Magnetic Fields

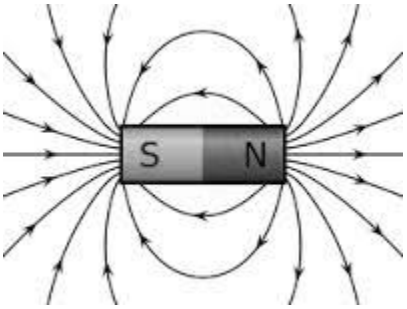
- Magnet – object that exerts a magnetic field.
- Magnetic field – a 3D area (field) that causes a force on magnetic objects such as iron.

We can map this area of magnetic force. 'Field map'

Iron slivers (filings) will line up.

- Magnetic force is a vector, so we must have direction too.
- We use the 'north' end of a small compass as the direction pointer.

Result – when we connect all the iron filings:



Rule: Magnetic force lines will come
OUT of NORTH and INTO the SOUTH

Field lines NEVER CROSS. The force is exerted one way…not two.

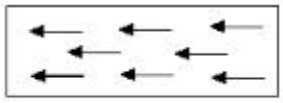
Magnetic Law: Like poles (N-N and S-S) repel and unlike poles (N-S) attract. The pointy end of the compass is a north pole so…. Think about this→ This means our geographic north pole is actually magnetic **south** pole!

Applications

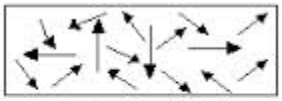
1. MagLev Cars – Use 12.1 in your text to sketch the MagLev train (car) and describe how this work.
2. Northern Lights – charged solar particles interact with strong magnetic field and O2 and N2 particles → Ek converts to light! Read about this in 12.1 as well.

Domain Theory of Magnetism

A 'domain' is a small magnetized area of an object. When all domains are aligned, the magnet is at maximum strength.



Magnetised
(domains lined up)



Unmagnetised
(randomly orientated domains)

- Dropping magnet mixes up domains → weakens it
- Snap magnet in half → each ½ weaker
- Heating magnet – more Ek – jumbles domains → weakens

Curie point – temperature when no longer magnetic