The National Orthodox School Shmaisani

Science Worksheet #2
Electricity

Name: __**Answer key**__ Grade **8 ( )**

Date: **/03/2023**

Relationship between voltage, current and resistance.

1- The mathematical relationship between voltage and current for most fixed resistors is

***V* = IxR**

a) Work out the resistance of a circuit with single light bulb if the voltmeter reading is 9 V and the ammeter reading for the circuit is 4.5 A.

R= V / I = 9 / 4.5 = 2 Ω

b) What would happen to the current of a circuit if the light bulb is replaced with one of higher resistance? The same batteries are used.

There will be a smaller urrent, the light will be dimmer.

2- Complete the following sentences, filling in the gaps.

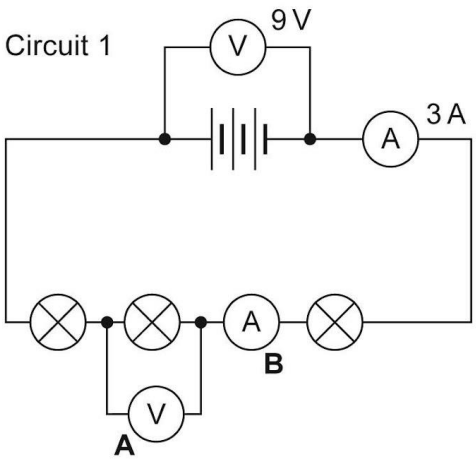
Resistance is the …**opposition**…. to the flow of current. Current is the movement of …**electrons**……. in the wires of a circuit. As the ……**electrons**……. flow they collide with ……**other atoms**…. .

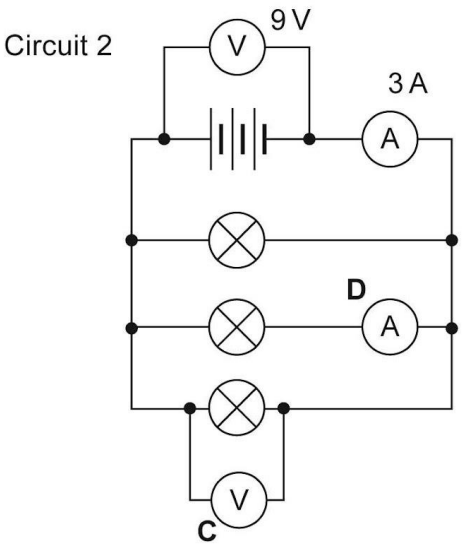
This is the cause of resistance. If there are more atoms in the wire, the resistance is likely to be ……**higher**…….. A long wire has ……**more**……. atoms. The resistance of a long wire is likely to be ……**higher** . than the resistance of a shorter wire.

3- Record what you know about current and voltage in series and parallel circuits.

In a series circuit the current…. **is the same across the components** **In a parallel circuit the current….** **is shared among the components**	**In a series circuit the voltage…** **is shared among the components** **In a parallel circuit the voltage ….** **is the same across the branches**

4- Work out the values of voltage and current on meters **A** to **D** in the two circuit diagrams. All the light bulbs are identical. The ammeters and voltmeters do not affect the circuits.





A ....**9 / 3 =3 V**.....

B ....**3 Amp**.....

C .....**9 V**.....

D ...**3 / 3 = 1 Amp**.....

i. Using ***V* = IxR**, calculate the resistance of the series circuit in task 2.

R= V / I= 9 / 3 = 3Ω

ii. What is the resistance of one bulb? (They are all identical.)

3 ÷ 3 (bulbs) = 1 Ω

iii. Another identical bulb *and* another identical cell are then added to the series circuit. Calculate the resistance of the circuit with four bulbs.

4 Ω

iv. Using *I* = *V* / *R*, calculate the current in the series circuit with four bulbs and four cells.

I= 12 / 4 = 3 Amp

v. What does this tell you about the brightness of the bulbs in this circuit, compared with the original circuit?

That they are the same brightness.

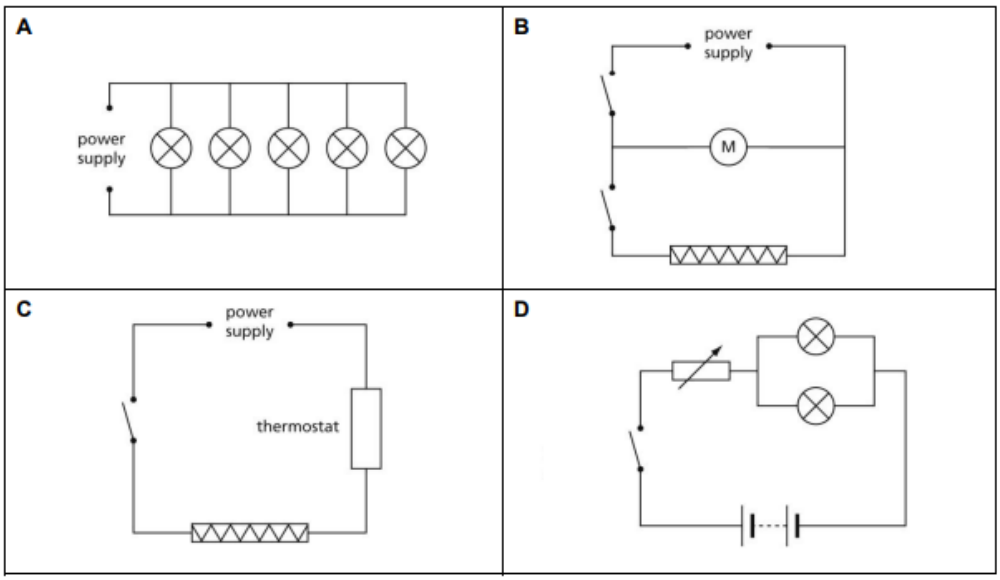
5- Look at the different circuits on the cards on page 2 of this worksheet. Identify whether they are connected in series, in parallel or both.

A .....**parallel**.....

B ..... **parallel**.....

C .....**series**.....

D ..... **series and parallel**.....



6- The circuits on the cards on page 3 come from a hairdryer, water heater, Christmas tree lights, and car lights dimmer. Try to match each circuit to its appliance.

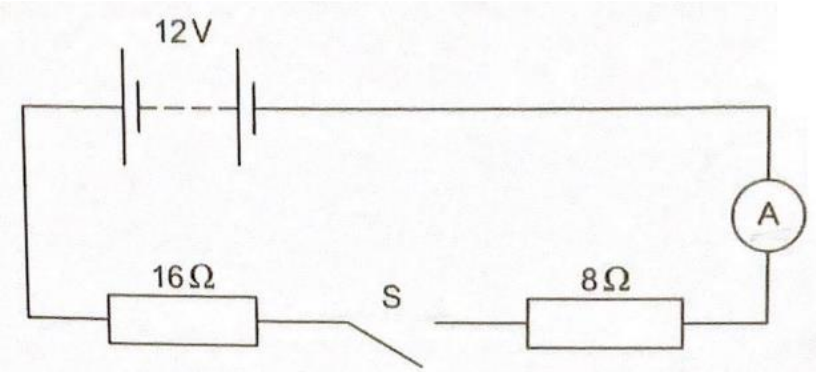
A ....**Christmas tree lights**.....

B .....**Hairdryer**.....

C .....**Water heater**.....

D .....**Car lights dimmer**.....

7- The circuit in the figure below uses a 12 V battery.



i. Switch **S** is open as shown in the figure.
State the value of

- The reading on the ammeter: …**0 Amp**……
- The voltage across S: ……**12 V**……

ii. Switch **S** is closed.

- Calculate the current in the ammeter.

I = V / R = 12/24 = 0.5 Amp

- Calculate the voltage across the 8Ω resistor.

V= I x R = 0.5 x 8 = 4 V