Exercise walk-through

7.1

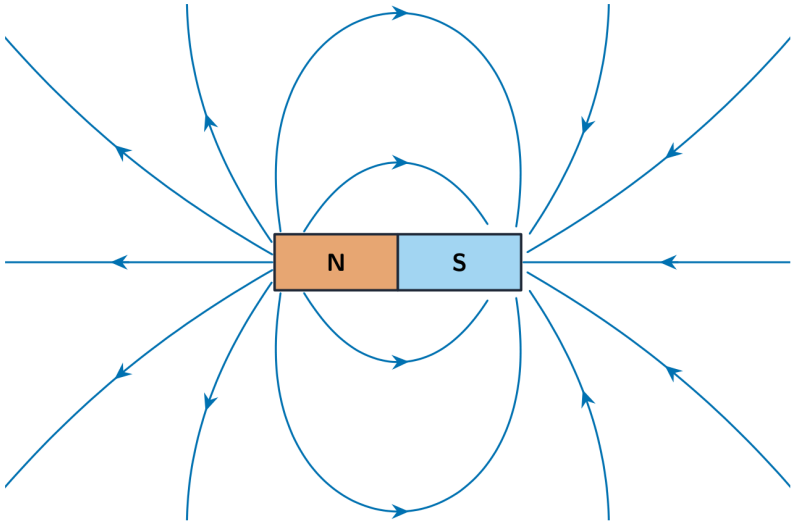
Permanent and induced magnetism, magnetic fields (4.7.1)

AQA · GCSE · Physics

Magnets and magnetic fields

- A **permanent magnet** produces its own magnetic field.
- An **induced magnet** is a material that becomes a magnet when it is placed in a magnetic field. Induced magnetism always causes attraction. When the **induced magnet** is taken out of the field, it loses most or all of its magnetism quickly.

Figure: Magnets and magnetic fields



- Field lines run from north to south outside a bar magnet.
- Match each part of the diagram to the text.

Exercises 2.1·2.2

2.1 Two magnets are placed as shown. State whether they attract or repel, and explain why. [2]



2.2 Name one magnetic material, and explain why a steel paper clip is attracted to either pole of a magnet. [2]



Exercises 2.1·2.2

2.1 Two magnets are placed as shown. State whether they attract or repel, and explain why. [2]



2.1

- they repel; like poles (two south poles) face each other

2.2 Name one magnetic material, and explain why a steel paper clip is attracted to either pole of a magnet. [2]

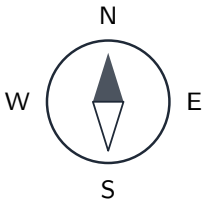


2.2

- iron, steel, cobalt or nickel; the clip becomes an induced magnet with the opposite pole facing the magnet, so it is always attracted

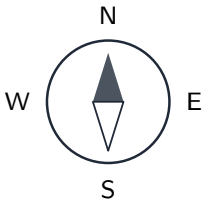
Exercise 3.1

3.1 A compass needle points north when there are no magnets nearby. Explain why, and what this shows about the Earth. [3]



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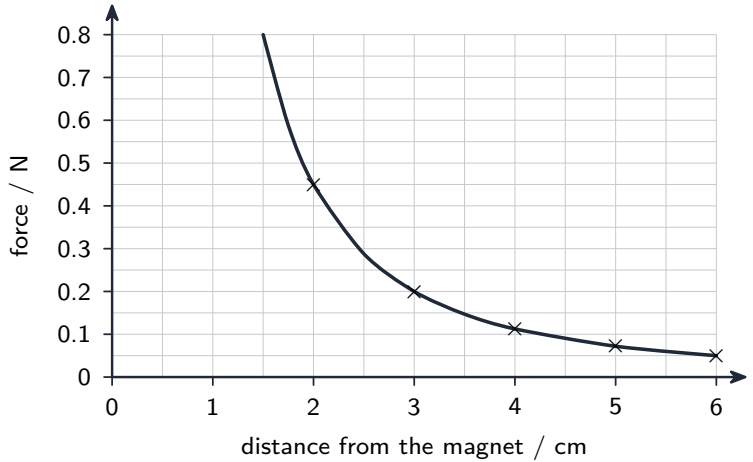
3.1

- the needle is a small magnet that lines up with a magnetic field
- the Earth has a magnetic field
- this shows the core of the Earth is magnetic (it acts like a big bar magnet)

Exercise 3.2 (a)

3.2 A student measures the force of a magnet on a small steel ball at different distances. The graph shows the results.

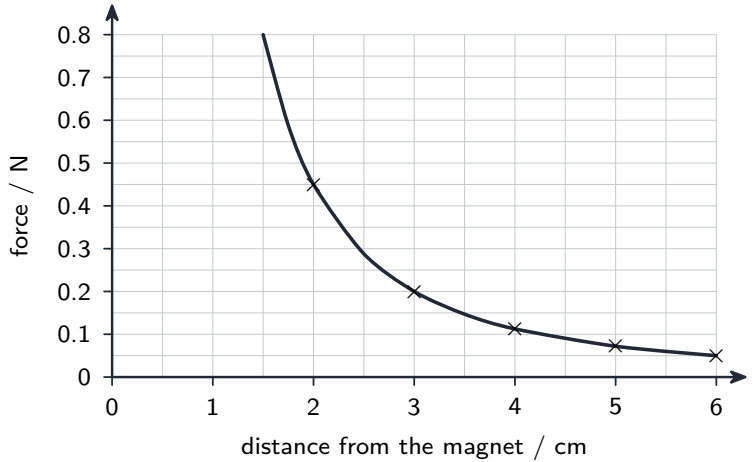
(a) Use the graph to find the force when the ball is 3.0 cm from the magnet. [2]



Exercise 3.2 (a)

3.2 A student measures the force of a magnet on a small steel ball at different distances. The graph shows the results.

(a) Use the graph to find the force when the ball is 3.0 cm from the magnet. [2]



(a) read at 3.0 cm; **0.20** N

Exercise 3.2 (b)

3.2 A student measures the force of a magnet on a small steel ball at different distances. The graph shows the results.

(b) Describe the pattern shown by the graph, and explain it using the idea of a magnetic field. [3]

Exercise 3.2 (b)

3.2 A student measures the force of a magnet on a small steel ball at different distances. The graph shows the results.

(b) Describe the pattern shown by the graph, and explain it using the idea of a magnetic field. [3]

(b) the force decreases as the distance increases; it falls quickly at first, then more slowly; the magnetic field gets weaker further from the magnet

Exercise 3.2 (c)

3.2 A student measures the force of a magnet on a small steel ball at different distances. The graph shows the results.

(c) Describe how a student could use a small compass to plot the magnetic field around a bar magnet, and describe the field pattern they would see. [6]

Exercise 3.2 (c)

3.2 A student measures the force of a magnet on a small steel ball at different distances. The graph shows the results.

(c) Describe how a student could use a small compass to plot the magnetic field around a bar magnet, and describe the field pattern they would see. [6]

(c) points to include:

- place the magnet on a sheet of paper and draw round it
- put the compass near the north pole and mark the direction the needle points with a dot at each end
- move the compass so its tail is on the last dot and mark again; repeat until reaching the south pole
- join the dots to make a field line, with an arrow from north to south
- repeat from different starting points to draw several field lines
- the lines leave the north pole and curve round to the south pole; they are closest together at the poles, where the field is strongest

Levels: **5–6** a full, logical answer with correct physics and correct terms; **3–4** several correct points, partly linked; **1–2** one or two relevant points.