

SNC 1D Lab

Circuit Builder Teacher Notes

Source: McGraw-Hill Ryerson, ON Science 9, pp. 474-477

Teacher Notes:

- Maximum group size should be 3-4 students. 2 is the ideal group size.
- Make sure there is no running water near the lab.
- Remind students of the dangers of electrical current.

Curriculum Links:

- E2.5: design, draw circuit diagrams of, and construct series and parallel circuits, and measure electric current I , potential difference V , and resistance R at various points in the circuits, using appropriate instruments and SI units.
- E2.6: analyse and interpret the effects of adding an identical load in series and in parallel in a simple circuit.
- E2.7: investigate the quantitative relationships between current, potential difference, and resistance in a simple series circuit.

Materials:

- See student lab for list of materials.

SNC1D

Circuit Builder Lab

Part A: Series circuits

Question :How are the current, potential difference, and resistance of a circuit affected as more loads (bulbs) are connected in series?

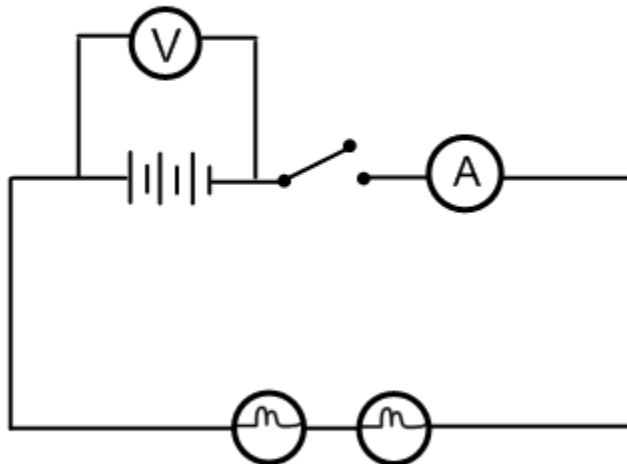
Materials:

- 6V battery
- switch
- 8 connecting leads
- 3 identical light bulbs
- ammeter
- voltmeter

Procedure:

1)Connect the circuit diagram shown below, using a 6V battery. Make sure the switch is in the open position. When finished, show your circuit to your teacher and obtain their initials.

Teacher initials: _____



2)Close the switch long enough to compare the brightness of the bulbs and take readings on the ammeter and voltmeter. Record your observations of the current in the circuit and the potential difference across the terminals of the battery in Table 1: Series circuit observations.

3) With the switch open, disconnect the voltmeter and connect it across bulb 1.
 4) Close the switch and record the potential difference across the bulb. Repeat this procedure to measure and record the potential difference across bulb 2.

5) Open the switch. Add a third bulb in series with the other, between bulb 2 and the ammeter.

6) Reconnect the voltmeter across the battery, then repeat step 3.

7) Measure and record the potential difference across each bulb.

8) Use the ammeter to measure and record the current between bulbs 2 and 3.

Observations:

Table 1: Series circuit observations

Number of bulbs	Comparative Brightness	Current (A)	Potential Difference (V)		
			Across the Battery	Across Each Bulb	
				1	2
2					
3					

Analysis:

1. As more bulbs are connected in series in a circuit, what happens to :
 2. The brightness with which each glows?
 3. The current leaving the source?
 4. The potential difference across the source?
 5. The potential difference across each load (bulb)?

Conclusion:

Summarize the relationship between the current leaving the source and the current through each load (bulb) in a series circuit.

Part B: Parallel Circuits

Question :How are the current, potential difference, and resistance of a circuit affected as more loads (bulbs) are connected in parallel?

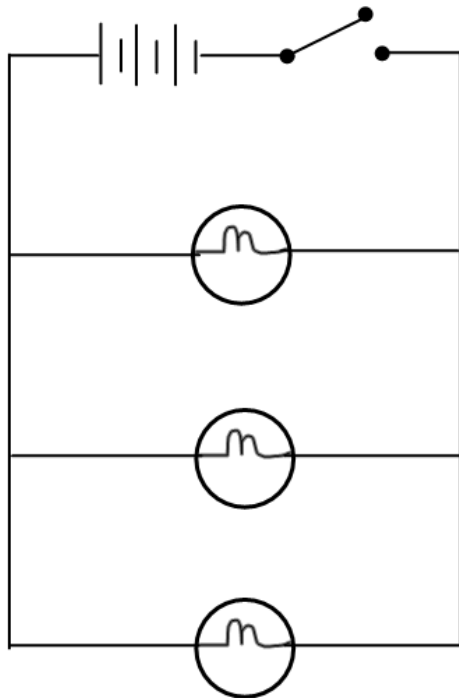
Materials:

- 6V battery
- switch
- 10 connecting leads
- 3 identical bulbs
- ammeter
- voltmeter

Procedure :

1) Connect the circuit diagram shown below, using a 6V battery. Make sure the switch is in the open position. When finished, show your circuit to your teacher and obtain their initials.

Teacher initials: _____



2) Close the switch and compare the brightness of the bulbs. Record your observation.

3) Open the switch. Connect a voltmeter between the terminals of the cell (battery). Then, insert an ammeter to the right of the cell.

4) Close the switch. In Table 2, record the potential difference across the cell, and the current leaving the cell.

5) Open the switch and disconnect both meters. Reconnect the basic circuit.

6) Measure the potential difference between the connections for each bulb, and the current entering each bulb. (as in step 3).

Observations :

Table 2: Parallel circuit observations

Measurements of Potential Difference and Current			
Potential Difference (V)		Current (A)	
Across Cell (terminals of battery)	Across Each Bulb	Leaving Cell (Battery)	Through Each Bulb
	N.1		N.1
	N.2		N.2
	N.3		N.3

Analysis:

1. When loads (bulbs) are connected in parallel to a cell, how does the potential difference across each load compare with the potential difference across the cell?
2. In a parallel circuit, how does the current throughout each path compare with the current entering the parallel connection?
3. If you take 1 bulb away, how would that affect the brightness of the other bulbs?

Conclusion:

Summarize the relationship between the current leaving the source and the current through each load in a parallel circuit that has three loads.