







Lesson 3 - Series Circuits

Match the circuit symbols to their definitions

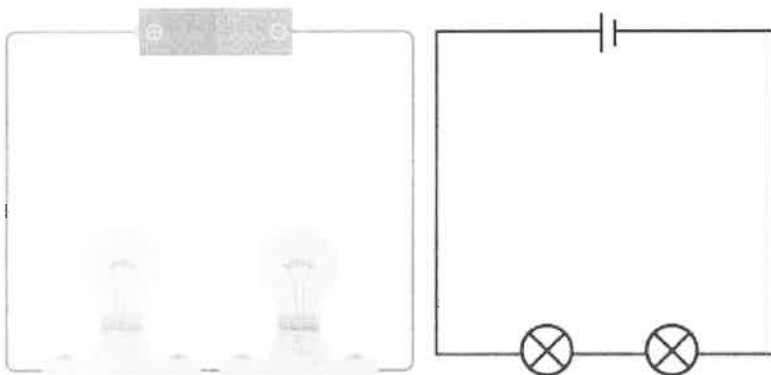
Symbol







Component
ammeter
cell
battery
bulb
switch
motor

Series circuits

In a television series, you get several episodes, one after the other. A series circuit is similar. You get several components one after the other.

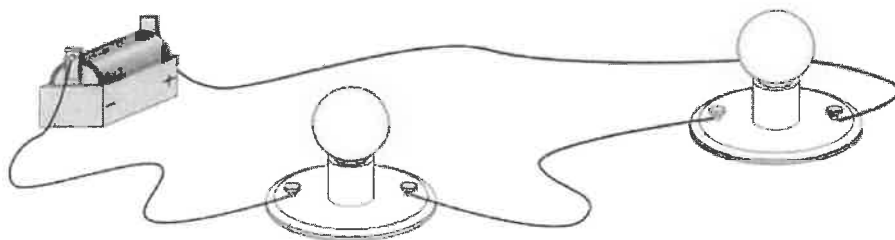
If you follow the circuit diagram from one side of the cell to the other, you should pass through all the different components, one after the other, without any branches.



In a series circuit, if a component breaks or is disconnected, the current cannot flow and the circuit stops working.

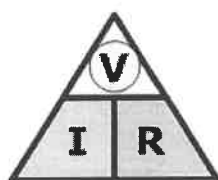
The current is the same everywhere in a series circuit.

This means each component has the same current.

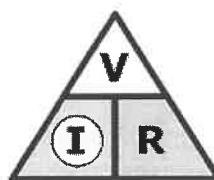


If a light bulb is missing or broken in a series circuit, will the other bulb light? Explain.

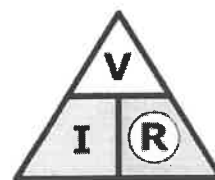
V – Potential Difference (Volts)
 I – Current (amps)
 R – Resistance (ohms)



$$\text{V} = I \times R$$



$$I = \frac{V}{R}$$



$$R = \frac{V}{I}$$

Series circuit problems

Aim

To reinforce what you have learned about series circuit.

1 A cell, a resistor, a lamp and an ammeter are connected in series, as in Figure 1.

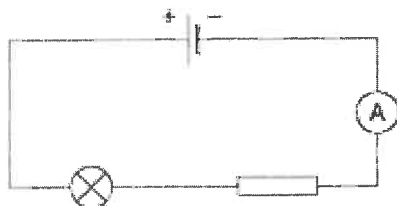


Figure 1

a) Complete the following sentences using words from the list below.

greater than less than the same as

- i) The current through the battery is the current through the ammeter.
- ii) The potential difference across the battery is the potential difference across the resistor.
- iii) The current through the lamp is the current through the resistor.
- iv) The potential difference across the lamp is the potential difference across the battery.

b) In Figure 1, the cell has a potential difference of 3.0 V and the resistor has a resistance of 8.0 Ω. The ammeter reading is 0.2 A.

i) Calculate the potential difference across the resistor.

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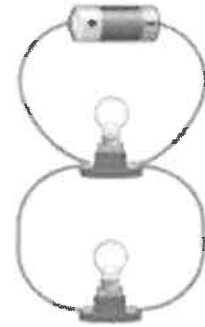
ii) Calculate the potential difference across the lamp.

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Lesson 4 - Parallel circuits

Draw circuit diagrams of the 3 circuits



Parallel Circuits

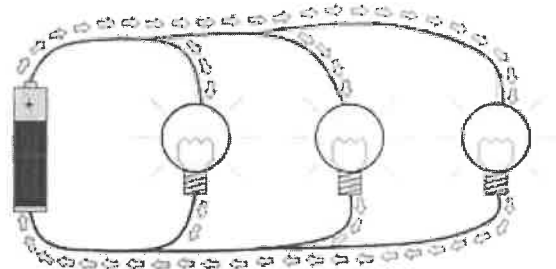
A parallel circuit is rather like separate series circuits connected to the same energy source. The different components are connected by different wires. Therefore, if a bulb blows or is disconnected from one parallel wire, the components in the other circuit keep working because they are still connected to the battery in a complete circuit.

If more bulbs are added in parallel, all the bulbs light up with the same brightness as before, because the potential difference across each is the same (and equal to the battery voltage).

Potential difference is the same in every branch.

Current splits for each branch and is therefore shared by each component.

Parallel circuit



Series & Parallel Circuits



Diagram 1

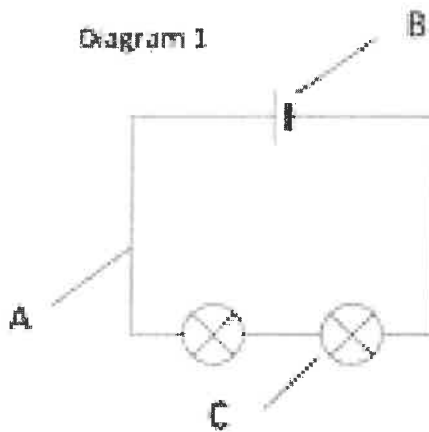
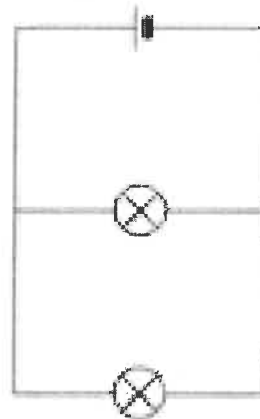


Diagram 2



1. What components do the letters A, B and C represent?

A B C

2. What is the name given to the way the bulbs are arranged in Diagram 1?

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3. What is the name given to the way the bulbs are arranged in Diagram 2?

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4. In a series circuit, like in Diagram 1, how is the brightness of the first bulb affected when the second bulb is connected? Explain why this happens?

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5. In a parallel circuit, like in Diagram 2, how is the brightness of the first bulb affected when the second bulb is connected? Explain why this happens?

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6. Give one example of where we might find a series circuit in everyday life.

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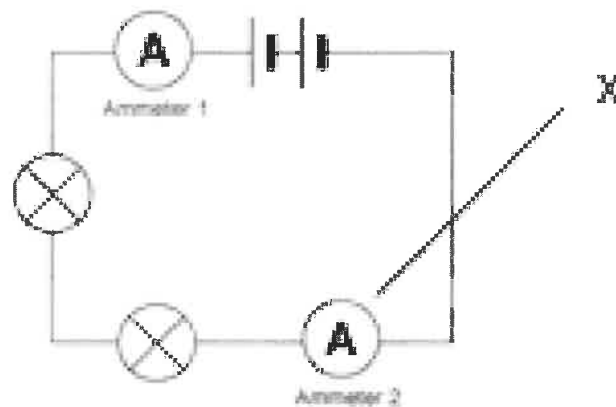
7. Give one example of where we might find a parallel circuit in everyday life.

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8. Explain one advantage of using a parallel circuit rather than a series circuit.

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9. Dan and Tom build a circuit like the one shown below.



(a) Name the component labelled X.....

(b) What are Dan and Tom using the component labelled X to measure?

(c) Dan says, "Ammeter 1 will show a lower reading than Ammeter 2 because the bulbs in the circuit use up the current."

Tom says, "Ammeter 1 will show the same reading as Ammeter 2 because current is not used up."

Who is right?

(d) If Ammeter 1 has a reading of 1.5A, what reading will Ammeter 2 show?A

10. (a) The circuit above contains 2 cells. Describe what would happen to the bulbs if Dan and Tom added another cell.

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(b) Describe how the reading on the reading on the ammeters would change if another cell was added to the circuit.

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