

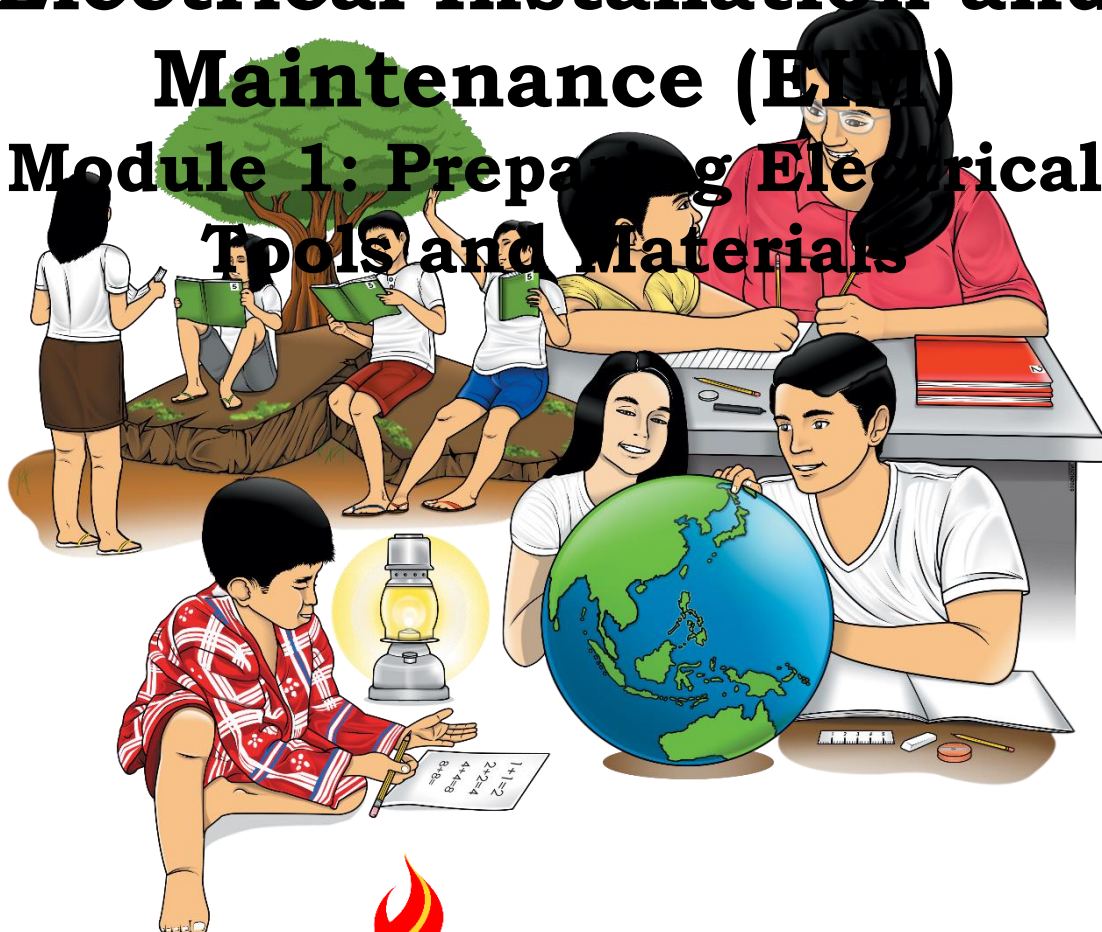
# Technology and Livelihood Education

Exploratory Course

## Electrical Installation and

## Maintenance (EIM)

### Module 1: Preparing Electrical Tools and Materials



**TLE – EIM Grade 7/8**  
**Alternative Delivery Mode (ADM)**  
**Module 1: Preparing Electrical Tools and Materials**  
**First Edition, 2020**

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**7/8**

**Technology and  
Livelihood Education**

**Exploratory Course**

**Electrical Installation and  
Maintenance (EIM)**

**Module 1: Preparing Electrical  
Tools and Materials**

## **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.

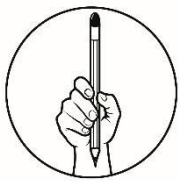


## ***What I Need to Know***

This module was designed and written with you in mind. It is here to help you master the topic of preparation of electrical materials in electricity. 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.

- **Learning Objective- 1** – Prepare electrical materials and tools for the task **(TLE\_IAEI7/8UT-0a-1)**

After going through of this module, you are expected to prepare a list of electrical tools and materials for a specific job.



## ***What I Know***

### **Pre-test**

#### **Directions:**

Choose the letter of the correct answer. Write it in your activity sheet.

1. Which of these is designed to protect electrical circuit devices from damage caused by overload or short circuit and its basic function is to interrupt the flow of current when fault is detected?
  - A. Circuit breaker
  - B. Cut off switch
  - C. Fuse
  - D. Safety switch
2. Which device provides protection against overload and short circuits?
  - A. Circuit breaker
  - B. Cut off switch
  - C. Safety switch
  - D. Single switch
3. Which tool is used to tighten and loosen screws with cross slot heads?
  - A. Drill bit
  - B. Flat screw driver
  - C. Philip screw driver
  - D. Socket wrench

4. Which electrical material allows the current to flow through the circuit?
  - A. Control wire
  - B. Electrical wire
  - C. Fiber optic cable
  - D. Telephone wire
  
5. Which of these is made of metal and plastic box in an octagonal form used in wiring installation?
  - A. Conduit box
  - B. Junction box
  - C. Square box
  - D. Utility box
  
6. Which of these is a wireless device or equipment designed to tighten and loosen bolts screws in electrical works?
  - A. Auger machine
  - B. Battery drill
  - C. Electric drill
  - D. Jack hammer
  
7. Which is a receptacle designed in a surface and flush wall mounted connection to lamps, electrical appliances and other purposes?
  - A. Convenience outlet
  - B. Cooking range outlet
  - C. 3-way switch
  - D. Telephone outlet
  
8. Which is made from metal with insulated handle used for cutting, twisting, bending, holding and pressing wires and cables?
  - A. Pliers
  - B. Screw tester
  - C. Test light
  - D. Wire stripper
  
9. Which type of tool with indicator light is used to determine the live part of a circuit?
  - A. Analog tester
  - B. Megger tester
  - C. Multi tester
  - D. Screw tester
  
10. Which simple tool is used to drive bolts and screws with hexagonal sockets in their heads?
  - A. Allen wrench
  - B. Pipe wrench
  - C. Socket wrench
  - D. Torque wrench

11. Which device with pointed metal tip is used to melt soldering led in order to connect wires in a particular electrical circuit?
  - A. Heat gun
  - B. Glue gun
  - C. Soldering iron
  - D. Soldering rod
  
12. Which tool is used for bending metal conduit from 45-90 degrees depending upon the desired shape?
  - A. Heat gun
  - B. Hickey
  - C. Spring bender
  - D. Soldering gun
  
13. Which of these are metal and plastic pipe fittings designed to hold and protect electrical cables and wires?
  - A. Electrical pipe fittings
  - B. Nail clamps
  - C. Split knob
  - D. Staple wire
  
14. Which tool is used to measure the length and width of an object and commonly used by carpenters?
  - A. Caliper
  - B. Plumb bob
  - C. Pull push rule
  - D.T-square
  
15. Which machine or equipment is used for boring holes?
  - A. Auger machine
  - B. Battery drill
  - C. Electric drill
  - D. Power machine

# Lesson 1

# Preparing Electrical Tools and Materials

Electrical tools and materials are essential elements in the preparation for a specific electrical job. Using appropriate materials and tools will help you perform the different tasks easily and efficiently.



## *What's In*

### **Activity 1.**

#### **Directions:**

Identify the different electrical tools and materials. Write your answer in your activity notebook.

1.



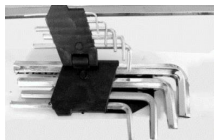
2.



3.



4.



5.



6.



7.



8.



*Source: Original Photos by Samuel Aplan*



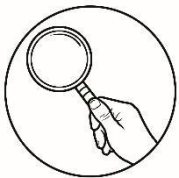


## ***What's New***

### **Directions:**

Arrange the jumbled letters to form the name of electrical tools and materials in your activity sheet.

1. CWRES RIDEVR
2. ULMIT TSERTE
3. LEECRILAC ATEP
4. OLNG SENO LPSIER
5. EMTLA LAMPC



## ***What is It***

### **Unlocking of Technical Terms**

**Conductor** - a wire or a cord which provides path for current flow.

**Hot wire** - a wire through which current flows.

**RSC**—means Rigid Steel Conduit.

**Single Pole Switch**- a simple on/off switch that connects and disconnects two terminal to control the flow of current in a circuit.

**PVC Connectors**- a type of electrical fittings used to hold and connect conduit in a box.

**Incandescent bulb**- an electric light with a wire filament heated until it glows.

**Heat gun**- a power tool used in bending PVC conduit that blows hot air.

**Lamp holder**- a type of device used for holding compatible light bulb.

**Metallic Conduits-** metal raceways classified into four; rigid steel conduit (RSC), intermediate metallic conduit or tubing (IMC or IMT), electrical metallic conduit or tubing (EMC or EMT) and the flexible metallic conduit (FMC)

**PVC-** means Polyvinyl Chloride

**Electrical tools-** handheld devices that support in achieving a task. It is designed to aid and protect the worker against electric shock while allowing him/her to work swiftly and comfortably.

**Electrical materials-** used to grasp and anchor electrical conduits to keep strong and stable position. Electrical fittings are most likely used to attach metallic and non-metallic conduit respectively.

Tools and materials are very essential to aid in any electrical operation which everyone should have sufficient knowledge and manipulative skills in proper handling of tools, electrical instruments, materials and devices in accordance to the job requirements.

### Common types of electrical tools and materials

1. **Pliers** - made from metal with insulated handle used for cutting, twisting, bending, holding and pressing wires and cables.



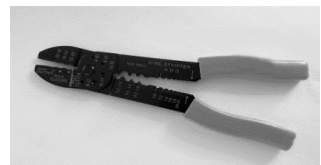
2. **Electrical Screw Drivers** –common tools used to drive (tight and loose) screws.



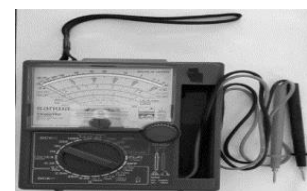
3. **Portable Electric drills** - machines or equipment used for boring holes.



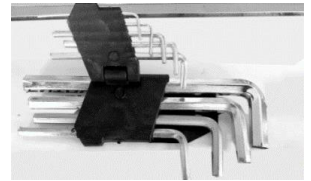
4. **Wire stripper** - a very convenient tool used to strip off wire insulator.



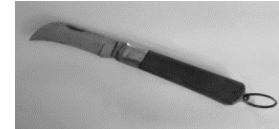
5. **Multi-tester** – a device used to measure volts, current and resistance and other parameters of electrical circuits.



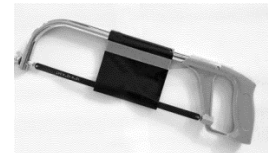
6. **Allen wrench/key** – simple tool used to drive bolts and screws with hexagonal sockets in their heads



7. **Electrical Knife** – essential tool in carrying abrupt stripping and cutting depending on the type of wire.



8. **Hack saw** - a saw with a narrow fine-toothed blade set in a frame, used especially for cutting metal.



9. **Pull Push Rule** – used to measure the length and width of an object and commonly used by carpenters.



10. **Claw Hammer** – used for driving and pulling out nails.



11. **Hickey** – a device used for bending metal conduits from 45-90 degrees depending upon your desired shape and angle.



12. **Battery Drill** – a wireless device or equipment designed to tighten and loosen bolts screws pertaining to electrical works.



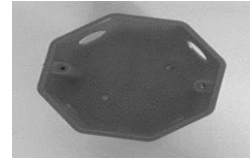
13. **Soldering Iron** - a device made of heated metal tip to melt soldering lead to connect wires in particular electrical circuits.



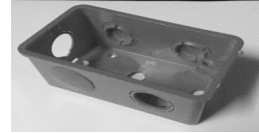
14. **Clamp-on ammeter** – an electrical instrument or device used to measure volts, current and resistance, it is intended and designed for specific purpose and measurement.



15. **Junction box** – made of metal and plastic box in octagonal form. It is a protective box where wires are interconnected. .



16. **Utility box** – made of metal and plastic box intended for light switches and multi convenience outlets.



17. **Electrical wire** - allows the current to flow through the wire to complete the circuits.



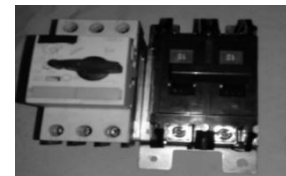
18. **Electrical tape** – an adhesive material which is commonly used in electrical installation for wrapping uninsulated or stripped wire.



19. **Screw Tester** – a tool with indicator light used for measuring the live part of a circuit.



20. **Circuit Breaker** - designed to protect electrical circuit devices from damage caused by overload or short circuit. Its basic function is to interrupt the flow of current when fault is detected.



21. **Safety Switch** – a fusible device to provide protection against overload and short circuits.

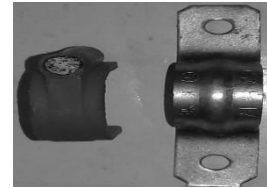


22. **Convenience Outlet** – a receptacle is designed in a surface wall mounted and flush wall mounted connection to lamps, electrical appliances and other purposes.



23. **PVC conduit** - a most common electrical conduit which resists moisture and corrosion but the tubing is non-conductive.

24. **Electrical Conduit Fittings** - metal, plastic or fiber pipes clamp designed to hold and protect electrical conduits conduit cables and wires.



25. **RSC Conduit** - a conduit made from galvanized steel tubing intended to protect and provide the route of electrical wiring. It is commonly used in industrial and commercial building.



### STEPS IN FILLING OUT THE REQUISITION FORM

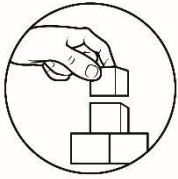
1. Fill in the needed information/data (ex. name, project, location, classification and purpose).
2. Write the quantity of the materials/tools requested.
3. Indicate the unit ex. piece/s, meter/s and etc.
4. Write the description/specifications of the unit.
5. Indicate the unit price.
6. In getting the total cost, multiply the unit cost and quantity.
7. Write your name and affix your signature.

### SAMPLE REQUEST SLIP FORM

Name: Juan dela Cruz  
 Project: Fluorescent lamp replacement  
 Location: EIM Laboratory  
 Classification: Electrical Installation and Maintenance  
 Purpose: Troubleshoot defective fluorescent lamp

NO.	QUANTITY	UNIT	DESCRIPTION	UNIT COST	TOTAL COST
1.	1	piece	Fluorescent tube	150.00	150.00
2.	1	piece	Ballast	100.00	100.00
3.	1	piece	Starter	15.00	15.00
4.	1	piece	Lamp holder	25.00	25.00
5.	2	meter	Duplex wire	25.00	50.00
6.	2	piece	Male plug	20.00	40.00
			<b>Total</b>		<b>380.00</b>

\_\_\_\_\_  
**Signature over printed name**



## ***What's More***

### **Activity 1**

**Directions:** Identify the tools and materials needed in troubleshooting defective fluorescent lamp as shown below. Copy the table and write your answer in your activity sheet.






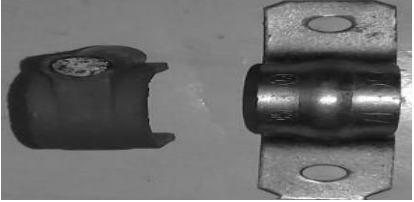

Tools	Materials
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
	6.

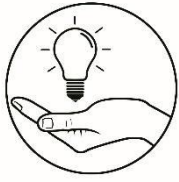
## Matching Type

### Activity 2

#### Directions:

Match the tools in column A with the illustrations in column B. Write the letter of the correct answer in your activity sheet.

COLUMN A	COLUMN B
1. allen key	A. 
2. circuit breaker	B. 
3. battery drill	C. 
4. electric drill	D. 
5. conduit fittings	E. 



## ***What I Have Learned***

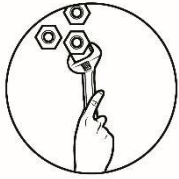
### **Fill in the Blanks**

**Directions:** Supply the correct electrical tools and materials needed in wiring installation. Write it in your activity notebook.

- \_\_\_\_\_ 1. designed to protect electrical circuit devices from damage caused by overload or short circuit. Its basic function is to interrupt the flow of current when fault is detected.
- \_\_\_\_\_ 2. Made from metal with insulated handle used for cutting, twisting, bending, holding and pressing wires and cables.
- \_\_\_\_\_ 3. Made of metal and plastic box in octagonal form. It is a protective box where wires are interconnected.
- \_\_\_\_\_ 4. A simple on/off switch that connects and disconnects two terminal to control the flow of current in a circuit.
- \_\_\_\_\_ 5. An adhesive material which is commonly used in electrical installation for wrapping uninsulated or stripped wire.
- \_\_\_\_\_ 6. It allows the current to flow through the wire to complete the circuits.
- \_\_\_\_\_ 7. It is an electric light with a wire filament heated until it glows.
- \_\_\_\_\_ 8. Most common electrical conduit which resists moisture and corrosion but the tubing is non-conductive.
- \_\_\_\_\_ 9. It is a power tool used in bending PVC conduit that blows hot air.
- \_\_\_\_\_ 10. A saw with a narrow fine-toothed blade set in a frame, used especially for cutting metal.
- \_\_\_\_\_ 11. A very convenient tool used to strip off wire insulator.
- \_\_\_\_\_ 12. A device used to measure volts, current and resistance and other parameters of electrical circuits.
- \_\_\_\_\_ 13. Used to measure the length and width of an object an commonly used by carpenters.
- \_\_\_\_\_ 14. Are metal, plastic or fiber pipes clamp designed to hold and protect electrical conduits, cables and wires.



- \_\_\_\_\_ 15. Common tools used to drive (tight and loose) screws.
- \_\_\_\_\_ 16. It is a type of device used for holding compatible light bulb.
- \_\_\_\_\_ 17. Made of metal and plastic box intended for light switches and multi convenience outlets.
- \_\_\_\_\_ 18. It is a type of electrical fittings used to hold and connect conduit in a box.

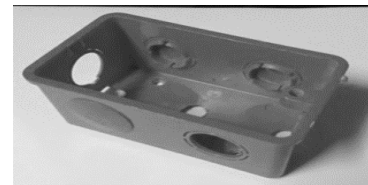
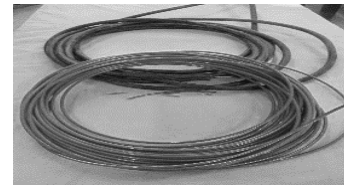


## ***What I Can Do***

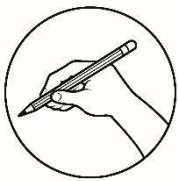
### **Activity 1**

#### **Directions:**

Identify the materials, tools and devices drawn below. Copy the table and write its name in your activity notebook.



Materials	Tools	Devices



## ***Assessment***

### **Post-test**

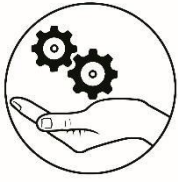
#### **Multiple Choice**

**Directions:** Choose the letter of the correct answer. Write it in your activity notebook.

1. Which of these are metal and plastic pipe fittings designed to hold and protect electrical cables and wires?
  - A. Electrical pipe fittings
  - B. Nail clamps
  - C. Split knob
  - D. Staple wire
  
2. Which tool is used to drive bolts and screws with hexagonal sockets in their heads?
  - A. Allen wrench
  - B. Pipe wrench
  - C. Socket wrench
  - D. Torque wrench
  
3. Which is designed to protect electrical circuit devices from damage caused by overload or short circuit. Its basic function is to interrupt the flow of current when fault is detected?
  - A. Circuit breaker
  - B. Cut off switch
  - C. Fuse
  - D. Safety switch

4. Which fusible device is used to provide protection against overload and short circuits?
  - A. Circuit breaker
  - B. Cut off fuse
  - C. Safety switch
  - D. Single switch
  
5. Which tool is used to tighten and loosen screws with cross slot heads?
  - A. Drill bit
  - B. Flat screw driver
  - C. Philip screw driver
  - D. Socket wrench
  
6. Which electrical material allows the current to flow through the circuit?
  - A. Control wire
  - B. Electrical wire
  - C. Fiber optic cable
  - D. Telephone wire
  
7. Which of these is made of metal and plastic box in an octagonal form used in wiring installation?
  - A. Conduit box
  - A. B Junction box
  - B. Square box
  - C. Utility box
  
8. Which of these is a wireless device or equipment designed to tighten and loosen bolts screws pertaining to electrical works?
  - A. Auger machine
  - B. Battery drill
  - C. Electric drill
  - D. Jack hammer
  
9. Which type of tool with indicator lamp used to determine the live part of a circuit?
  - A. Analog tester
  - B. Megger tester
  - C. Multi tester
  - D. Screw tester
  
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  - A. Caliper
  - B. Plumb bob
  - C. Pull push rule
  - D. T-square

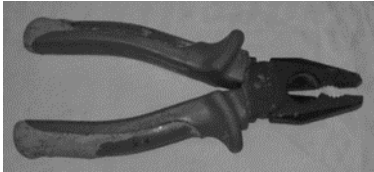

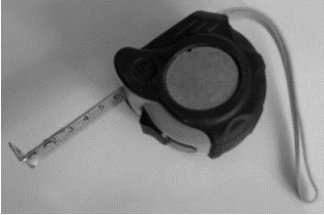
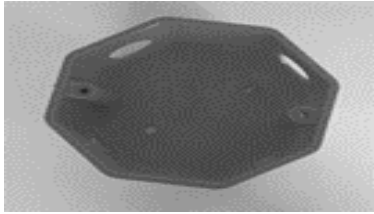
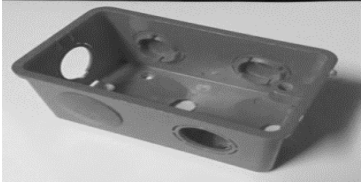
11. Which is a machine or equipment used for boring holes?
- A. Auger machine
  - B. Battery drill
  - C. Electric drill
  - D. power machine
12. Which is used by linemen to remove insulation of wire and cables in low and high voltage transmission lines?
- A. Combination plier
  - B. Long nose plier
  - C. Side cutter plier
  - D. Wire stripper
13. Which of these is a receptacle designed in a surface and flush wall mounted connection to lamps, electrical appliances and other purposes?
- A. Convenience outlet
  - B. Cooking range outlet
  - C. 3-way switch
  - D. telephone outlet
14. Which of these is a device with pointed metal tip used to melt soldering lead in order to connect wires in a particular electrical circuit?
- A. Heat gun
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  - B. Hickey
  - C. Spring bender
  - D. Soldering gun

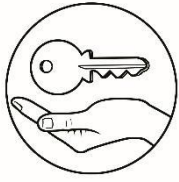


## ***Additional Activities***

### **Directions:**

Name the following materials and tools and their uses. Write your answer in your activity sheet.

<b>Images of materials/tools</b>	<b>Name of materials/tools</b>	<b>How is it used?</b>
1. 	a.	b.
2. 	a.	b.
3. 	a.	b.
4. 	a.	b.
5. 	a.	b.



# Answer Key

**What's New**

1. Screw driver
2. Multi-tester
3. Electrical tape
4. Long nose pliers

**What I Know**

A  
C  
C  
B  
A  
C  
A  
D  
A  
A  
A  
B  
B  
B  
C  
C  
A

**What's More**

Combination pliers  
Phillips screw driver  
Flat screw driver  
Analog Multimeter  
Soldering Iron

**Materials**

Fluorescent lamp  
Ballast  
Starter  
Lamp holder  
Duplex wire  
Male plug

**What I Have Learned**

Circuit breaker  
Combination plier  
Junction box  
Single pole switch  
Electrical tape  
Electrical wire  
Incandescent bulb  
PVC Conduit  
Heat gun  
Hack saw  
Wire stripper  
Multi tester  
Pull push rule  
Electrical conduit  
fittings  
Screw drivers  
Lamp holder  
Utility box  
Electrical conduit

**What's In**

Electrical Tape  
Soldering Iron  
Pliers  
Allen Wrench  
Electrical knife  
Hickey  
Screw Tester  
Utility box

**Assessment**

A  
A  
A  
B  
C  
B  
B  
B  
D  
B  
C  
A  
B  
C  
B  
C  
B

**Additional Activities**

Pliers - made from metal with insulated handle used for cutting, twisting, bending, holding and pressing wires and cables.  
Claw Hammer – used for driving and pulling out nails.  
Pull Push Rule – used to measure the length and width of an object and commonly used by carpenters.  
Junction box – made of metal and plastic box in octagonal form. It is a protective box where wires are interconnected.  
Utility box – made of metal and plastic box intended for light switches and multi convenience outlets

## **References**

## **References**

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