

S2 Science

ELECTRICITY

Name: _____

Form Class: _____

Science Teacher: _____

Contents:

Success Criteria pages 2 - 3

Summary Notes pages 4 - 7

Homework pages 8 - 11

Websites & Videos (QR) page 12

Success Criteria

Level	Success Criteria - Static Electricity	
2	Name the two types of static charge.	
2	Give a definition of a neutral material.	
2	Predict the charge of a material given information about the charges present.	
3	Explain how the Van de Graaf generator generates charges.	
3	Explain why all the charges on the dome of the Van de Graaf are like charges.	

Level	Success Criteria - Circuits	
2	Identify correctly a variety of circuit symbols	
2	Use electrical symbols to draw circuit diagrams	
2	Describe what factors a circuit needs to work correctly	
2	Explain that in a circuit the electric current flows	
3	Identify correctly a series circuit and a parallel circuit	
3	Build series and parallel circuits	

Level	Success Criteria - Current and Voltage	
3	Give a definition of current	
3	Give a definition of voltage	
3	Describe the features of series and parallel circuits	
3	Explain the benefits of parallel circuits compared to series circuits	
3	Calculate current and voltage in a series circuit using a simple mathematical formula	
3	Calculate current and voltage in a parallel circuit using a simple mathematical formula	

Summary Notes

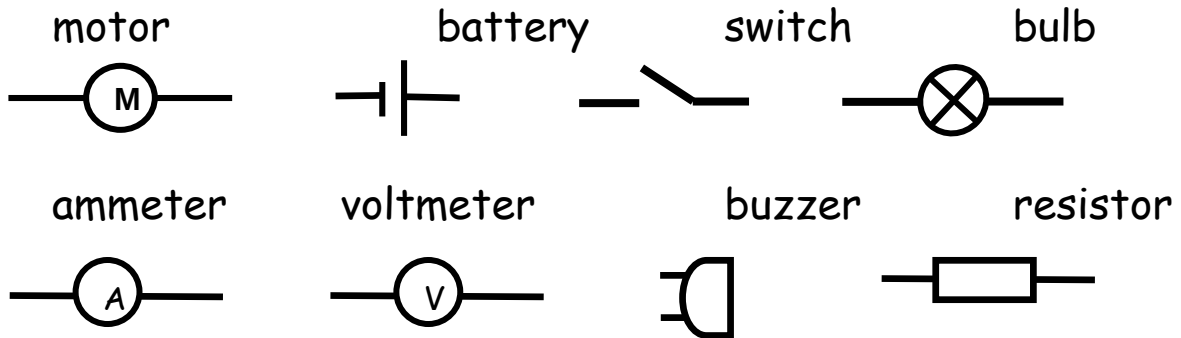
Static Charges

- ☐ There are 2 types of charges, **positive** and **negative**.
- ☐ A **neutral** material has the **same** number of positive and negative charges.
- ☐ A **negatively** charged material has **more negative** charges than positive ones.
- ☐ A **positively** charged material has **less negative** charges than positive ones.
- ☐ **Like** charges **repel** each other.
- ☐ **Opposite** charges **attract** each other.
- ☐ All the charges on the dome of a Van de Graaff generator are **like** charges because the charges in each hair **repel** each other making your hairs stand up!
- ☐ The **charges** on a Van de Graaff are made when the belt rubs on the brushes which transfer these charges to the metal dome at the top.
- ☐ The Van de Graaff gives off sparks of electricity because the charges **jump** from the dome to any object which is close enough and connected to the earth.



Circuit Symbols

☐ The components used in circuits are drawn below.

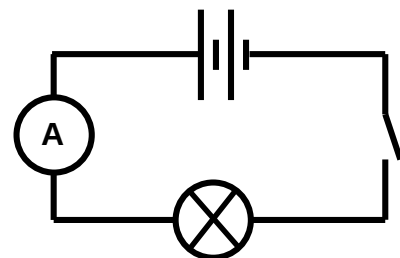


Current

☐ **Current** is number of negative charges (electrons) **flowing** in a circuit.

☐ **Current** is measured in **amperes**.

☐ An **ammeter** is used to measure current. The ammeter is placed **beside** (in **series**) with the component in a circuit.

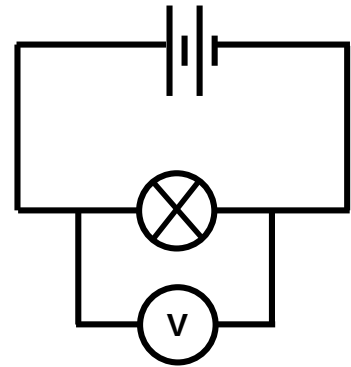


Voltage

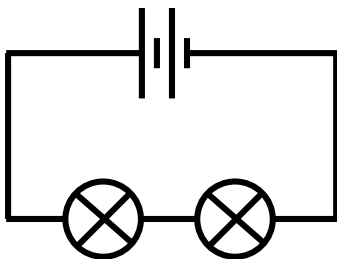
☐ **Voltage** is the **push** (or **energy**) given to the charges to allow a current to flow.

☐ **Voltage** is measured in **volts**.

☐ A **voltmeter** is used to measure voltage. The voltmeter is placed **across** (in **parallel** with) the component in a circuit.



☐ **Increasing** the number of **batteries** **increases** the **voltage** (push or energy) available to the circuit.

Series Circuits

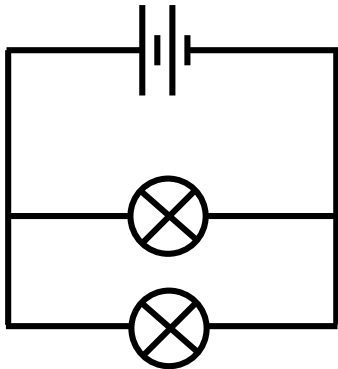
☐ In a **series** circuit there is only **one path** for the current to flow along (it is one big loop).

☐ Adding **more** components in a **series** circuit **decreases** the **current** flowing.

☐ The current is the **same** in all parts of a series circuit.

$I_s = I_1 = I_2 = I_3$. This is because there is only one path for the current to flow around.

☐ The **voltages** across the components in a series circuit **add** to the supply voltage $V_s = V_1 + V_2 + V_3$

Parallel Circuits

☐ In a parallel circuit there is **more than one** path for the current to flow along. The paths are sometimes called branches. (It looks like a ladder).

☐ The **voltage** is the **same** across all the components in a parallel circuit.

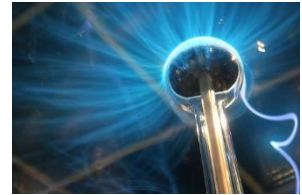
$$V_s = V_1 = V_2 = V_3$$

☐ The **current** in each branch of a parallel circuit **add** to the supply current. $I_s = I_1 + I_2 + I_3$

☐ An **advantage** of parallel circuits is that if one component is broken or switched off, the other components will still work.

Parallel circuits are used in house **lighting**, **car wiring** and the **sockets** in a house.

Homework



Homework 1 - Charges

1. *State* the 2 types of charges found in a material.

2. *Describe* what happens when 2 like charges are brought close together.

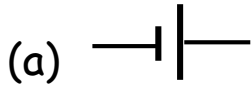
3. *Describe* what happens when 2 opposite charges are brought close together.

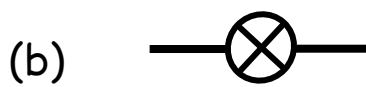
4. *Explain* how the Van de Graaff generator transfers charge across the dome from the belt.

5. *Explain* why you do NOT get an electric shock when you touch the Van de Graaff generator if you are standing on a plastic box.

Homework 2 - Circuits

1. *Name* the following circuit symbols.











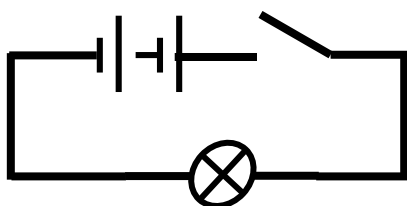
2. *Draw* a **series** circuit which contains a battery, switch and 2 bulbs.

3. *Draw* a **parallel** circuit which contains a battery, switch and 2 bulbs.

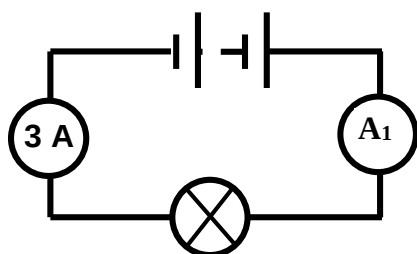
4. Describe one difference between series and parallel circuits.

Homework 3 - Current

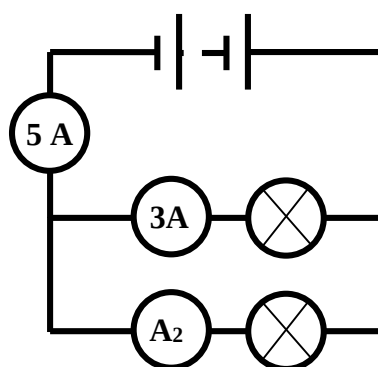
1. You want to measure the current that is travelling through the bulb in this circuit. Copy the diagram and **add** an ammeter in the **correct** position.



2. What will be the reading on ammeters A_1 and A_2 in these circuits?



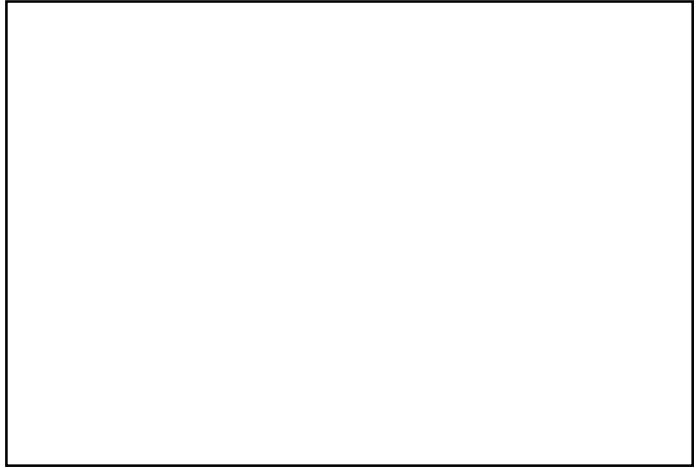
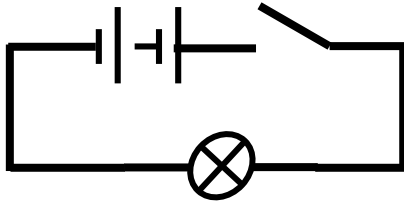
A_1 _____



A_2 _____

Homework 4 - Voltage

1. Copy the circuit and **add** a voltmeter in the **correct** position to measure the voltage across the bulb.



2. *Describe* what the word voltage means.

3. *Describe* a way to increase the voltage available to a circuit.

4. A circuit contains 4 batteries which each provide a voltage of 1.5 volts. What is the total voltage?
Space for calculation:

Useful Websites



<http://www.explainthatstuff.com/electricity.html>

<https://www.theschoolrun.com/what-is-electricity>

Videos



What is Electricity?- By Power Bytz Bill Nye Science Guy- Electricity