

**10**

# **TVL Industrial Arts:**

## **Electrical Installation and Maintenance (EIM) NCII**

**Quarter 2 – Module 7:**

**Basic Methods and  
Requirements for Installation:  
Wiring Installation of Flexible  
Metallic Conduit**

**(Week 7)**



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

In this module, you will be trained to install wiring devices using different types of conduit wiring according to pipe installation especially in Flexible Metallic Conduit. This includes the Philippine Electrical Code (PEC) provisions in installing EMT.

In this module, you are expected to:

1. understand the concept of wiring diagram using flexible metallic conduit;
2. draw electrical wiring diagram; and
3. install wiring devices using flexible metallic conduit.



## ***What I Know***

Name: \_\_\_\_\_ Grade and Section: \_\_\_\_\_ Quarter: \_\_\_\_  
Module Number: \_\_\_\_\_ Lesson Title: \_\_\_\_\_

**A. Multiple Choice.** Choose the letter of your answer and write it on a separate sheet of paper.

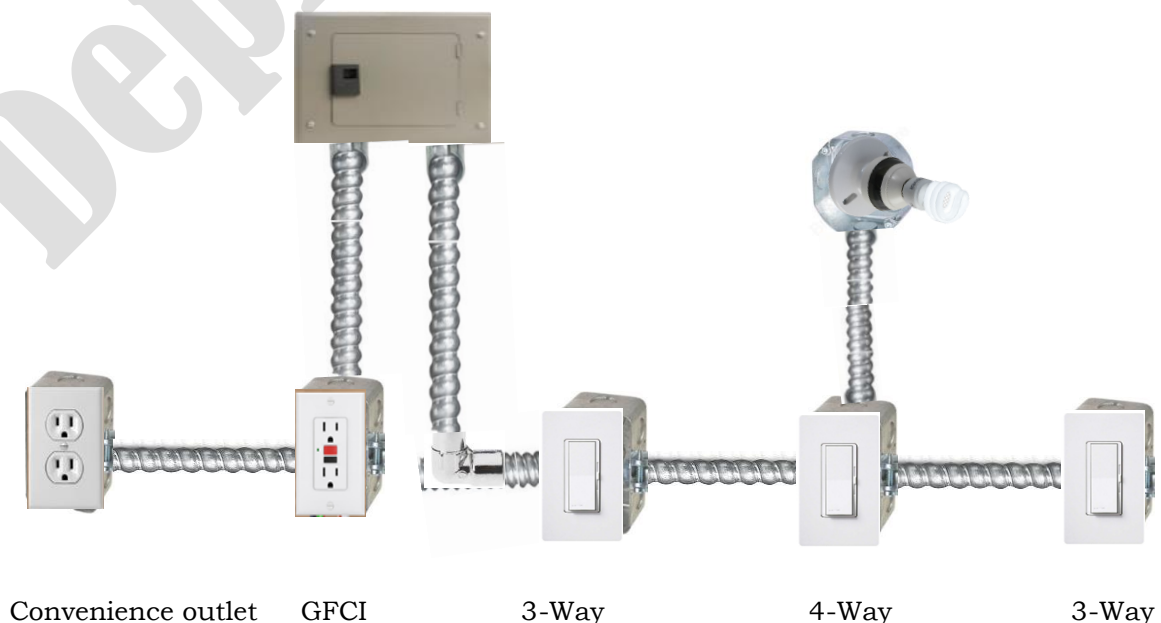
1. The minimum trade size of flexible metallic conduit  
A.  $\frac{1}{4}$                       B.  $\frac{1}{2}$                       C.  $\frac{1}{8}$                       D.  $\frac{3}{4}$
2. The maximum trade size of flexible metallic conduit  
A. 1                      B.  $1\frac{1}{8}$                       C.  $1\frac{1}{4}$                       D.  $1\frac{1}{2}$
3. It is the support used to hold the flexible metallic tubing.  
A. Metal strap    B. connector                      C. box                      D. fittings
4. It is the minimum length of conduit in a single roll.  
A. 30 feet                      B. 40 feet                      C. 50 feet                      D. 60 feet
5. It is the maximum number of conductors for a trade size no. 12 AWG. in a  $\frac{1}{2}$  inch diameter size conduit.  
A. 5                      B. 6                      C. 7                      D. 8
6. These are the locations where metallic conduits are permitted to use **EXCEPT** \_\_\_\_\_.  
A. in dry location                      C. not more than nominal 1000-V systems.  
B. in accessible location                      D. in wet location
7. It is the maximum length of conduit in a single roll.  
A. 100 feet                      B. 200 feet                      C. 300 feet                      D. 400 feet

8. It is the fitting used for joining flexible metal conduits.  
A. Metal strap B. connector C. box D. fittings
9. These are the locations where metallic conduits are not allowed to use **EXCEPT** \_\_\_\_\_.  
A. in wet location C. in storage battery room  
B. in hoistways D. in dry location
10. It is the maximum number of conductors for a trade size no. 8 AWG. in a 3/4-inch diameter size conduit.  
A. 8 B. 9 C. 10 D. 11
11. It consist of flexible steel tube which is made from convex to concave metal strip in a winding with the length from 50 to 200 feet.  
A. Electrical metallic conduit C. Polyvinyl Chloride (PVC) conduit  
B. Flexible metallic conduit D. Flexible Non-Metallic Conduit
12. How many maximum number of conductors in a 1 inch trade size conduit using number 6 AWG conductor?  
A. 9 B. 10 C. 11 D. 12
13. The appropriate tool to use in cutting flexible metallic conduit or armored cable?  
A. Back saw B. Hacksaw C. Knife D. Pliers
14. It is a type of fitting which is used to change direction.  
A. Adaptor B. Connector C. Coupling D. Elbow
15. A process of removing sharp edges or burrs left after cutting a pipe.  
A. Finishing B. Reaming C. Shaping D. Smoothing



### What's New

Describe what type of metal conduit used in the given illustration.



Flexible metallic conduit is a kind of wiring installation which is commonly used for external motor terminal connection. It is being manufactured in rolls in the form of a coil. This type of wiring method should not be allowed under the following conditions:

- In wet location
- In hoist way
- In storage battery room
- In hazardous location
- When exposed to oil, gasoline or materials which affects rubber



### ***What is It***

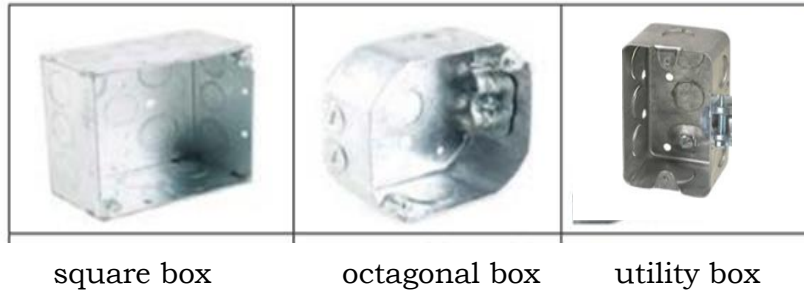
A flexible conduit consists of a flexible steel tube which is made from convex to concave metal strip in a spiral winding with length from 50 to 200 feet. Flexible metallic conduit should be supported with 136cm or closer. Every turn should be done carefully to avoid deformity. Straps or clamps can be used to secure the conduit.

Flexible metallic conduit (FMC) is used in a connection where the load being supplied has no definite place and where flexibility is desired. It has also a spiral construction that allows the conduit to bend easily, simplifying installation. Some common equipment is the portable motor, drill press lathe machine, etc. The minimum size of this type of conduit ranges from ½ to 1 ½ inches electrical trade size.

**Maximum number of conductors in a trade size conduit**

Trade size of conduit	Size in AWG	No. of Conductors
3/8	16	8
1/2	12	8
3/4	8	10
1	6	12
1 ½	2	12

**Electrical boxes-** boxes such as utility, square and octagonal are used for the installation of electrical wiring fixtures such as switches, receptacles, and for making electrical termination.



<https://hztimes.en.made-in-china.com/product/hvGnWacJITVH/China-1-1-8-Deep-4-Octagonal-EMT-Conduit-Boxes.html>

### Flexible metallic tubing fittings



<https://www.homedepot.com/p/Halex-2-in-Flexible-Metal-Conduit-FMC-Squeeze-Connector-04220/100135616>

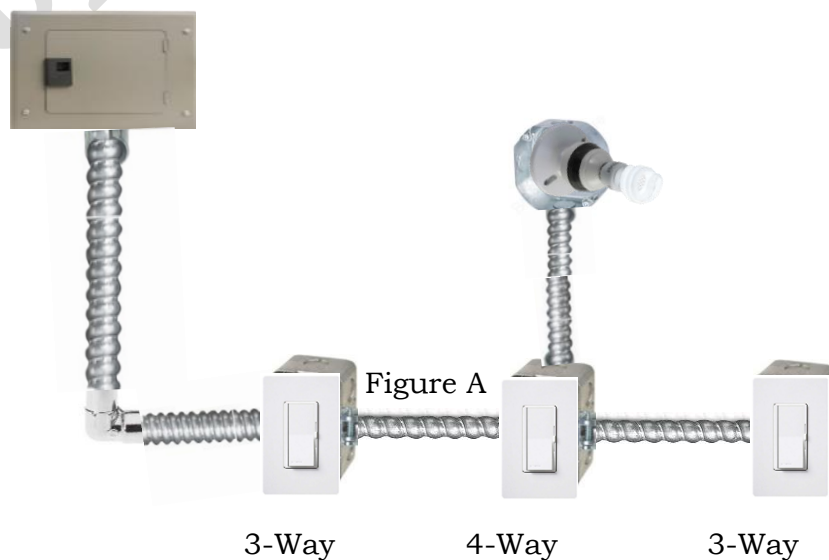


### What's More

**Instructions:** Given the illustration of a pictorial diagram of “a bulb controlled by four-way switching circuit” in figure A.

Draw a line diagram in figure B, the actual wiring diagram in figure C and Pictorial diagram in figure D using a long size bond paper. After the activity check your work by looking at the answer key at the end of the module.

### Pictorial Diagram



Schematic Diagram	Line Diagram
Figure B	Figure C

Actual wiring Diagram
Figure D



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

Name: \_\_\_\_\_ Grade and Section: \_\_\_\_\_ Quarter: \_\_\_\_\_  
Module Number: \_\_\_\_\_ Lesson Title: \_\_\_\_\_

Answer the following questions. Then, check your answer by looking at the answer key which is found at the end of this module.

1. In what areas is flexible metallic conduit not allowed?
2. List all the materials to be used in the installation of flexible metallic conduit.



## Assessment

Name: \_\_\_\_\_ Grade and Section: \_\_\_\_\_ Quarter: \_\_\_\_\_

Module Number: \_\_\_\_\_ Lesson Title: \_\_\_\_\_

1. The minimum trade size of flexible metallic conduit.  
A.  $1/8$                       B.  $1/4$                       C.  $1/2$                       D.  $3/4$
2. The maximum trade size of flexible metallic conduit.  
A. 1                          B.  $1\frac{1}{8}$                       C.  $1\frac{1}{4}$                       D.  $1\frac{1}{2}$
3. It is the support used to hold the flexible metallic tubing.  
A. Connector              B. Metal strap              C. fittings                  D. box
4. It is the minimum length of conduit in a single roll.  
A. 40 feet                  B. 50 feet                  C. 60 feet                  D. 70 feet
5. It is the maximum number of conductors for a trade size no. 12 AWG. in a  $\frac{1}{2}$  inch diameter size conduit.  
A. 6                          B. 7                          C. 8                          D. 9
6. It is the maximum length of conduit in a single roll.  
A. 400 feet                  B. 300 feet                  C. 200 feet                  D. 100 feet
7. It is the fitting used for joining flexible metal conduits.  
A. Metal strap              B. box                          C. connector                  D. fittings
8. These are the locations where metallic conduits are not allowed to use EXCEPT \_\_\_\_\_.  
A. in dry location                      C. in storage battery room  
B. in hoistways                          D. in wet location
9. It is the maximum number of conductors for a trade size no. 8 AWG. in a  $3/4$ -inch diameter size conduit.  
A. 9                          B. 10                          C. 11                          D. 12
10. These are the locations where metallic conduits are permitted to use EXCEPT \_\_\_\_\_.  
A. in dry location                      C. not more than nominal 1000-V systems.  
B. in accessible location                  D. in wet location
11. How many maximum number of conductors in a 1 inch trade size conduit using number 6 AWG conductor?  
A. 9                          B. 10                          C. 11                          D. 12
12. It consist of flexible steel tube which is made from convex to concave metal strip in a winding with a length from 50 to 200 feet.  
A. Electrical metallic conduit                  C. Polyvinyl Chloride (PVC) conduit  
B. Flexible metallic conduit                      D. Flexible Non-Metallic Conduit
13. It is a type of fitting which is used to change direction.  
A. Adaptor                      B. Connector                      C. Coupling                      D. Elbow
14. A process of removing sharp edges or burrs left after cutting a pipe.  
A. Finishing                      B. Reaming                      C. Shaping                      D. Smoothing
15. The appropriate tool to use in cutting flexible metallic conduit or armored cable?  
A. Back saw                      B. Hacksaw                      C. Knife                          D. Pliers

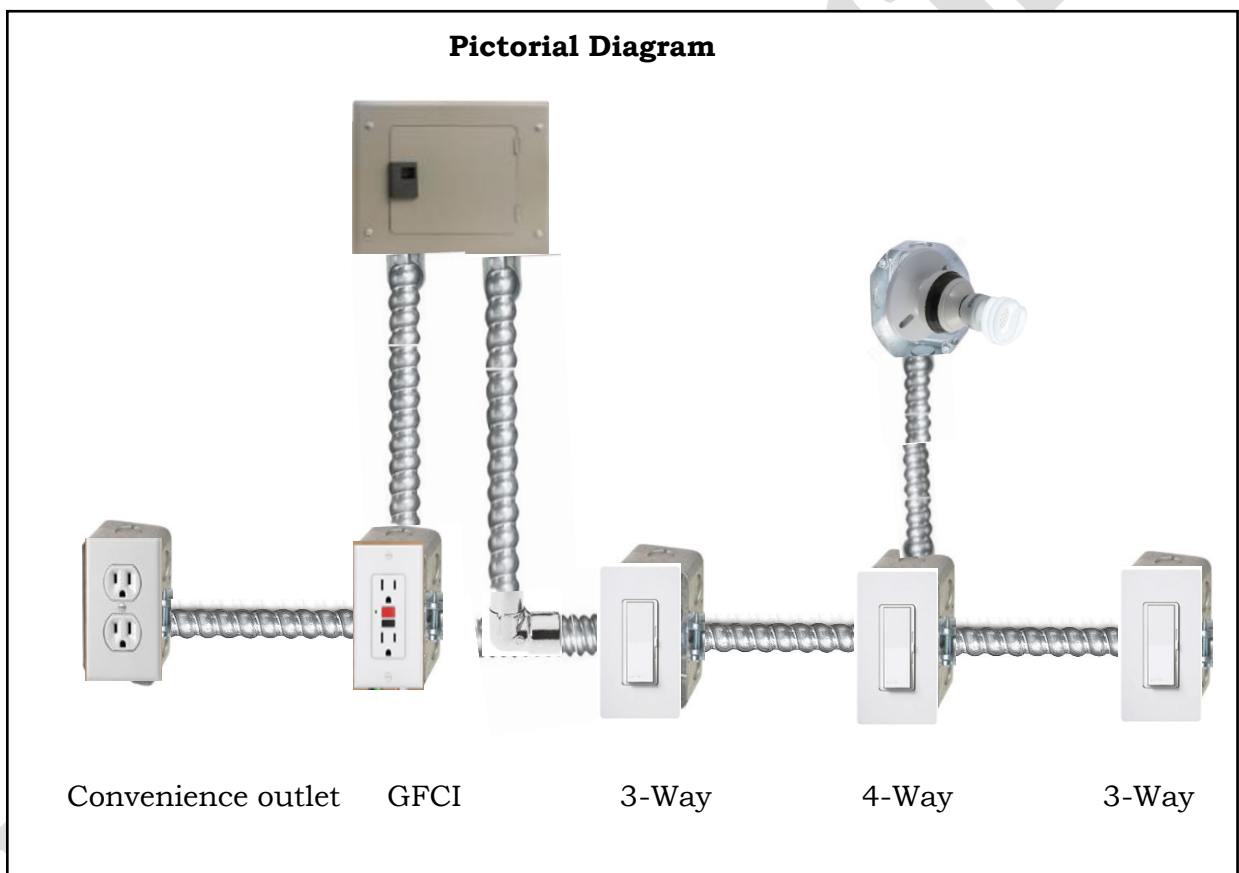


## ***Additional Activities***

Name: \_\_\_\_\_ Grade and Section: \_\_\_\_\_ Quarter: \_\_\_\_  
Module Number: \_\_\_\_\_ Lesson Title: \_\_\_\_\_

**Instructions:** Given the pictorial diagram of “a bulb controlled by a four-way switching circuit and an ordinary outlet protected by a ground fault current interrupter GFCI outlet.

Draw a schematic diagram in figure B, line diagram in figure C and the actual wiring diagram in figure D on a long size bond paper. Use three colors of pens.



**Figure A**



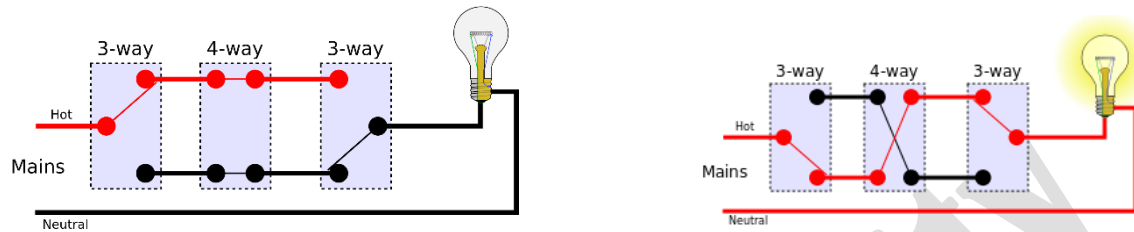
<p>Schematic diagram</p> <p>Figure B</p>	<p>Line diagram</p> <p>Figure C</p>
<p>Actual wiring diagram</p> <p>Figure D</p>	



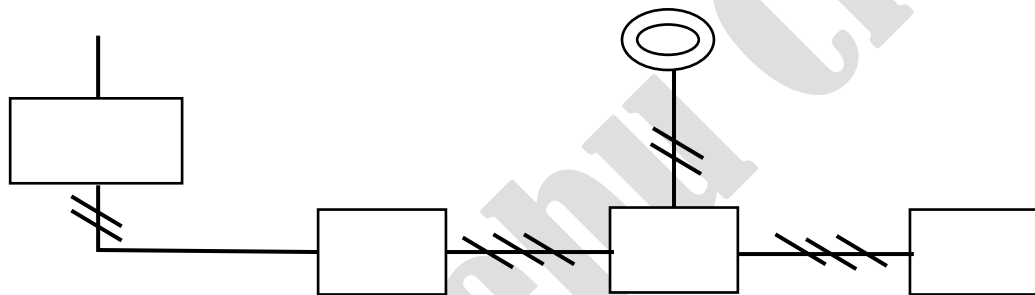
## Answer Key

### What's More

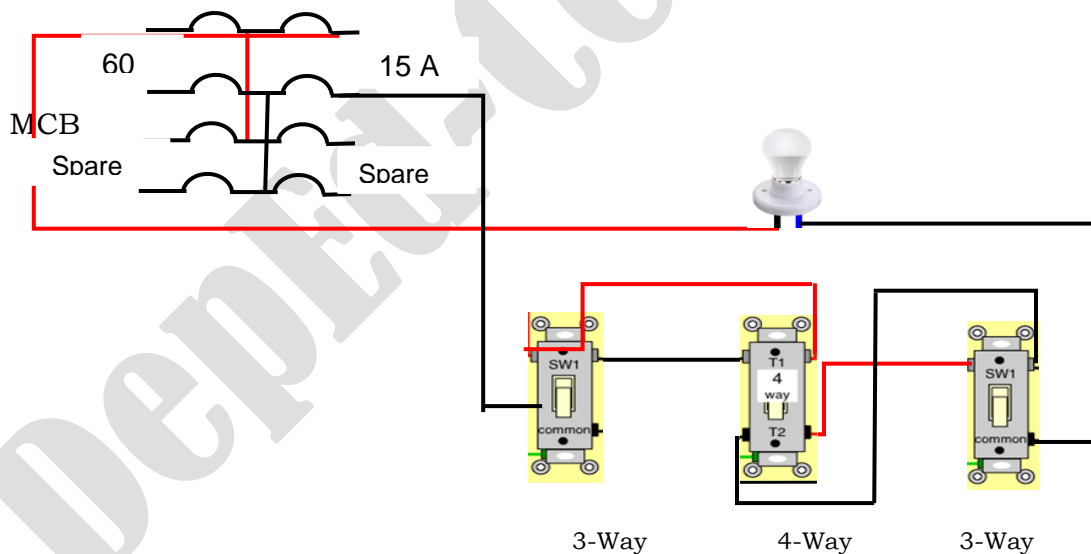
Schematic diagram (Figure B)



Line Diagram (Figure C)



Actual Wiring Diagram

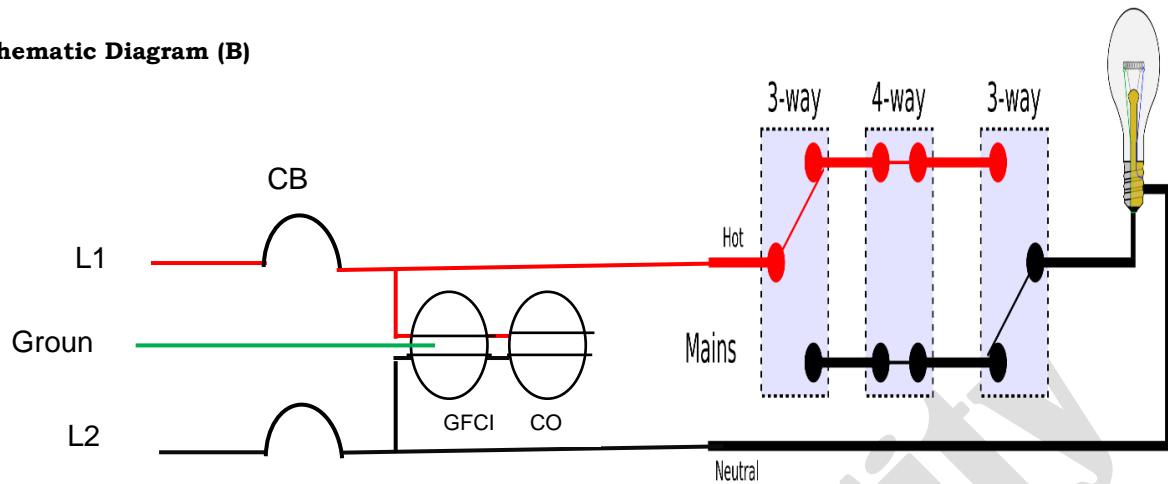


### What I Have Learned

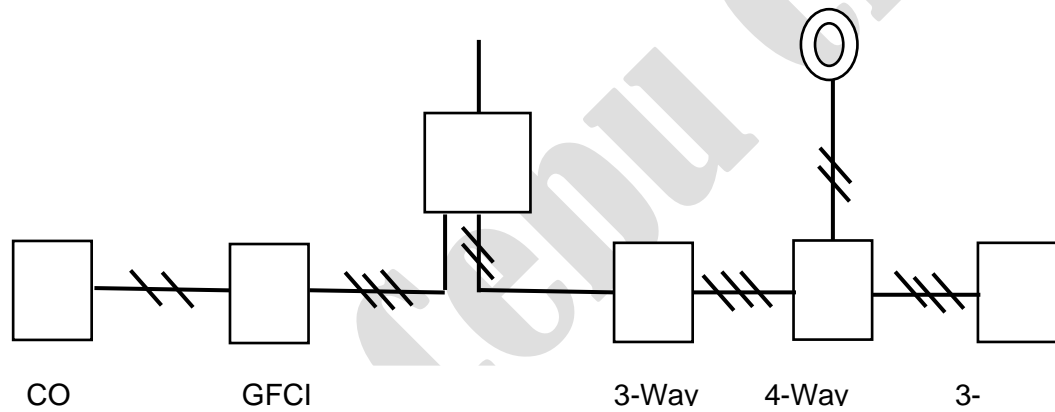
1. in wet location, hoist way, in storage battery room, in hazardous location, when exposed to oil, gasoline or materials which affects the rubber
2. FMT (flexible metallic tubing), 4x4 square metal box, octagonal metal box, utility metal box, FMT connectors, clamps or straps, adapter or lock-nut, panel board, circuit breaker, switches, outlet, bulb, bulb socket, electrical wires

## Additional Activities

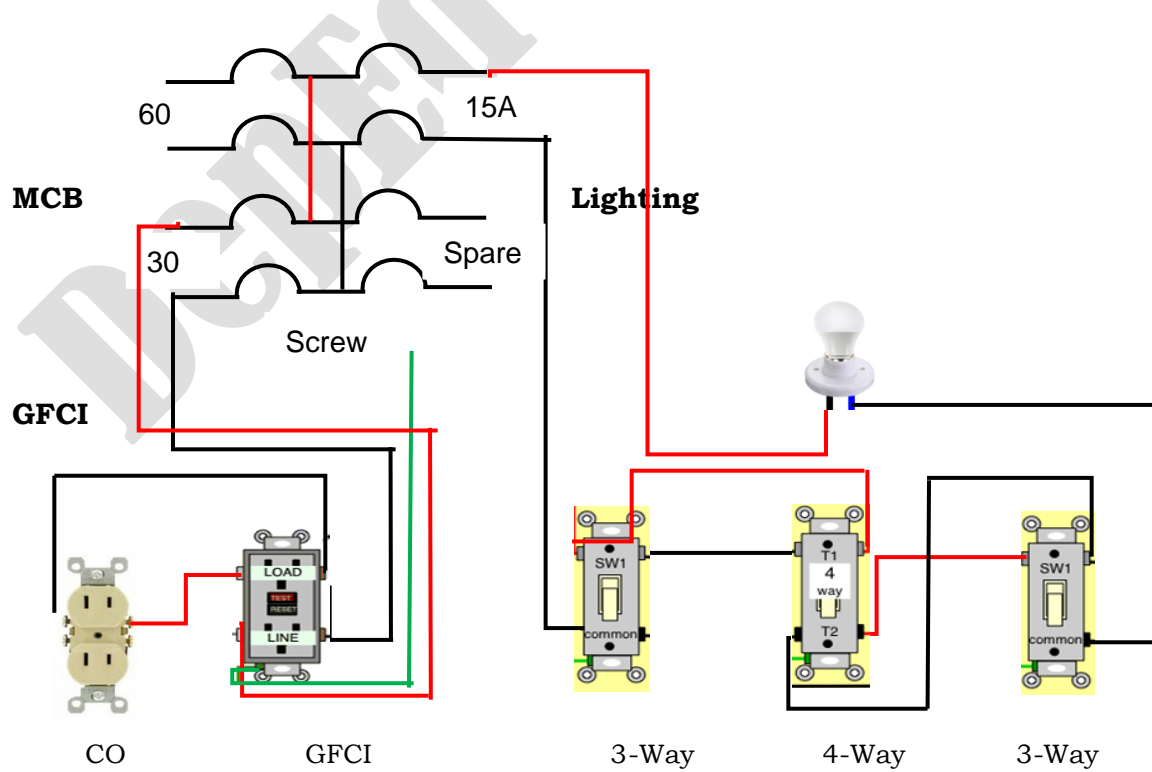
**Schematic Diagram (B)**



**Schematic Diagram (Figure C)**



**Actual Wiring Diagram (Figure D)**



## References

Department of Education Learner's Material, first edition 2014  
Copyright **Department of Education 2008**. First Published JUNE 2008

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<https://www.homedepot.com/p/Halex-2-in-Flexible-Metal-Conduit-FMC-Squeeze-Connector-04220/100135616>, retrieved on October 22, 2020