

# Electromagnets

## Task 1

### Magnets

1 Draw the magnetic field lines around the bar magnet. Add the direction of the field lines. Label your diagram with these four labels:

north-seeking pole	south-seeking pole
strongest magnetic field	weakest magnetic field



2 State which of these statements about magnetism are true and which are false.

- All materials are magnetic. T / F
- Magnetic force is a non-contact force. T / F
- Iron filings can be used to show the shape of a magnetic field. T / F
- The closer the magnetic field lines, the weaker the magnetic field. T / F
- Permanent magnets have their own magnetic field. T / F
- A north-seeking pole attracts a north-seeking pole. T / F
- The Earth has a magnetic field. T / F

3 A student wants to know whether an object is a magnet or an iron bar. Describe how they could use a simple bar magnet to decide.

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**Task 2**

**Earth's magnetic field**

A compass needle is a small magnet that is able to turn.

Imagine all the floors in your school were covered in compasses.

Explain why they would all point in the same direction.

Use these key words in your explanation:

magnetic field lines	magnetic force
north-seeking pole	magnetic field

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**Task 3**

**Electromagnets**

- 1 a List the equipment you would need to make an electromagnet.
- b Describe how you would make it.
- c Explain how you could change its strength.
- d Describe how the magnetic field varies with distance from the electromagnet.
- e Draw a diagram below to help with your explanations.

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2 Oscar decides to build an electromagnet and see how the number of coils affects the strength of the electromagnet. Here is a list of the variables for his experiment.

current	number of paperclips	size of paperclip	number of coils	core
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The independent variable is .....

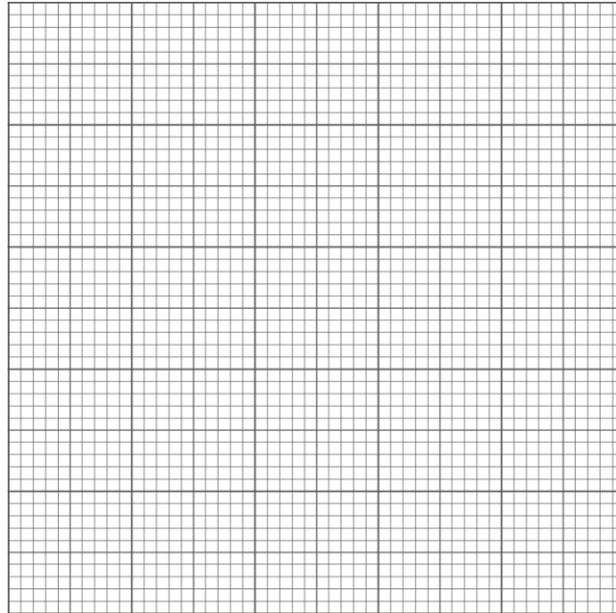
The dependent variable is .....

The control variables are .....

Here are Oscar's results.

Number of coils	Number of paperclips
5	4
10	9
15	13
20	18
25	25
30	40
35	35

3 Plot the data on a graph.



4 Describe and explain the pattern shown by Oscar's results.

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5 One of the results does not fit in with the others. Which one?

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6 What could Oscar do to improve his experiment?

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7 If Oscar decided to see whether current changed the strength of a magnet, what would the control variables be?

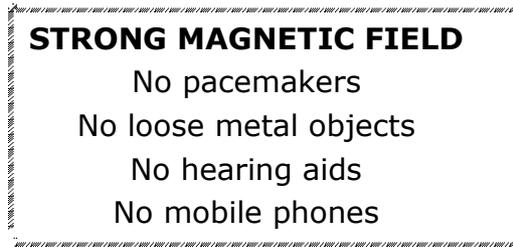
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**Task 4**

**Permanent magnet or electromagnet?**

1 Magnets are used in hospitals.

A door in a hospital has this warning sign:



Explain why you are safe outside the door.

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2 This question is about permanent magnets and electromagnets.

a State two similarities between a permanent magnet and an electromagnet.

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b State two differences between a permanent magnet and an electromagnet.

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c How would you move a car safely in a scrapyard from one place to another?

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