitor is\_\_\_\_\_.
6. These are components used to resist the flow of electric current.
7. It is a system used to determine the value of a resistor without using a multimeter.
8. What defective capacitor that shows very low Resistance?
9. A type of transformer that is used to increase the output voltage.
10. A type of transformer that is used to decrease the output voltage.

After going through this lesson, you are expected to:

1. identify tools and equipment for electronic components testing;
2. identify the resistance value of the resistor using Color Coding;
3. perform test of some electronic components; and
4. practice safety while testing electronic components.

##### B. Development (Time Frame: 2 hours & 30 minutes)

###### Learning Task 1.

**Directions:** Copy and search the following words in the puzzle. Write your answer on a separate sheet of paper.

1. Electronics
2. Multimeter
3. Resistor
4. Capacitor
5. Transformer
6. Resistance
7. Capacitance
8. Ohms
9. Farad
10. Defective

###### What is a Resistor?

**Resistors** are components used to resist the flow of electric current and have a stated value of RESISTANCE. To determine the resistance of a resistor, you can use the Color Coding or directly use the multi-tester. Resistors can be fixed or variable.

M P C E U C D Q Q C R B F U K  
U D G H L A S T D E C R N A N  
L L E L R L K G M P E C H K V  
T R G A X Q O R X S G U P O G  
I E F I R R O T I C A P A C H  
M B L A Q F R S S Z R C H X P  
E E D E S Y T U N Q O V I I C  
T D V N C A P A C I T A N C E  
E R A I N T O H M S S X W R W  
R R L C T J R Z S Q I R Q F Y  
T K E Q V C J O S I S F F R H  
D H V P W J E D N M E J S T X  
F Z T T L L K F Y I R R I C C  
V L L D M C Q M E E C F W D J  
T K H W J K E U E D M S W H A



## Calculating Resistor Values

**Resistor Color Coding** uses colored bands to easily identify a resistor's resistive value and its percentage tolerance.

### Resistor Color Code

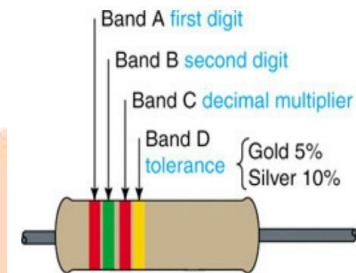


Fig. 2-8: How to read color stripes on carbon resistors for  $R$  in ohms.

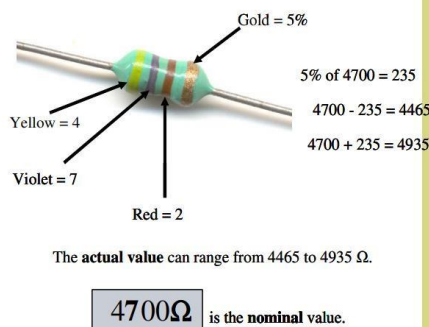
Color Code	
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray
9	White

The **Resistor Color Code system** is all well and good, but we need to understand how to apply it in order to get the correct value of the resistor. The "left-hand" or the most significant colored band is the band which is nearest to a connecting lead with the color-coded bands being read from left-to-right as follows:  
Digit, Digit, Multiplier = Color, Color  $\times 10$  color in Ohm's ( $\Omega$ )

For example, a resistor has the following colored markings;  
**Yellow Violet Red =  $4\ 7\ 2 = 4\ 7 \times 10^2 = 4700\ \Omega$  or  $4k7\ \text{Ohm}$ .**

### Applying the Color Code

- The amount by which the actual  $R$  can differ from the color-coded value is its **tolerance**. Tolerance is usually stated in percentages.



The fourth and fifth bands are used to determine the percentage tolerance of the resistor. Resistor tolerance is a measure of the resistor's variation from the specified resistive value and is a consequence of the manufacturing process and is expressed as a percentage of its "nominal" or preferred value.

Typical resistor tolerances for film resistors range from 1% to 10% while carbon resistors have tolerances up to 20%. Resistors with tolerances lower than 2% are called precision resistors with the or lower tolerance resistors being more expensive.

Most five band resistors are precision resistors with tolerances of either 1% or 2% while most of the four band resistors have tolerances of 5%, 10% and 20%. The color code used to denote the tolerance rating of a resistor is given as:

**Brown = 1%, Red = 2%, Gold = 5%, Silver = 10 %**

### How to Test a Resistor?

Resistors regulate the amount of current flowing in an electronic circuit. Resistors present a resistance, or impedance, to the electrical circuit and reduce the amount of current that is allowed to flow. Resistors are utilized for simple signal conditioning and to protect active electronic devices that could be damaged by receiving excess current. Resistors must be properly sized and intact to perform these functions.

- Remove power from the circuit containing the resistor.** This can be done by unplugging it from the mains or by removing the batteries if it is a portable device.
- Isolate the resistor from the circuit.** An attempt to measure a resistor that is still connected to the circuit can yield an incorrect calculation, as part of the circuit might also be measured.
- Inspect the resistor.** If the resistor shows signs of blackening or charring, it may be damaged by excess current flow. A resistor showing blackening or charring should be replaced and discarded.
- Read the resistor value visually.** The resistor value will be printed on the resistor. Smaller resistors may have their value indicated by color coded bands.

5. **Prepare a digital multimeter (DMM) or analog multimeter to measure the resistor.** DMMs and AMMs are available at electronics parts and hobby stores.
6. **Measure the resistance. Connect** the 2 leads of the DMM to the 2 legs of the resistor. Resistors have no polarity, so it does not matter which DMM lead is connected to which resistor leg.
7. **Determine the actual resistance of the resistor.** Read the result shown on the multimeter. In determining whether the resistor is within the allowable range for that resistor, do not forget to take the resistor tolerance into account.
8. **Reattach a resistor that gives an accurate reading.** Reconnect it to the circuit by pressing it back into place if you pulled it free with your fingers. If the solder joint had to be melted and the resistor had to be disconnected using pliers, melt the solder with the soldering iron and use the needle nose pliers to push the resistor back in to place.
9. **Replace a resistor that measures outside of the acceptable value range.** Discard the old resistor. Resistors are available in electronics parts stores and hobby stores.

Note that replacing the malfunctioning resistor will not necessarily fix the problem, if the resistor fails again the source of the problem should be sought elsewhere in the circuit.

## How to Test a Capacitor?

A **capacitor** is an electronics/electrical component that stores energy in the form of Electric Charge. Capacitors are often used in electronics circuit boards or few electrical appliances and perform a variety of functions.

For an initial test, you can easily do without using test & measuring equipment – you just need to visually check whether the capacitor is in good condition. The main indicators of its failure are as follows:

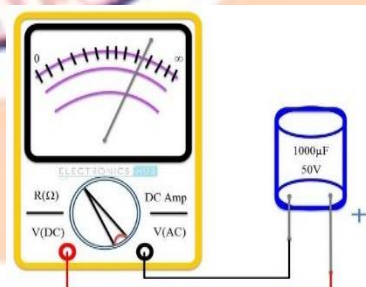
1. bulging of the vent on top/bottom of the capacitor/swelling of the casing or its damage;
2. leaked electrolyte; and
3. darkening on the PCB or casing around the contacts.

If you see any of these, you need to replace the capacitor with a new one immediately. If there are no visible signs of capacitor failure, then proceed to the next testing stage using such test & measuring tools as an RLC meter or a multimeter with resistance & capacitance measuring functions.

## Test a Capacitor by Analog Multimeter

To check a capacitor by AVO (Ampere, Voltage, Ohm Meter), follow the following steps.

1. Make sure the suspected capacitor is fully discharged.
2. Take an AVO meter.
3. Select analog meter on OHM (Always, select the higher range of Ohms).
4. Connect the Meter leads to the Capacitor terminals.
5. Note The reading and Compare with the following results.
6. Short Capacitors: Shorted Capacitor will show very low Resistance.
7. Open Capacitors: An Open Capacitor will not show any movement (Deflection) on OHM meter Screen.
8. Good Capacitors: Initially, it will show low resistance, and then gradually increases toward the infinite. It means that Capacitor is in Good Condition.



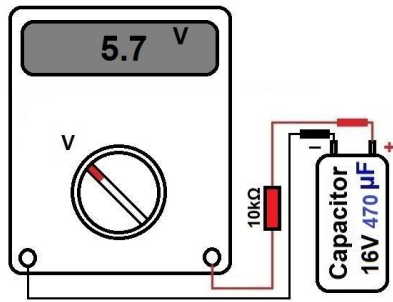
<https://www.electronicshub.org/how-to-test-a-capacitor/>

## Check a Capacitor by a Digital Multimeter

To test a capacitor by DMM (Digital Multimeter), follow the steps given below.

1. Make sure the capacitor is discharged.
2. Set the meter on Ohm range (Set it at least 1000Ohm = 1k).
3. Connect the meter leads to the capacitor terminals.
4. Digital meter will show some numbers for a second. Note the reading.
5. And then immediately it will return to the OL (Open Line). Every attempt of Step 2 will show the same result as was in step 4 and Step 5. It means that Capacitor is in Good Condition.
6. If there is no Change, then Capacitor is dead.





<https://www.electricaltechnology.org/2013/06/how-to-check-capacitor-with-digital.html>

## How to Test a Transformer?

**Transformers** are an electrical component that transmit electrical energy between at least two circuits. Transformers regulate the voltage in circuits, but in some cases, these can go bad and cause a circuit to not work. There are three types of linear transformer:

1. Step up transformer-to increase the output voltage. Typical example is 240v ac input with a 480-volt ac output (high voltage).
2. Step down transformer-to decrease the output voltage. Typical example is 240v ac input with a 12-volt ac output (low voltage).
3. Isolation transformer-produce the same amount of voltage as the input voltage. Typical example is 240 v ac input with a 240-volt ac output.

1. **Prepare to measure the circuit voltages.** Turn off the power to the circuit. Remove covers and panels as necessary to gain access to the circuits that contain the transformer. Acquire a digital multimeter (DMM) to take the voltage readings.

Generally, you will need to attach the leads of your DMM to the input lines to verify that the primary of the transformer is not shorted. The same process will be used to check the transformer secondary.



2. **Confirm the proper input to the transformer.** Apply power to the circuitry. Use the DMM in AC mode to measure the transformer primary. If the measurement is less than 80 percent of the expected voltage, the fault could lie in either the transformer or the circuitry providing the primary with power.

### In that case:

- Separate the transformer from the input circuit. Test the input with your DMM. If the input power climbs to the expected value, the primary of the transformer is bad.
- If the input power does not climb to the expected value, then the problem lies not with the transformer, but with the input circuitry.
- The input and output on the transformer may be labeled with "input" and "output," or the input might be a black and white pigtail.
- If the transformer has terminals, the input will usually be L, which stands for "line," or hot power, and N, which stands for neutral, or the neutral power going into that wire. The output will be the low voltage side.





3. **Measure the secondary output of the transformer.** If there is no filtering or shaping being performed by the secondary circuitry, use the AC mode of the DMM to read its output. If there is, use the DC scale of the DMM.

- If the expected voltage is not present on the secondary, either the transformer or a filtering or shaping component is bad. Test the filtering and shaping components separately.
- If the testing of the filtering and shaping components show no problems, then the transformer is bad.



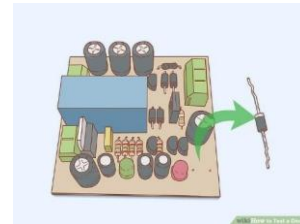
### How to Test a Diode

In an electronic circuit, a diode is a small device that allows an electric current to flow through in only one direction. It works by having low resistance in one direction and high resistance on the other. You'll have to occasionally test a diode—which is typically made from a semiconductor material (like silicon in Group IV of the periodic table or selenium in Group VI of the periodic table)—to make sure it's working properly. You can check the health of a standard diode with either a digital or analog multimeter, which will measure in ohms ( $\Omega$ ) or volts.

### Checking with an Analog Multimeter

1. **Shut off the diode's power source.** Testing a diode while it is still in a circuit will not only throw off results, it's also incredibly dangerous. Remove the diode completely from the circuit or turn off the energy source, which could be an electrical outlet or battery.

Discharging the capacitors to get rid of any extra voltage they hold will decrease your risk of an explosion or electric shock.



2. **Turn the selector switch to low resistance.** This will be about 1 K $\Omega$ . Setting the multimeter on low resistance allows some current to flow through without overloading the diode with too much.

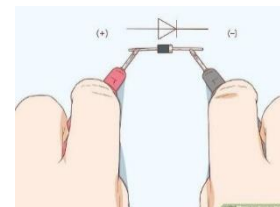
The selector switch is the dial in the center of the multimeter.



3. **Put the red lead on the anode and the black lead on the cathode.** The anode is the positive end, while the cathode is the negative end. The diode is now forward biased, meaning there is a current flowing through it.

Any easy way to tell which end is the cathode vs. the anode, look for the silver stripe. That designates the cathode.

The leads have mini alligator clips at the ends which you will use to attach to the diode.



4. **Check the reading on the meter to determine if the diode is healthy.** If your diode is forward biased, then the meter will read between 1  $\Omega$  and 100  $\Omega$  if it's in working order. If the diode is reverse biased, then the reading on the meter should be infinite resistance, which means the diode is open. A lower resistance for either type of diode means the diode is shorted and needs to be replaced. In either of these cases, you should replace your diode.

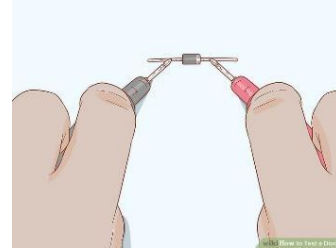
If you see no reading at all, make sure the leads are securely clipped onto the diode.



Check if your leads are functioning properly by testing them on a brand-new battery. Set the multimeter to voltage mode and attach the red clip to the positive end and the black clip to the negative end. If the reading does not match the voltage of the battery, you need new leads.

5. **Swap the red lead onto the cathode and the black lead onto the anode.** It is now reverse biased, meaning no current is flowing through. You will get best results if you turn the dial to high resistance (about 100 K $\Omega$ ) before clipping the leads into their new positions.

High resistance is necessary here because reverse bias is meant to stop all current (or "resist" it) from flowing through.



### Learning Task 2.

**Directions:** Arrange the steps chronologically using the numbers. Write your answer in your answer sheet.  
How to Test a Resistor (1-10)?

- \_\_\_ 1. Determine the actual resistance of the resistor.
- \_\_\_ 2. Inspect the resistor.
- \_\_\_ 3. Isolate the resistor from the circuit.
- \_\_\_ 4. Measure the resistance.
- \_\_\_ 5. Prepare a digital multimeter (DMM) or analog multimeter to measure the resistor.
- \_\_\_ 6. Read the resistor value visually.
- \_\_\_ 7. Reattach a resistor that gives an accurate reading.
- \_\_\_ 8. Remove power from the circuit containing the resistor.
- \_\_\_ 9. Replace a resistor that measures outside of the acceptable value range.
- \_\_\_ 10. Wait for the result of the test.

### C. Engagement (Time Frame: 2 hours)

#### Learning Task 3.

**Directions:** Using Resistor Color Coding, give the value of the following:

1. Blue, Yellow, Red - \_\_\_\_\_
2. Gray, Red, Yellow - \_\_\_\_\_
3. Orange, Green, Brown - \_\_\_\_\_
4. Red, Yellow, Violet - \_\_\_\_\_
5. Blue, Red, Gray - \_\_\_\_\_

#### Learning Task 4.

**Directions:** Answer the K-W-L chart. Write your answer on a separate sheet of paper.

K	W	L
What do you think you <b>KNOW</b> about Testing and Evaluating Electronic Components?	What do you <b>WANT</b> to know about Testing and Evaluating Electronic Components?	What did you <b>LEARN</b> about Testing and Evaluating Electronic Components?

#### Learning Task 5.

**Directions:** Arrange the steps chronologically using the numbers. Write your answer in your answer sheet.  
Checking a capacitor by AVO (Ampere, voltage, Ohm Meter)

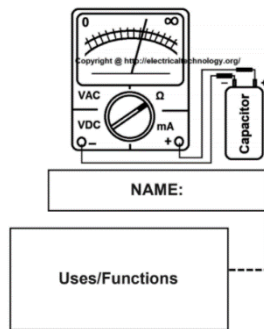
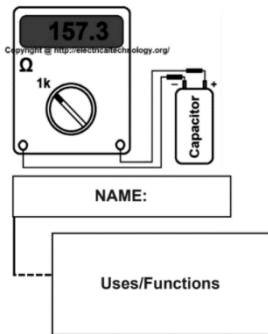
- \_\_\_ 1. Connect the Meter leads to the Capacitor terminals.
- \_\_\_ 2. Make sure the suspected capacitor is fully discharged.
- \_\_\_ 3. Reading and Compare with the following results.
- \_\_\_ 4. Select analog meter on OHM (Always, select the higher range of Ohms).
- \_\_\_ 5. Take an AVO meter.



### D. Assimilation (Time Frame: 2 hours & 30 minutes)

#### Performance Task 1.

**Directions:** Differentiate the two instruments illustrated below by giving their functions/uses. Name the given instruments. Please refer on the criteria given.



CRITERIA	RUBRICS				
	10	8	5	3	1
Quality of Answer with Correct Usage of Grammar	The students can understand and answer the questions correctly and clearly explained	The students can understand and answer the questions correctly	The students can understand and answer the questions slightly correct	The students can understand and answer the questions slightly correct with a minimal error in usage grammar	The students can answer questions but has a difficulty in constructing ideas
Ideas and Explanation	The students can explain and expand his/her ideas extremely	The students can explain his/her ideas thoroughly	The students can explain his/her ideas slightly	The students can explain his/her idea	The students have the hardship to explain his/her idea

#### Performance Task 2.

**Directions:** Create a Ven Diagram that will show the importance/use/functions of the following:

- Resistors
- Capacitor
- Transformer

#### Performance Task 3.

**Directions:** Download a picture or Draw an image that will show the following condition of capacitors:

- Short Capacitor
- Open Capacitor
- God Capacitor

	RUBRICS			
	20	13	6	2
Completion	All of the assigned work is complete	Most of the assigned work is complete	Some of the assigned work is complete	The student did not turn in the assignment
Timeliness	Homework was received on the due date	Homework was one(1) day late	Homework was two(2) days late	Homework was three(3) days late
Accuracy	All of the answers are correct	Most of the answers are Correct	Some of the answers are correct	Little to none of the answers are correct.
Work Shown	All work is meticulously shown	Most work is meticulously shown	Some work is meticulously shown	Students didn't show any work

### V. ASSESSMENT (Time Frame: 30 minutes)

**A. Direction:** Identify the word or phrase being described in the sentence. Write your answers on your answer sheet.

- It is an electronic measuring instrument that combines several measurement functions in one unit.
- In diodes, what do the silver stripe represents?
- This is an Electronic/Electrical component that stores energy in the form of Electric Charge.
- This allows you to change the function between volts, ohms, and amps, and to change the scale of the meter.
- In testing capacitor, if the multimeter shows very low resistance, it means that the capacitor is
- These are components used to resist the flow of electric current.
- It is a system used to determine the value of a resistor without using a multimeter.
- What defective capacitor that shows very low Resistance?
- A type of transformer that is used to increase the output voltage.
- A type of transformer that is used to decrease the output voltage.

**B. Direction:** Give the value of the following resistor color bands.

- Red – Yellow – Violet
- Blue – Black – Black
- Green – White – Blue
- Brown – Gray – Red
- Orange – Green – Brown

### VI. REFLECTION (Time Frame: 20 minutes)

- Communicate your personal assessment as indicated in the Learner's Assessment Card.

Personal Assessment on Learner's Level of Performance



Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

✗ - I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

Learning Task	LP	Learning Task	LP	Learning Task	LP	Learning Task	LP
Number 1		Number 3		Number 5		Number 7	
Number 2		Number 4		Number 6		Number 8	

### VII. REFERENCES

[https://drive.google.com/drive/folders/1e6HF47L-H1DjpXMXuVlovs5\\_3hatGDm?fbclid=IwAR3s5CWbycthsFPZn7a\\_KRgAX2eNnzOJH8rr\\_jjVsATD-BUWluJ\\_A1vd\\_Po](https://drive.google.com/drive/folders/1e6HF47L-H1DjpXMXuVlovs5_3hatGDm?fbclid=IwAR3s5CWbycthsFPZn7a_KRgAX2eNnzOJH8rr_jjVsATD-BUWluJ_A1vd_Po)

[https://drive.google.com/drive/folders/1y-NU0ZTVu-8AYuronCe2MRYUiMDdv\\_ct?fbclid=IwAR2v17Z4qBpvmfW3Thibe4sGiSL8c9c2uy21ND70k7Bi32B5y80Coup\\_CQ](https://drive.google.com/drive/folders/1y-NU0ZTVu-8AYuronCe2MRYUiMDdv_ct?fbclid=IwAR2v17Z4qBpvmfW3Thibe4sGiSL8c9c2uy21ND70k7Bi32B5y80Coup_CQ)

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