A Supplementary Material in Science Grade Five

# En Route to Brilliance



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**NENA K. ARNADO**
Division of Cebu Province
*Writer*

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Overview:

There are two types of electric circuits – the series circuit and the parallel circuit. What is the difference between these two circuits?

This material provides activities that will lead the Grade Five pupils to differentiate a series circuit from a parallel circuit. Furthermore, it provides an opportunity for pupils to construct an electric circuit using the series connection and another circuit using the parallel connection.

I. Objectives:

A. Differentiate a parallel from a series circuit connection;

B. Construct electric circuits using the series connection and the parallel connection; and

C. Cite safety measures to prevent fires caused by electricity.

II. Subject Matter:

A. Topic: Series and Parallel Circuits

B. References:

Cyber Science, Villona et al, pp. 224 – 227

Science for Active Learning 6, Vengco et al, pp. 172 – 174

Science for Daily Use 6, Conchita Tan, pp. 158 – 159

Philippine Elementary Learning Competency V.3

C. Materials:

Per group:

1 dry cell (1.5 V)

2 flashlight bulbs

2 bulb holders

3 lengths, 15 cm long red insulated copper wire

3 lengths, 15 cm long blue insulated copper wire

cutter

Activity Sheets

III. Procedure

A. Motivation

- Are you familiar with Christmas lights? They are usually made up of many bulbs connected one after another.
- Are your other lights in the house similarly connected as the Christmas lights?
- What type of electrical connections do you have at home?

B. Activity

1. Remind pupils on the preset norms of conduct.
2. Activity Proper
    a. Refer to Activity Sheets
3. Publishing and reporting of observations by group

C. Analysis

**Teaching Hint:** Record observations on a table using the format below. Use column 2 for observations to Activity 1.

| | Activity 1 | Activity 2 |
|---|---|---|
| What happened when the bulb was taken out of its holder? | | |
| What happened when the bulb was screwed back to its holder? | | |
| Why did it happen? | | |
| Why do you say the path of the electric current is complete / incomplete? | | |

- In Activity 1, what happened when you took a bulb out of its holder?

    *(Expected Answer- The two bulbs went out when one bulb was taken out from its holder.)*

    What happened when the bulb was screwed back to its holder?

    *(Expected Answer- All the bulbs lighted when the bulb was screwed back to its holder.)*

Why did this happen?

*(Expected Answer- The path of the electric current was made incomplete when one bulb was taken out from its holder.)*

Why do you say that the path was made incomplete?

*(Expected Answer- There is only one continuous path of the electric current for all the bulbs.)*

**Teaching Hint:** At this point, the teacher introduces "series connection" and writes this on top of the observations written under column 2.

- In Activity 2, what happened when you took one bulb out of its holder?

*(Expected Answer- When one bulb was taken out from its holder, the two bulbs remained lighted.)*

**Teaching Hint:** Teacher writes pupils' observations on the third column.

What happened when the bulb was screwed back to its holder?

(Expected Answer- When the bulb was screwed back to its holder, all the bulbs still remained lighted.)

Why did this happen?

**Teaching Hint:** Allow pupils to examine the connection again.

*(Expected Answer- The path of the electric current was still complete.)*

Why do you say that the path of the electric current was still complete?

(Expected Answer- *There is a separate path of electric current to each bulb.)*

**Teaching Hint:** At this time, the teacher introduces "parallel connection" and writes this above the written observations of Activity 2.

D. Abstraction

Say: Based on your observations, tell the difference between a series connection from a parallel connection.

**Teaching Hint:** Compare observations in Column 2 with observations in Column 3. Guide the pupils when making the comparison.

*Expected Answer: A series connection is one in which the current passes through all the electrical devices in one continuous path, while a parallel connection is one in which the current passes through all the electrical devices in separate paths, one for each electrical device.*

Lecturette on Series and Parallel Connections

(Refer to Background Information for Teachers.)

E. Application

Read each situation below and answer the question that follows.

1. All electrical connections in Sheila's new house are arranged in parallel. Why?

   *(Expected Answer: When one bulb goes out, the other bulbs will still remain lighted and appliances may be turned off when not in use.)*

2. During the Christmas season, Mrs. Reyes hanged Christmas lights on the Christmas tree. What safety measures should she do to prevent fires caused by Christmas lights?

   *(Expected Answer:*

   *a. Check if the bulbs and wires of the used Christmas lights are still in good condition.*

   *b. When buying Christmas lights look for the ICS logo on the item, a proof that the product has passed the International Classification for Standards (ICS).*

IV. Assessment

Encircle the letter of the correct answer.

1. Mary Ann noticed that a set of ten bulbs in her Christmas tree lights did not light when it was turned on. What could be a probable cause of this?

   A. Small wires are used.

   B. Small bulbs are used.

   C. There are bulbs in the strand.

   D. There is one defective bulb in the set

2. What will happen to the other bulbs in a series connection when one bulb is removed? The other bulbs will _____.

   A. light

   B. not light

   C. have dim light

   D. have bright light

3. What will happen to the other bulbs in a parallel connection when one bulb is removed?

   A. A few bulbs will light.

   B. A few bulbs will no longer light.

   C. The other bulbs will still light.

   D. The other bulbs will no longer light.

4. Which of the following measures can prevent fire caused by electricity?

   A. Have a regular inspection of electrical cords

   B. Avoid walking under low dangling wires.

   C. Touch a switch with dry hands.

   D. Do not leave sockets empty.

5. In a series connection, why do the remaining bulbs not light when one bulb is taken out of its holder?

   A. The other bulbs will not light.

   B. The other bulbs were burnt out.

   C. The path of electric current was renewed.

   D. The path of electric current became incomplete.

V. Assignment:

Christmas lights vary in the number of bulbs in each strand. There are 20s, 40s, 50s or even 100-bulb Christmas lights in a strand. Examine 1 strand. Find out what type of connections are used. Check how many bulbs are in a set of each type of connection.

VI. Resource List

- Teacher's Guide
- Activity Sheets
- Background Information for Teachers
- Teaching Hints
- Answer Key

Time Limit: 15 minutes

Activity 1

**WHY, OH WHY**

Materials:

1 dry cell (1.5 V)

2 flashlight bulbs

2 bulb holders

3 lengths, 15 cm long red insulated copper wire

3 lengths, 15 cm long blue insulated copper wire

cutter

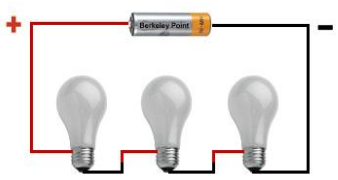
Masking tape

Procedure:

1. Using a cutter, carefully strip a part of the insulation from each end of the wire.
2. Attach each end of the exposed wiring to one terminal at each bulb holder.
3. Screw a bulb into each bulb holder.
4. Using a masking tape, attach the loose wirings to the terminal of the dry cell. What happens? _____
5. Remove one bulb.
   Did the other bulbs light? _____
6. Return the bulb.
   What happens? _____
   Why? _____

*Hint: The nub at the top and the small dip at the bottom of the dry cell are called terminals.*

Diagram of a dry cell with 3 bulbs in a series connection. Each bulb is in its holder with positive and negative terminals labelled.



Time Limit: 15 minutes

Activity 2

**MISSING OR NOT MISSING**

Materials:

1 dry cell (1.5 V)

2 flashlight bulbs

2 bulb holders

3 lengths, 15 cm long, red insulated copper wire

3 lengths, 15 cm long, blue insulated copper wire

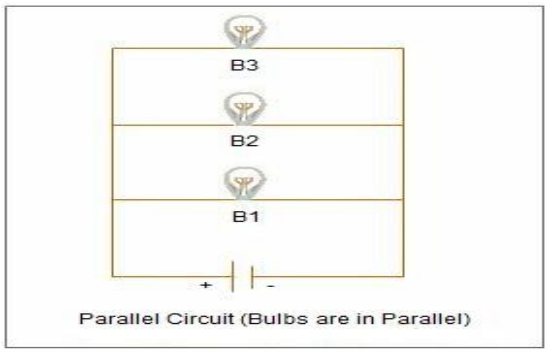
cutter

Masking tape

Procedure:

1. Using a cutter, remove carefully a part of the insulation at each end of the wire.
2. Attach each end of exposed wiring to each terminal of the three sockets.
3. Attach the wire of one socket to the terminal of another socket.
4. Screw a bulb into each socket.
5. With a masking tape, connect one loose end of the wire to the negative end of the dry cell and the other end to the positive end of the dry cell.
   What happens? _____
6. Remove one bulb.
   What happens? _____
   Did the other bulbs light?_____

Diagram of a dry cell with 3 flashlight bulbs in a parallel connection. Each bulb is in its holder with positive and negative terminals labelled



Parallel Circuit (Bulbs are in Parallel)

## BACKGROUND INFORMATION FOR TEACHERS

Electricity flows through two types of circuits – the series circuit and the parallel circuit and the parallel circuit.

A series circuit is one in which there is only one path for the electric current. The available current flows through each bulb. The components in a series circuit are connected one after the other. When you take one bulb out, the path is broken. Electricity cannot flow.

Since there is only one source of current, the current becomes less as more bulbs are added to the circuit. The available current flows through each bulb. If there are 8 bulbs in a series circuit, all the lights will be dimmer because the same amount of current has to do more work.

A parallel circuit is one in which current passes through the electric devices in separate paths, one for each electrical device. When you take one bulb out, the other bulbs still remain lighted.

In the activities just done, the dry cell is the source of electricity. The nub of the top of the dry cell is the positive terminal and the dip at the bottom is the negative terminal. Electricity flows from the source (dry cell), to the paths (electric wires), and to the resistance (bulb). Electricity flows from a negative terminal to a positive terminal, then to a negative, to a positive, to a negative, etc. and back to its source.

## TEACHING HINTS

1. At least 5 sets of materials must be prepared for the activity.
2. Group pupils according to the number of sets of materials prepared. Do this before the start of the lesson.
3. Remind pupils of the set of norms of conduct when performing an activity. Do this before they go to their respective corners for the activity proper.
4. Each set of materials together with the Activity Sheets must be placed in a tray for easy transport.
5. Materials used in Activity 1 are the same materials to be used for Activity 2.

## POSSIBLE OBSERVATIONS

| | Activity 1 | Activity 2 |
|---|---|---|
| What happened when the bulb was taken out of its holder? | The other bulbs went out | The other bulbs remained lighted. |
| What happened when the bulb was screwed back to its holder? | All the bulbs lighted | The other bulbs still remained lighted. |
| Why did it happen? | The circuit became incomplete | The circuit was still complete. |
| Why do you say the path of the electric current is complete / incomplete? | There is only one path for the electric current. | The electric current passes through the bulbs or devices in separate paths, one for each electrical device. |

## ANSWER KEY

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