



PEAK SUCCESS EDUCATION
Kenya Certificate of Secondary Education

NAME:

SCHOOL:.....

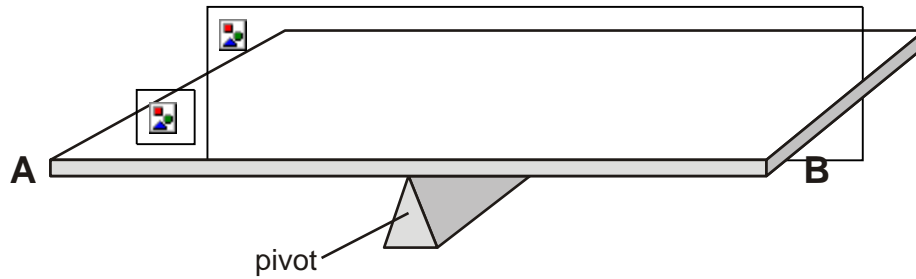
DATE:

ELECTROMAGNETISM 1

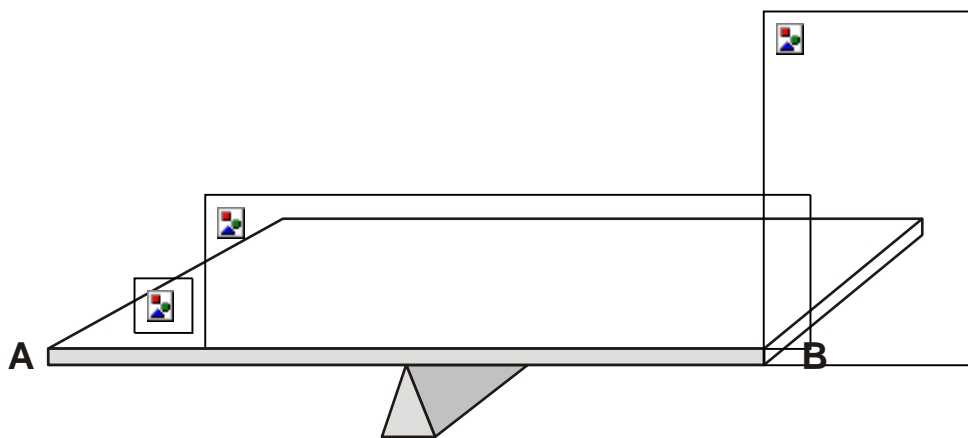
INSTRUCTIONS TO CANDIDATES

*Answer **ALL** questions in this paper in the spaces provided.*

1. Fran has a balancing game.
On each side of the pivot there are nine steel balls. The tray is balanced.



- (a) Fran removes one of the steel balls as shown below.



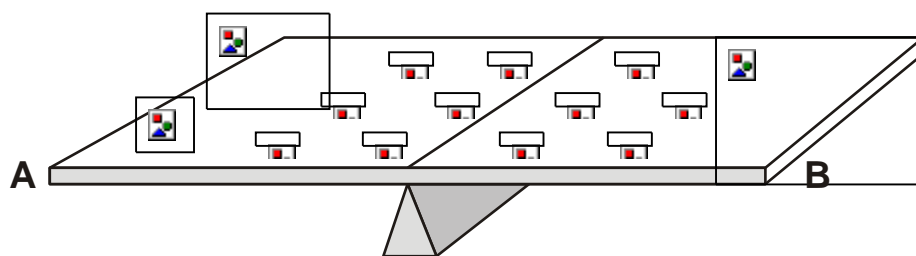
What will happen to end A?

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1 mark

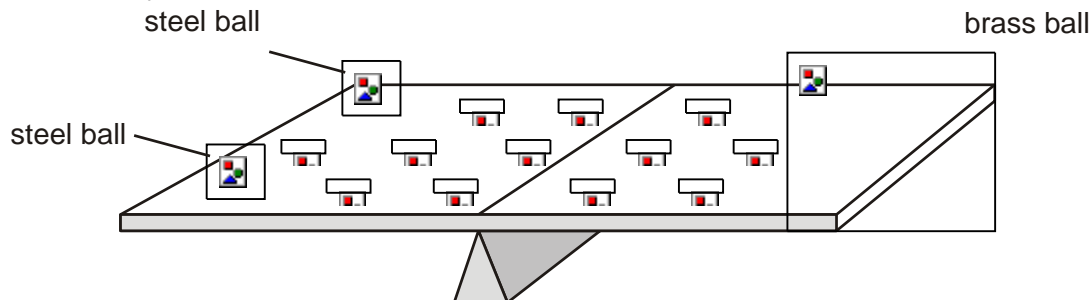
- (b) There are three balls on side A as shown below.

Draw three other balls in the correct positions to balance the tray.



1 mark

- (c) Fran puts two steel balls on one side and one brass ball on the other side. The tray is balanced.



The mass of each steel ball is 50 g.

What is the mass of the brass ball

..... g

1 mark

- (d) The table below gives information about the brass and steel balls.

	Is it attracted to a magnet?	elements in the ball
brass	no	copper and zinc
steel	yes	iron and carbon

- (i) Which element is **not** a metal?
Tick the correct box.

carbon	<input type="checkbox"/>	copper	<input type="checkbox"/>
iron	<input type="checkbox"/>	zinc	<input type="checkbox"/>

1 mark

- (ii) Look at the elements in the brass ball and the steel ball.

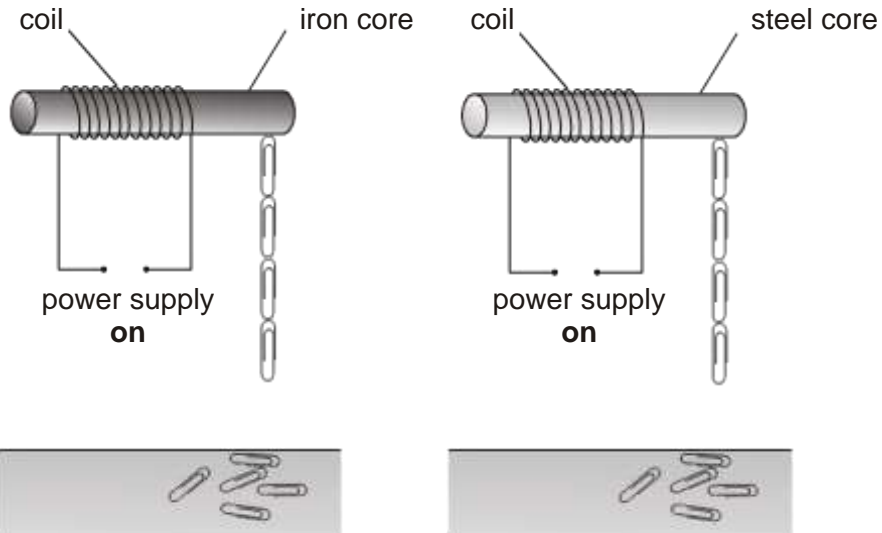
Why is steel attracted to a magnet but brass is **not**?

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1 mark

maximum 5 marks

2. David made two electromagnets as shown below. He used paper-clips to test the strength of each electromagnet. He switched on the power supply in both circuits.

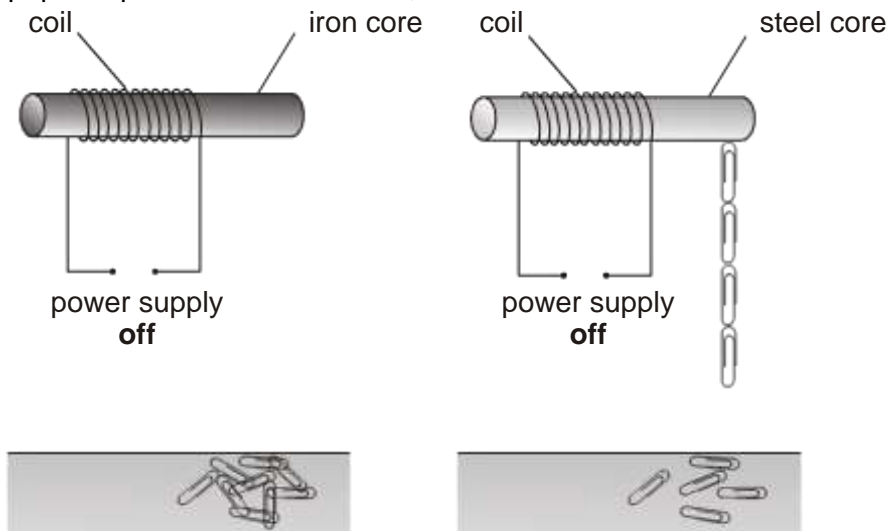


- (a) How can you tell that the strength of both electromagnets is the same?

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1 mark

- (b) David switched off the power supply in both circuits. The paper-clips fell off the iron core, but **not** off the steel core.



Why is iron used, rather than steel, for the core of an electromagnet?
Use the diagrams above to help you.

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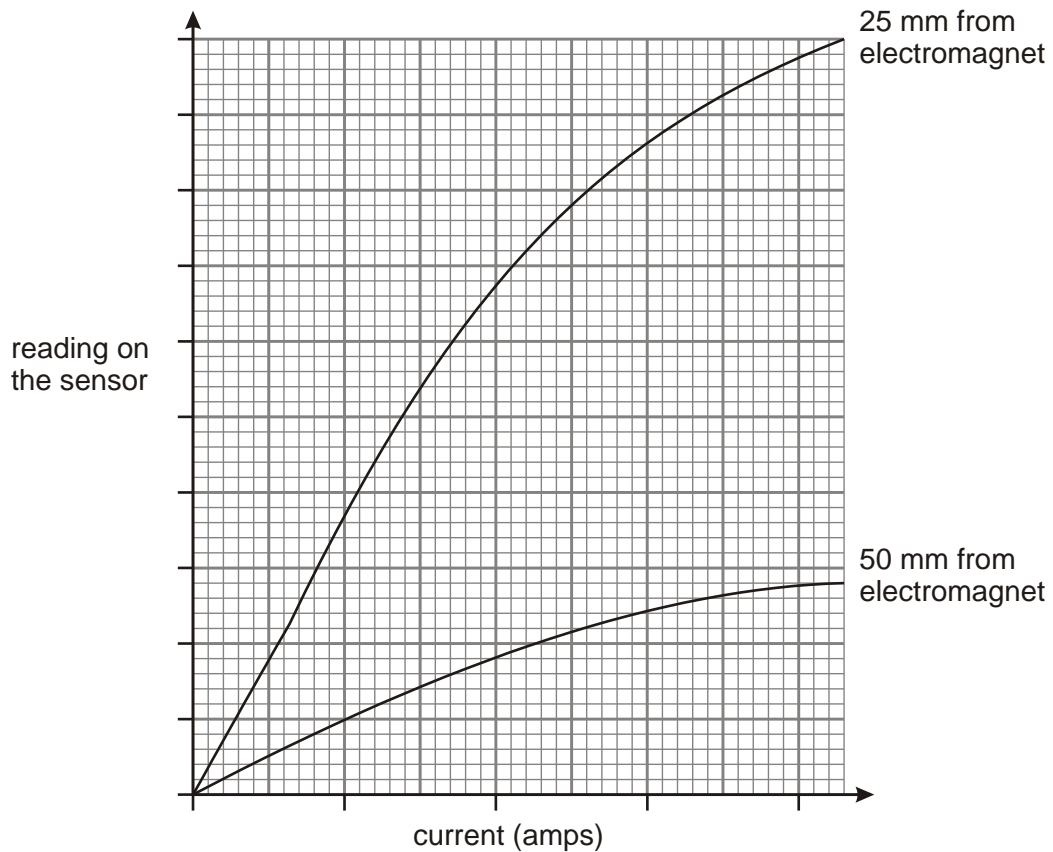
1 mark

(c) David used a sensor to measure the strength of an electromagnet.

He placed the sensor 25 mm from the electromagnet and increased the current in the coil.

He repeated the experiment with the sensor 50 mm from the electromagnet.

The graph below shows his results.



(i) How did the distance of the sensor from the electromagnet affect the reading on the sensor?

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1 mark

(ii) How did the size of the current in the coil affect the strength of the electromagnet?

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1 mark

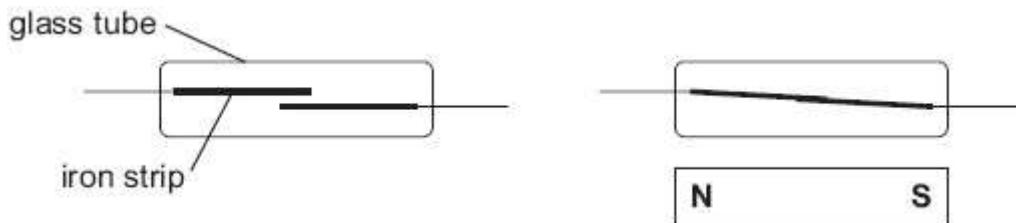
(iii) What else could David do to an electromagnet to change its strength?

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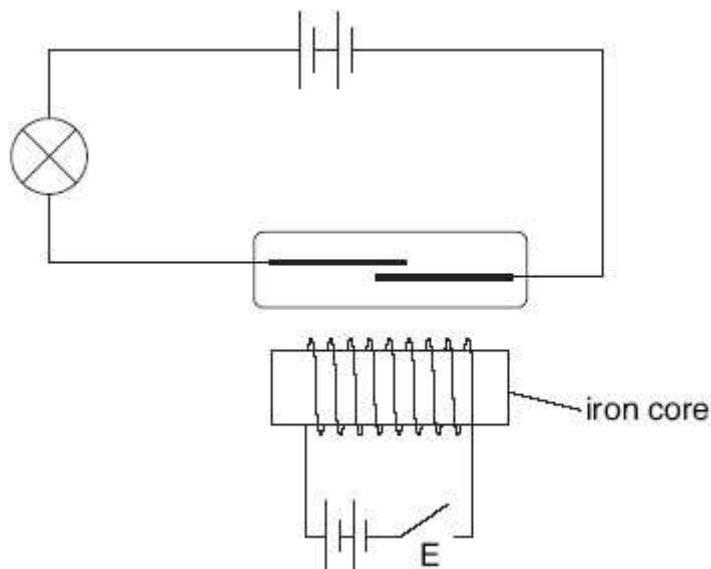
1 mark

maximum 5 marks

3. A reed switch is made of two iron strips inside a glass tube. The iron strips close together when a magnet is brought near. They spring apart again when the magnet is removed.



- (a) Hilary set up the circuit shown below.
She tried to close the reed switch using an electromagnet.



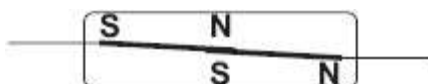
She closed switch E but the electromagnet was **not** strong enough to close the reed switch.

- (i) Give **two** ways Hilary could increase the strength of the electromagnet.

1.
2.

2 marks

- (ii) Hilary increased the strength of the electromagnet.
The reed switch closed.
The iron strips were magnetised as shown below.



She reversed the current in the coil of the electromagnet.
On the diagram below, label the poles of the iron strips when the current was reversed.



1 mark

- (b) (i) Iron and steel are both magnetic materials.
Explain why the strips must be made of iron and **not** steel.

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1 mark

- (ii) She replaced the reed switch with a piece of copper wire.
The current through the bulb increased.

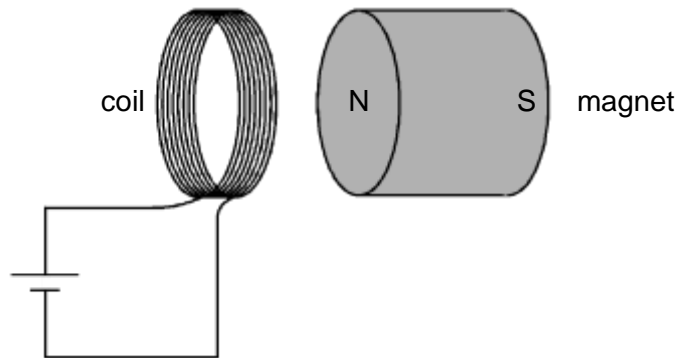
Explain why more current flowed through the bulb when the reed switch was replaced with copper wire.

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1 mark

maximum 5 marks

4. (a) A pupil makes a small coil of copper wire and passes an electric current through it. The pupil places a small magnet near the coil.

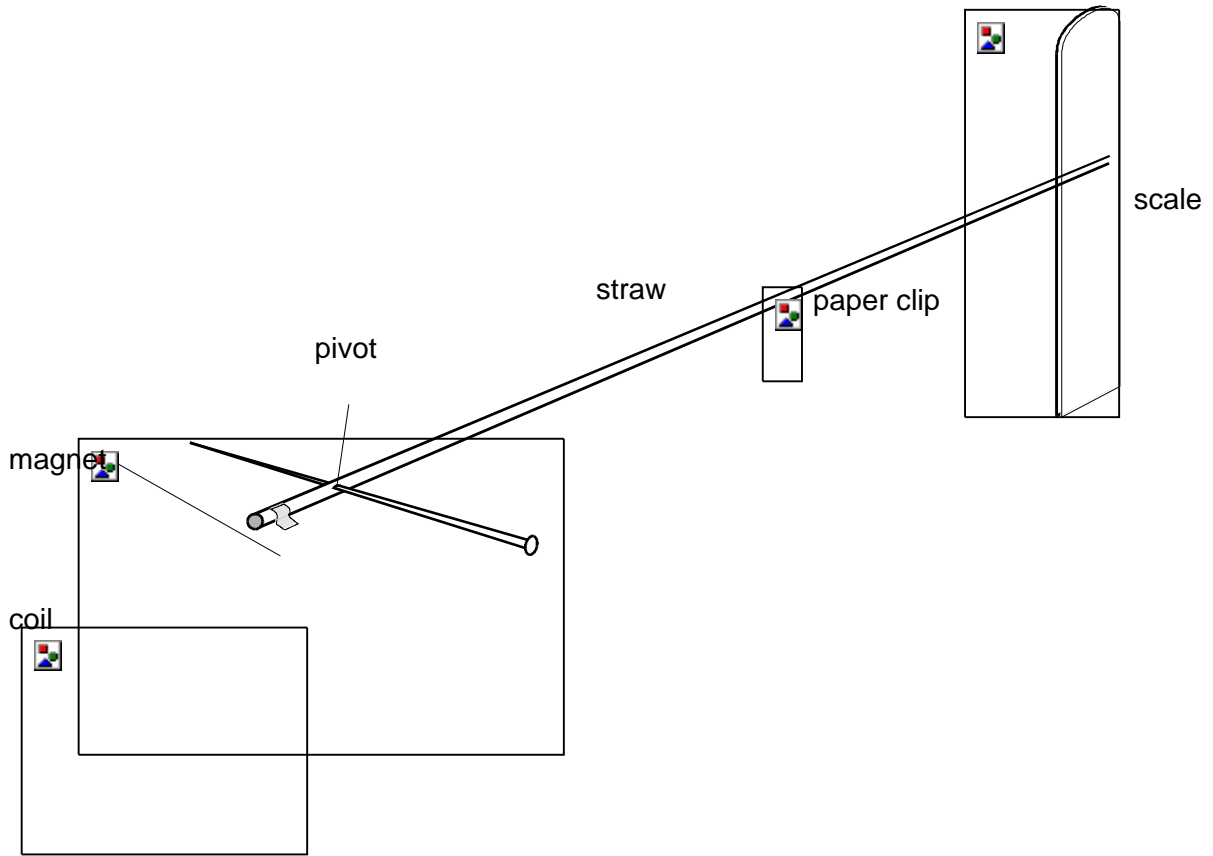


The magnet is attracted towards the coil. The pupil turns the magnet around so that the South pole is nearest the coil.
What effect, if any, will this have?

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1 mark

- (b) The pupil uses the coil and the magnet to make a simple ammeter to measure the current through a bulb.



not to scale

- (i) The paper clip is used to balance the weight of the magnet. Why is the paper clip further away from the pivot than the magnet is?

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1 mark

- (ii) Explain how a current in the coil makes the straw pointer move.

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2 marks

- (iii) The pupil places a piece of soft iron in the middle of the coil. Describe and explain how this will affect the reading on the scale when the same current flows through the coil.

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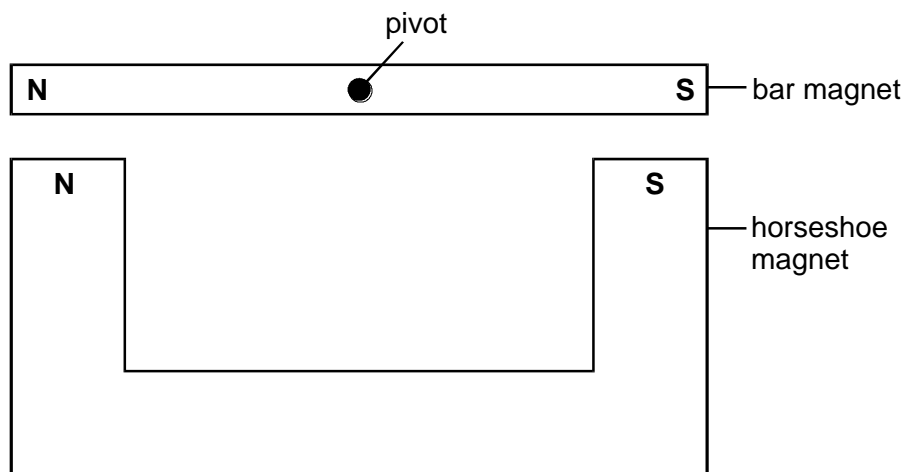
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2 marks
Maximum 6 marks

- 5. Anita has arranged a horseshoe magnet with a long bar magnet pivoted above it.



- (a) Whenever Anita tips the bar magnet, it always moves back to the position shown in the diagram. Explain why this happens.

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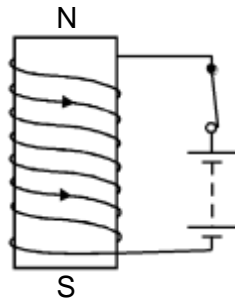
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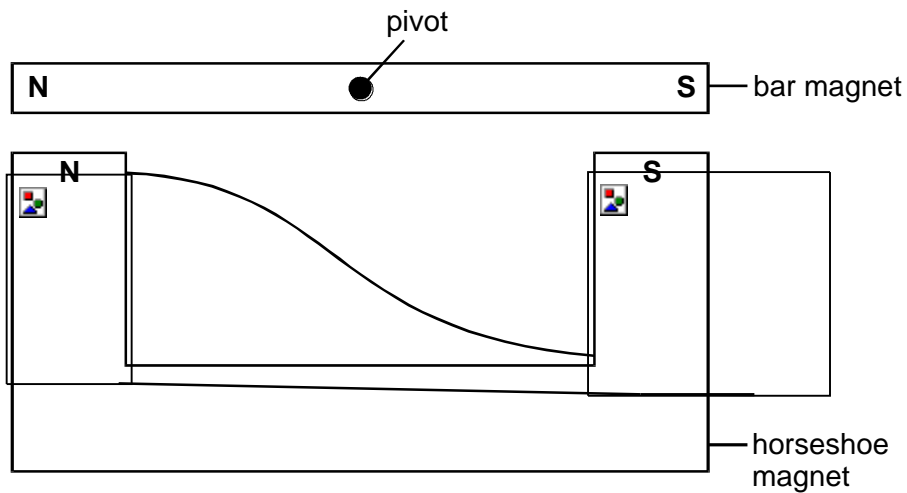
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2 marks

- (b) When a current is passed through a coil, it produces magnetic poles as shown in the diagram below.



Anita winds a coil around each end of the horseshoe magnet as shown below.



- (i) Describe what will happen to the bar magnet when she closes the switch. Explain your answer.

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3 marks

(ii) Anita reverses the battery. Suggest what happens to the bar magnet.

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1 mark

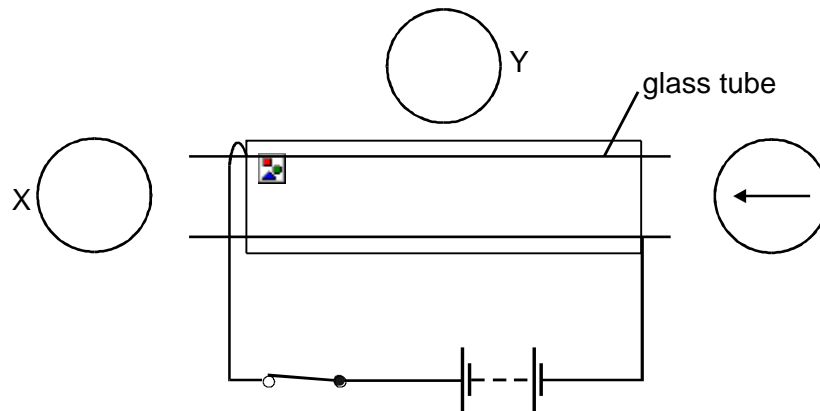
(iii) Anita replaces the battery with a power supply which changes the direction of the current every second. Suggest what happens to the bar magnet.

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1 mark

Maximum 7 marks

6. A pupil wound a coil of copper wire around a glass tube and connected the wire to a battery. She placed a compass at each end of the tube and one compass beside the tube as shown.



- (a) (i) Complete the diagram by drawing arrows in compasses X and Y to show the direction of the magnetic field. 2 marks
- (ii) Draw an arrow in the middle of the glass tube to show the direction of the magnetic field in the glass tube. 1 mark
- (iii) When the switch is opened, in which direction will the three compass needles point? 1 mark

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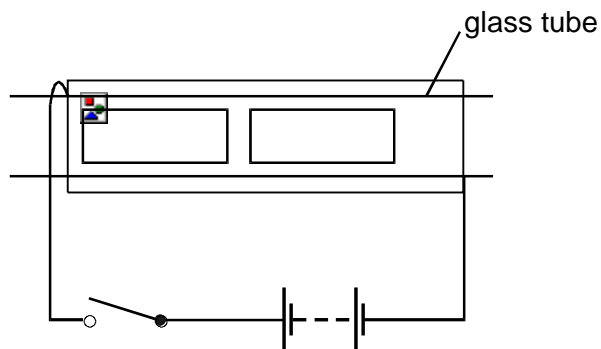
- (b) Give **one** way to reverse the magnetic field around the glass tube

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1 mark

- (c) Two pieces of iron are placed inside the glass tube.

- (i) When the switch is closed, the magnetic field is the same as in the diagram opposite. The pieces of iron become magnetised. Label the **four** poles on the pieces of iron.



1 mark'

- (ii) When the switch was closed, the pieces of iron moved.
Explain why they moved.

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1 mark

Maximum 7 marks