

Magnetism Electromagnetism

GCSE Physics · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Explain the difference between a permanent magnet and an induced magnet, and why an induced magnet always attracts. (3 marks)

Step 1 · Permanent

Produces its own magnetic field all the time (for example a bar magnet).

Step 2 · Induced

Becomes a magnet only when placed in a magnetic field; it loses most or all of its magnetism when removed.

Step 3 · Always attracts

The induced pole nearest the magnet is always opposite to the magnet's pole, so the force is always attraction.

Answer: Permanent: own field; induced: magnetic only in a field; induced poles are opposite, so it attracts

Check: Iron and steel paper clips are induced magnets near a bar magnet.

2. Now try one with the steps

Describe how to plot the magnetic field pattern of a bar magnet using a plotting compass. (4 marks)

Step 1 · Start

Step 2 · Move

Step 3 · Join

Step 4 · Repeat

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. State what happens when two north poles are brought close together. [1]

2. Name four magnetic materials. [2]

3. Describe the difference between a permanent magnet and an induced magnet. [2]

4. State the direction of magnetic field lines around a bar magnet. [1]

5. Describe the shape of the magnetic field around a long straight wire carrying a current. [2]

6. Give three ways to increase the strength of an electromagnet. [3]

7. Describe how to plot the field lines of a bar magnet using a plotting compass. [3]

8. Explain why a compass needle points north when no magnets are nearby. [2]

9. Explain why an induced magnet is always attracted to a permanent magnet. [2]

10. Describe how the strength of the field around a straight wire depends on the current and the distance from the wire. [2]

11. Describe the magnetic field inside and outside a solenoid. [2]

12. Give one advantage of an electromagnet over a permanent magnet. [1]

13. A current flows upwards in a vertical wire. Use the right-hand grip rule to state the direction of the magnetic field seen from above. [2]

14. Explain how a relay allows a small current to switch on a large current. [4]

4. Before you hand it in

"All metals are magnetic."

Iron, steel, cobalt and nickel are magnetic. Aluminium, copper and gold are not.

Drawing field lines that cross or point from S to N

Field lines go from N to S outside the magnet and never cross.

"An induced magnet can repel a permanent magnet."

Repulsion is the only true test for a permanent magnet: induced magnets always attract.

"An iron core makes the current bigger."

The iron core becomes magnetised (an induced magnet), adding its field to the coil's field.