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TOTAL MARKS: 30

MARKS OBTAINED =

30

CONTENT: Electric cells as energy systems

TOPIC: Series and parallel circuits

Background information:



Electricity is used all around us in our daily lives. Electricity is used to make electric devices work, such as making a light bulb glow or driving machines like cars and toys. All electricity must be in a closed electrical circuit. The circuit has a power source that provides electrical energy, electrical devices that transfer electrical energy into other energy forms and conducting wires that connect the power source and electrical devices. The components in an electric circuit can either be connected in series or parallel. Components that are connected in series will behave differently to the components that are connected in parallel. For example, if a light bulb that is connected in series to other light bulb stops working, all the other light bulbs will stop working. If the light bulb is connected in parallel to the other light bulbs, all the other light bulbs will continue to work. For this reason, the lighting system in our houses is connected in parallel. It is important for us to understand the difference between series and parallel circuits, and the effects of connecting components in this manner.

When cells are connected together they are called a battery. What happens when we put more than one cell in a circuit? You are then expected to setup a circuit and observe what happens when we add cells, in series, to a circuit.

INVESTIGATION: What happens when we add more resistors in series?

AIM:

To investigate the effect of adding resistors to a series circuit.

HYPOTHESIS:

Write a hypothesis for this investigation. (2)

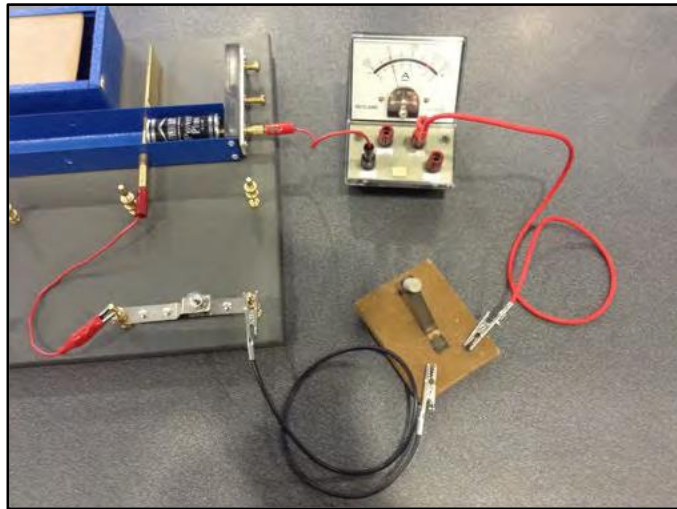
This is a learner-dependent answer. The hypothesis should relate the dependent and independent variables and make a prediction. The dependent variable will change as the independent variable is changed. Here is an example of a possible answer: As the number of resistors increases ✓, the current strength decreases. ✓

MATERIALS AND APPARATUS:

- 1,5 V cells
- 3 torch bulbs
- Insulated copper conducting wires
- Switch
- Ammeter

METHOD:

1. Construct the circuit with the cell, the ammeter, 1 bulb and the switch in series.

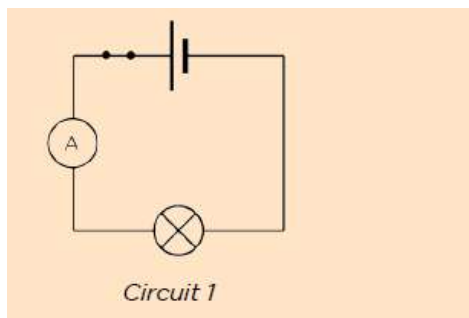


2. Close the switch, or the circuit if you are not using a switch.
3. Note how brightly the bulb is shining and write down the brightness of the bulb.(1)

Learner dependent. For example. Brighter ✓

Draw a circuit diagram.

(4)



Title: A circuit diagram for the first circuit

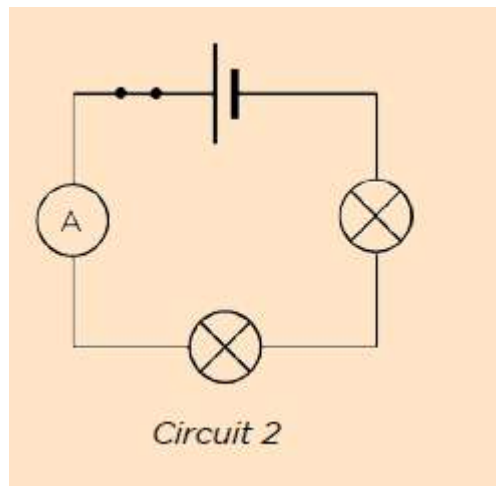
CRITERIA	MARKS
Correct symbol of a cell	1
Correct symbol of 1 bulbs in series	1
Correct symbol of a switch	1
Appropriate heading	1

4. Open the switch.
5. Add another light bulb into the circuit.
6. Close the switch.
7. Note how brightly the bulbs are shining and write down the brightness of the bulb compared to the previous connection. (1)

Learner dependent. For example Bright ✓

Draw a circuit diagram.

(4)



Title: A circuit diagram for the last circuit

CRITERIA	MARKS
Correct symbol of a cell	1
Correct symbol of 2 bulbs in series	1
Correct symbol of a switch	1
Appropriate heading	1

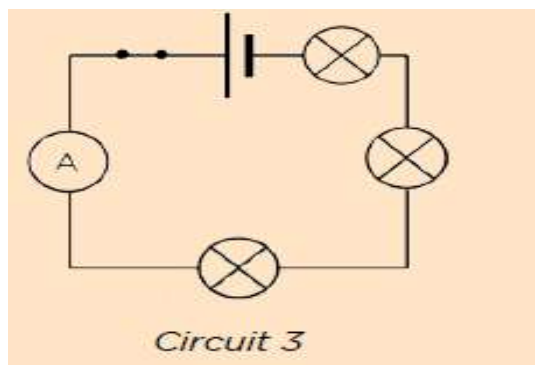
8. Open the switch.
9. Add the third light bulb into the circuit.
10. Close the switch.
11. Note now how brightly the bulbs are shining.

(1)

Learner dependent. For example Dim ✓

Draw a circuit diagram for the last circuit you built.

(4)



Title: A circuit diagram for the last circuit

CRITERIA	MARKS
Correct symbol of a cell	1
Correct symbol of 3 bulbs in series	1
Correct symbol of a switch	1
Appropriate heading	1

RESULTS:

Complete the table:

(3)

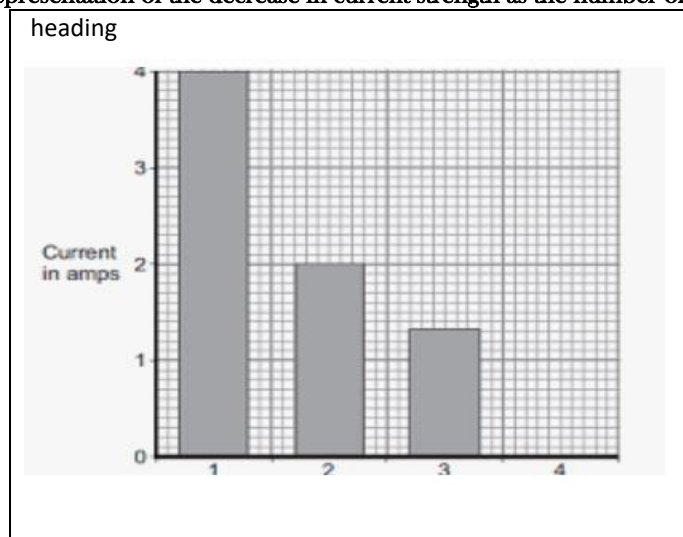
NUMBER OF BULBS	BRIGHTNESS
1	Brighter✓

2	Bright ✓
3	Dim ✓

Draw a graph to show the relationship between the number of bulbs and the current. (4)

TEACHER'S NOTE

The brightness of the bulbs is a qualitative comparison. Learners should use "bright, brighter, brightest" as a way to describe the glowing bulbs. The graph should show the quantitative data of the ammeter reading and the number of bulbs. If you do not have an ammeter to take readings, either do not draw a graph, or change the graph to a bar graph which has bright, brighter, brightest as the values on the y-axis. This is not a particularly useful graph but will give the learners a chance to practice drawing a bar graph and give them a visual representation of the decrease in current strength as the number of bulbs increases.



Title: a graph to show the relationship between the number of bulbs and the current

CRITERIA	MARKS
Correct labels on y-axes (Brightness of the bulb)	1
Correct labels on x-axes (Number of bulbs)	1
Correct plotting Longest bar: Brighter Long: Bright Short: dim	1
Appropriate heading	1

ANALYSIS:

1. What happened to the brightness of the bulbs as the number of bulbs increased? (1)

The bulbs got dimmer as more bulbs were added. ✓

2. When you had two bulbs, did they glow with the same brightness, or was one brighter than the other? (1)

The bulbs glowed with the same brightness. ✓

3. When you had three bulbs, did they glow the same as each other or was one brighter than the others? (1)

The bulbs glowed with the same brightness. ✓

4. What do your answers to the previous questions tell you about the current in the series circuit? (1)

If all the bulbs glow the same, it means that they all experience the same current. This means that the current is the same everywhere in a series circuit. ✓

CONCLUSION:

1. Based on your answers, what conclusions can you draw from this activity? (2)

As more bulbs were added, the current decreased. ✓✓