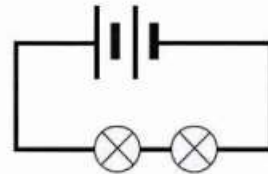


The circuit below shows two lamps. Initially these lamps are of **normal brightness**.

Work out the brightness of the lamp(s) when the following modifications a) to f) are carried out.

- a) One lamp is unscrewed. — Choose from: **off, dimmer, normal** or **brighter**.
 b) One cell is turned around.
 c) Another cell is added the same way around as the others.
 d) Another cell is added the other way around to the others.
 e) Another bulb is added.
 f) Both cells are turned around.



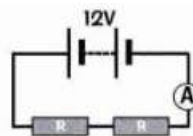
1

Draw a circuit with a 2Ω and 4Ω resistor in series with a $6V$ battery.

- a) What is the total resistance?
 b) Calculate the current in the circuit.

2

The resistances of the resistors in this circuit are equal. What are they if the ammeter reads $1A$?



3

Christmas tree lights are a shining example of lamps in **series**.

What happens if one of the lamps is removed?

Find the **total resistance** of 10 lamps running off the mains ($240V$), if the current in each lamp is $0.5A$. What is the resistance of each lamp?



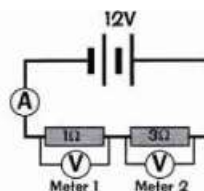
4

Match each series combination a) → d) with the equivalent single resistor 1) → 4).

- | | |
|--------------------------------------|---------------|
| a) 1Ω — 9Ω | 1) 9Ω |
| b) 3Ω — 4Ω — 5Ω | 2) 11Ω |
| c) 6Ω — 3Ω | 3) 12Ω |
| d) 5Ω — 3Ω — 3Ω | 4) 10Ω |

5

- a) Find the **total resistance** in the circuit opposite.
 b) What current will the ammeter show?
 c) Calculate the **voltmeter reading** for Meter 1 and Meter 2.



6

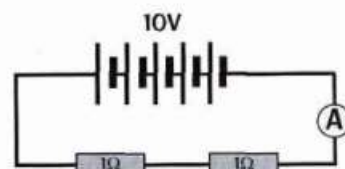
Complete the following, using these words: **decreases, dimmer, up, increased, smaller**

If lamps are connected in **series** the current goes through all the lamps in turn. The more lamps you add, the _____ they get. The ammeter reading _____ because the current is _____. This means the resistance in the circuit has _____.
 When we add more resistors to a series circuit, the total resistance goes _____.

7

Look at the circuit opposite.

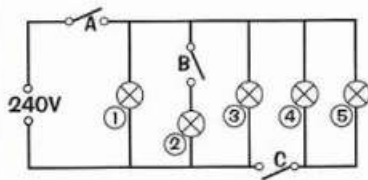
- a) Find the **total** resistance.
 b) The ammeter reading is $5A$. If you wanted to reduce the current to $2A$ (using the same power supply and ammeter), how many **extra 1Ω** resistors would you have to connect in series?



8

9

Study the circuit diagram opposite. Which lamp(s) (1 → 5) are operated by switches A, B and C?



Taking all switches to be closed to start with.
 Switch A operates: _____
 Switch B operates: _____
 Switch C operates: _____

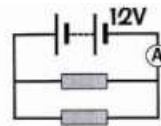
10

Draw a circuit with a 2Ω and a 4Ω resistor in parallel, running off a 6V battery.

- What is the current in the 2Ω resistor?
- What is the current in the 4Ω resistor?
- What is the current in the cell?
- These two resistors are replaced with a single resistor, connected **in series** with the cell. What would this resistance be if the current in the cell stayed the same?

11

The resistances of the resistors in the circuit opposite are identical. The ammeter reads 1A.



What is the resistance of these resistors?

- Look at the diagram opposite and **complete the following**:

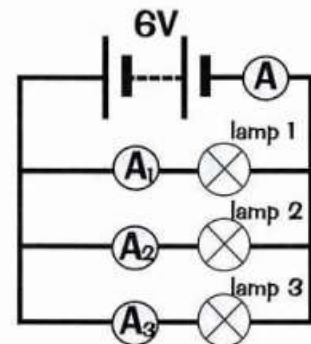
Use these words: less, branch, parallel, A_2 and A_3 , more, A_1

If lamps are connected in _____, the current in the main part of the circuit splits up and goes through each _____.

The brightness of the lamps stays the same the _____ lamps you add in _____.

The ammeter reading at _____ is lower than at (A) but is the same as those at _____.

The total resistance of lamps in parallel is _____ than the resistance of any of the individual lamps.

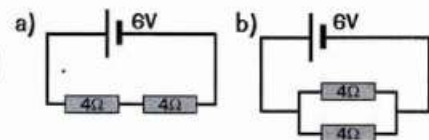


- Look at the diagram again. Work out the **total resistance** of the lamps if each lamp has a resistance of 3Ω . Find the current in A, A_1 , A_2 and A_3 .

12

Look at the two circuits opposite.

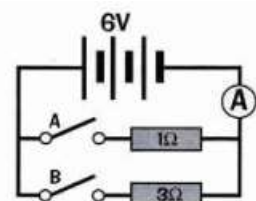
- Find the **current** in each of the parallel branches of circuit (b)
- Find the **current** in the main branch of both circuits.



13

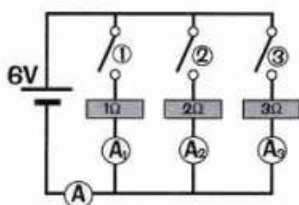
Find the current in the circuit (left) when:

- switch A only is closed.
- switch B only is closed.
- Find the current through the 2 branches (through the 1Ω resistor and the 3Ω resistor). Then find the current in the circuit when both switches are closed.



14

Study the circuit diagram below and **complete the table**.



Switch closed	Reading of current on ammeter			
	A	A_1	A_2	A_3
1 and 2				
1 and 3				
1, 2, and 3				

15