

Bulbs in Series and Parallel: Resistance

Resources:

Specialist

- *2 cells of 1.5V each, 2 cell holders, 2 small bulbs of 2.5V in bulb holders, 4 electric wires, 10ohm resistor per group of students – these electrical items would need to be purchased*

Time to set up:

- *Collecting equipment is very easy and quick.*

Time for students to carry out experiment:

- *Probably around 10 - 15 minutes*

Difficulty:

Easy

- *This experiment is very straightforward*
- *Safety points*
 1. *Possibility of very mild electrical shocks from the cells*

EXPERIMENT FROM VSO EXPERIMENT SUPPORT BOOK

Lesson 6 Bulbs in series and parallel: resistance

Key Question

In what way does the resistance of electric components determine the current in a circuit?

What do you need?

Two batteries of 1.5 V each, 2 small bulbs of 2.5 V in sockets, electric wires, 1 resistor of 50 ohm.

Activity

Students write the results in the table below.

1. Build an electric circuit with two batteries in a series and a bulb, look at the pictures in the Textbook Grade 7, Physics, Chapter 3, Lesson 6.2.
2. Build an electric circuit with two batteries in a series and two bulbs in a series, see the pictures in the Textbook Grade 7, Physics, Chapter 3, Lesson 6.2. Why are the bulbs in the second situation burning more weakly than in the first situation? Give your explanation using the word resistance.
3. Build an electric circuit with two batteries parallel to each other and one bulb in a series with a resistor, look at the pictures in the Textbook Grade 7, Physics, Chapter 3, Lesson 6.2.
4. Build an electric circuit with two batteries in a series and two parallel bulbs , look at the pictures in the Textbook Grade 7, Physics, Chapter 3, Lesson 6.2.

Results and conclusions

Answer the key question.

Clarification for the teacher

	Bulb burns weakly	Bulb burns brightly
One bulb		+
Two bulbs in series	+	
One bulb and a resistor in series	+	
Two bulbs parallel		+
What is your answer to the key question?	When a current flows through an electric component, the current experiences resistance. The bigger the resistance, the	

	32 Experiment Support Book Science grade 7 — 9, second edition smaller the current (if the voltage is the same).
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The worksheet on the next 4 pages could be given to students to work independently or in pairs with the electrical equipment they have been given. It is more inquiry based than the VSO experimental instructions.

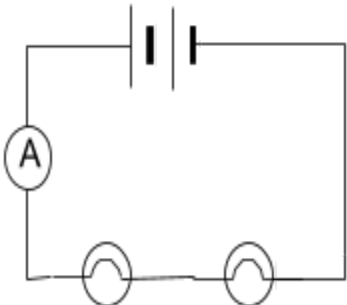
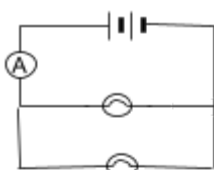
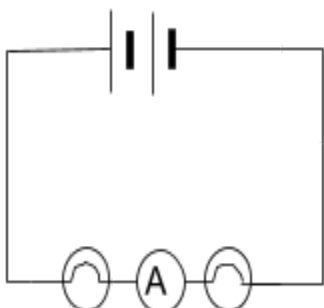
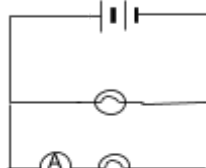
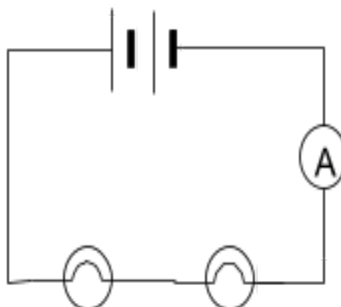
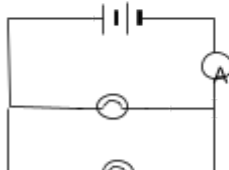
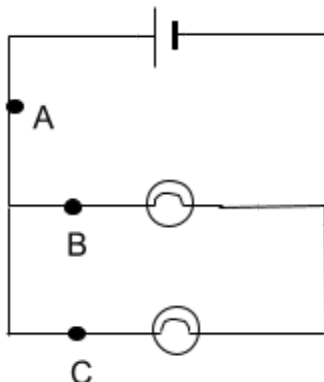
STUDENT WORKSHEET

Two different types of circuits.

1	<u>TASK</u> - Connect the following circuit.
	You can use TWO bulbs, TWO cells and 3 wires. Connect the bulbs to the cells in such a way that: <i>When one bulb is unscrewed, they both go out</i>
2	<u>DRAW</u> the circuit diagram. Ask your teacher to check your circuit diagram.
3	<u>TASK</u> - On your circuit diagrams draw arrows to show the path (way) the electricity takes around the circuit. <u>CLUE</u> - Electricity always travels from + to - (positive to negative).
4	<u>COMPLETE</u> When Electricity can only move along _____ path the circuit is called a SERIES circuit
5	<u>TASK</u> - Connect the following circuit. You can use TWO bulbs, two cells and 4 wires. Connect the bulbs to the batteries in such a way that: <i>When one bulb is unscrewed, the other one stays on</i>
6	<u>DRAW</u> the circuit diagram. Ask your teacher to check your circuit diagram.

7	TASK - On your circuit diagram draw arrows to show the 2 paths the electricity takes around the circuit. Remember - Electricity always travels from + to - (positive to negative).
8	<u>COMPLETE</u> When electricity has a _____ of paths, the circuit is called a PARALLEL CIRCUIT
9	<u>ANSWER THE QUESTION IN A FULL SENTENCE.</u> 1. In which circuit, parallel or series, are the bulbs brighter - connect up the two circuits again if you are not sure of the answer. 2. Connect up the series circuit - if one bulb is unscrewed, what happens to the other bulb? 3. Why does this happen? 4. Connect up the parallel circuit - if one bulb is unscrewed, what happens to the other bulb? 5. Why does this happen?
10	GET YOUR WORK CHECKED AND MARKED BEFORE YOU MOVE ON

Measuring current in series and parallel circuits

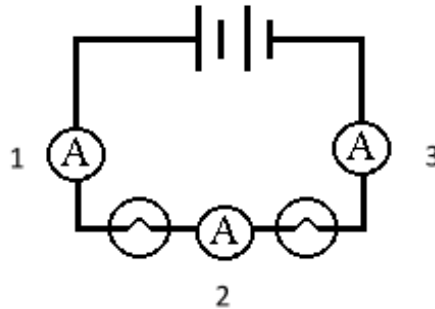
1	TASK – Set up the SERIES circuits below and use an ammeter to measure the current in each position and record it. Set up the PARALLEL circuits, measure the current in each circuit and record it				
SERIES CIRCUITS		Ammeter reading	PARALLEL CIRCUITS 	Ammeter reading	
					
					
2	ANSWER THE QUESTION Look at your ammeter readings for each circuit. What do you think is happening to the current in the parallel circuit?				
3	<u>COMPLETE</u>  In a parallel circuit, the starting current at A _____ up between the two bulbs so that Current A = Current B _____ Current C				
4	GET YOUR WORK CHECKED AND MARKED BEFORE YOU MOVE ON				

Mini test - Do I understand electric current?

1. This is a written test. You do not need any equipment. Do not connect up any of the circuits. Try and answer the questions on your own.
2. **GET YOUR WORK CHECKED AND MARKED BEFORE YOU MOVE ON**

Series circuits

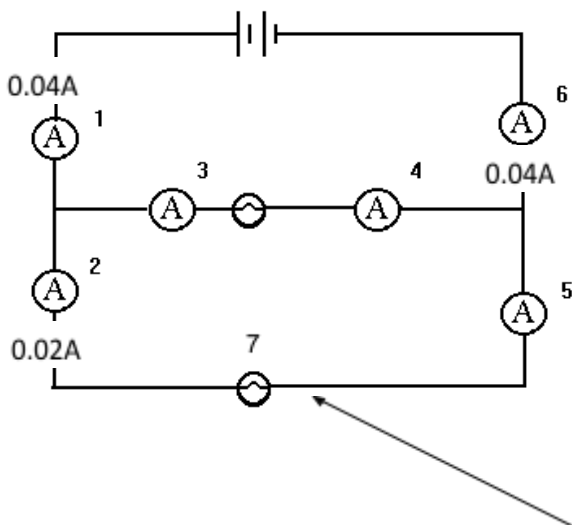
Look at the following circuit and answer the questions



1. What does an ammeter **measure** and what are its **units**?
2. What do you predict that the number would be on ammeters **2** and **3** if **1** was 0.03A?
3. From Q2, what can you say about an electric current around a series circuit?
4. What do you predict that the number from Q2 would be if you had **4** cells instead of **2**?
5. What do you predict that the number from Q2 would be if you had **1** bulb instead of **2**?

Parallel circuits

Look at the following circuit and answer the questions



- What do you predict the current will be on ammeters **3**, **4** and **5**? Look at the numbers on **1**, **2** and **6** to help you.
- What can you say about the **current** in a parallel circuit?
- If you **unscrewed** a bulb in a **series** circuit, what would happen to the other bulb?
- If you **unscrewed** a bulb in a **parallel** circuit, what would happen to the other one?
- Which type of circuit do you think you have on the lights in your house, series or parallel? Why do you say this?
- If you added a third bulb in parallel with bulb 7, it would use another 0.02A. What would ammeter 1 now read?