

WJEC (Eduqas) Physics GCSE

7.3: Static Electricity

Detailed Notes

(Content in **bold** is for higher tier **only**)

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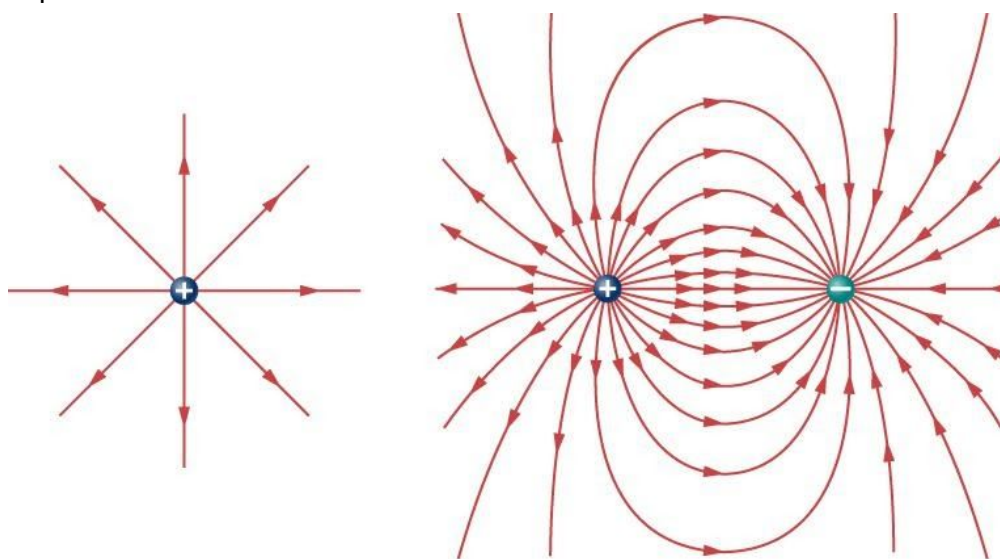


Electrical Charges

Charged objects will experience a force when placed in an **electric field**. Objects can become charged from **electron transfer**. Electrons are negatively charged sub-atomic particles that can flow between two conductors or be transferred by **friction** between two insulators.

The force experienced in an electric field is a **non-contact force** and can be **attractive** or **repulsive**. If two **like** fields or charges interact, they will **repel**. If two **opposite** fields or charges interact, they will **attract**.

Electric fields are radial and can be represented using field lines with arrows that point in the direction a positive charge would go (i.e. **towards negative** charges.). The field lines sit at **right angles** to the surface. The **stronger** the charge, the **more** field lines there are and the **stronger** the force experienced.



Point source electric field diagrams (openpress.usask.ca).

Charge Density

Charges are **not evenly distributed** across a surface and the **shape** of the surface can affect where the charge is concentrated. Electric fields are concentrated to be strongest at **curved points** on a surface. If the curve is very **sharp**, charge density becomes **very large** meaning electrons are lost or gained **very quickly** at this point.

Points like this can be known as **action points**. They are used in devices such as **lightning rods**, that have **sharp points** to redirect lightning to try and reduce any damage from a strike.





Static Electricity

Friction Transfer

When two insulators are rubbed together electrons are **transferred** from one to the other. This forms a **positive** charge on the object losing electrons and a **negative** charge on the object gaining electrons. The object that loses or gains electrons depends on the materials involved. These insulators become charged because the electrons cannot flow and are only transferred by rubbing. The objects become **statically charged**.

If conductors are rubbed, electrons will **flow** in and out of them cancelling any overall effect, so they remain neutral.

Sparking

This occurs when enough charge builds up, and the objects are close but not touching. The “spark” is when the charge jumps through the air from the **highly negative** object to the **highly positive** object to balance out the charges.

