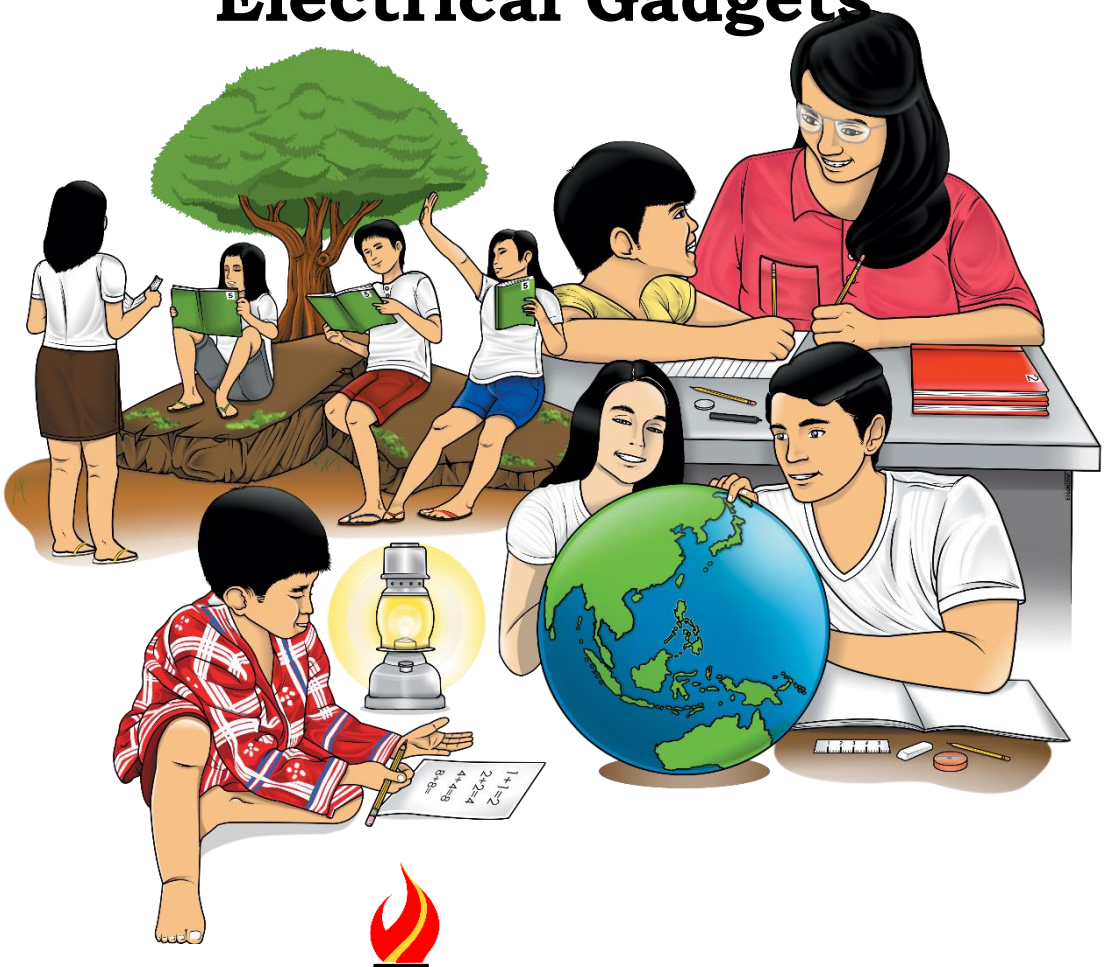
6

DepED
DEPARTMENT OF EDUCATION

Technology and Livelihood Education

Industrial Arts – Module 9: Protocols (Processes) in Making Electrical Gadgets



ALTERNATIVE DELIVERY MODE
ADM

TLE– Grade 6
Alternative Delivery Mode
Industrial Arts – Module 9: Protocols (Processes) in Making Electrical Gadgets
First Edition, 2020

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer: Jofel D. Nolasco

Editors and Reviewers: Jeanalyn L. Jamison, Ana Lee C. Bartolo, Petronilo R. Bartolo, Velly P. Seguisa, Ivy Dalisay

Illustrator: Jofel D. Nolasco

Layout Artist: Andres M. Cuyasan, Jofel D. Nolasco, Ana Lee C. Bartolo

Management Team: Ramir B. Uytico, Pedro T. Escobarte, Jr.
Elena Gonzaga, Donald T. Genine
Melgar B. Coronel, Ana Lee C. Bartolo
Jeanalyn L. Jamison

Printed in the Philippines by Department of Education – Region VI-Western Visayas
Office Address: Duran Street, Iloilo City
Telefax: (033) 336-2816, (033) 509-7653
E-mail Address: region6@deped.gov.ph

6

Technology and Livelihood Education

Industrial Arts – Module 9: Protocols (Processes) in Making Electrical Gadgets

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

This module was designed and written with you in mind. It is here to help you master the skills in making simple electrical gadgets. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

This module focuses on the following topics:

- What to do before making electrical gadgets;
- What to do during the preparation of electrical gadgets; and
- What to do after working on electrical gadgets.

After going through this module, you are expected to:

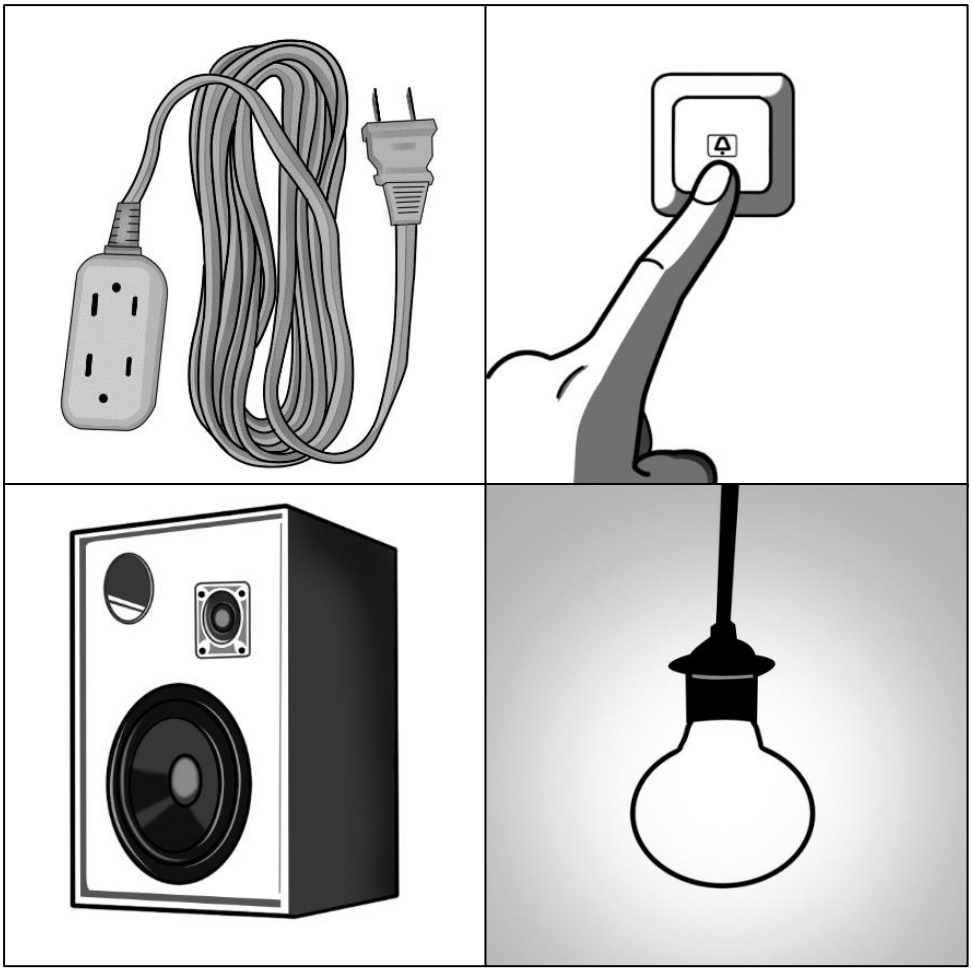
a. Explain the protocols (processes) in making electrical gadgets. (TLE6IA-0g- 9)

What I Know

Directions: Put a check (✓) mark if the statement is correct and (x) if it is wrong. Write your answer on a separate sheet of paper.

1. Protocol is a detailed plan and procedures to be followed in formal situations.
2. Personal protective equipment should be worn while working with electricity.
3. Appliances marked with 110V capacity can be connected to 220V power source.
4. Wear loose clothes to feel comfortable while working with electrical gadgets.
5. Repairing or making electrical gadget does require close supervision of knowledgeable person.
6. Safety precautions should be put into consideration while working.
7. In making a gadget, we can use any other tools available in school or at home.
8. When working with electrical gadgets, ensure that the circuit breaker is in ON position.
9. Make a regular inspection of tools and equipment.
10. Circuit breaker is an electrical switch designed to protect an electrical circuit from damage caused by an overload or short circuit.

Lesson 1 Protocols (Processes) in Making Electrical Gadgets



Today, electrical gadgets can be seen and used anywhere. Some of it are homemade electrical gadgets since it is so easy to install depending on its operation or function.

Can you name some of the gadgets shown above?

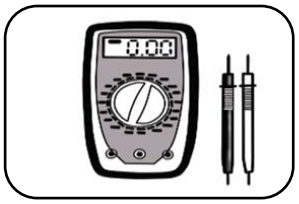
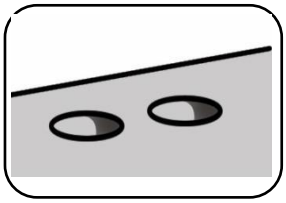
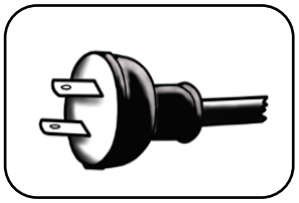
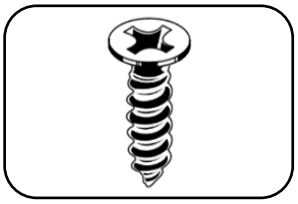
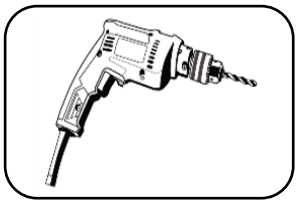
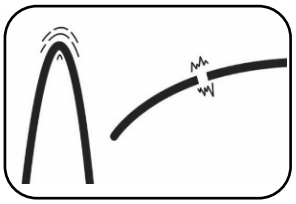
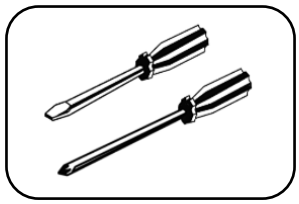
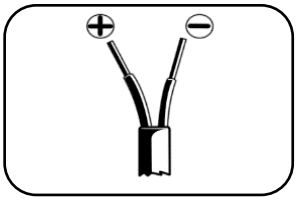
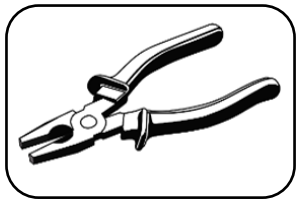
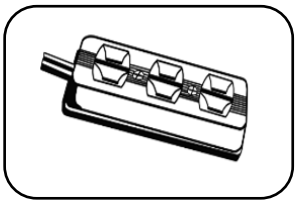
Can you find these gadgets at home?

All Illustrations on this page were made by Jofel D. Nolasco

What's In

Matching Type

Directions: Match the tool in making simple electrical gadgets in column A with its appropriate pair in column B. Write your answer on a separate sheet of paper.

A		B	
1.		A.	
2.		B.	
3.		C.	
4.		D.	
5.		E.	

All Illustrations on this page were made by Jofel D. Nolasco

Notes to the Teacher

To our beloved teachers:

The following words listed below are defined according to how they are referred to this module.

Please help the pupils understand these words.

We encourage you to provide examples as necessary.

Here are some words related to our lesson. Familiarize them before you proceed with this module.

1. **Protocol** – a detailed plan or procedure

2. **Live wire** – it is where the current flows.

3. **Electric shock** – a dangerous condition due to direct or indirect contact with energized conductor that may result injury to a person or damage to workplace.

4. **Electric panel** – is a component of an electricity supply system that divides an electrical power supply into subsidiary circuits, while providing circuit breaker for each circuit in a common enclosure.

5. **Circuit breaker** – an automatically operated electrical switch designed to protect an electrical circuit from damage caused by an overload or short circuit.

6. **Short circuit** – an abnormal connection between two nodes of an electric circuit intended to be at different voltages.

7. **Electric current** – is a flow of electricity through a wire or circuit.

8. **Electrical surge** – an unexpected, temporary increase in the current or voltage of an electrical circuit.

9. **Electric voltage** – is the pressure from an electrical circuit's power source that pushes current between two points.

10. **Direct current (DC)** – an electric current flowing in one direction only.

11. **Alternating current** – an electric current that reverses its direction many times a second at regular intervals, typically used in power supplies.

What's New

Electrical gadgets can provide fun and convenience at home or any working places. These tools can be useful in performing simple tasks.

Instead of buying electrical gadgets at store, you can make or repair one for yourself for household and school needs to save money. But before doing some of it, you must observe protocols in making electrical gadgets. Safety precautions should always be taken into consideration when working with electrical gadgets.

Have you ever done simple repair of gadget at home?

Or have you observed electricians doing repair in school or at home?

Is he or she observing safety procedures in doing the repair?

If not, then we will learn those things on this module.

What is It

If you are thinking of a project for you to work on, that is good. Especially when you plan to make a gadget that can be use every day.

Here are the protocols/processes in making electrical gadgets.

A. Before work

1. Familiarize yourself with the working place.

    - Locate the electric panel that contain circuit breakers. You must know how to shut it down, in case of emergency or before you start the work. Circuit breaker should have a label for easy identification and location
    - Locate the fire extinguishers, other tools and equipment needed

2. Inspect electrical tools and equipment.

    - Inspection of electrical tools and equipment should be done periodically to ensure its good working condition. Poor condition of working tools may result to high risk.

3. Wear personal protective equipment (PPE) – this should be done before servicing any of your appliances or gadgets.
4. If not sure of the process, seek assistance from qualified workers or electrician.
5. Ready all needed materials, tools and equipment**.**

Personal Protective Equipment (PPE)

a. safety clothes

b. insulating gloves

c. safety goggles

d. safety boots

e. safety helmet

B. During work

1. Work with dry hands.

   Avoid water or any liquid substances when working with electricity. Working with wet hands will increase the conductivity of electric current.
2. Wear appropriate working clothes.

   Avoid wearing loose clothes or ties. This may expose skin to electrical connections or rotating machinery.

All Illustrations on this page were made by Jofel D. Nolasco

3. Use appropriate or insulated tools.
   Do not use damaged tools, broken plugs, damaged insulation or with worn out cords.

4. Check that the main switch of the circuit breaker is in the off position.
   The main switch must always be in off position before working. Put a warning sign, so that no one can switch it on by accident.

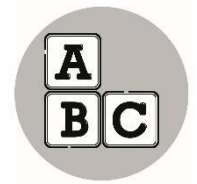
5. Disconnect or power off gadgets before doing the repair.
   Do not work with energized gadgets or equipment. Always use electrical tester to ensure if there is an electrical current that flows in it. It is much better to disconnect or power off gadgets and appliances from its source.

6. Check the specified electric voltage of each gadgets or appliances (110V or 220V) to avoid short circuit.
7. Connect gadgets to the exact power supply. Working with different specific electric current may cause explosion. Avoid connecting Direct current (DC) supply to alternating current (AC) supply.
8. Use wooden or bamboo ladder when working with receptacles at height. Aluminum or steel ladder may cause electrical surge that will ground you.
9. Always replace the parts with the same size specification and capacity.
10. Work away from any hot point sources to avoid electrical fire.
11. Avoid overloading of outlets. Plugging too many devices in one outlet will cause overheating and fire.
12. Observe safety instructions and warnings posted in the appliances. This can be found at the side or back portion of appliances.
13. Work under the supervision of a certified worker or person with enough knowledge.
14. Always pay close attention to what you are doing.

C. After work.

1. Check your work. Make sure that all electrical connections are correctly and securely connected. Open wire should properly cover with electrical tape.
2. Return tools and equipment in their proper places, toolbox or cabinet.
3. Remove and store all safety barriers used.
4. Keep the workplace clean and orderly.
5. Wash hands or clean yourself after working.

As a learner, making electrical gadgets is not an easy thing. Always follow the protocols above. Remember, safety and protection from electrical hazards are the primary criteria while making innovative gadgets at home. It is better to consult first or ask permission from your parents before doing simple gadgets or repair at home.



What's More

Instructions: Read, understand and do the different activities below. Write your answer in a separate sheet of paper.

Activity 1: Classifying and Sorting

Learning the Skill: Classify and sort protocols based on lesson learned

Directions: Read the list of the protocols below. Write them according to the category where they belong: BEFORE, DURING, or AFTER work. Copy the format of the table below. Use a separate answer sheet.

BEFORE	DURING	AFTER

a) Circuit breaker must be in OFF position.
b) Locate the place of fire extinguishers.
c) Wear personal protective equipment.
d) Pay close attention in your work.
e) Work with dry hands.
f) Wash hands or clean self.
g) Assume all open wires are live wires.
h) Be familiar with your workplace.
i) Return all tools used in its proper place
j) Replace parts with the same size specification.

Activity 2: Word Study Journals

There are words listed already in *What's In* which are related to our lesson. Each word was given a meaning for you to understand it.

It is now your turn to select five words from our lesson that you think it is hard for you to understand its meaning.

Write them and try to give own definition based on your understanding.

Learning the Skill: Defining Words in Context

1. First, read to see if the word is defined directly in the sentence.
2. If the word is not defined directly, read several sentences beyond the one in which the word first appears. These sentences may provide information about the definition of the word.
3. If possible, define the word based on your own past knowledge. You may have learned the word in an earlier grade, or you may be familiar with it because you hear it every day.
4. Figure out the meaning of the word by how it is used in the sentence and by the sentences around it.

Activity 3: Discover It

A

B

Learning the Skill: Compare and Explain

Directions: Read and do the activity in a separate sheet of paper.

1. Examine the two pictures above.
2. Compare the two workers by writing your observation inside the box.

Worker A	Worker B

3. Which worker observed the protocol or process in making electrical gadget? Explain your answer using your previous observation.

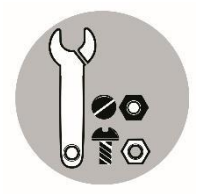
All Illustrations on this page were made by Jofel D. Nolasco

What I Have Learned

Directions: Fill in the blank/s with appropriate word/s that will make the statement correct. Choose your answer from the box below. Write your answer on a separate sheet of paper.

PPE	periodically	short circuit
overheating	water	electric voltage
attention	electrical tape	safety precautions
	electrical tester	

1. _____ _____ should always be taken into consideration when working with electrical gadgets.
2. Plugging too many devices in one outlet will cause _____ _____.
3. Use _____ _____ to ensure if there is an electrical current that flows in a wire or connection.
4. Always wear _____ before servicing any of your appliances or gadgets.
5. _____ _____ is caused by connecting two electrical circuit intended to be at different voltages.
6. Avoid _____ or any substances when working with electricity.
7. Before doing a repair on gadgets or appliances, check the specified_____.
8. Inspection of electrical tools and equipment should be done _____ to ensure its good working condition.
9. Always pay close _____ to what you are doing.
10. Open wire should be covered properly with _____ to avoid injury.



What I Can Do

After studying this module, try to think if one of the light bulbs in your house goes out and you want to replace it with a new working bulb.

List down the procedures before, during and after you replace it. Follow the table below and prepare your answer in a separate sheet of paper.

BEFORE	DURING	AFTER

Assessment

Multiple Choice

Directions: Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. Which of the following does NOT belong to personal protective equipment while repairing an electrical gadget?
    a. Thermal scanner
    b. Safety boots
    c. Safety cap
    d. Goggles

2. What is the electrical equipment used to know if there is an electric current flow in a source?
    a. tester
    b. gauge
    c. steel tape
    d. screw driver

3. Why is it important to follow the protocols in making electrical gadgets?
    a. To avoid fire caused by faulty electrical connections.
    b. To make work in orderly manner.
    c. To avoid injury while working.
    d. All answers are correct.

4. Which of the following is NOT consider as a cause of injury while working with electricity?
    a. Making a short circuit.
    b. Switching off the circuit breaker first.
    c. Doing repair without prior knowledge.
    d. Putting of gadgets near the source of heat.

5. Which should always be consider when working with electrical connections?
    a. Leave wire that is not in use.
    b. Open wire is a live wire.
    c. Connect all open wire.
    d. Cut all the wires.

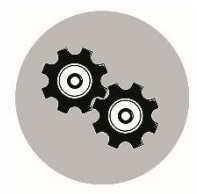
6. What is the importance of wearing safety/rubber gloves while working with electrical gadgets?
    a. To avoid electrical surge.
    b. To make hands free from dirt.
    c. To follow the instructions of your teacher.
    d. To earn additional grades from your teacher.

7. Why is it important to use electrical tools in good condition?
    a. So that your classmates will follow you.
    b. This will make your work fast and safe.
    c. This will be check by your teacher.
    d. It will empress your teacher.

8. What should be done before leaving your workplace?
    a. Check your work.
    b. Leave the workplace.
    c. Clean the working area.
    d. Let the teacher check your work.

9. If you want to work with an electrical gadget but you are not familiar with it, to whom will you call for an assistance?
    a. your teacher.
    b. your parents.
    c. a certified worker.
    d. your elder brother or sister.

10. The following should be checked when working with electrical gadgets except ONE, which one is it?
    a. Load current of a gadget.
    b. Specific voltage of a gadget.
    c. Safety precautions and warnings.
    d. Connect gadgets at power source.



Additional Activities

On this activity you need the help of your parents, electrician, or any of your neighbor with knowledge on how to repair simple electrical gadget. Remember don't do it by yourself.

1. Choose any simple electrical gadgets in your home that does not properly function or is worn out.

   Example: light bulb, receptacle, extension cord, etc.

2. With their help and supervision, try to fix it.

3. Follow the protocols that you have learned.

4. You can take pictures or video as part of your portfolio.

5. Below is the rubric. This will be the basis of your performance.

Task Description	Out-standing 9-10	Highly competent 7-8	Competent 4-6	Not yet competent 2-3	Not achieved 0-1	Sub Total
Inspection						
Selection of tools and use						
Safety						
Workplace/ housekeeping						
					Total Score	

Answer Key

What I Know

D
E
A
B
C

What I Know

x
x
x
x
x

What's More

Activity 1
BEFORE
b
c
h
DURING
a
e
g
j
AFTER
D
f
i

Activity 2
Answers may vary

Activity 3
Answers may vary

What I can Do

Answers may vary

What I Have Learned

Safety
precautions
Overheating/
fire
Electrical
tester
PPE
Short circuit
Water/ liquid
Electric
voltage
Periodically
Attention
Electrical
tape

Assessment

1. A
A
D
B
A
A
B
C
C
D

References

Department of Education Curriculum Guide 2016, EPP 6, Industrial Arts pages 38 – 41

Department of Education MELCs in EPP/TLE Grade 6 Industrial Arts pages 353 – 354

https://lrmds.deped.gov.ph/pdf-view/511

https://lrmds.deped.gov.ph/pdf-view/17020

https://en.wikipedia.org/wiki/Electrical_injury

https://en.wikipedia.org/wiki/Electricity

https://www.esfi.org/electrical-safety

https://www.esfi.org/resource/electrical-safety-while-working-from-home-757

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph