

Series and Parallel Circuits

KS3 Physics · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

One bulb in a string of series bulbs breaks. What happens?

Step 1 · Series

There is only one path for the current.

Step 2 · Broken bulb

It makes a gap, so the circuit is incomplete and no current flows anywhere.

Answer: All the bulbs go out

Check: In parallel, only the broken bulb would go out.

2. Now try one with the steps

A 9 V battery runs three bulbs in series. Two have 3 V and 2 V across them. What is across the third?

Step 1 · Series p.d. rule

Step 2 · Calculate

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. In a series circuit, how does the current compare at different points? [1]

2. In a parallel circuit, how does the p.d. across each branch compare with the supply? [1]

3. One bulb breaks in a series circuit of three bulbs. What happens to the others? [1]

4. One bulb breaks in a parallel circuit of three bulbs. What happens to the others? [1]

5. In a series circuit, an ammeter next to the cell reads 0.4 A. What is the current through the second bulb, in A? [1]
6. Three parallel branches carry 0.3 A, 0.3 A and 0.4 A. What is the current from the battery, in A? [1]
7. A 9 V battery runs three bulbs in series. Two have 3 V and 2 V across them. What is the p.d. across the third, in V? [2]
8. Two lamps are in parallel with a 6 V battery. What is the p.d. across each lamp, in V? [1]
9. Three identical lamps are in parallel and each carries 0.5 A. What is the total current from the cell, in A? [1]
10. What happens to the brightness of the other bulbs when an extra bulb is added in series? [1]
11. What happens to the total current from the cell when an extra bulb is added in parallel? [2]
12. Where should a switch go in a parallel circuit so it controls only one bulb? [1]
13. Give two reasons why the lights in a house are wired in parallel, not in series. [2]
14. Describe a circuit with one battery and two lamps where each lamp can be switched on and off separately. [2]

4. Before you hand it in

"In parallel, the current is the same in every branch."

In parallel, p.d. is the same across each branch; currents add up to the total (they are equal only if the branches are

identical).

Putting a switch in the main line to control one bulb.

Put the switch in the branch of the bulb you want to control.

"Adding bulbs in parallel makes them all dimmer."

In parallel each bulb still gets the full p.d., so brightness stays the same (but the battery runs down faster).