Investigating series and parallel circuits worksheet

Power Smart for Schools

Name: _____ Date: _____

Challenge

To construct series and parallel circuits, measure their respective voltages and current, and analyze the similarities and differences.

Critical question

How are series and parallel circuits different in terms of current and voltage? How are they similar? Why?

_____

_____

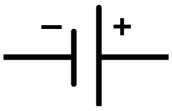
Materials

- 2 dry cell holders
- 2 dry cells
- conducting wires
- 2 light bulbs
- switch
- voltmeter
- ammeters

Safety

Make sure that voltmeters and ammeters are connected properly (with negative to negative and positive to positive). Ammeters are connected in series with the circuit (so all current must run through them), while voltmeters are connected in parallel (giving the current another path).

CIRCUIT DIAGRAM SYMBOLS

Ammeter	Voltmeter	Light bulb
		
Connection point	**Resistor**	**On/off switch**
		
Wire	**Dry cell**	
		

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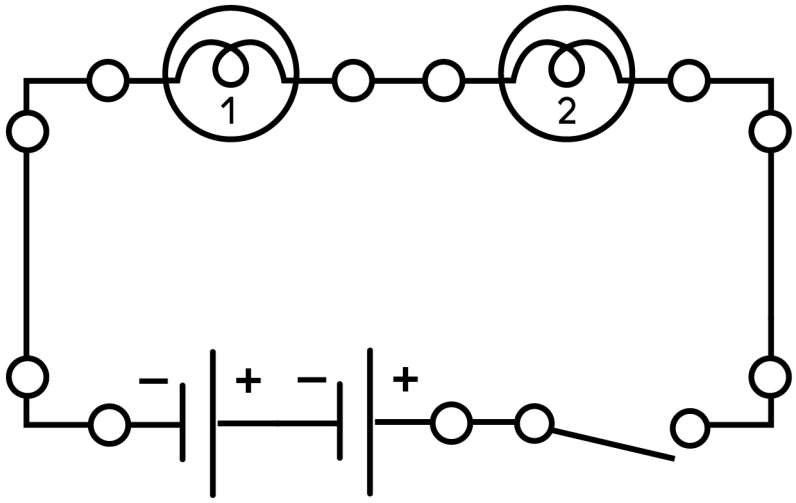
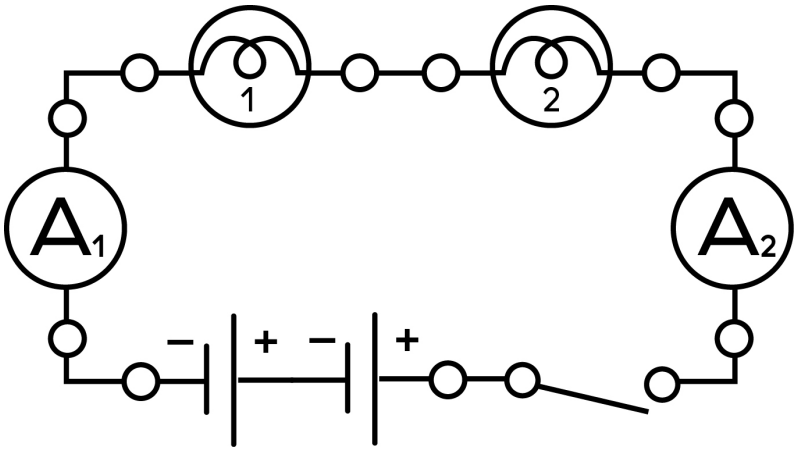
Instructions

PART A

1. Construct a series circuit as shown below.



2. Close the switch and use an ammeter to measure the current at positions A1 and A2 as shown below. Record these measurements in Table A.



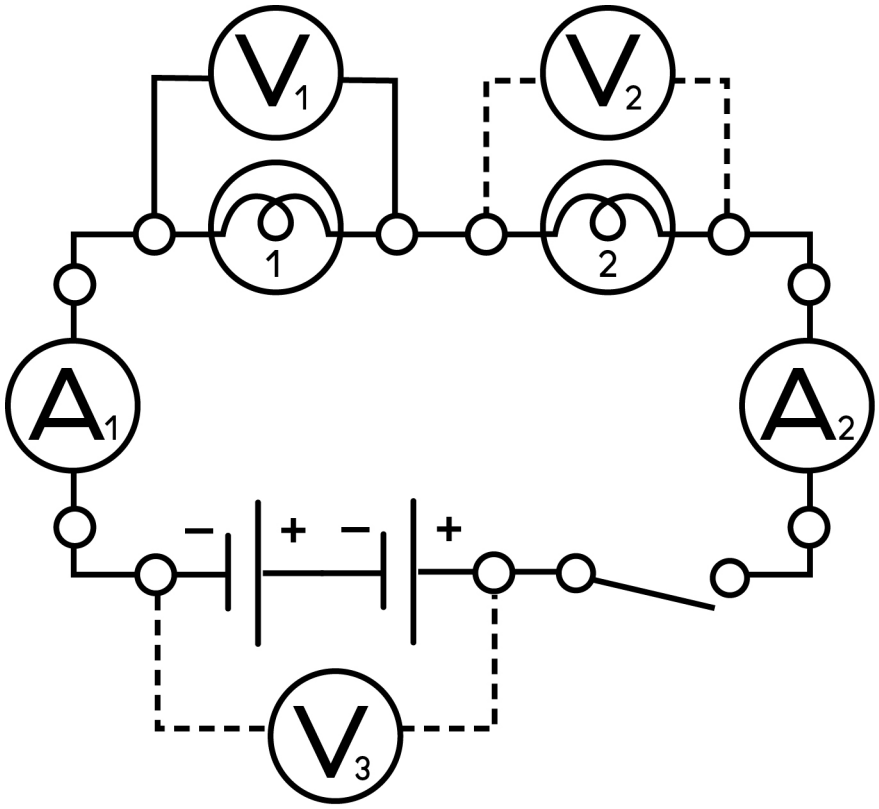
3. Using a voltmeter, measure and record the voltage across bulb 1 (at position V1).

a. Remove the voltmeter from bulb 1 and connect it to bulb 2 (at V2).

b. Measure and record the voltage across bulb 2.

c. Remove the voltmeter and connect it across the 2 dry cells (at V3).

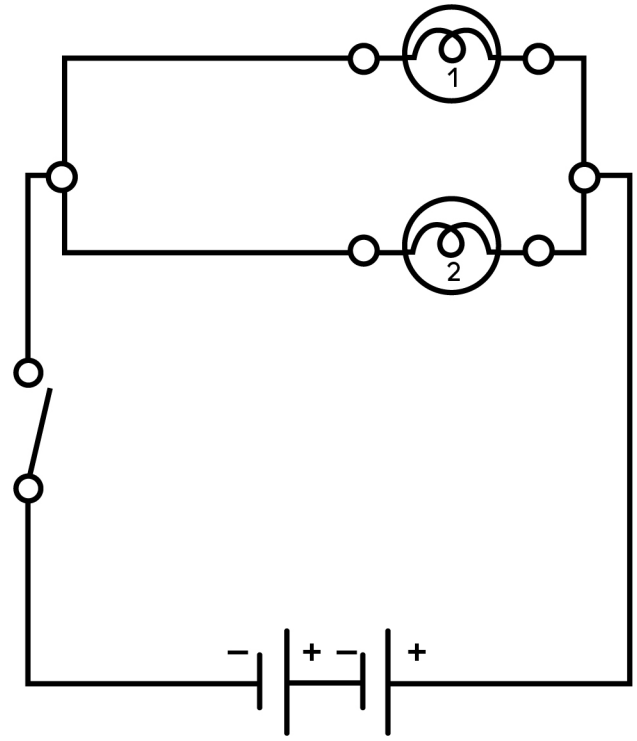
d. Measure and record the voltage.



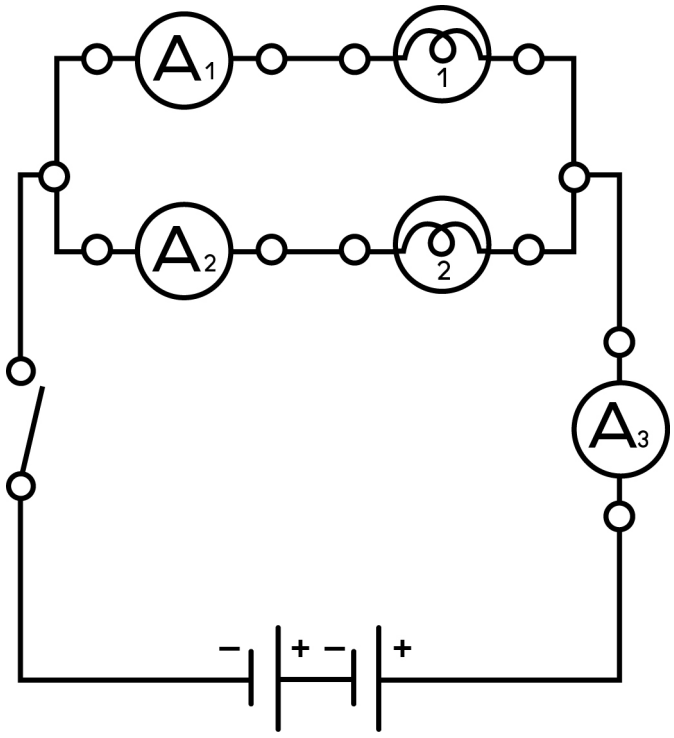
4. Disassemble your series circuit.

PART B

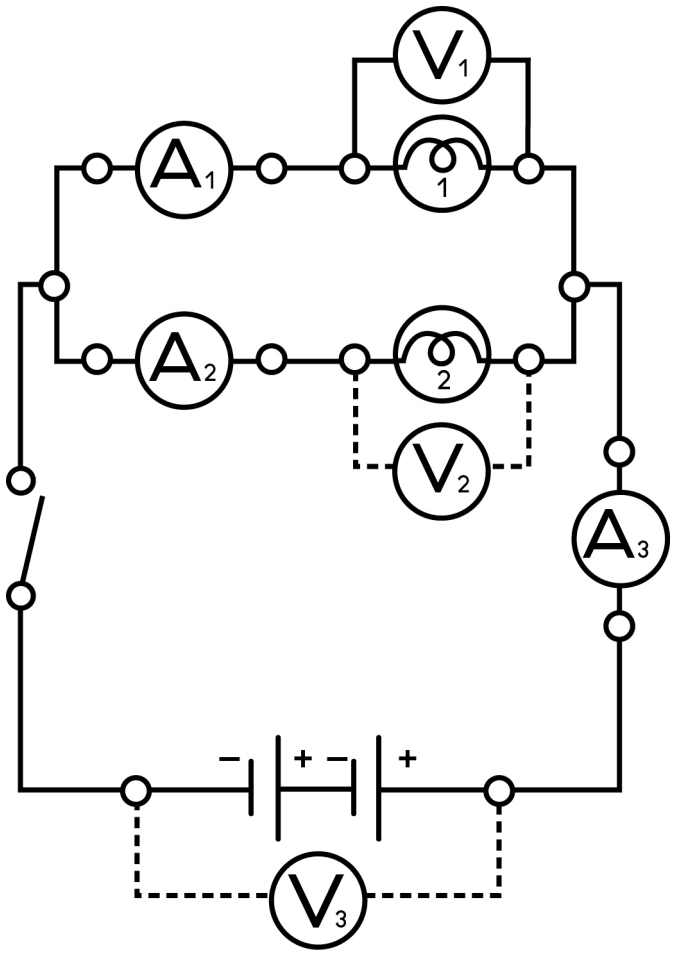
1. Construct a parallel circuit as shown below.



2. Close the switch and measure the current with an ammeter at positions A1, A2 and A3 as shown below. Record these measurements in Table B



3. Using a voltmeter, measure and record the voltage across each of the bulbs (at V1 and V2) and the power source (2 dry cells) at V3 in turn.



4. Disassemble and return your materials.

5. Complete your analysis and conclusions.

Observations

TABLE A — SERIES CIRCUIT MEASUREMENTS

Current (mA)	Voltage (V)
Ammeter 1 =	Bulb 1 =
Ammeter 2 =	Bulb 2 =
	Dry Cells =

TABLE B — PARALLEL CIRCUIT MEASUREMENTS

Current (mA)	Voltage (V)
Ammeter 1 =	Bulb 1 =
Ammeter 2 =	Bulb 2 =
Ammeter 3 =	Dry Cells =

Analysis

1a. How does the current compare between ammeters 1 and 2 in the series circuit (refer to Table A)?

1b. How does the current compare among ammeters 1, 2 and 3 in the parallel circuit (refer to Table B)?

2. How does the voltage compare across bulbs in the series circuit? How does the voltage compare across bulbs in the parallel circuit?

3. In Part A of the procedure, what do you notice about the voltage measurements in the series circuit? How do the bulb measurements compare with the dry cell measurement?

4. In Part B, what do you notice about the measurements of current in the parallel circuit? How do the bulb measurements compare with the dry cell measurement?

Conclusions

In a paragraph, compare the differences in current and voltage in your series and parallel circuits.

Why are your findings different from what you would theoretically expect and from other students' results (why aren't your measurements perfect)?