8.3.5 MAGNETIC FIELDS

Electric currents also produce magnetic fields and these fields are used in different devices in the home

5.1 Describe the **behaviour of the magnetic poles** of bar magnets when they are **brought close together**

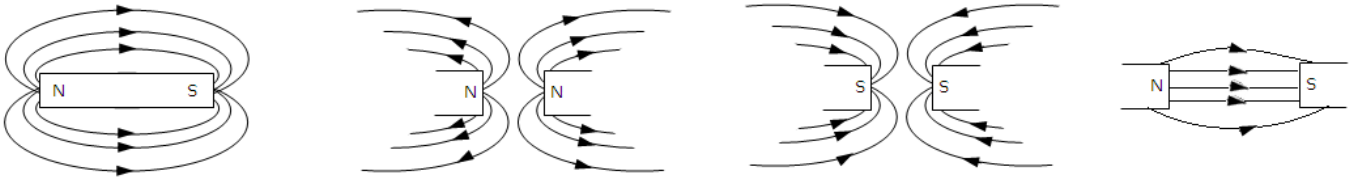
- Magnets – natural magnets from magnetite, has a north and a south pole and aligns itself to north/south
  - Poles occur in pairs – magnetic dipole, and cannot be isolated (i.e. only North pole)
- When two poles are **brought close together**, they **exert forces between each other**
  - **N and N repel, S and S repel, N and S attract**
  - **Like** poles **repel**, **unlike** poles **attract**
- Force increases when closer

5.2 Define the **direction of the magnetic field** at a point as the **direction of force** on a very small **north magnetic pole** when placed at that point

- **Magnetic field** – field **surrounding a magnetic pole**, that **exerts forces** on other poles in the field
- **Direction of field** is the direction of force on a small north pole placed on that point
  - **North pole of a magnet points towards** direction of field
  - Magnetic field strength – B, similar to electric field strength

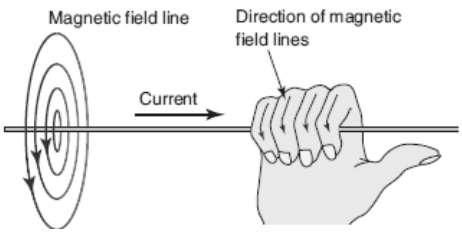
5.3 Describe the **magnetic field around pairs of magnetic poles**

- Magnetic fields **represented by lines** – from N to S, **amount of lines** represents strength
- Magnetic field always goes **away from N** and **towards S** around pairs of magnetic poles



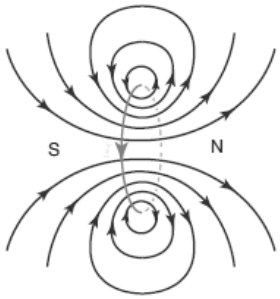
5.4 Describe the **production of a magnetic field** by an electric current in a straight current-carrying **conductor** and describe how the **right hand grip rule** can determine the direction of current and field lines

- **Magnetic field** produced by electric current are **concentric circles around conductor**
  - Oersted – compass was **deflected at right angles** to wire
  - This is because **N aligns in same direction** as field
- Direction of current and field lines through **right hand grip rule**
  - Thumb points at direction of **conventional current** (+ to -)
  - Fingers curling at direction of **magnetic field lines**
- Diagram of magnetic field sometimes drawn **perpendicular to paper**
  - Current **going in** is ⊗, current **going out** is ⊙



5.5 Compare the **nature and generation of magnetic fields** by **solenoids** and a **bar magnet**

- Wire carrying a current **bent into a loop**, so that the magnetic field direction from the **right of loop**, goes to the **left**, similar to a **bar magnet**
- Solenoid – straight wire **wound into a helix**
    - **North** is towards **direction of convection current**
        - OR N = anticlockwise, S = clockwise
    - Different to bar magnets, as **field continue to pass through** the inside of solenoid



5.P1 Plan, choose equipment or resources for, and perform a first-hand investigation to **build an electromagnet**

- See Experiment 5.P1 in 8.3 Experiment Booklet

5.P2 Perform a first-hand investigation to observe magnetic fields by mapping **lines of force**: around a **bar magnet**, surrounding a **straight DC**, a **solenoid** and present information **using ⊗ and ⊙** to show the **direction of a current and direction of a magnetic field**

- See Experiment 5.P2 in 8.3 Experiment Booklet

5.P3 Identify data sources, gather, process and analyse information to explain one **application of magnetic fields** in **household appliances**

- Magnetic discs – flat circular surface with **magnetic coating**
- Data arranged using a **read/write head** with coil wrapped
    - **Magnetic head** magnetises spots on disks
    - Can be reversed changed by **reversing current**