

**Lesson Plan by
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Subject: Physics

Topic: Electricity

Goals:

At the end of this section students will be able to:

1. List the 2 different ways a circuit can be connected (parallel or in series). **{Sequence}**
2. Evaluate the advantages and disadvantages of series and parallel circuits. **{Precision}**
3. Construct a circuit with bulbs in series and a circuit in parallel. **{Technical}**
4. Compare the difference of current flowing in parallel and in series. **{Precision}**
5. Compare the difference of voltage flowing in parallel and in series. **{Precision}**

Key Concepts

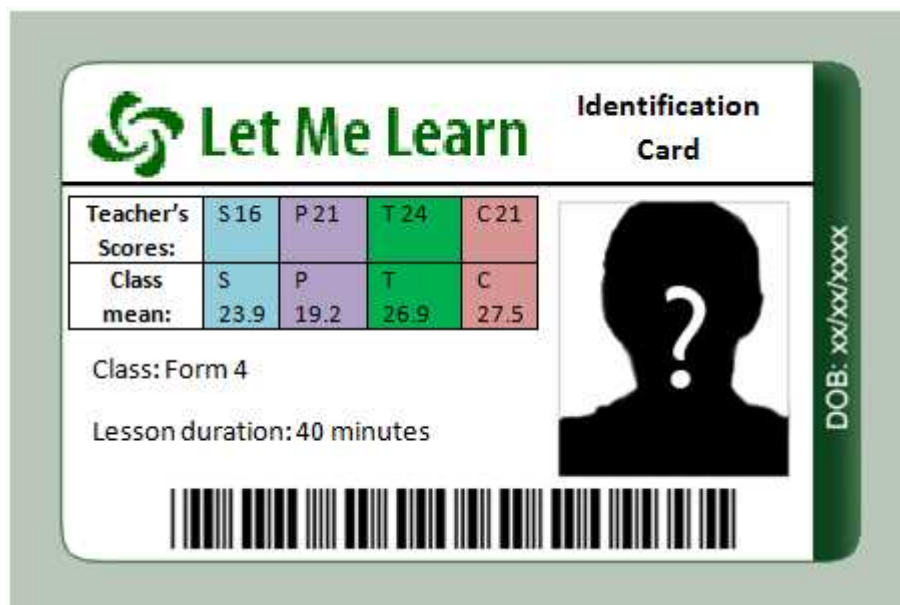
- In series current is the same through out
- Sum of the currents in the branches of the parallel circuits is equal to the current entering or leaving the parallel section.
- In parallel the voltage is the same as the supply voltage.
- The voltage at the terminals of the battery equals the sum of voltages across each component in a circuit.

Prerequisites

During the small investigation, I have to make sure that each member of the team works together, since the mean average in technical reasoning is very high, students tend to work individually. Also, I should provide a guide sheet for the set up such that the students enhance their sequential abilities (most students score use as needed). Following instructions should hopefully reduce time wasting as students know exactly what to do and what to observe. The instructions should be concise as their high confluence would discourage them from reading a chunk of text.

List of Materials Required

1. Hand out
2. Set up guide sheet
3. Wires
4. Power supply/batteries
5. Bulbs
6. Multimeters



Lesson Progression

Introduction

Ask and discuss with students the following;

- Why is it that in Christmas tree decorations if one light bulb breaks then none of the light bulbs will light up?
- How do the lights in street lighting remains on when one bulb is broken?

Development

After discussing the pervious question, explain that there are two different ways in which components of a circuit (e.g. bulbs) can be connected.

Explain that in a series circuit, all components are in line and in parallel the components are parallel to each other.

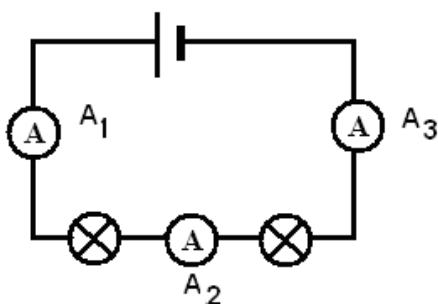
Provide students with the guide sheet and the apparatus required and ask them to investigate what happens if the bulbs are connected in series and in parallel.

Students are requested to report their findings on the handout provided.

Sample of guide sheet

Current in a Circuit

Current in Series

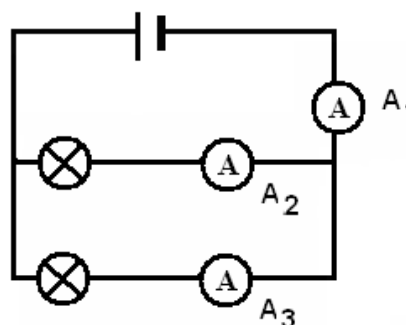


Current is the same at all points in a series circuit.

$$A_1 = A_2 = A_3$$

There is only one path to pass through

Current in Parallel

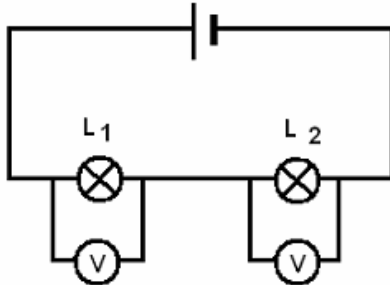


The sum of the currents in the branches of the parallel circuit equals the current entering or leaving the parallel section

The total current entering a junction must be equal to that leaving the junction.

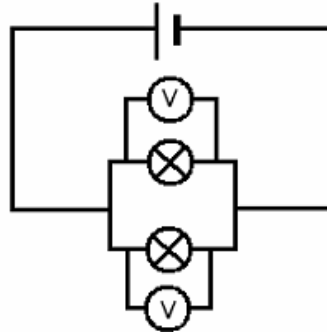
Voltage in a circuit

Voltage in a Series Circuits



The voltage at the terminals of the battery equals the sum of the voltages across each lamp in the external circuit

Voltage in Parallel



The voltages across lamps in a parallel circuit are equal to the voltage across the battery.

Note:

The above can be demonstrated using 3 bulbs first connected in series and the voltage and current is measured using a multi-meter.

This time the bulbs are connected in parallel and the current and voltage is measured once again using a multi-meter.

Assessment

Fill in handout

Perform experiment of parallel and series connections