

Magnetic fields

Background

"A magnetic field is the magnetic effect of electric currents and magnetic materials. The magnetic field at any given point is specified by both a direction and a magnitude (or strength); as such it is a vector field."

Source: https://en.wikipedia.org/wiki/Magnetic_field

Introduction

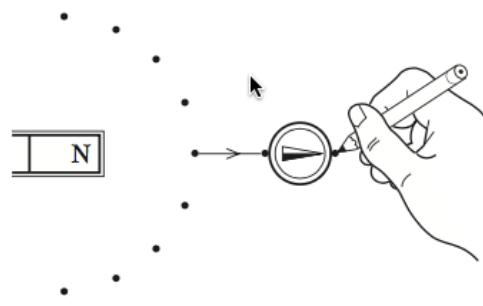
Experiment

Equipment

- Plotting compass
- Bar magnets
- Pencil
- Ruler

Method

- I. Place your bar magnet in the middle of a sheet of paper
- II. Draw around the magnet, remove the magnet and label the pole
- III. Replace the magnet in the drawn box
- IV. Place the plotting compass around the magnet
- V. Put a dot where the arrow head of the compass is pointing
- VI. Put a dot where the back of the arrow is
- VII. Remove the plotting compass and use a ruler to join the dots, then draw an arrow head
- VIII. Put the plotting compass back on the paper and align the arrow head of the compass with the drawn arrow
- IX. Draw at least five complete lines that go from the edge of the paper to the magnet or vice versa
- X. Repeat with two bar magnets fixed two cm apart with both N-N (or S-S) and N-S



Conclusion

Sketch the three magnetic field patterns for:

1. A simple bar magnet

2. Two bar magnets, N-N (or S-S)

3. Two bar magnets, N-S

Analysis

What do you notice about the direction of the field lines?

How would you describe the pattern of the simple bar magnet?

‘Demonstration

Take the 3-d magnetic field demonstrator and ensure the magnet is removed
Shake the box so the iron filings are spread uniformly throughout the mineral oil

Sketch or describe what you see

How is this different from the magnetic field patterns you have already seen?

How far do the magnetic field lines extend?

What is the relationship between the strength of the magnetic field and the concentration of field lines?