

Key Concepts:

Magnetic materials (iron, nickel, cobalt, steel) can be magnetised or attracted to a magnet.

Permanent magnets produce their own persistent magnetic field and retain their magnetism.

Induced magnets are temporary, becoming magnetic only when placed in an external magnetic field.

Magnetic field lines go from North to South, never cross, and show field strength by their density.

Interaction: Opposite poles attract, like poles repel.

Section A: Key Terms & Concepts

1. Complete the sentences below using appropriate scientific terms:

- a) A permanent magnet _____ magnetic field and _____ its magnetism.
- b) An induced magnet is a _____ magnet, meaning it only becomes magnetic when it is _____

2. List three common magnetic materials.

3. Draw the magnetic field lines around the bar magnet shown in Figure 1. Include arrows to show the direction of the field.



Figure 1: Bar Magnet

Section B: Core Concepts & Explanations

4. Answer the following questions:

- a) Explain the key difference between a permanent magnet and an induced magnet.

- b) Describe how a compass can be used to determine the direction of a magnetic field line.

- c) Explain why a permanent magnet can attract an unmagnetised magnetic material (e.g., an iron nail), but cannot repel it.

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- d) Describe the properties of a 'soft' magnetic material and give one common application.

Section C: Exam Application & Extended Writing

5. Figure 2 shows two bar magnets interacting.



Figure 2: Interacting Bar Magnets

- a) Draw the magnetic field lines between the two magnets in Figure 2, including arrows to show their direction. State the type of force between them.

- b) Explain the process of magnetic induction and how it leads to the attraction between a permanent magnet and an unmagnetised iron nail. Discuss the forces involved and why repulsion is not observed in this scenario.
