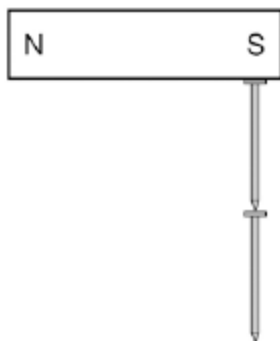


1

Figure 1 shows two iron nails hanging from a bar magnet.

The iron nails which were unmagnetised are now magnetised.

Figure 1



(a) Complete the sentence.

Use a word from the box.

forced	induced	permanent
---------------	----------------	------------------

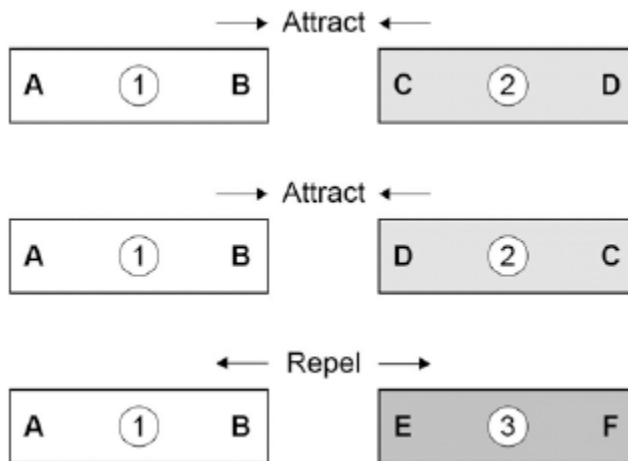
The iron nails have become _____ magnets.

(1)

- (b) Each of the three metal bars in **Figure 2** is either a bar magnet or a piece of unmagnetised iron.

The forces that act between the bars when different ends are placed close together are shown by the arrows.

Figure 2



Which **one** of the metal bars is a piece of unmagnetised iron?

Tick **one** box.

Bar 1

Bar 2

Bar 3

Give the reason for your answer.

(2)

- (c) A student investigated the strength of different fridge magnets by putting small sheets of paper between each magnet and the fridge door.

The student measured the maximum number of sheets of paper that each magnet was able to hold in place.

Why was it important that each small sheet of paper had the same thickness?

(1)

- (d) Before starting the investigation the student wrote the following hypothesis:

'The bigger the area of a fridge magnet the stronger the magnet will be.'

The student's results are given in the table below.

Fridge magnet	Area of magnet in mm ²	Number of sheets of paper held
A	40	20
B	110	16
C	250	6
D	340	8
E	1350	4

Give **one** reason why the results from the investigation **do not** support the student's hypothesis.

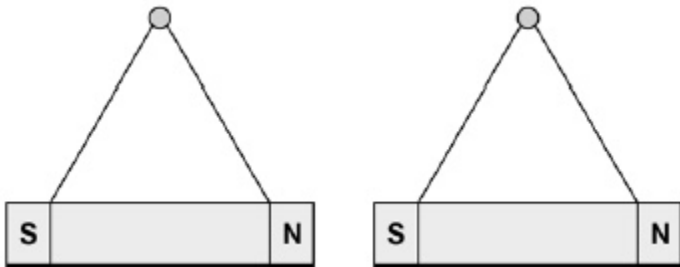
(1)

(Total 5 marks)

2

Figure 1 shows two bar magnets suspended close to each other.

Figure 1



(a) Explain what is meant by the following statement.

'A non-contact force acts on each magnet'.

(2)

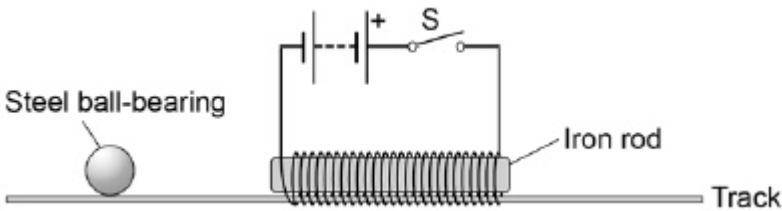
(b) Describe how to plot the magnetic field pattern of a bar magnet.

(3)

A student has set up the apparatus shown in Figure 2.

The iron rod is fixed to the track and cannot move.

Figure 2



(c) The student gives the steel ball bearing a gentle push in the direction of the iron rod.

At the same time the student closes the switch **S**.

Explain the effect on the motion of the ball bearing when the switch **S** is closed.

(4)

(Total 9 marks)

3

(a) Electromagnets are often used at recycling centres to separate some types of metals from other materials.

Give **one** reason why an electromagnet would be used rather than a permanent magnet.

(1)

- (b) In this question you will gain marks for using good English, organising information clearly and using scientific words correctly.

Some students want to build an electromagnet.

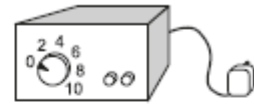
The students have the equipment shown below.



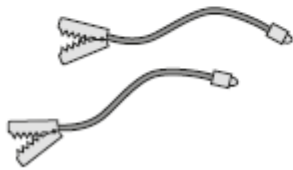
Insulated wire



Iron nail



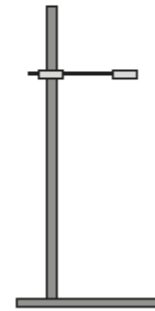
Power supply



Connecting leads



Steel paperclips



Wooden clamp and stand

Describe how the students could build an electromagnet. Include in your answer how the students should vary and test the strength of their electromagnet.

(6)

(Total 7 marks)

4

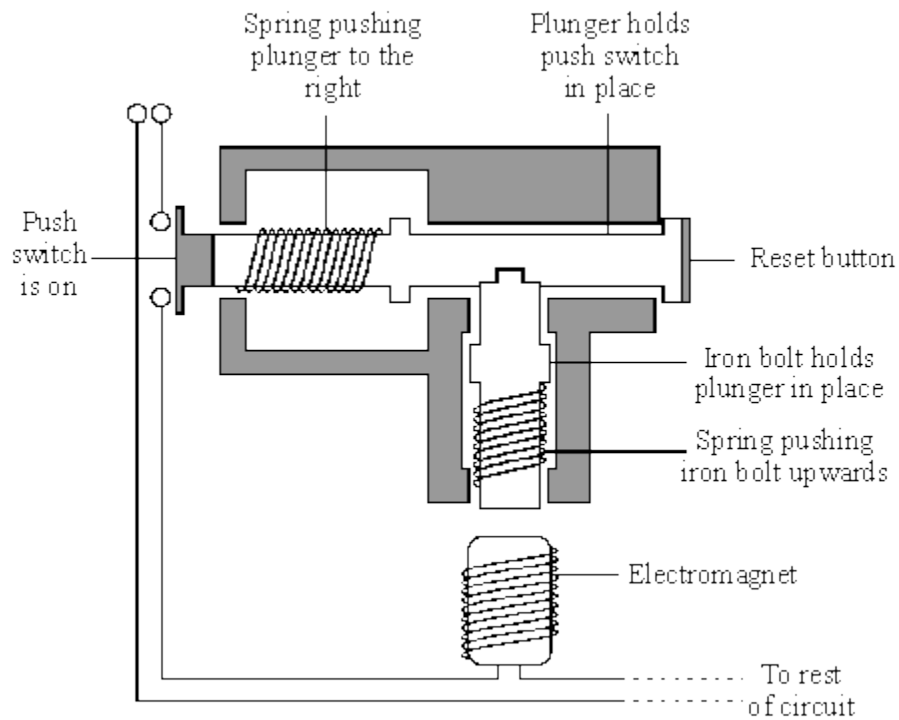
- (a) Name a material that could be used to make the outside case of the plug.

Give a reason for your choice.

(2)

- (b) To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

Some electrical circuits are protected by a circuit breaker. These switch the circuit off if a fault causes a larger than normal current to flow. The diagram shows one type of circuit breaker. A normal current (15 A) is flowing.



Source: adapted from V. PRUDEN and K. HIRST, *AQA GCSE Science*
 Reproduced by permission of Hodder and Soughton Educational Ltd

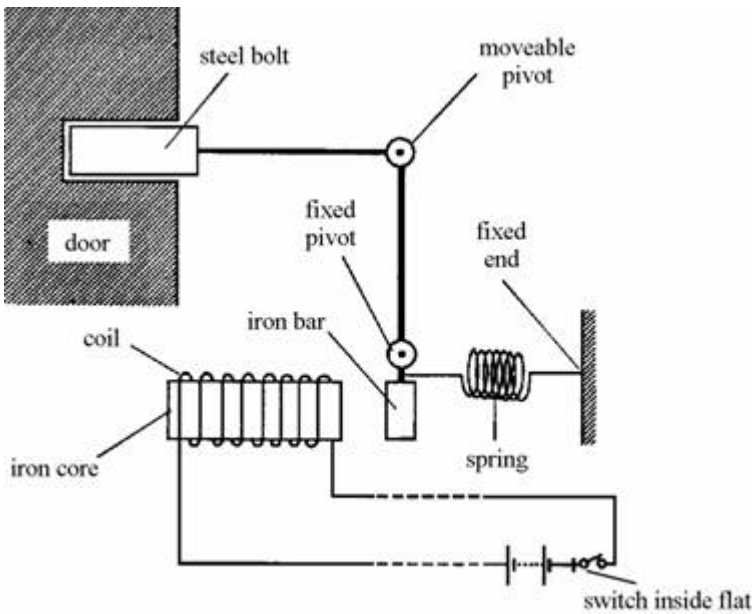
Explain what happens when a current larger than 15A flows. The answer has been started for you.

When the current goes above 15 A, the electromagnet becomes stronger and

(3)
 (Total 5 marks)

5

The diagram below shows a door lock which can be opened from a flat inside a building.



(a) Explain how the door is unlocked when the switch is closed.

(4)

(b) State **two** changes which would increase the strength of the electromagnet.

1. _____

2. _____

(2)

(c) Why is the spring needed in the lock?

(1)

(d) The connections to the coil were accidentally reversed. Would the lock still work?

Explain your answer.

(2)

(Total 9 marks)