Q1.
A student investigates magnetism using two toys as shown in Figure 7.

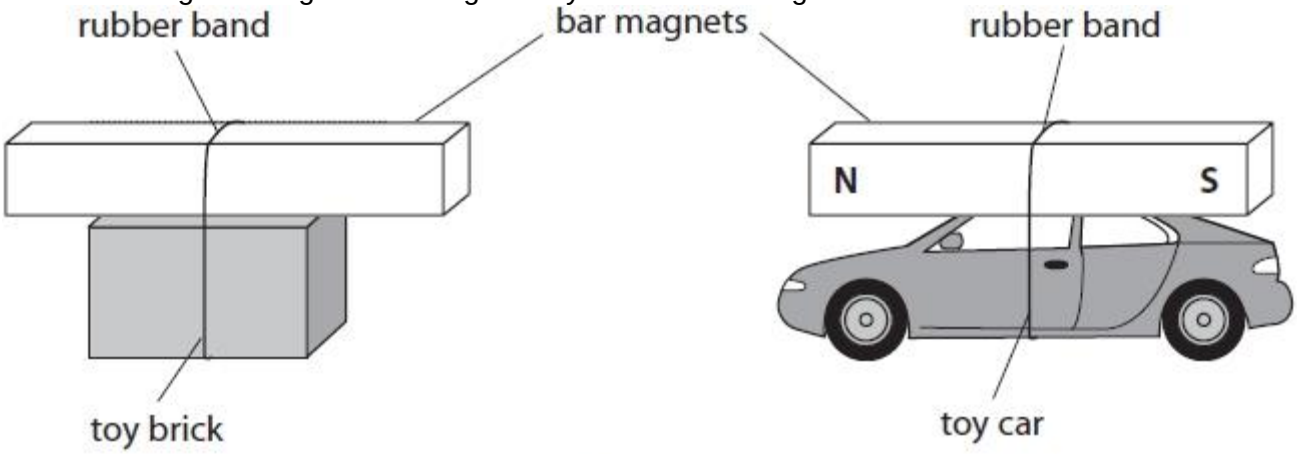


Figure 7

(i) There is a magnet attached to the top of each toy.
The student moves the toy brick towards the toy car.
The magnet on the toy brick repels the magnet on the toy car.
On Figure 7, label the north pole and the south pole on the magnet attached to the toy brick.

(1)

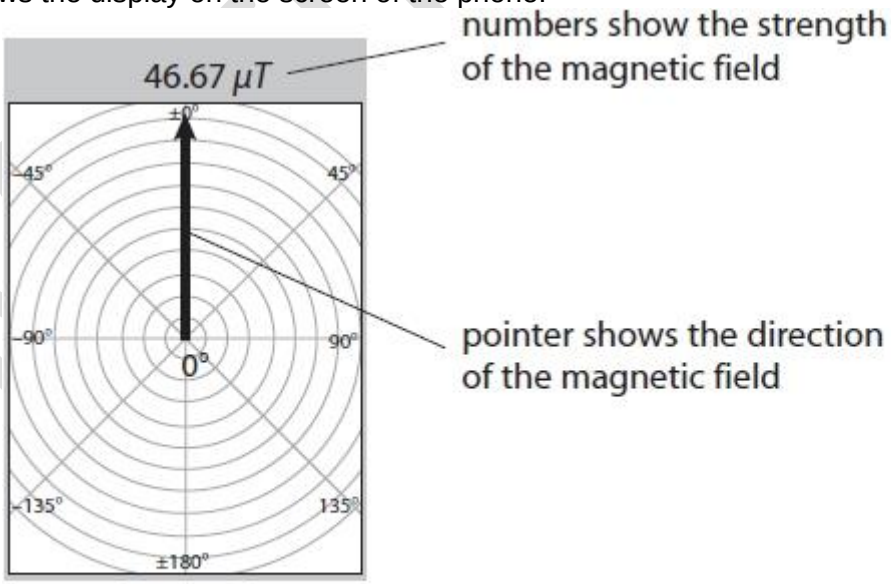
(ii) Explain why the toy car starts to move only when the toy brick gets near to the toy car.

(2)

(iii) The student thinks that two magnets on top of each other will produce a magnetic field that is stronger than the magnetic field from a single magnet.
The student has a metre rule and more magnets available.
Describe how the student could develop this investigation to test this theory.

(4)

Q2.
A student's mobile phone has an app to measure a magnetic field.
The student places the phone on a table and rotates the phone until it is pointing north.
There are no magnets near to the phone.
Figure 3 shows the display on the screen of the phone.



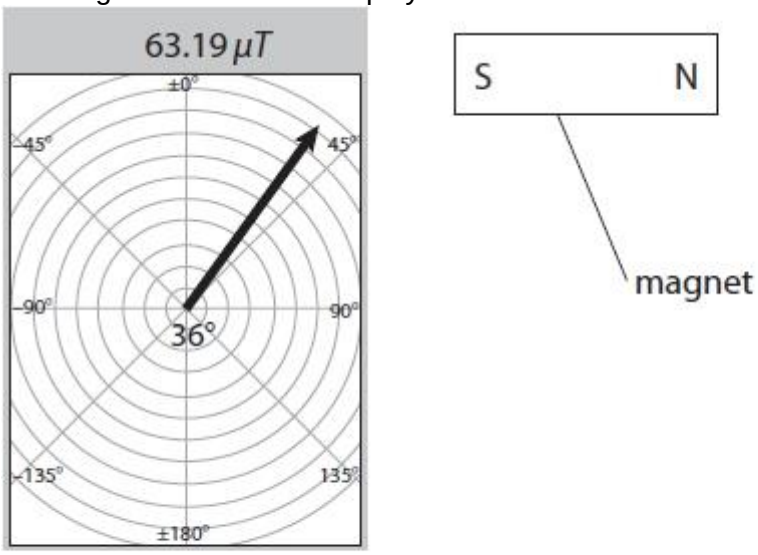
(Source: adapted from MGS Lite app for iPhone)

Figure 3

(i) State why the strength of the magnetic field shown is not zero.

(1)

The student places a magnet near to the phone on the table.
Figure 4 shows the magnet and the new display on the screen.



(Source: adapted from MGS Lite app for iPhone)

Figure 4

(ii) State **two** changes in the magnetic field measured by the phone from Figure 3 to Figure 4.

(2)

(iii) Describe how the student could use the mobile phone to investigate the strength of the magnetic field at different distances from the magnet.

(3)

Q3.

Figure 1 shows a magnet, P, hanging from a support.

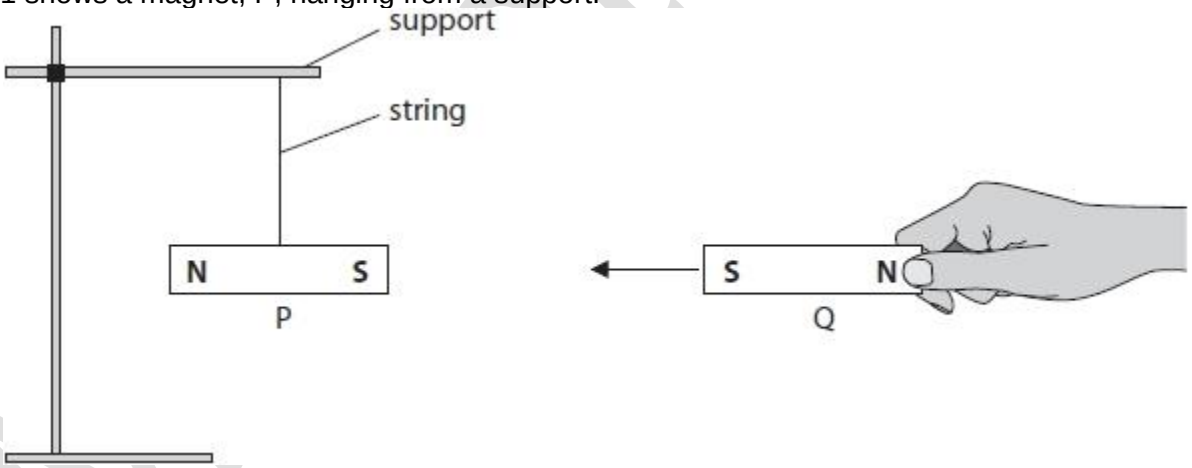


Figure 1

Explain what happens to magnet P when another magnet, Q, is brought towards it as shown.

(2)

Q4.

A student has
− a power pack
− a long piece of wire
− a stiff card
− iron filings
Describe how the student could use this equipment to show the shape of the magnetic field produced by a current in the wire.
You may draw a diagram to help with your answer.

(4)

Q5.
Figure 4 shows a wire passing through a piece of card. The wire carries an electric current.

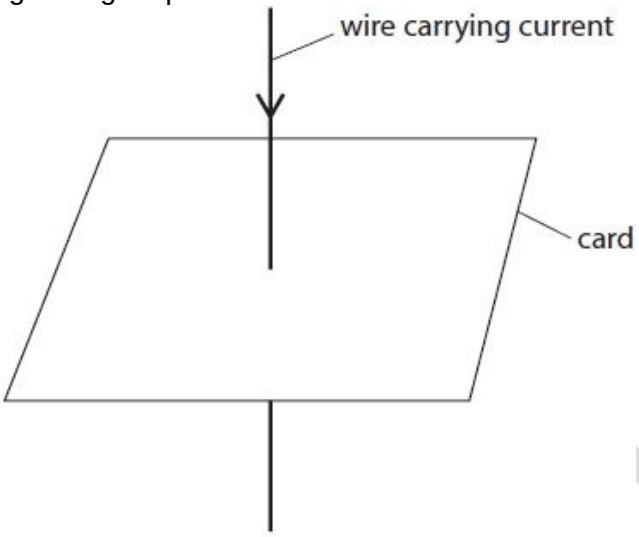


Figure 4

(i) Draw **one** magnetic field line on Figure 4, to show the shape of the magnetic field produced by the current.

(1)

(ii) Draw **one** arrow on the field line you have drawn to show the direction of the magnetic field.

(1)

Q6.
Figure 3 shows some objects and words describing these objects.
Draw one line from each object to its description.

(2)

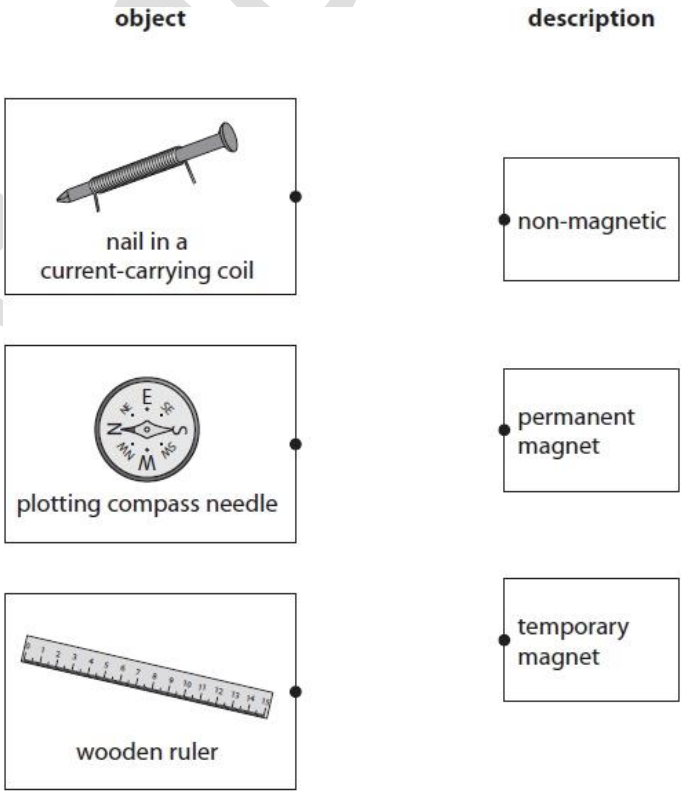


Figure 3

Q7.

Figure 3 shows two magnetic poles facing each other.
The magnetic field between the poles is uniform.
On Figure 3, draw the magnetic field lines between the two poles and show the direction of this magnetic field.

(3)

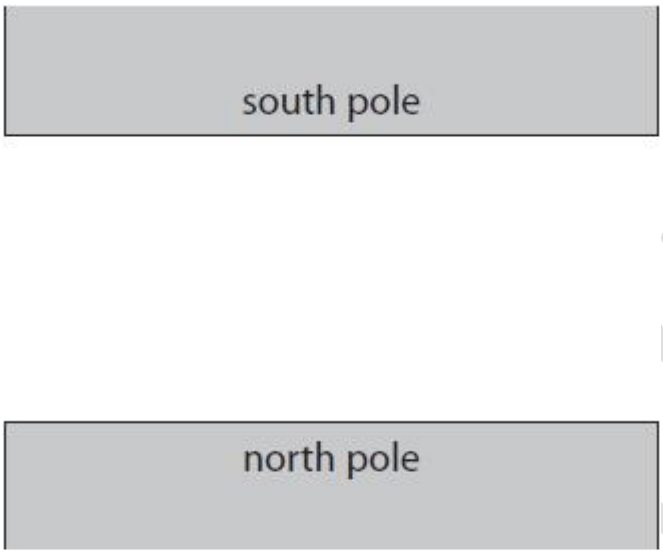


Figure 3

Q8.

Figure 6 shows a part of a machine used to separate steel cans from aluminium cans.

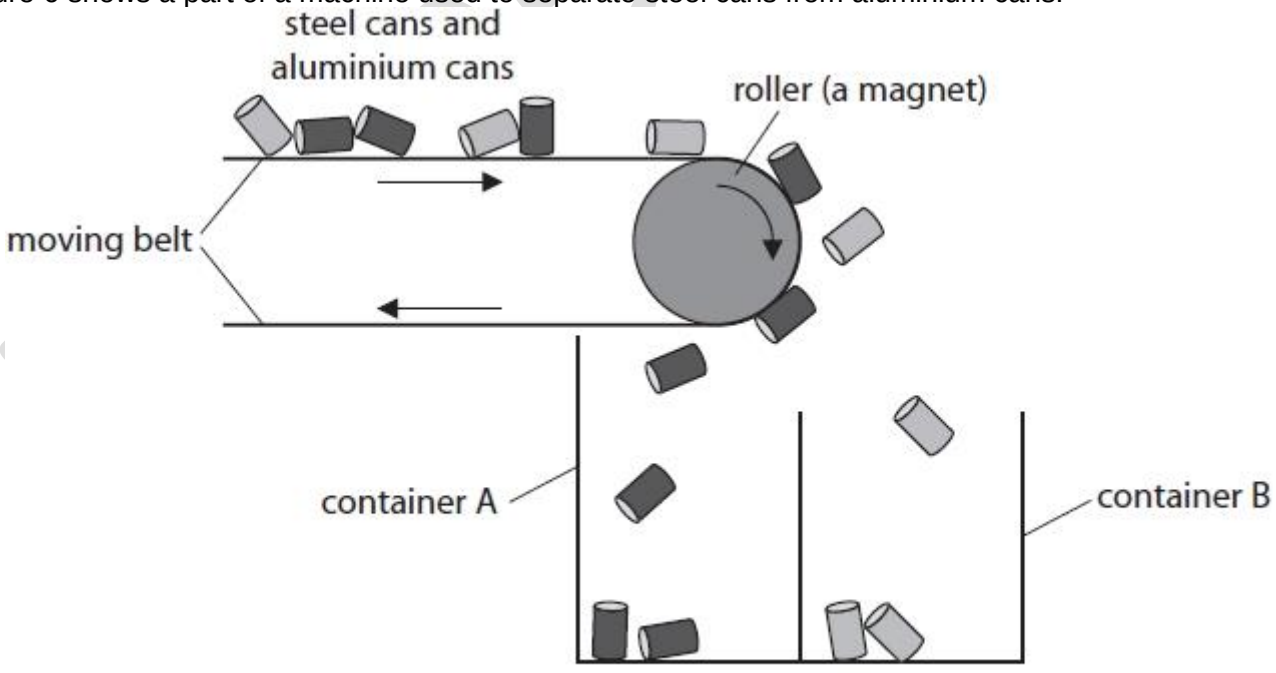


Figure 6

The cans are carried along a moving belt. The belt goes around a roller. The roller is a magnet. Each can falls into one of the containers. Explain how this machine separates the steel cans from the aluminium cans.

(2)

Q9.
Which of these is a magnetic material?

(1)

- ☒ **A** aluminium
- ☒ **B** carbon
- ☒ **C** cobalt
- ☒ **D** copper

Q10.
Three of the following are magnetic materials. Which of these is **NOT** a magnetic material?

(1)

- ☒ **A** cobalt
- ☒ **B** copper
- ☒ **C** iron
- ☒ **D** nickel

Q11.
Figure 4 shows the magnetic field produced by a current in a long, straight wire.

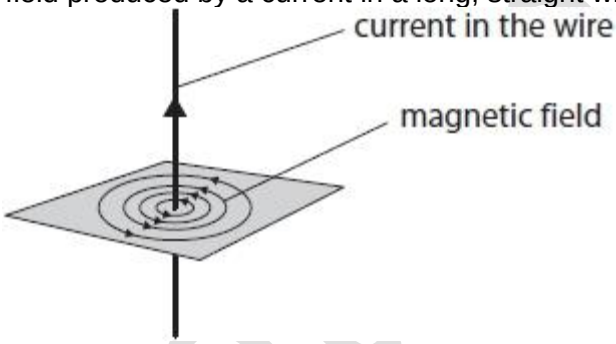


Figure 4

Which row of the table is correct when the strength of the magnetic field is greatest?

(1)

	distance from the wire	current
☒ **A**	small	small
☒ **B**	small	large
☒ **C**	large	small
☒ **D**	large	large

Q12.

Figure 5 shows a magnet holding some paper clips.

Figure 5

Describe how a student could show that the paper clips are induced magnets. **(2)**

Q13.
A student measures the strength of the magnetic field at several distances from the wire in Figure 4.
Figure 5 shows most of the student's results.

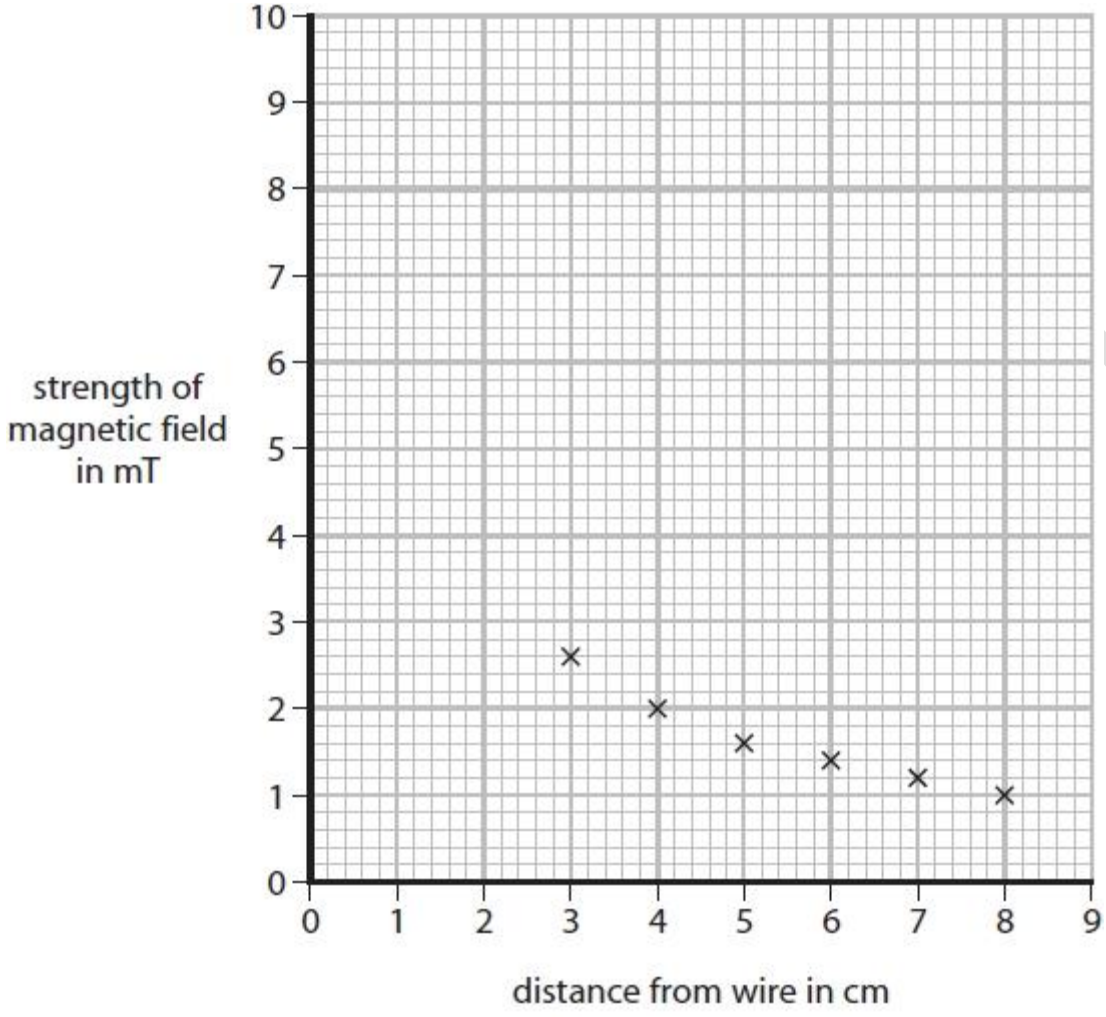


Figure 5

Figure 6 shows two extra sets of results.
mT is a unit of strength of a magnetic field.

distance from wire in cm	strength of magnetic field in mT
1.0	8.1
2.0	3.9

Figure 6

(i) Plot the two extra points on Figure 5.

(2)

(ii) Draw a best fit curve on the graph in Figure 5.

(1)

(iii) Use the graph in Figure 5 to calculate the change in strength of magnetic field when the distance from the wire changes from 4 cm to 8 cm.

(2)

(iv) The distance from the wire affects the strength of the magnetic field.
State **one** other factor that affects the strength of the magnetic field.

(1)

Q14.
A student uses iron filings to show the pattern of a magnetic field around a bar magnet.
Figure 2 shows the pattern the student produced.

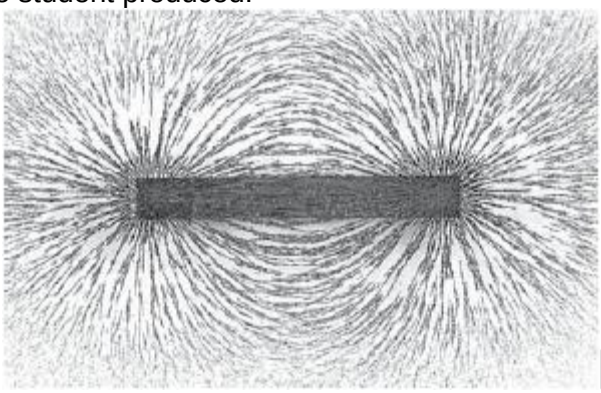


Figure 2

(i) Describe how you can tell from Figure 2 where the magnetic field is strongest.

(2)

(ii) The bar magnet is placed on a sheet of paper. Describe how the student could plot the shape and show the direction of the magnetic field around the magnet.

(3)

Q15.
Describe how you could show that the Earth has a magnetic field.

(2)

Q16.
A teacher prepares some equipment to demonstrate electromagnetism. Figure 2 shows the equipment.

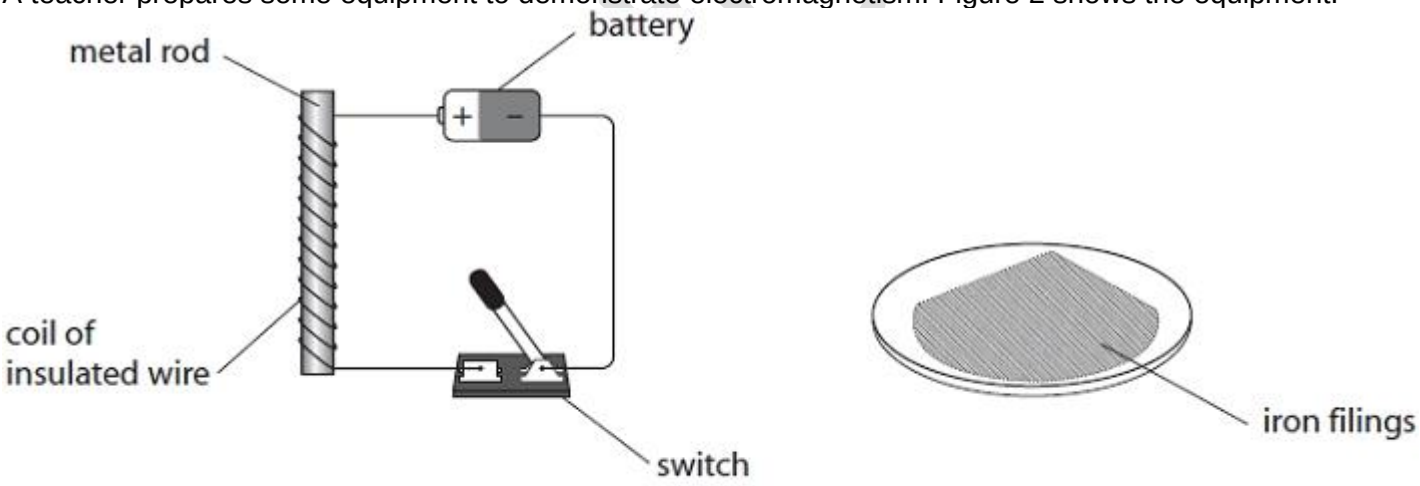


Figure 2

The teacher wants to show that iron filings

- are picked up by the metal rod when the switch is closed
- fall off the metal rod when the switch is opened again.

(i) Suggest a suitable metal for the rod.

(1)

(ii) Give **two** reasons for your choice.

(2)

1 .....
.....
2 .....
.....

Q17.

Which of these materials would be the most suitable for making a temporary magnet?

(1)

- ☒ **A** copper
- ☒ **B** iron
- ☒ **C** plastic
- ☒ **D** steel

Q18.

A student uses a compass to investigate the magnetic field near a bar magnet.
The student places the compass near the bar magnet as shown in Figure 6.

Figure 6

(i) Mark the north pole of the bar magnet with an 'N' in Figure 6.

(1)

(ii) State two ways in which the investigation could be developed to show the shape of the magnetic field around the bar magnet.
You may add to Figure 6 to help with your answer.

(2)

1 .....
.....
2 .....
.....