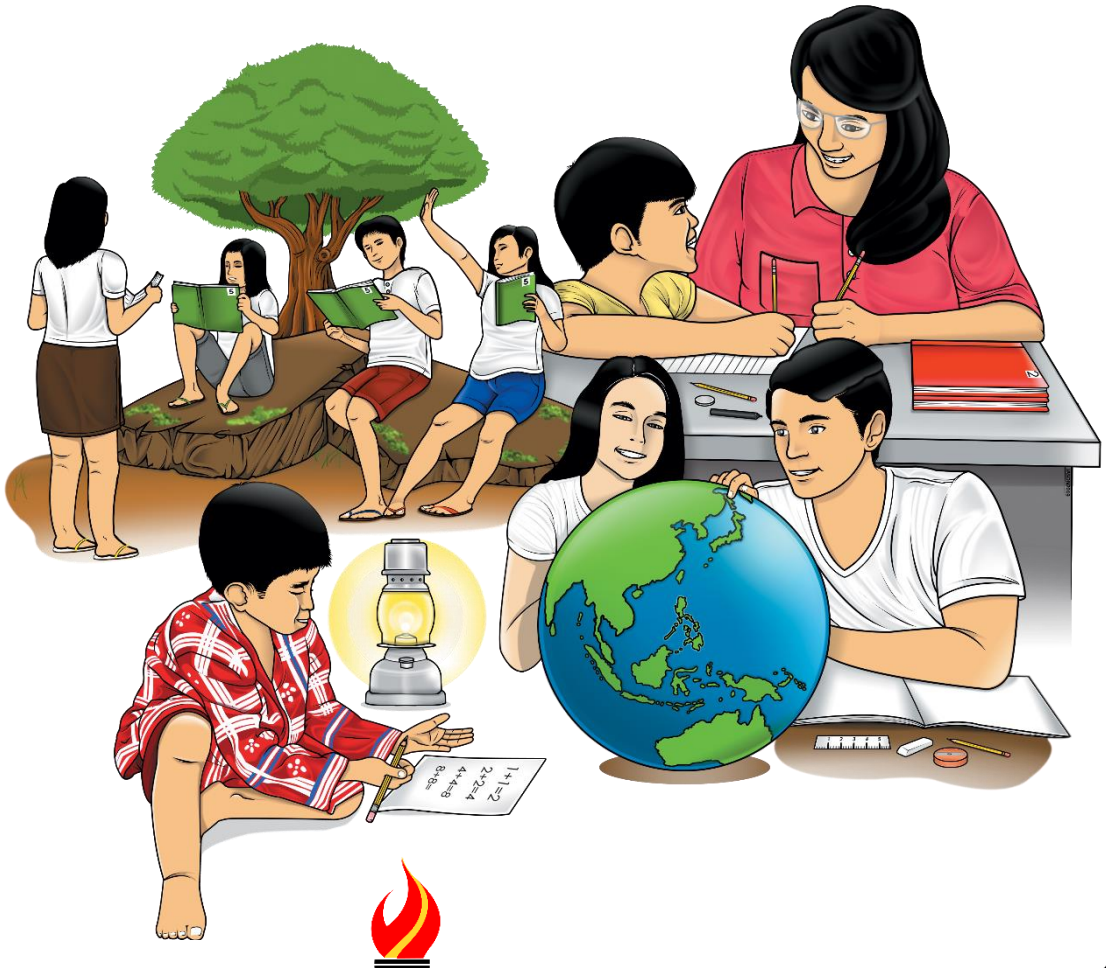
6

DepED
DEPARTMENT OF EDUCATION

Technology and Livelihood Education

Industrial Arts – Module 8:

Simple Electrical Gadgets



ALTERNATIVE DELIVERY MODE
ADM

TLE – Grade 6
Alternative Delivery Mode
Industrial Arts – Module 8: Simple 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 Artists: Jofel D. Nolasco, Ana Lee C. Bartolo, Celeste Faith R. Almanon

Management Team: Ramir B. Uytico, Pedro T. Escobarte, Jr.
Neri Anne M. Alibuyog, Bernie L. Libo-on
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, Philippines, 5000
Telefax: (033) 336-2816, (033) 509-7653
E-mail Address: deped6@deped.gov.ph

6

Technology and Livelihood Education

Industrial Arts – Module 8:

Simple 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 Industrial Arts. 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

At your age, it is necessary that you can identify different tools and materials in working simple electrical gadgets. In many different situations, you may be using these tools and materials to construct electrical gadgets. You will be learning them all in this lesson.

This module focuses on the following topics:

a. Basic Materials and Tools needed in Making Simple Electrical Gadgets;
b. Simple Electrical Gadgets and Their Uses;
c. Safety and Health Habits in Making Simple Electrical Gadgets; and
d. How to make Extension Cord.

After going through this module, you are expected to:

a. Construct simple electrical gadget (TLE6IA-0f-8);
b. Identify the materials and tools needed in working simple electrical gadgets;
c. Identify simple electrical gadgets and their usage; and
d. Observe safety and health habits in making simple electrical gadgets.

What I Know

Find out how much you already know by answering the following questions.

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

1. If you have something to bend or cut like wires, what specific tool do you need?
   A. hammer
   B. pliers
   C. screwdriver
   D. wire stripper

2. What is the main function of electric drill?
   A. to drive or pull nails out
   B. to bore holes
   C. to cut or bend tiny wires
   D. to remove insulation from wires

3. If you saw an open wire, what should you use to wrap it so that it cannot cause injury?
   A. plastic wrapper
   B. electrical tape
   C. rubber band
   D. card board

4. What do you call a special tool that is used to strip or remove insulation from wires?
   A. hammer
   B. pliers
   C. screw drivers
   D. wire stripper

5. This gadget is used by other people to connect other devices that need electric supply which cannot be accommodated by a wall outlet?
   A. lampshade
   B. USB hub
   C. electrical wires
   D. extension cord

6. Which of the following does not belong to the group?
   A. close wrench
   B. female plug
   C. male plug
   D. cable and wire

7. It is a device used to check if there is a flow of current in electrical wires or cables.
   A. electrical tester
   B. volt meter
   C. screw driver
   D. thermometer

8. What tool and material do you need if you want to tap connection of wire especially on electrical board?
   A. screw driver and screw
   B. plier and wire
   C. hammer and nail
   D. soldering gun and lead

9. It is used to wrap two metals to avoid contact and to stop the flow of current.
   A. conductor
   B. insulator
   C. plastic
   D. tube

10. Electrical devices and connections may cause fire because of the following reasons EXCEPT.
   A. overloading
   B. follow load limit
   C. short circuit
   D. faulty electrical wire

Lesson 1 Simple Electrical Gadgets

You may have seen a carpenter or an electrician in your school. Have you observed what they are doing every day? Most of the time they construct or repair something to be of use in school. In doing their daily task it is obvious that they are using tools. Tools that are appropriate and proper for their safety.

In this module you will discover that there are proper tools to be used in making simple gadgets, with the different safety and healthy habits to be observed.

What's In

Directions: Write **TRUE** if the statement is correct and **FALSE** if not. Write your answer on a separate sheet of paper.

_____ 1. In every project, planning is very important.
_____ 2. Technology plays important role in creating new project.
_____ 3. Simple electrical gadget needs simple tools.
_____ 4. Safety measures are only for the user and not for everybody.
_____ 5. Making or repairing simple electrical gadgets costs higher than to buy a new one.
_____ 6. Construction of simple electrical gadgets can be a source of family income.
_____ 7. There is no need to wear personal protective equipment in making simple gadgets only.
_____ 8. Any tools can be used in any projects.
_____ 9. Tools that are in good conditions are harmful since most of it are pointed and very sharp.
_____10. Proper tools are the tools that have no defect.

Notes to the Teacher

Please help the learner to better understand the terms being introduced. Lesson is easy to understand when they can comprehend these words.

The words below are defined according to their function in this module. Take time to familiarize them, it will help you on your journey in this module.

New Words to Learn

1. **Electrical** – materials related to electricity or produce electricity.
2. **Gadgets** – a small device with a practical use, can be electrical or electronic device.
3. **Resistance** – to go against the flow of electricity in a circuit.
4. **Voltage** – potential electric power measured in volts.
5. **Insulation** – to separate two conducting bodies by means of non-conductor or insulator.
6. **Stripping** – to remove covering of electrical wire.
7. **Overload** – excess load resulting to overburden.
8. **Combustible** – something that is flammable, easily catch by fire.
9. **Female electric plug** – plug that contains hole where the male plug is inserted.
10. **Pound** – to strike repeatedly, as in hammer striking the nails.

What's New

Nowadays, households in our community are equipped with appliances and gadgets powered by electricity. There are instances that we will have to repair, improve, or install equipment and electrical lines in our home.

As a learner in Grade Six, do you:

1. know the basic tools and equipment in making simple electrical gadgets?
2. know the uses of basic tools and equipment?
3. repair some common gadgets like extension cords, doorbells, plugs, and simple lampshades? or
4. make your own simple electrical gadgets?

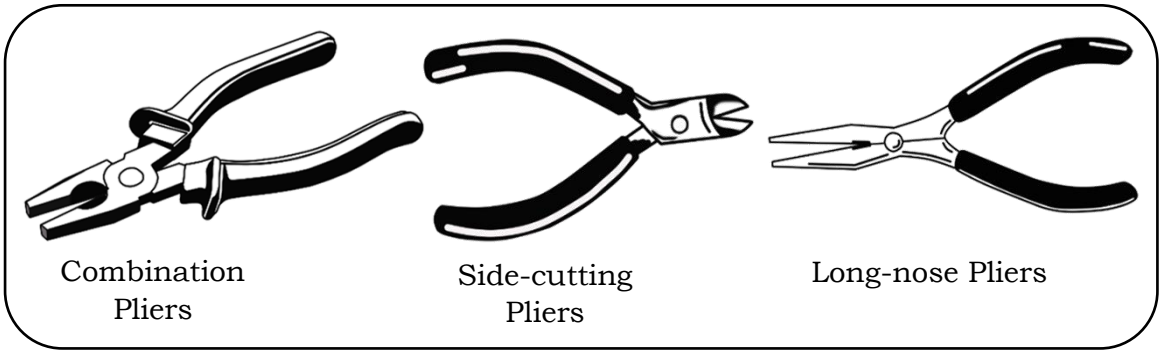
What is It

Basic Materials and Tools needed in Making Simple Electrical Gadgets

Tools play important roles. Without tools, work cannot be done. Every year, basic tools undergone improvement because of technology. But proper knowledge on the use of appropriate tools, encourage a person to work with eagerness and achieve desired output.

Here are some of the basic tools and their uses in making simple electrical gadgets.

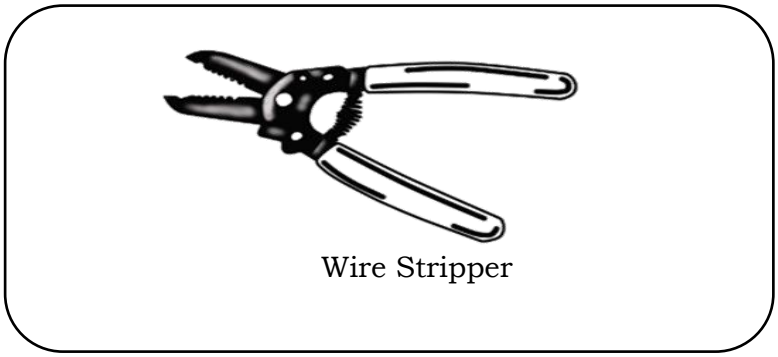
1. Pliers



Combination Pliers | Side-cutting Pliers | Long-nose Pliers

There are various types of pliers. The most common are long-nose pliers, side-cutting pliers, and combination pliers. Major functions of these pliers are to cut, hold, bend, and twist tiny object and wires.

2. Wire stripper

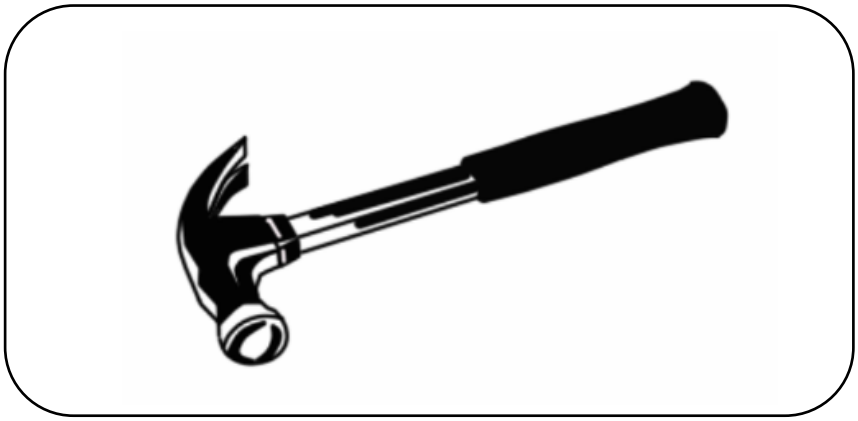


Wire Stripper

The function of this tool is to remove insulation from the wire to make connection.

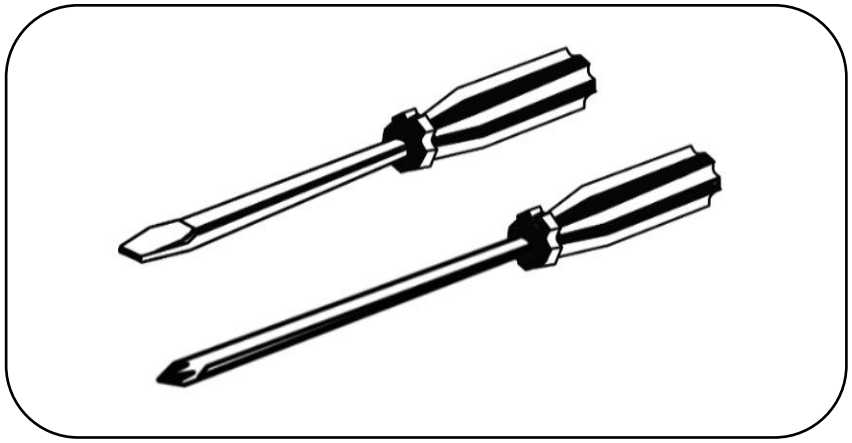
All Illustrations on this page were made by Jofel D. Nolasco

3. Hammer



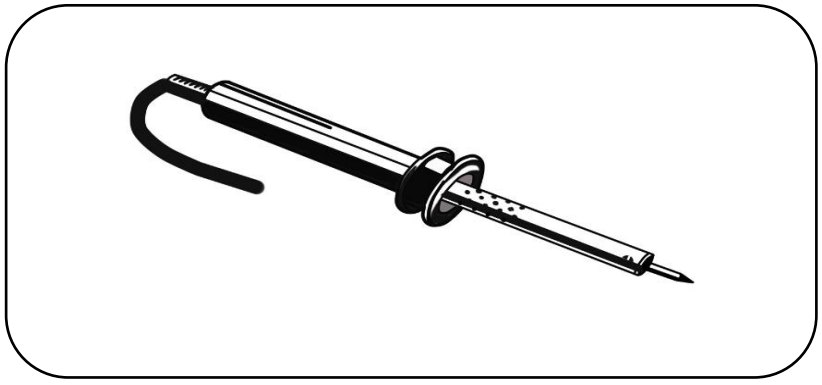
This is used to pound, to punch, to pull and to drive out nails and staple wires.

4. Screwdrivers



These tools come with different heads. The most common are flathead and Phillips head screw drivers. They are used to loosen and tighten screws.

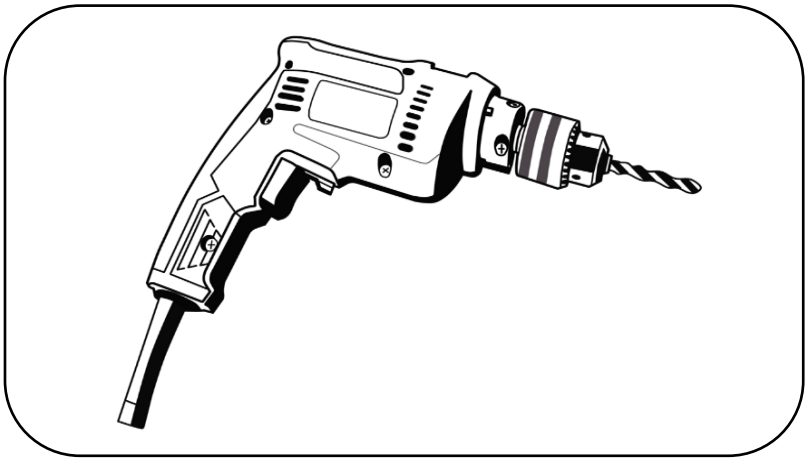
5. Soldering tools



This tool is used to tap connection of wire which cannot be done by pliers especially on boards of electronic device or gadget. Example of these tools are soldering iron and soldering gun, usually accompanied with soldering lead for tapping connections.

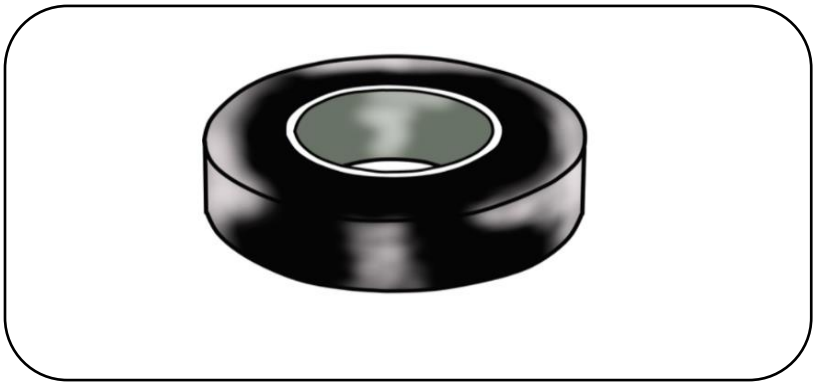
All Illustrations on this page were made by Jofel D. Nolasco

6. Electric drill



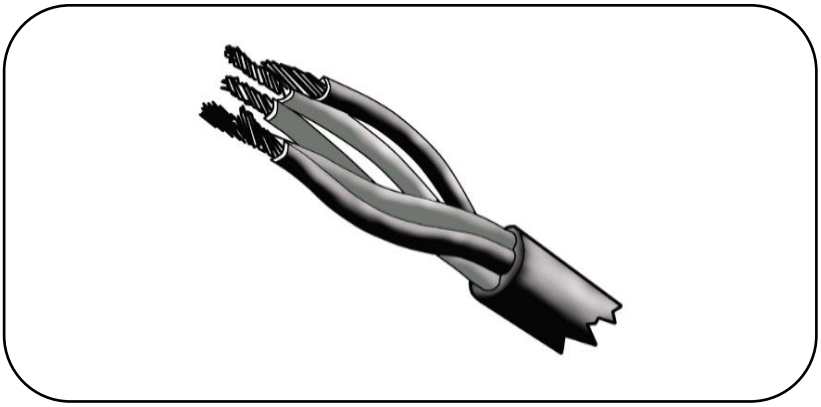
This is used to bore holes on concrete surfaces or metal surfaces. It is equipped with different types of blades or drill bit for concrete, wood, and metal surfaces.

7. Electrical tape



This is used to wrap open wires to avoid contacts with another wires. Main purpose of electrical tape is for insulation of connected open wire.

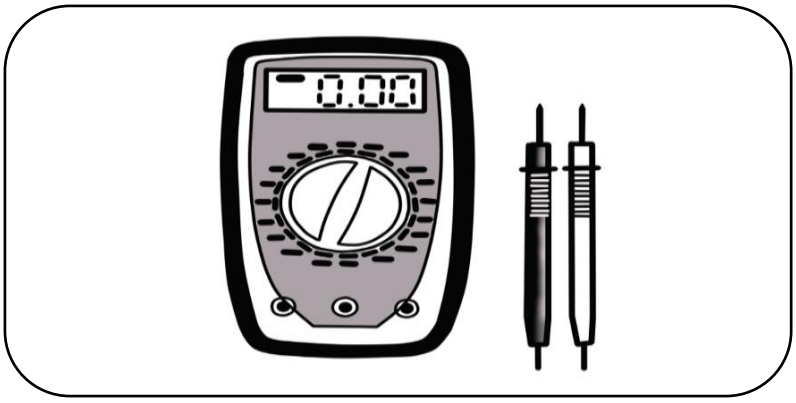
8. Cables and wires



This comes with different gauge or sizes. They are important in making electrical connections.

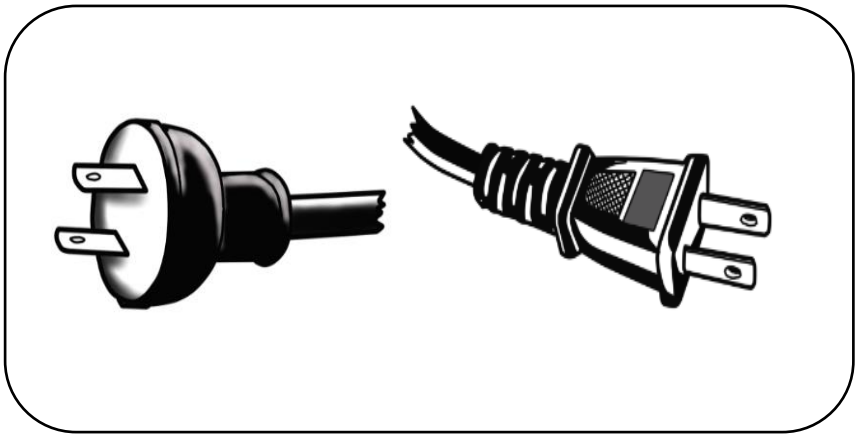
All Illustrations on this page were made by Jofel D. Nolasco

9. Tester



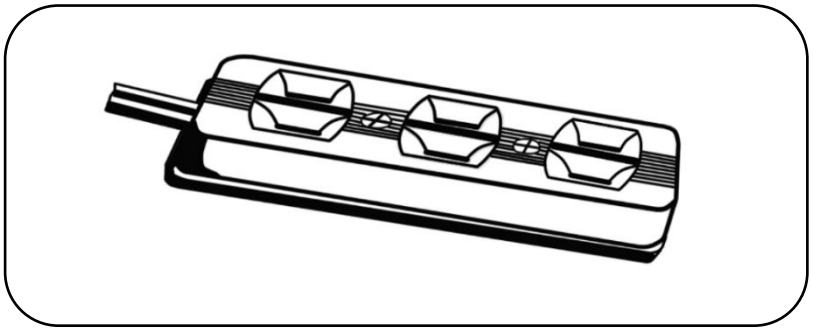
Tester is used to check the continuity of electrical flow. Testing is done before working to avoid the risk of electrical shock, while testing after work ensure that electricity flows properly on the gadgets made. This is also used to measure voltage of electric current.

10. Male plug



This is attached to one end of a gadget and used to insert to a female electrical socket to secure electrical connection.

11. Female outlet



This material is usually attached to the wall of houses with ready electric supply, from which a male plug is inserted to obtain electric supply. Sometimes it is found on the other end of improvised extension cord while male plug on the other end.

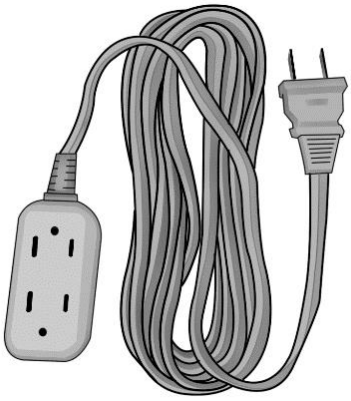
All Illustrations on this page were made by Jofel D. Nolasco

Simple Electrical Gadgets and Their Uses

Simple electrical gadgets are very useful especially at home. If you are looking for information and details on how to construct them, the best resources are books, magazines and internet. But if you consider the help of skilled person or experts it would be much better.

Here are some of the electrical gadgets we usually use at home.

1. **Extension cord**



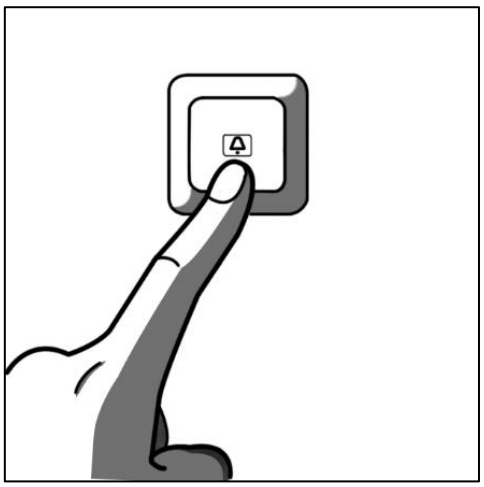
- It is made up of a male plug, female plug, and electrical wire.
- The length of the cord is usually 6 meters using a standard gauge No. 16 stranded electrical wire. Some people construct extension cord with their desired length depending on their need.
- It is assembled with the male plug on one end of the cord and the female plug on the other end.
- It is used to accommodate extra electrical devices needing electric supply.

2. **Lampshade**

- It is a kind of fixture used to cover a light bulb with the purpose to control and shade the light emitted by the light. Dim light is the result
- Lampshade can usually be found in bedroom or living room

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

3. Door bell



- A device usually placed at the gate or door of the house. When turned on, it creates a ringing, ticking or other sound which signals that there is someone knocking.

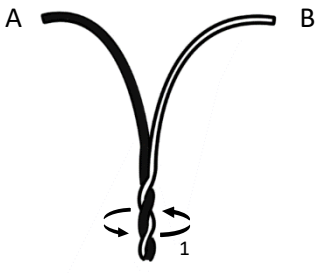
Here's How to Make Extension Cord

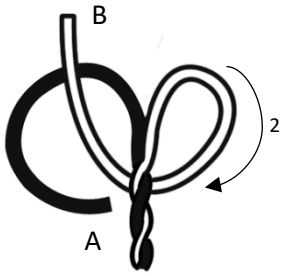
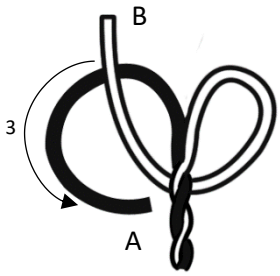
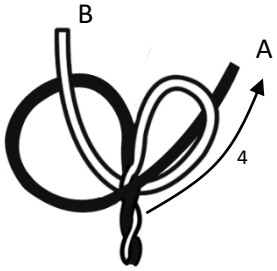
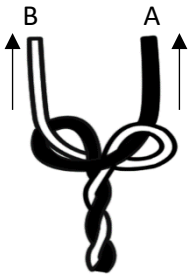
Materials:	**Tools:**
Male electric plug (round)	Screwdriver
Female electric plug	Cutter plier
Electrical cord/wire (5 meters)	Combination plier
	Wire stripper

Procedure:

1. Measure the wire 10cm from its end, then, separate it.
2. Strip the insulator cover or skin of each wire about 2cm from end.
3. Use a screwdriver to loosen the screw of the male plug to remove the cover.
4. Insert the cord into the hole of the plug then perform the **Underwriters knot** to serve as the lock of the wire to the hole, this is to protect the wire from loosening when the cord is accidentally pulled out.

Steps to perform Underwriters Knot:

1. Twist the wire A and B.	

2. Make a loop in wire B.	
3. Make a loop in wire A under wire B.	
4. Pass wire A through the wire B loop.	
5. Knot is complete.	

5. After the Underwriters knot, loosen the screw on the terminal point of the plug then twist the wire on the screw and lock the screw with screwdriver to secure connections.
6. Make sure that the wire is properly installed on the plug and no wire is exposed to each other to avoid short circuit.
7. Return the cover of the plug.
8. Repeat the same steps to secure connection of the cord to the female electrical plug.

After completing the process, you now have constructed a simple electrical gadget named extension cord.

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

Safety and Healthy Habits in Making Simple Electrical Gadgets

In this part of the lesson we will give you some reminders to avoid risk of electrical related accident. As they say "Prevention is better than cure". Working with electrical project is exciting and fun. But health and safety must also be given emphasis.

Here are some of the safe and healthy habits you should always remember:

1. Always wear personal protective equipment.
2. When handling electrical connection, wire and switches, make sure your hands are dry.
3. Concentrate on what you are working. Keep your focus to avoid accident.
4. When a gadget or device is new to you, do not attempt to operate or repair. Ask for assistance of an expert.
5. Avoid short circuit. It can cause fire. So do not overload electric supply.
6. Combustible materials should be kept away from electrical gadgets that emit heat, electrical wiring or connections.
7. Do not attempt to insert, metal, or wire into electric outlet with power supply on.
8. Keep the floor and all materials dry when working.
9. All accidents like faulty wirings, open wire, broken bulbs and others must be reported immediately to proper authorities.
10. Keep maintenance and regular checklist of all electrical gadgets.

Keep these reminders in mind because safety should always be your priority.

What's More

Activity 1: Evaluate Yourself

Learning the Skill: Evaluating oneself

Below are the good working practices you may consider when doing a project. Copy the table below on a separate sheet of paper. Please be honest with your answer.

Directions: Put a check (√) in the column appropriate to you. Write your answer on a separate sheet of paper.

Practices	Yes	No	Reason
I prepare all the materials needed before starting any project.			
I read books and magazines or surf the internet on various crafts in order to enrich my knowledge.			
I am convinced that one's artistic talents are venues for generating income.			
I try my best to maximize the use of the materials I buy.			
I always leave my workplace clean and tidy.			
I start and finish a project without asking extra help from other people.			
I follow health and safety habits while doing my project			
I am open to suggestions and criticisms for the purpose of improving my work.			
I try to make useful objects out of materials that are considered trash.			
I consider artistic activities as a challenge to my talents and capabilities.			
Total			

Reflection:

Score	**Working Practices**	**Description**
8 – 10	Excellent	Congratulations! You possess the qualities needed in project making.
5 – 7	Good	You possess certain working practice in project-making but need little improvement.
4 below	Fair	You need to learn the good working practices needed in project-making for improvement.

Now, look at your NO answers. Examine each of the statement, and opposite each NO answer, write your reason why you answered NO.

Activity 2: Classify Objects

Learning the Skill: Classifying Objects According to Groups

Directions: Classify the following terms below as to group of tools and materials. Write your answer in a separate sheet of pad paper.

TOOLS	**MATERIALS**

Electrical tape
Pliers
Wire stripper
Hammer
Screwdrivers
Electrical cord
Soldering tools
Male electrical plug
Female Electrical plug
Electric drill
Tester

Activity 3: Write It

Learning the Skill: Writing Reflection

Directions: Read and understand each question. Make a reflection out of it.

1. What is the importance of using proper tools in working for your electrical gadgets?

2. Why skill is important in making electrical gadgets?

3. How can a skill in constructing simple electrical gadget promotes livelihood to oneself, family, and community?

What I Have Learned

A. **Directions:** Complete the sentences by filling in the blanks with the correct word or phrase. Choose your answer from the box. Write it on a separate sheet of paper.

dry	doorbell	extension cord	additional income
functions	checked	flat head and Phillip	
emits heat	health and safety	underwriter's knot	

1. The tools and materials in making simple electrical gadgets must be identified to better understand their _____.

2. Always remember to observe _____ habits in making electrical gadgets.

3. Skill in making electrical gadgets can be good source of _____ for the family.

4. Simple electrical gadgets and electrical lines at home should be _____ regularly for improvement or repair.

5. Floor, tools and other materials should be _____ when working.

6. _____ to serve as the lock of the wire to the hole and protect it from loosening when the cord is accidentally pulled out.

7. _____ is used to accommodate extra electrical devices needing electric supply.

8. The most common are _____ screw drivers.

9. Combustible materials should be kept away from electrical gadgets that _____.

10. _____ is a device that usually placed at the gate or door of some houses.

What I Can Do

Directions: Complete the table of materials needed in making a 3-meter extension cord below. You can ask assistance from your parents for the price of each item. Write your answer on a separate sheet of paper.

Item No.		Item Description	Unit	Quantity	Unit Cost	Cost
1		Male plug (round or flat)				
2		2 gang female plug				
3		#14 stranded wire				
4		$\frac{3}{8}$ x $\frac{1}{2}$ wood screw				

A. Make a diagram of the extension cord based on the materials stated above. Draw it on a separate sheet of paper.

Assessment

Directions: Read each question carefully, then, write the letter of the correct answer on a separate sheet of paper.

_____ 1. What tool is used to remove insulator from electrical wire?
A. Pliers
B. Wire stripper
C. Soldering tools
D. Electric drill

_____ 2. Which of the following does not belong to a simple electrical gadget?
A. extension cord
B. plugs
C. lampshade
D. Electric fan

_____ 3. What is the fastest and easiest way to look for information and details on how to construct gadgets?
A. neighbors
B. internet
C. books
D. electrician

_____ 4. In making electrical gadgets, it is not only on how to finish the project, but it is also about your _____.
A. health and safety
B. money
C. tools needed
D. time and effort

_____ 5. What is the usage of a plier?
A. bend a wire
B. cut a wire
C. hold a wire
D. all answers are correct

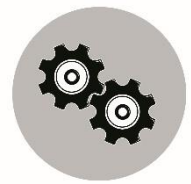
_____ 6. What is the first thing to do before making a project?
A. list all tools needed
B. make a plan
C. list the price of materials
D. make a diagram

_____ 7. What is the result if all family members know how to construct electrical gadgets?
A. an additional work for the family
B. an extra income for the family
C. a hobby for the family
D. no correct answer

_____ 8. Which of the tools listed below is used to tap connection of wire?
A. Screw drivers
B. Wire stripper
C. Soldering tools
D. Electric drill

_____ 9. Who is the best person to call in case you have a new gadget or device that need repair or maintenance?
A. Police
B. Fireman
C. Teacher
D. Technician

_____ 10. Which of the following can be done by a grade six pupil like you?
A. replace a worn-out bulb
B. repair an electric iron
C. replace of electric board
D. repair of electric fan



Additional Activities

After you complete your task in *"What I Can Do"*, you are now ready to construct your own extension cord. Remember your lesson about "how to construct a project". That will be your guide in making this output. Bring in the class your constructed extension cords together with the project.

Answer Key

What I Know

1. B
2. B
3. B
4. D
5. D
6. A
7. A
8. D
9. B
10. B

What's More

Activities 1 & 3

Note: answer may vary depending on the personal experience of the pupils.

The teacher is encouraged to facilitate the checking

Activity 2:

Tools	Materials
pliers wire stripper hammer screw driver soldering iron electric drill tester	Electrical tape Electrical cord Male electrical plug Female electrical plug

What I Have Learned

1. functions
2. health and safety
3. additional income
4. checked
5. dry
6. underwriter's knot
7. extension cord
8. flat head and phillip's
9. emits heat
10. door bell

Assessment

1. B
2. D
3. B
4. A
5. D
6. B
7. B
8. C
9. D
10. A

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/14659

https://lrmds.deped.gov.ph/pdf-view/6918

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

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