

Electricity – electric circuits

Problem Set 3

Please answer as many of the problems in this booklet as you can.

Please use CAPITAL letters

FIRST NAME

LAST NAME

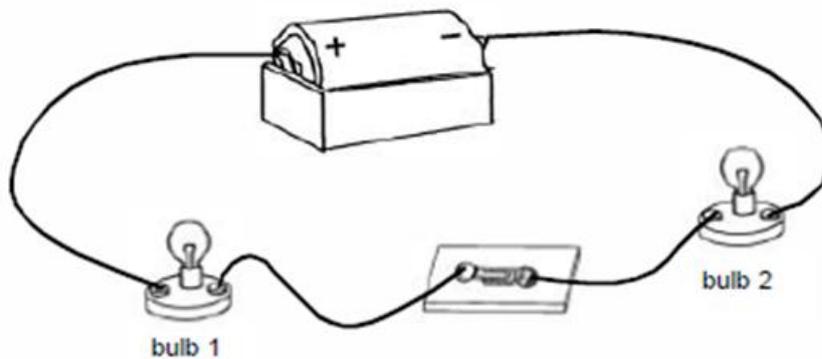
SCHOOL

CLASS

DATE ___/___/___

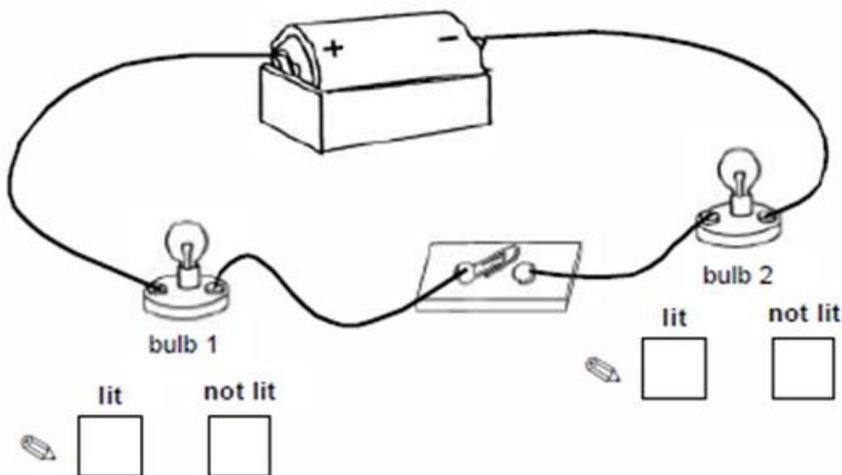
Question 1

In this circuit both bulbs are lit.



The switch is now opened.

A) For each bulb, tick one box (✓) to show if it is lit or not.



B) How did you decide whether the bulbs were lit or not? Tick one box (✓).

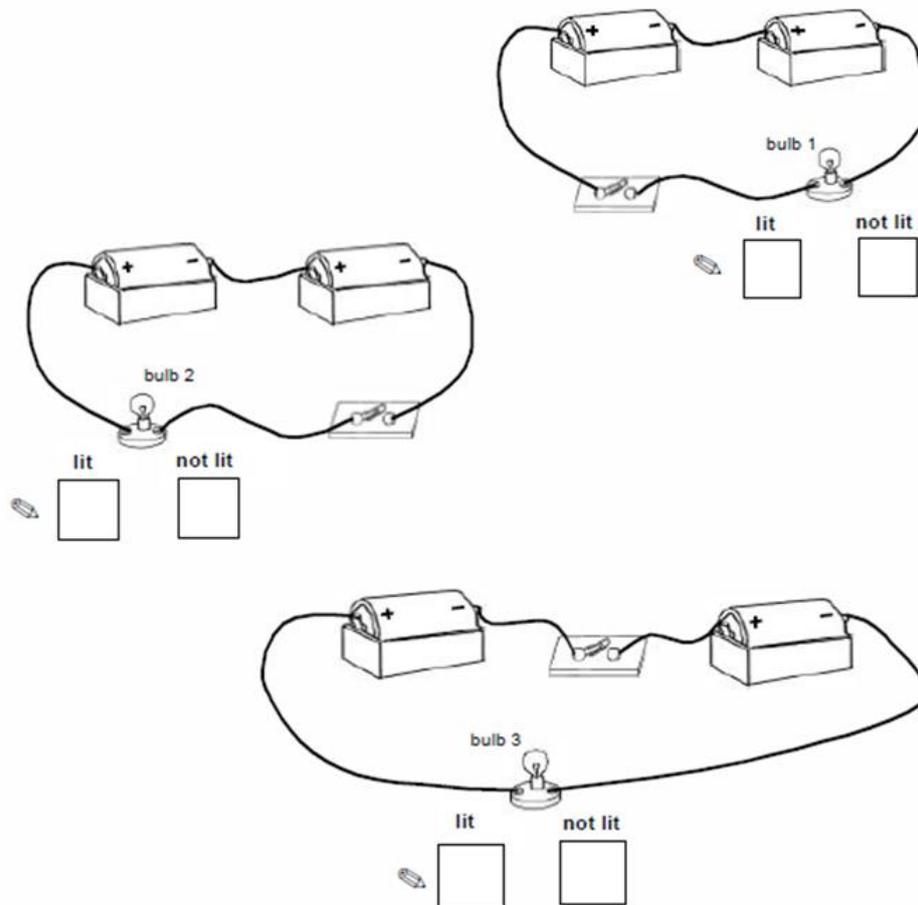
- Current can only flow to bulb 1, but not bulb 2, when the switch is open.
- Current flows to bulb 1 and bulb 2 through different wires.
- When the switch is open the circuit is broken and so no current can flow.
- As the switch is open the current can only flow to bulb 2, but not bulb 1.

Question 2

The circuits shown in the diagrams were set up. In each circuit, when the switch was closed, the bulb lit.

All the switches are now opened.

A) For each bulb, tick one box (✓) to show if it is lit or not.

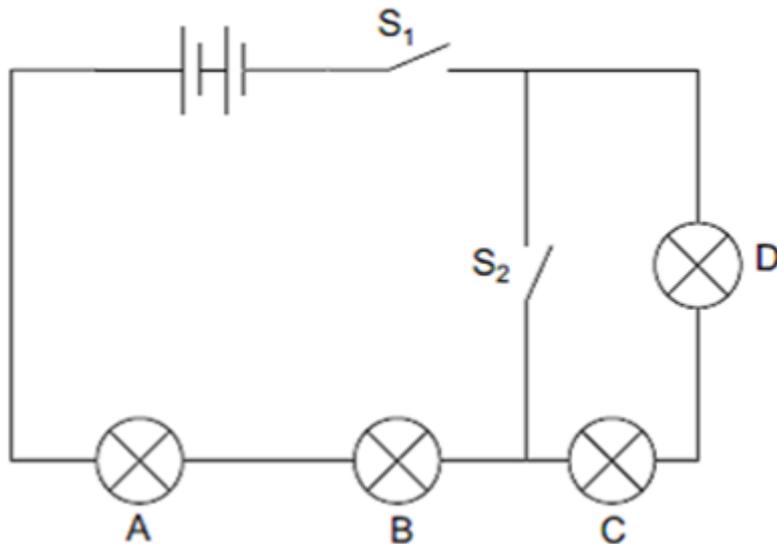


B) Choose the best explanation for your answer. Tick one box (✓).

- The lamp will be on if the open switch is placed after the lamp in the circuit.
- The lamp will be on if it is connected to at least one side of the battery.
- An open switch anywhere in the circuit will prevent current from flowing.
- Only a switch placed next to the lamp can turn it on or off.

Question 3

Lorna built the circuit drawn below. All the bulbs are identical.

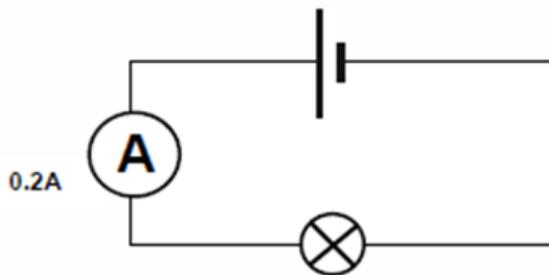


Complete the table below by writing **on** or **off** for each bulb. One has been done for you.

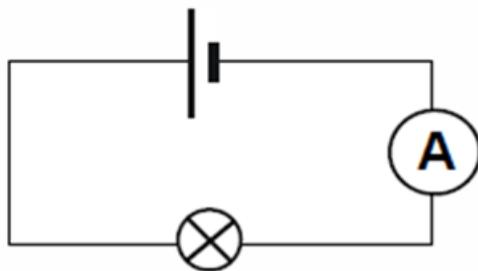
switch		bulb			
S ₁	S ₂	A	B	C	D
open	open	off	off	off	off
open	closed				
closed	open				
closed	closed				

Question 4

In this circuit the bulb is lit and the reading on the ammeter is 0.2 amps.



The ammeter is then moved to the other side of the circuit.



A) What is the reading on the ammeter now? Tick one box (✓).

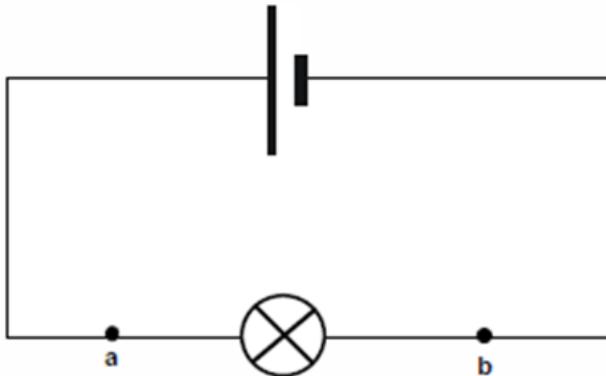
- More than 0.2 amps.
- Exactly 0.2 amps.
- Less than 0.2 amps, but not zero.
- Zero.

B) How would you explain this? Tick one box (✓).

- The current is the same all round the circuit.
- Some** of the current is used up by the bulb.
- All** of the current is used up by the bulb.

Question 5

In this circuit, the bulb is lit.



A) What can you say about the current at points **a** and **b**? Tick one box (✓).

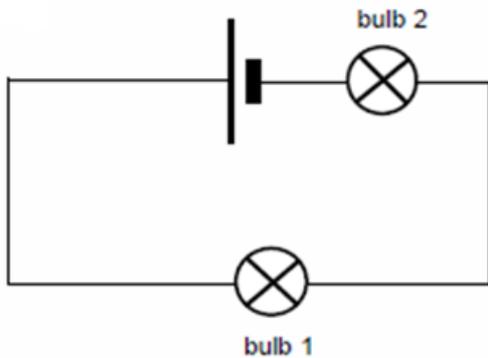
- The current at **a** is bigger than at **b**.
- The current at **b** is bigger than at **a**.
- The current is the same size at **a** and **b**.

B) How would you explain this? Tick one box (✓).

- The current is the same all round the circuit.
- Some** of the current is used up by the bulb.
- All** of the current is used up by the bulb.

Question 6

The two bulbs in this circuit are identical.



A) How bright will the bulbs be? Tick one box (✓).

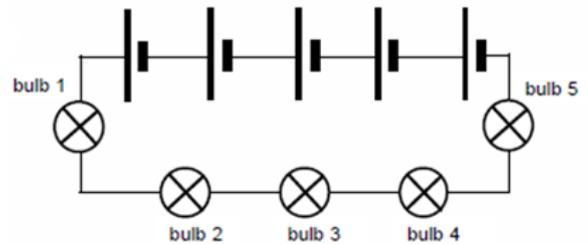
- Both bulbs are lit. Bulb 1 is brighter than bulb 2.
- Both bulbs are lit. Bulb 2 is brighter than bulb 1.
- Both bulbs are lit, with the same brightness.
- Bulb 1 is lit. Bulb 2 is off.
- Bulb 2 is lit. Bulb 1 is off.

B) How would you explain this? Tick one box (✓).

- The first bulb uses up **all** of the current, so there is none left for the other one.
- The first bulb uses up **some** of the current, so there is less left for the other one.
- Bulb 2 is closer to the battery, so it gets more current.
- The current is shared equally between the two bulbs.
- The current is the same everywhere in the circuit.

Question 7

The five bulbs in this circuit are identical.



A) How bright will the bulbs be? Tick one box (✓).

- Bulb 1 is lit. The others are off.
- Bulb 5 is lit. The others are off.
- Bulb 1 and 5 are brightest, then bulbs 2 and 4, and bulb 3 is dimmest.
- Bulb 3 is brightest, then bulbs 2 and 4, and bulbs 1 and 5 are dimmest.
- Bulb 1 is brightest, then they get gradually dimmer as you go round the circuit.
- Bulb 5 is brightest, then they get gradually dimmer as you go round the circuit.
- All the bulbs are lit with the same brightness.

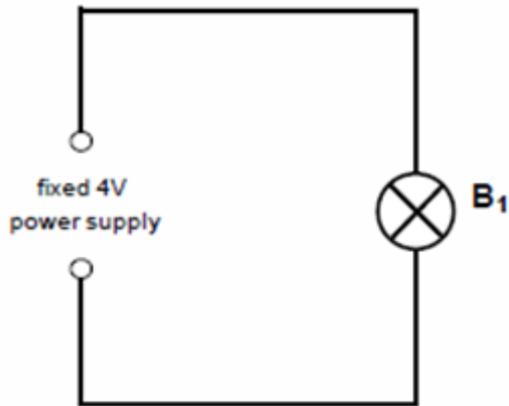
B) How would you explain this? Tick one box (✓).

- The first bulb uses up **all** of the current, so there is none left for the others.
- Each bulb uses up **some** of the current, so there is less left for the next one along.
- The current is shared between the five bulbs.
- The current gets weaker as it gets further from the battery.
- The current is the same all round the circuit.
- The currents from the two terminals of the battery meet at bulb 3.

Question 8

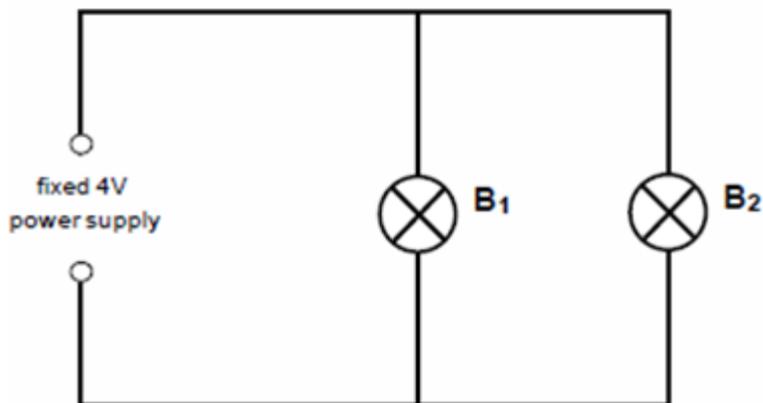
The power supply in this circuit has a fixed output voltage of 4V.

A bulb B_1 is connected to the power supply.



A) What is the voltage across bulb B_1 ? _____ volts

A second identical bulb B_2 is then connected, to make this circuit.

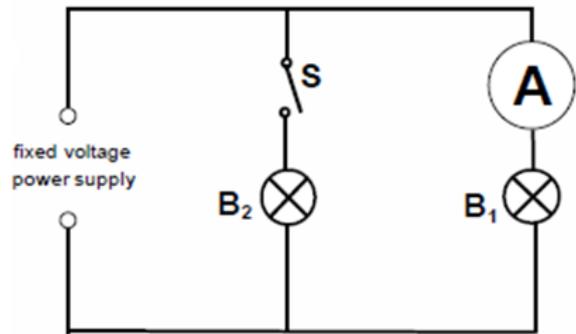


B) What is the voltage now across bulb B_1 ? _____ volts

C) What is the voltage across bulb B_2 ? _____ volts

Question 9

In this circuit, the power supply has a fixed voltage output. Switch S is open. Bulb₁ is lit. There is a reading on the ammeter.



The switch is then **closed**.

A) *What happens to the reading on the ammeter? Tick one box (✓).*

- It gets bigger.
- It stays the same.
- It gets smaller.

B) *What happens to the brightness of bulb B₁? Tick one box (✓).*

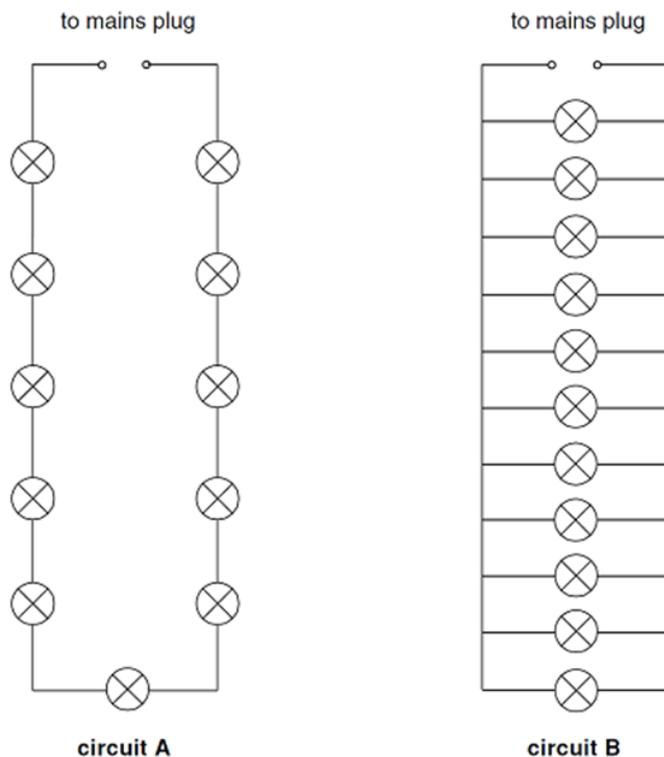
- It gets brighter.
- It stays the same brightness.
- It gets dimmer.

C) *How would you explain this? Tick one box (✓).*

- Some of the current now goes through B₂ bypassing B₁.
- Two bulbs need a bigger current from the power supply.
- The voltage across each parallel branch stays the same.
- The total resistance is now bigger, so the current gets less.

Question 10

Ahmed bought two sets of lights to put on a tree in his garden. Circuit diagrams for the two sets of lights are shown below.



Choose words from the list below to fill the gaps in the sentences.

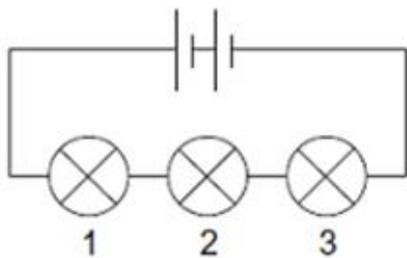
all none some parallel series short

- A) **Circuit A** is a _____ circuit.
- B) If one of the bulbs breaks in **circuit A** _____ of the other bulbs will go out.
- C) **Circuit B** is a _____ circuit.
- D) If one of the bulbs breaks in **circuit B** _____ of the other bulbs will go out.

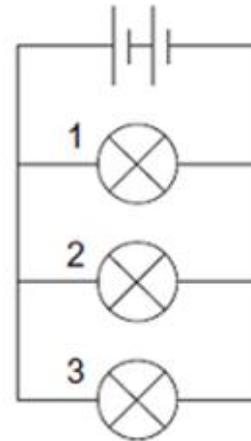
Question 11

In each circuit below, **bulb 1 breaks** and goes off.

Under each circuit diagram below, tick the correct boxes (✓) to show if bulb 2 and bulb 3 are **on** or **off**.



circuit A



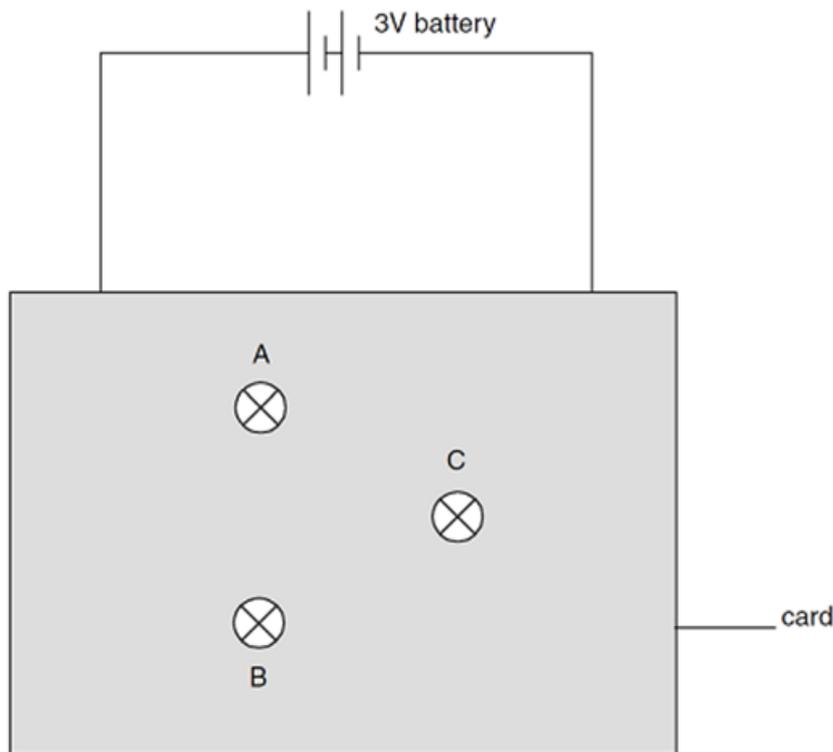
circuit B

	on	off
bulb 1 breaks		✓
bulb 2		
bulb 3		

	on	off
bulb 1 breaks		✓
bulb 2		
bulb 3		

Question 12

Imram built a puzzle circuit with three identical bulbs and a 3V battery. He covered the connections to the bulbs with a piece of card as shown below. The bulbs could be seen through holes in the card.



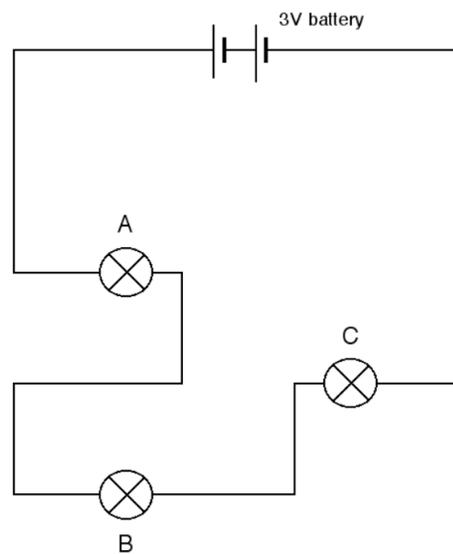
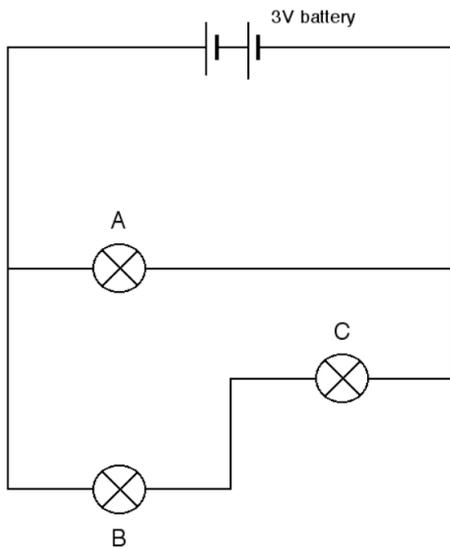
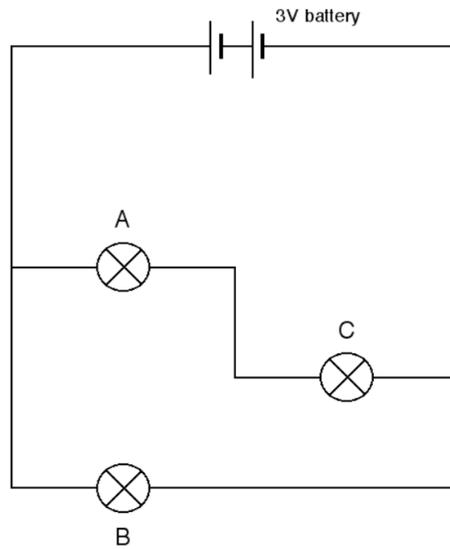
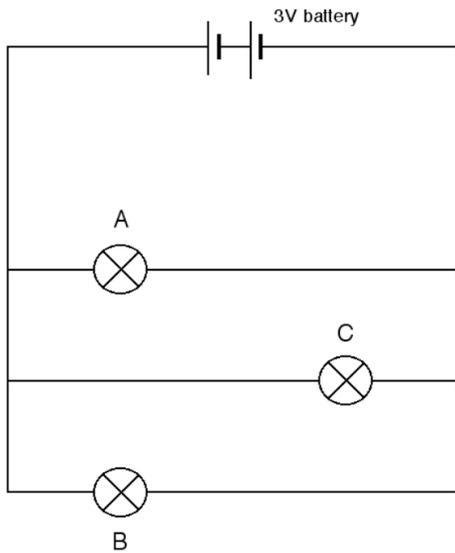
All the bulbs were on but their brightness was different.

Lucy removed bulbs A, B and C in turn. Before connecting each bulb back into the circuit she observed the effect on the other two bulbs. She recorded her observations in the table below.

bulb removed	observations
A	B and C stayed on
B	C went off A stayed on
C	B went off A stayed on

Question 12 (continued)

A) Select the circuit diagram below that shows how the three bulbs could be connected. Use your knowledge of series and parallel circuits, and the observations in the table to help you. Tick the box (✓) next to the correct circuit diagram.



Question 12 (continued)

Imram used three identical bulbs but their brightness was different.

B) Which bulb was brightest? Give the letter. _____

C) Select the best reason for your answer. Tick one box (✓).

I chose this bulb because

- it is nearest the battery.
- it is in parallel to the other bulbs.
- it has wires connecting it on both sides.
- it is in series with another bulb.

**WELL DONE –
NOW YOU’VE FINISHED**