Current and Circuits

Electric charges travel round a circuit to create a current.
Current is measured in amperes (A).
The charges can be positive or negative. Electric charges are the electrical "material" in a circuit.
For charges to flow around a circuit, the circuit must form a loop. We say it is closed.
If the circuit has a gap, it is **open**, and the current is zero.

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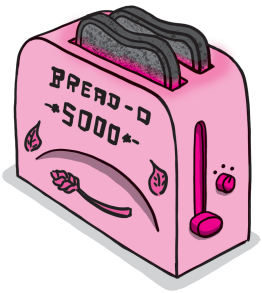
1 Which of these four situations are open open circuits and which are closed circuits?

(a) The bedside lamp is off.

(b) The phone is charging.

(c) The toaster is toasting bread.



(d) A remote control has a missing battery.

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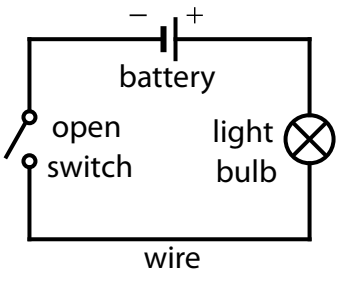
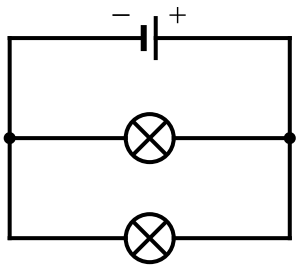
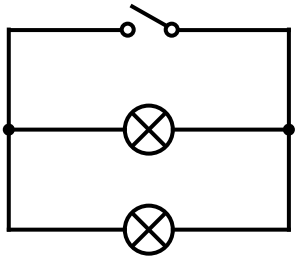
2 Which of these circuits are open and which are closed?



(a)



(b)



(c)

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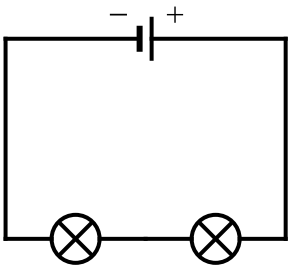
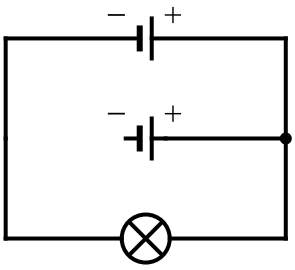
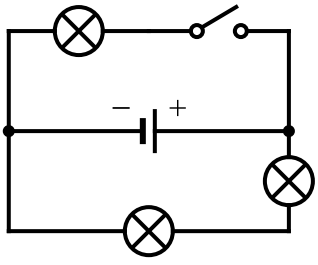
3 Draw around the closed loop in these circuits.



(a)



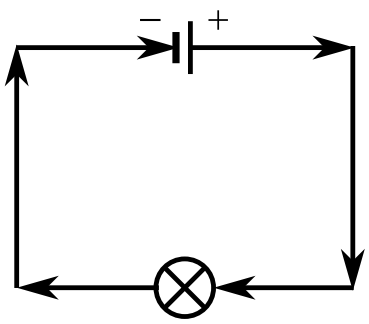
(b)



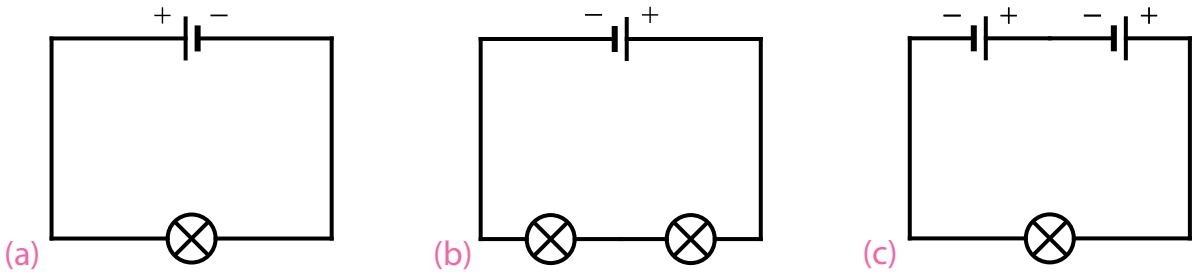
(c)

The direction of the current in circuits is the same as the direction in which positive charges would move.

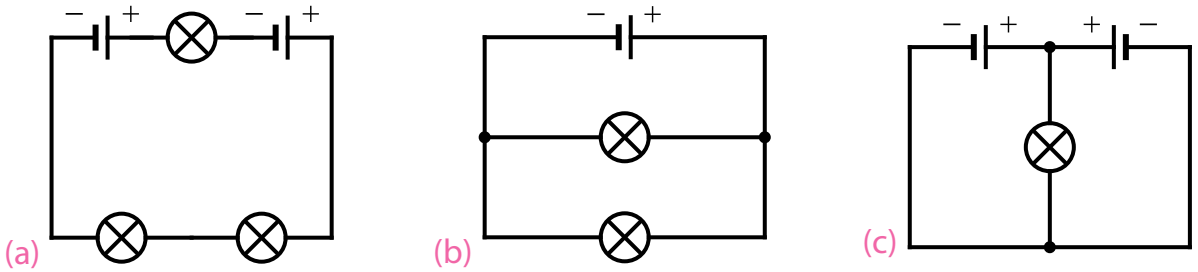
Positive charges will be repelled (pushed away) from the positive $(+)$ terminal of the battery. They are attracted to (pulled towards) the negative $(-)$ terminal of the battery.



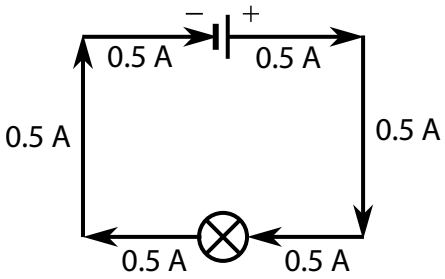
4 Draw arrows on the circuits in the direction of the current.



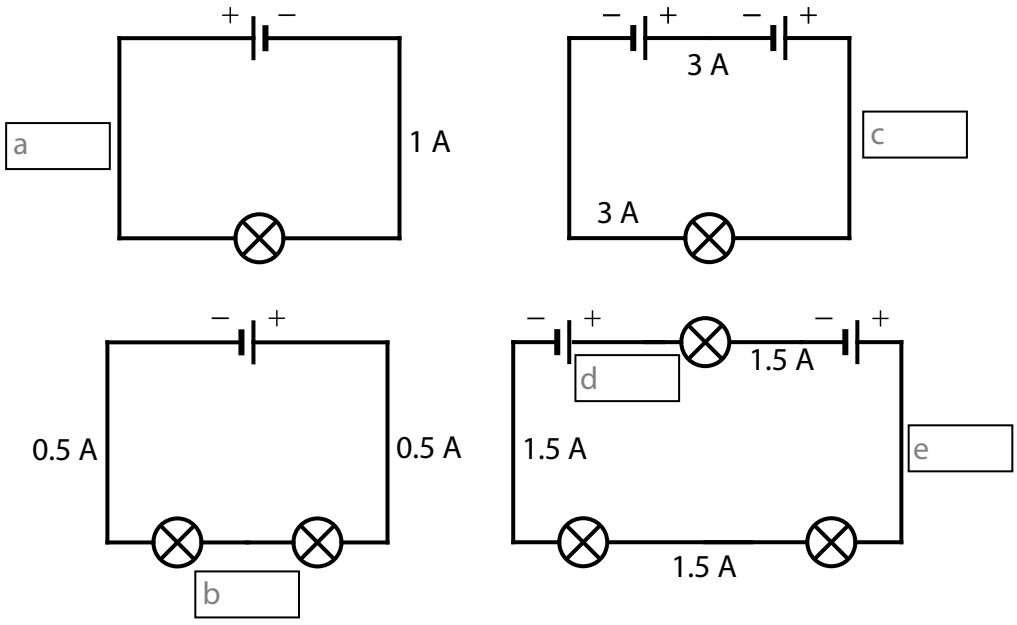
5 Draw arrows on the circuits in the direction of the current. Each line needs an arrow.



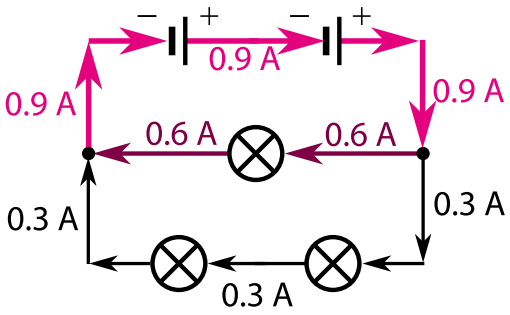
Charges in a circuit cannot be created or destroyed. The **total** amount of current in a closed circuit is the same at all points. This is an important rule of charge and current.



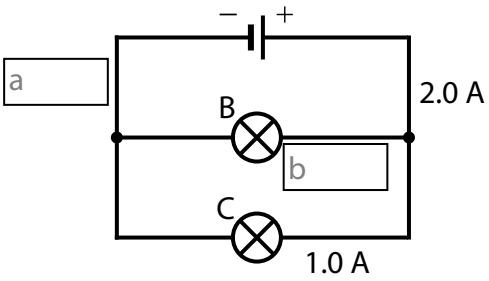
6 Write down the current in each of the boxes.

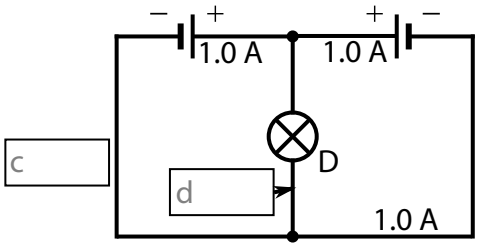


Parallel circuits have junctions. The total current flowing into a junction must be the same as the total current flowing out of the junction.

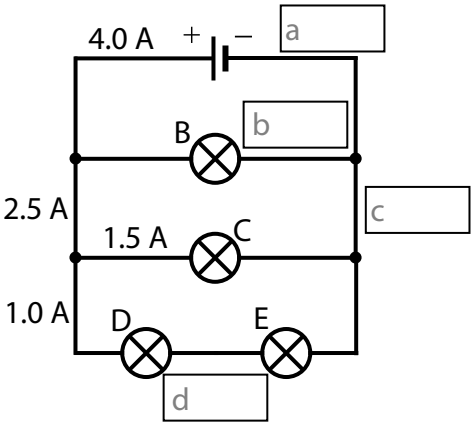


7 Write down the current in each of the boxes on these circuits from question 5.





8 Write down the current in each of the boxes.



If two light bulbs are on the same branch of the circuit, we say they are in series. The current is the same through each bulb.
If two light bulbs are on different branches of the circuit, we say the bulbs are in parallel. The current is shared between the two branches of the circuit.
When current passes through a light bulb, the bulb lights up. For a circuit with identical light bulbs, the brightest one is carrying the most current.

9 Fill in the sentences with the words **same, shared, most, brightness.**

(a) The current through two identical light bulbs in **series** will be the _____. They will have the same _____.

(b) The current through light bulbs in **parallel** will be _____. The branch with the _____ current passing through it will have the **brightest** light bulbs.

10 Go back to the circuits in questions 7 and 8. The light bulbs are identical in those circuits. Label which light bulbs will have the **same brightness**, which will be **brightest** and which will be **dimmest**.