

**Magnetism and electromagnetism – GCSE CS Physics**

1. No.2

0 2

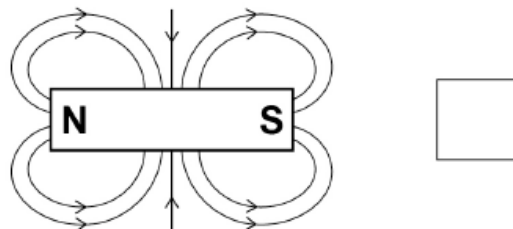
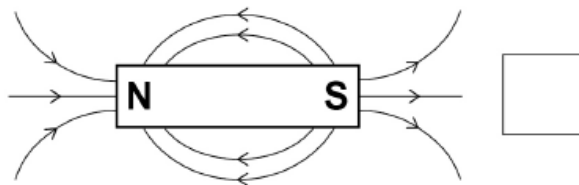
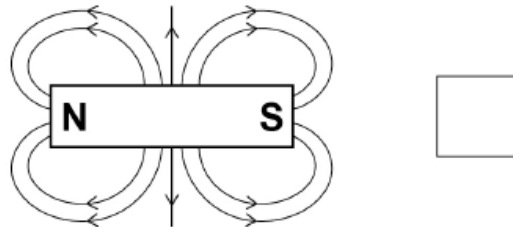
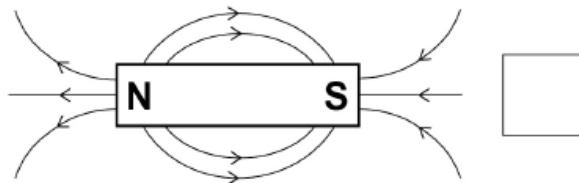
Magnets attract some metals.

0 2 . 1

Which diagram shows the correct magnetic field pattern for a bar magnet?

**[1 mark]**

Tick (✓) one box.



**Figure 3** shows an iron bar near a permanent magnet.

**Figure 3**



The iron bar becomes an induced magnet.

0 2 . 2

Label the poles on the iron bar.

[1 mark]

0 2 . 3

The magnet is turned around so that the north pole is closest to the iron bar.

Which statement about the iron bar is true?

[1 mark]

Tick (✓) **one** box.

The iron bar does not experience a magnetic force.

☐

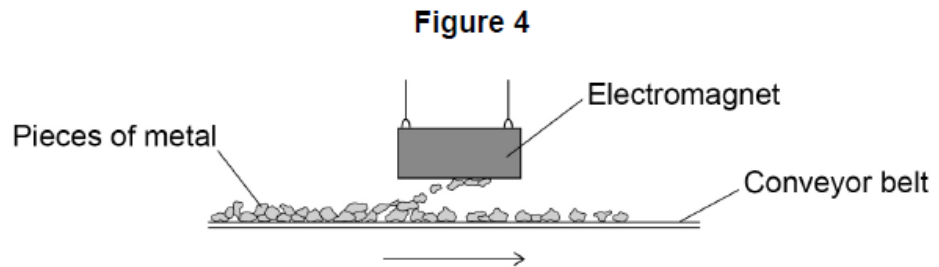
The iron bar experiences a magnetic force of attraction.

☐

The iron bar experiences a magnetic force of repulsion.

☐

**Figure 4** shows an electromagnet being used to separate pieces of different types of metal on a conveyor belt.



**0 2 . 4** Which **two** of the following types of metal would be attracted to the electromagnet? **[2 marks]**

Tick (✓) **two** boxes.

|           |                          |
|-----------|--------------------------|
| Aluminium | <input type="checkbox"/> |
| Copper    | <input type="checkbox"/> |
| Magnesium | <input type="checkbox"/> |
| Nickel    | <input type="checkbox"/> |
| Steel     | <input type="checkbox"/> |

**0 2 . 5** What is an advantage of using an electromagnet instead of a permanent magnet to separate the types of metal? **[1 mark]**

Tick (✓) **one** box.

An electromagnet attracts more types of metal than a permanent magnet.

☐

An electromagnet can be switched on and off.

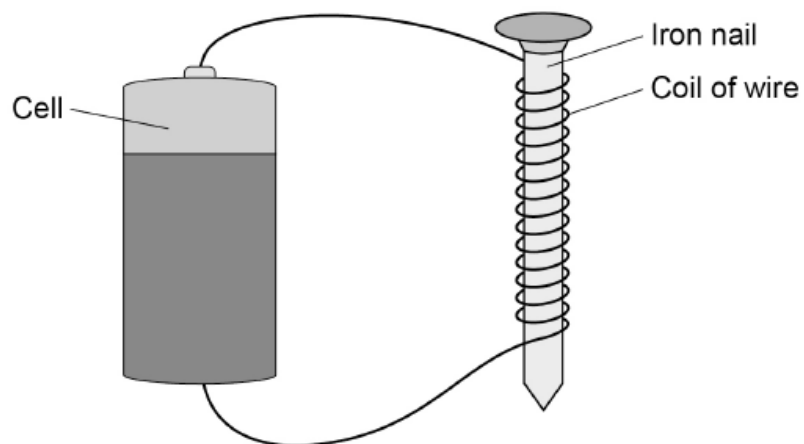
☐

An electromagnet transfers less energy than a permanent magnet.

☐

**Figure 5** shows a simple electromagnet.

**Figure 5**



**0 2 . 6** What is the purpose of the iron nail inside the coil of wire?

**[1 mark]**

Tick (✓) **one** box.

The iron nail makes the magnetic field stronger.

☐

The iron nail reduces the magnetic field to zero.

☐

The iron nail reverses the magnetic field.

☐

**0 2 . 7** Which of the following would increase the strength of the electromagnet?

**[1 mark]**

Tick (✓) **one** box.

Use a greater current.

☐

Use a shorter nail.

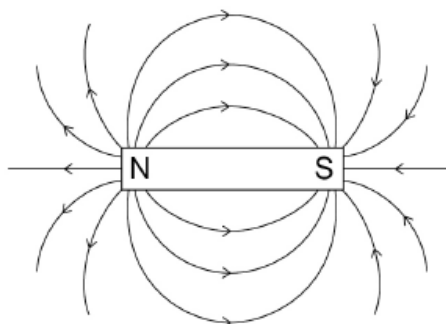
☐

Use a thinner wire.

☐

2. No.4

0 4

**Figure 4** shows the magnetic field pattern around a permanent magnet.**Figure 4**

0 4 . 1

Where is the magnetic field of the magnet the strongest?

[1 mark]

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0 4 . 2

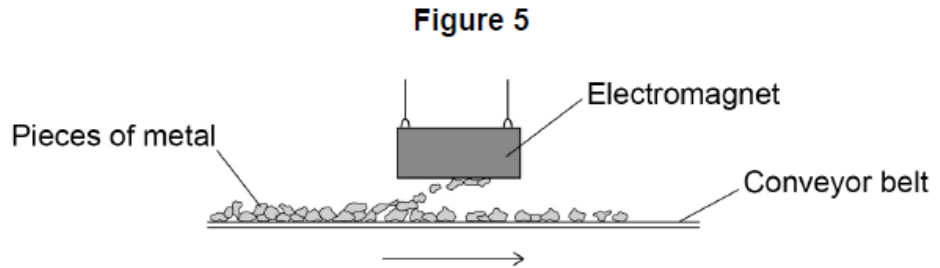
How does **Figure 4** show that the strength of the magnetic field is not the same at all places?

[1 mark]

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**Figure 5** shows an electromagnet being used to separate iron and steel from non-magnetic metals.



**0 4 . 3** Explain **one** reason why an electromagnet is used instead of a permanent magnet. **[2 marks]**

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**0 4 . 4** Pieces of iron and steel are attracted to the electromagnet.  
Name **two** other metals that would be attracted to the electromagnet.

**[2 marks]**

1 \_\_\_\_\_

2 \_\_\_\_\_

**0 4 . 5** The design of the electromagnet **cannot** be changed.

Give **two** ways the force exerted by the electromagnet on a piece of iron or steel could be increased.

**[2 marks]**

1 \_\_\_\_\_

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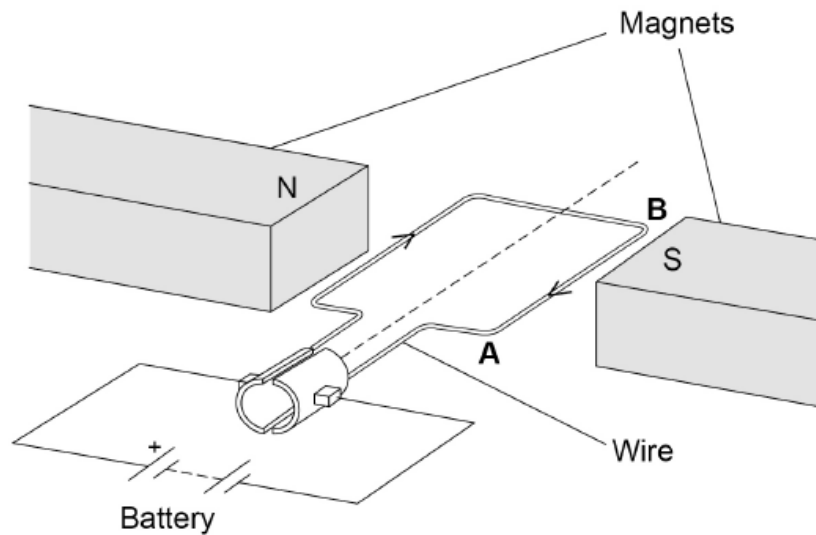
2 \_\_\_\_\_

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The conveyor belt that moves the pieces of metal is driven by an electric motor.

Figure 6 shows a simple electric motor.

Figure 6



0 4 . 6

The length of the wire **AB** in the magnetic field is 120 mm.

There is a current of 4.0 A in the wire. The length of wire **AB** experiences a force of 0.36 N.

Calculate the magnetic flux density between the magnets.

Give the unit.

[5 marks]

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Magnetic flux density = \_\_\_\_\_ Unit \_\_\_\_\_

0 4 . 7

Fleming's left-hand rule can be used to determine the direction of the force on wire **AB**.

Complete the labels on **Figure 7** to show Fleming's left-hand rule.

[2 marks]

**Figure 7**

