

Chapter – 13: Fun with Magnets

- Magnet – attracts other things – iron, steel, nickel, cobalt
- Made of – iron, steel or other alloys – magnetization – artificial magnets
- Different shapes, sizes – different purpose
- Most common – bar magnet – long, rectangular bar
- Other shapes – horseshoe, cylindrical (rod), button, ring

How magnets were discovered

- Discovered by chance – by a shepherd – Magnes – ancient Greece
- Magnes – always carried – wooden stick – end of stick covered with iron piece
- One day, he felt – iron piece is being pulled away – attracted by rock
- Rock – natural magnet – named ‘magnetite’ – named after Magnes
- Some people – believe – magnetite – first discovered in Magnesia, Turkey
- Magnetite – properties –
 - Attracted iron pieces
 - Pointed in same direction (north – south) – suspended freely – used by sailors – known as leading stone

Magnetic and non-magnetic materials

- Magnetic –
 - Materials – attracted by magnets
 - Iron, steel, nickel, cobalt
 - Products made of these materials – also magnetic
 - Magnetic materials – converted to magnet – magnetization
- Non-magnetic –
 - Materials – not attracted by magnets
 - Wood, plastic, paper, rubber, aluminium, diamond, lead, stone, etc
 - Products made of these materials – also non-magnetic
 - Cannot be converted to magnet – by any means
- Lots of pins – fall on the floor – pick them up by magnets – all at once
- Screws – mixed with wood shavings – separate them – with a magnet

Pull (attraction) of magnets can pass through non-magnetic materials

- Activity –
 - Take a plastic cup – fix it on a wooden stand
 - Place a magnet inside the cup – cover it with lid
 - Take a short thread – tie a paper clip on one end – tie the other end on the base – exactly below the cup
 - IMP. – length of thread – a bit shorter than the height of cup
 - Bring the paper clip near cup – leave it there – attracted by the magnet
- This activity – confirms – attraction of magnets – pass through non-magnetic materials
- BUT
- This attraction – cannot pass through magnetic materials
 - Take a magnet – place an iron piece near it – attracted by the magnet – sticks to the magnet

- Place another piece of iron near previous iron piece – new piece – not attracted

Poles of a magnet

- Bar magnet – put inside – heap of iron fillings
- Iron fillings – stick to the magnet – maximum at the ends
- Force of attraction – maximum at the ends
- This region – attraction of magnets – strongest – poles
- Each magnet – whatever shape – always 2 poles
- One pole – north pole – another pole – south pole
- Rub a magnet inside soil – rub off all the dirt – IF – some items still stuck to the magnet – soil contains iron
- Like poles –
 - Same type of poles – North and North OR South and South
 - Repel each other
- Unlike poles –
 - Different type of poles – North and South
 - Attract each other

Properties of Magnets

- Freely suspended magnet always points in North-South direction –
 - Tie a magnet to a thread – suspend it freely
 - Always points in north-south direction
 - One end of magnet – points in the north direction – north-seeking OR north pole
 - Another end of magnet – points in the south direction – south-seeking OR south pole
 - Other objects – do not behave the same way
 - 4 major directions – North (N), South (S), East (E), West (W)
 - 4 other directions – North-East (NE), North-West (NW), South-East (SE), South-West (SW)
 - Sun – rises from east – every morning
 - Face the sun – extend your arms – left arm – points in the north – right arm – points in the south
- Like poles repel, unlike poles attract –
 - Like poles –
 - Place 2 magnets side by side – like poles in front of each other
 - North of one magnet – in front of North of another
 - South of one magnet – in front of South of another
 - Magnets repel each other – run away
 - Unlike poles –
 - Place 2 magnets side by side – unlike poles in front of each other
 - North of one magnet – in front of South of another
 - South of one magnet – in front of North of another
 - Magnets attract each other – come near

Finding directions

- Freely suspended magnet – points in North-South direction
- This property – used by sailors and many more – find directions – without sun

- Compass – device – finds directions
- Consists of needle – made of magnet – one side coloured red – points in North direction – other directions – marked on the compass

Making Your Own Magnet

- Many ways –
 - Stroking method –
 - Take a bar magnet – rub one end on the iron piece – multiple times
 - Repeat this – 30-40 times
 - Iron piece – converts to a magnet
 - End of iron piece – where the stroke ends – pole generated – opposite to the magnet's pole being rubbed
 - Using electricity –
 - Take an iron piece – wind a copper wire like a coil around it
 - Electric current – passed through the coil
 - Iron piece – starts behaving as a magnet
 - Electricity turned off – magnetism vanishes
 - These magnets – called electromagnets

Precautions in Handling Magnets

- Many ways – magnets lose their magnetism
 - Never heat a magnet
 - Never hit a magnet with hammer
 - Never drop a magnet
 - Store the magnets properly

How to store magnets properly

- Stored properly – when not in use – lose magnetism – if not stored properly
- Bar magnets –
 - Stored in pairs – separated by piece of wood
 - Unlike poles – kept on same side
 - Soft iron bars – kept across the ends of the bar magnet
- Horseshoe magnets –
 - Both poles in same direction
 - Soft iron bar – kept across the ends
 - Stored singly – not in pairs

Uses of magnets

- Used in many places –
 - Hold objects – refrigerator doors, doors at home, etc
 - Separate items – iron scrap separated from other scrap materials
 - Making compasses – compass needle is made of a magnet
 - Various other products – as an electromagnet