Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Magnetism

Time allowed: 1 hour 5 minutes

Subject code **0625**

Physics

Questions from Paper 3 and Paper 4

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.

Total marks

/ 65

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.

Information

- This paper has 10 questions worth 65 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 **(a)** Describe how the N pole of a bar magnet can be identified.

.....

.....

.....[2]

(b) Use words from the following list to answer the three questions below.

attractive force

repulsive force

no force

What force is there between

(i) two N poles, ...

(ii) two S poles, ...

(iii) a N pole and a S pole? .....

[3]

(c) Fig. 9.1 shows an iron bar placed close to the N pole of a bar magnet.

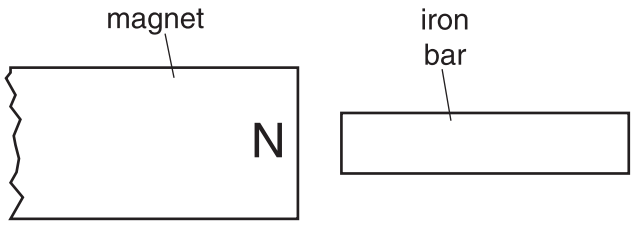


Fig. 9.1

(i) On Fig. 9.1, write N and S, to indicate the induced poles in the iron bar. [1]

(ii) Use a word from the list in **(b)** to describe the force between the magnet and the iron bar.

.....[1]

(iii) The iron bar is reversed end-to-end.

Describe the force that now exists between the magnet and the iron bar.

.....[1]

[Total: 8]

Magnetism Click for more variations

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2 A student has a permanent bar magnet and two metal bars, as shown in Fig. 9.1.

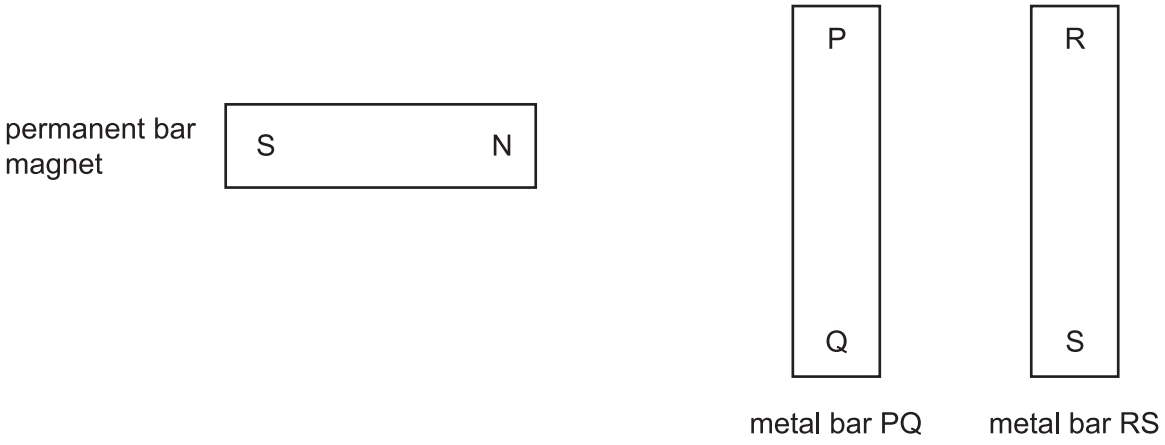


Fig. 9.1

The student tests bar PQ and bar RS separately. He holds the N pole of the permanent bar magnet close to each end of each metal bar. Table 9.1 shows the results of the tests.

Table 9.1

end of metal bar	result of test with N pole
P	attracted
Q	repelled
R	attracted
S	attracted

Deduce whether each metal bar is a magnet, an unmagnetised magnetic material or a non-magnetic material.

Give a reason for each of your answers.

1. metal bar PQ .....

.....

.....

2. metal bar RS .....

.....

.....

[4]

[Total: 4]

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3 The pivoted steel arrow from a small compass has become demagnetised.

The coil shown in Fig. 7.1 is to be used to magnetise it again.

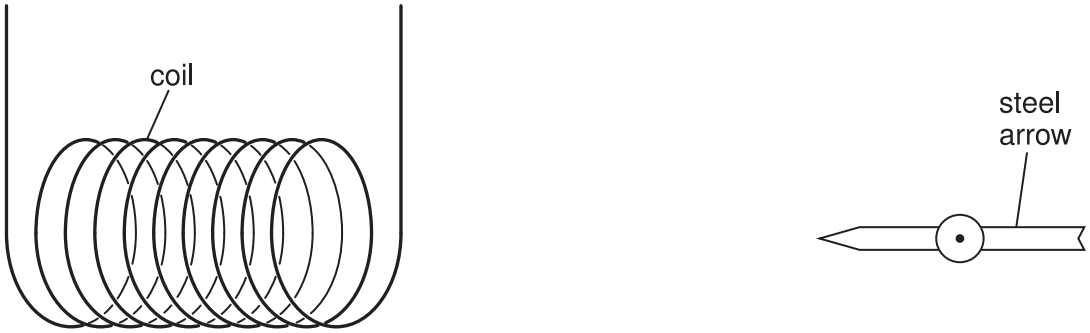


Fig. 7.1

(a) Describe carefully

(i) how the coil is used to magnetise the steel arrow,

.....

.....

.....

.....

.....[3]

(ii) how the polarity of the magnetised needle may be checked.

.....

.....

.....

.....[1]

(b) On Fig. 7.1, draw the magnetic field pattern of the magnetised needle. [2]

[Total: 6]

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4 Fig. 6.1 shows a person using a magnetic window cleaner. The part on the outside of the window is attracted to the inside part through the glass window.

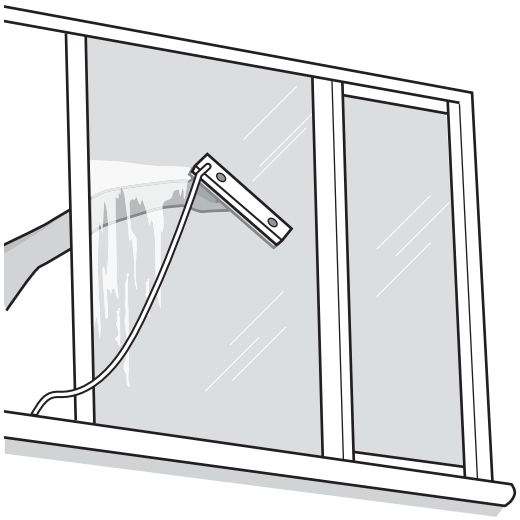


Fig. 6.1

Each part of the window cleaner contains two magnets. Fig. 6.2 shows the magnetic field between the parts of the window cleaner.

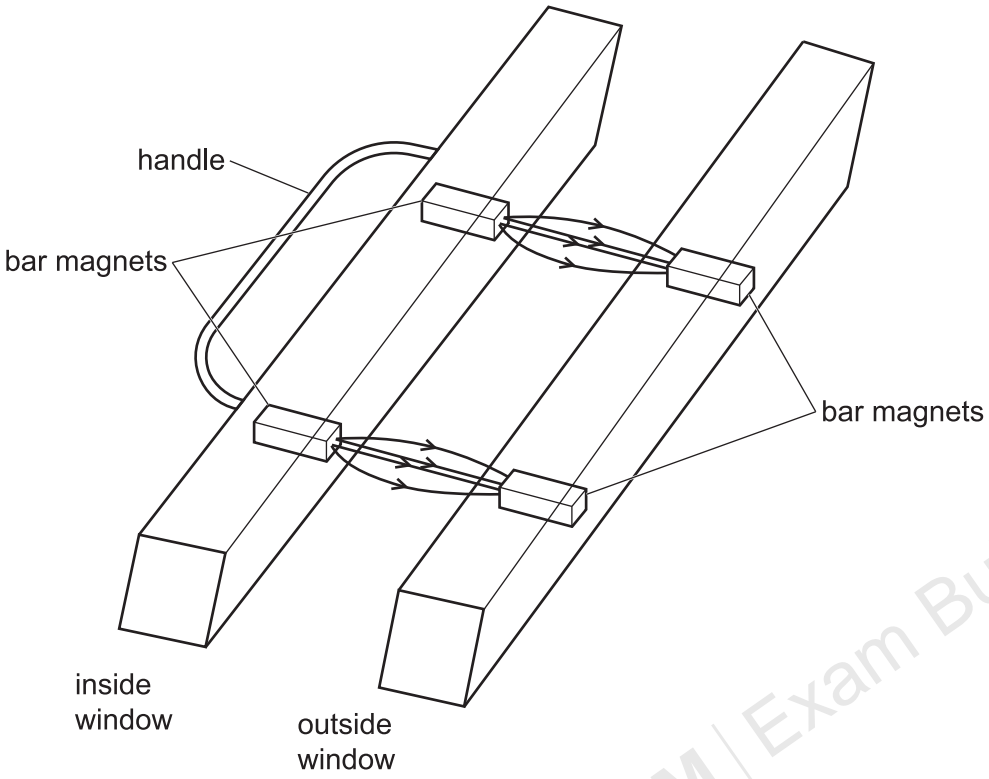


Fig. 6.2

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(a) Glass is **not** a magnetic material.

State the difference between magnetic and non-magnetic materials.

.....

..... [1]

(b) Suggest a suitable material for the magnets in the window cleaner. Explain your answer.

.....

..... [1]

(c) Label the poles of the magnets in Fig. 6.2. [1]

(d) State how the field lines in Fig. 6.2 show different strengths of the magnetic field between the magnets.

.....

..... [1]

[Total: 4]

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5 **(a)** Fig. 8.1 shows a permanent bar magnet.

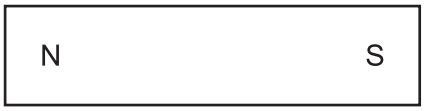


Fig. 8.1

Describe an experiment to identify the **pattern** and **directions** of the magnetic field lines around the bar magnet.
You may draw on Fig. 8.1 as part of your answer.

.....

.....

.....

.....

.....

..... [4]

(b) State the name of a material that is suitable for a permanent magnet.

..... [1]

(c) State **one** use of a permanent magnet.

..... [1]

[Total: 6]

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6 Fig. 8.1 shows a sheet of paper. A bar magnet is underneath the paper. A student sprinkles iron filings onto the paper.

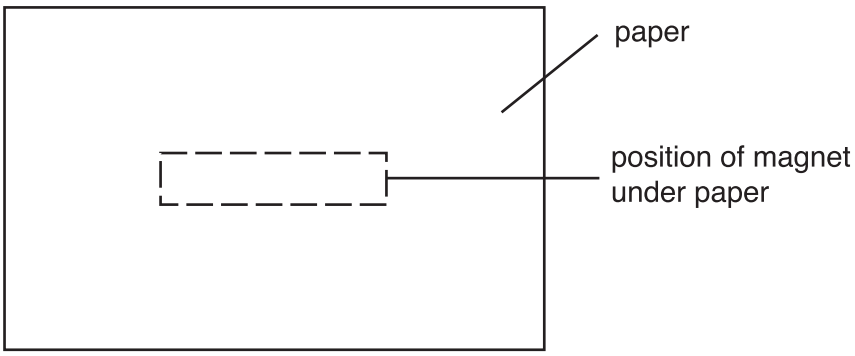


Fig. 8.1

(a) On Fig. 8.1

- Label the position of each pole of the magnet. Use the label N for the north pole and S for the south pole.
- Draw one magnetic field line above the magnet and draw one magnetic field line below the magnet.
- Add **one** arrow to show the direction of the magnetic field.

[4]

(b) A student places a soft iron rod inside a coil of insulated wire. The coil is connected to a battery, as shown in Fig. 8.2.

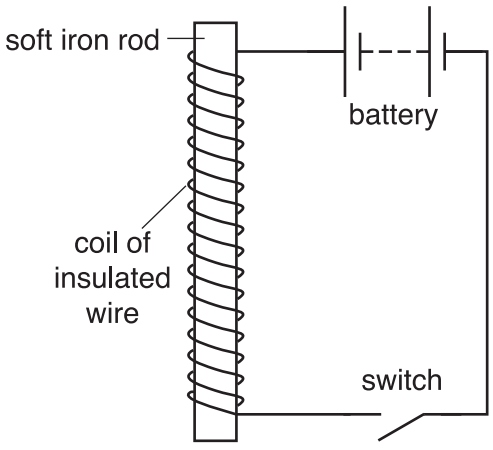


Fig. 8.2

(i) State the name given to the device shown in Fig. 8.2.

.....[1]

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(ii) The student puts one end of the device in Fig. 8.2 just above a pile of iron filings.

He closes the switch for a short time and then opens it again.

Describe the effect this has on the iron filings.

.....

.....[1]

(iii) The student removes the soft iron rod and replaces it with a steel rod.

He puts one end of the steel rod just above the pile of iron filings. He closes the switch for a short time and then opens it again.

Describe the effect this has on the iron fillings.

.....

.....

.....[1]

[Total: 7]

Magnetism Click for more variations

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7 A physics teacher suspends two pointers in a magnetic field. One pointer is made of brass and the other is a magnet.

She holds the pointers in the initial positions shown in the two upper circles of Fig. 7.1. She then releases the pointers.

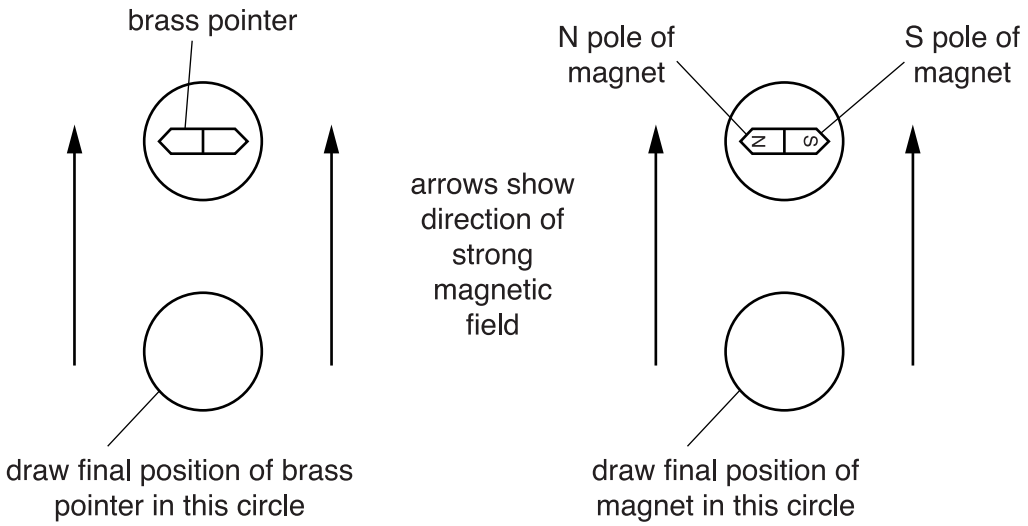


Fig. 7.1

(a) In the lower circles of Fig. 7.1, draw the settled final positions of the two pointers. [2]

(b) **(i)** Explain the final position of the brass pointer.

.....

.....

.....

(ii) Explain the final position of the magnet.

.....

.....

.....

[2]

(c) Suggest a material from which the magnet is made.

.....[1]

[Total: 5]

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8 **(a)** Different materials have differing magnetic properties.

(i) State the name of a material that is suitable for a **temporary** magnet.

..... [1]

(ii) State the name of a material that is suitable for a **permanent** magnet.

..... [1]

(iii) State how a magnet can show that a material is non-magnetic.

..... [1]

(b) A teacher uses the arrangement in Fig. 10.1 to demonstrate an electric bell. When the switch is closed, the hammer repeatedly hits the metal gong.

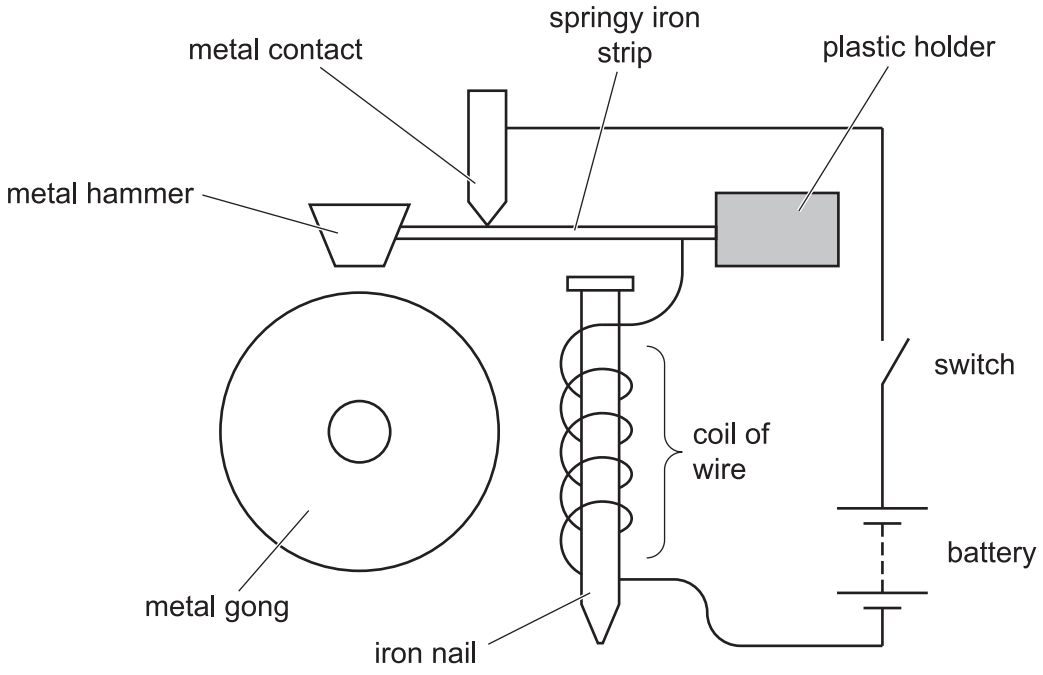


Fig. 10.1

Using the information in Fig. 10.1, explain why the hammer repeatedly hits the metal gong when the switch is closed.

.....

.....

.....

.....

..... [4]

[Total: 7]

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9 **(a)** Fig. 7.1 shows two magnets and the gap between the N pole of one magnet and the S pole of the other magnet.

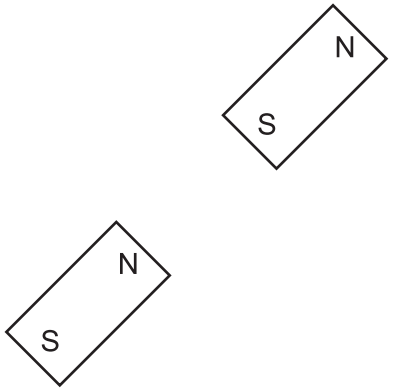


Fig. 7.1

On Fig. 7.1, draw **three** lines to show the pattern and direction of the magnetic field in the gap. [2]

(b) **(i)** Fig. 7.2 is a repeat of Fig. 7.1 showing the two magnets.

On Fig. 7.2, draw the position of a plotting compass needle when it comes to rest in the gap between the N pole and the S pole.

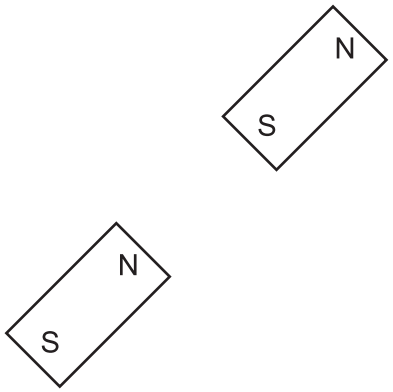


Fig. 7.2 [1]

(ii) Explain why the needle comes to rest in this position.

.....

.....

..... [2]

(c) Describe a method of demagnetising a bar magnet.

.....

.....

..... [2]

[Total: 7]

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10 Fig. 7.1 shows a barrier at the entrance to a car park. The wooden barrier arm has a weight of 60 N which acts through the centre of gravity at the position shown on Fig. 7.1.

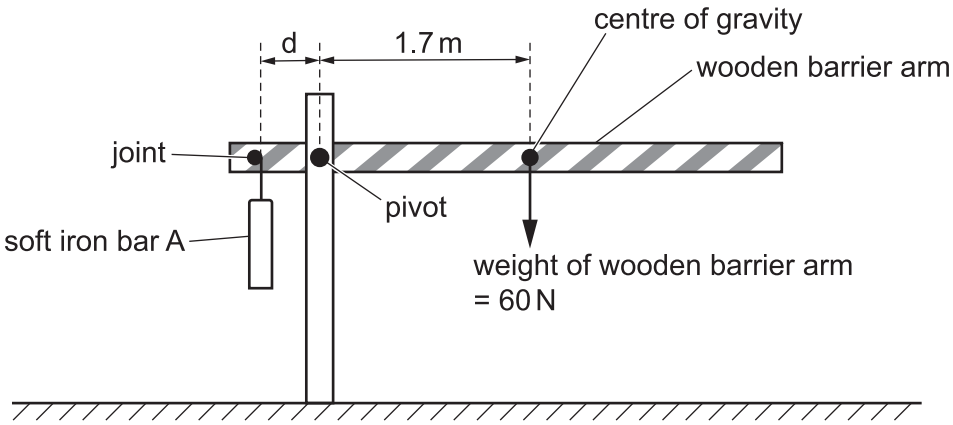


Fig. 7.1

(a) Initially the wooden barrier arm is horizontal.

(i) Using Fig. 7.1, calculate the clockwise moment of the weight of the wooden arm about the pivot.

clockwise moment = ... Nm [1]

(ii) The wooden barrier arm is in equilibrium. The mass of the soft iron bar A is 23 kg.

Calculate the distance d between the pivot and the joint holding the soft iron bar A.

distance d = ... [3]

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(b) Fig. 7.2 shows a coil attached to a power supply placed below the soft iron bar A.

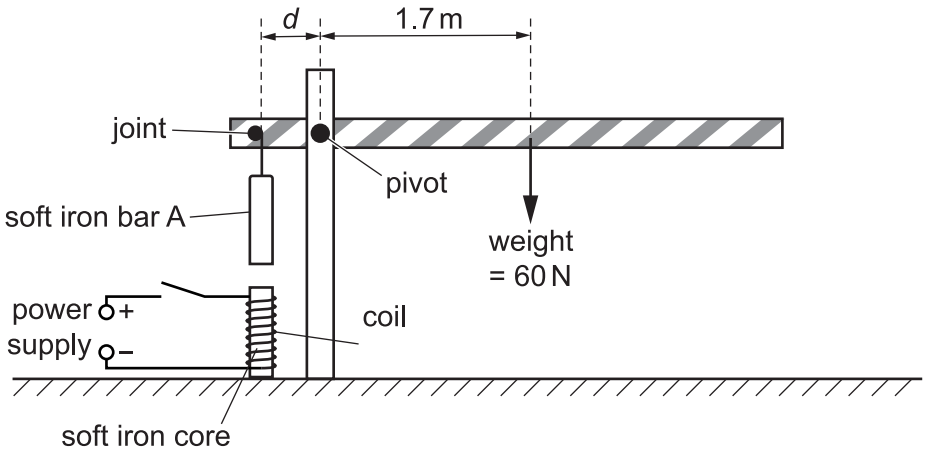


Fig. 7.2

(i) State and explain what happens to the wooden barrier arm when the switch in the coil circuit is closed.

statement .....

explanation .....

.....

.....

.....

[3]

(ii) The switch is opened. An operator decreases the potential difference across the coil and the switch is closed.

State and explain how the effect on the wooden barrier arm compares with the effect in **(b)(i)**.

statement .....

explanation .....

.....

[2]

(iii) A student suggests that the soft iron bar A is replaced by a steel bar. Explain why a steel bar is less effective than a soft iron bar in the barrier.

.....

.....

..... [2]

[Total: 11]

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