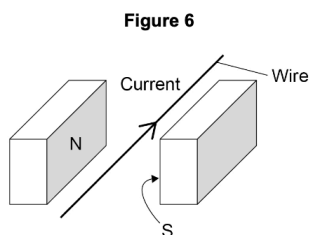


Q1. (2019)

0 4

Figure 6 shows a wire in a magnetic field.

The direction of the current in the wire is shown.

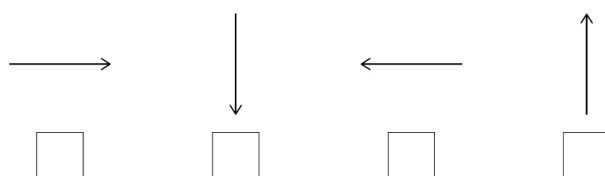


a)

0 4 . 1

There is a force on the wire due to the current in the magnetic field.

In which direction is the force on the wire?

[1 mark]Tick (✓) **one** box.

b)

0 4 . 2

Give **two** ways that the direction of the force on the wire could be reversed.**[2 marks]**

- 1 _____
- 2 _____

c)

0 4 . 3

The length of the wire in the magnetic field is 0.050 m

The force on the wire is 0.072 N

magnetic flux density = 360 mT

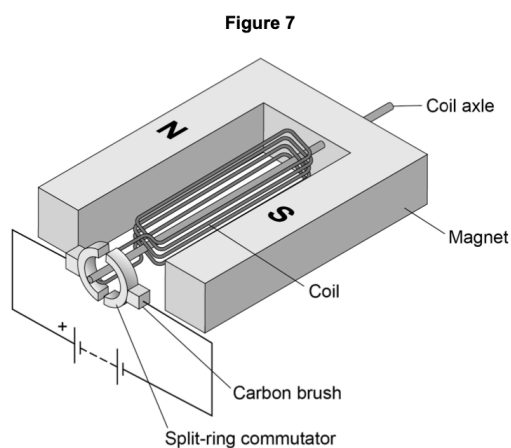
Calculate the current in the wire.

Use the Physics Equations Sheet.

[4 marks]

d)

0 4 . 4

Figure 7 shows a simple motor.

Explain why the coil rotates when there is a current in the coil.

[4 marks]

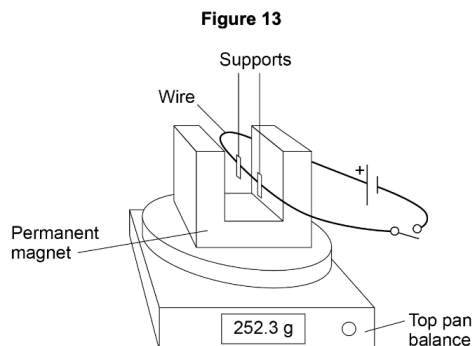
Q2. (2020)

07

A student clamped a wire between the poles of a permanent magnet.

The student investigated how the force on the wire varied with the current in the wire.

Figure 13 shows the equipment used.



The top pan balance was used to determine the force on the wire.

a)

07.1

When the switch was closed the reading on the top pan balance increased.

Explain why the increased reading showed that there was an upward force on the wire.

[2 marks]

b)

07.2

Table 3 shows the readings on the top pan balance with the switch open and with the switch closed.

Table 3

Switch	Mass in grams
Open	252.3
Closed	254.8

Explain how the values in Table 3 can be used to determine the size of the force on the wire.

[2 marks]

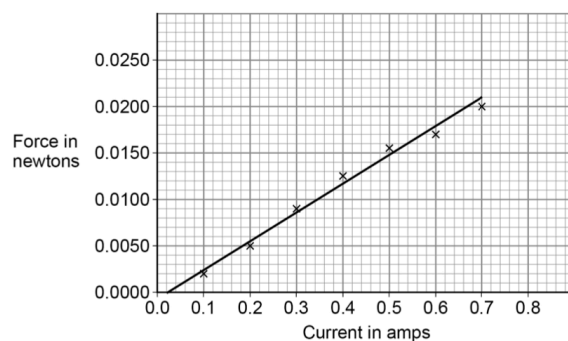
c)

07.3

The student varied the current in the wire and calculated the force acting on the wire.

Figure 14 shows the results.

Figure 14



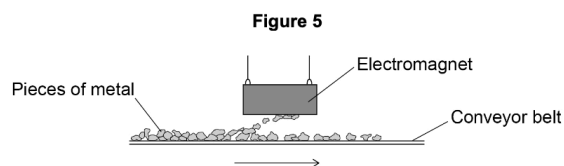
The length of the wire in the magnetic field was 0.125 m

Determine the magnetic flux density.

[4 marks]

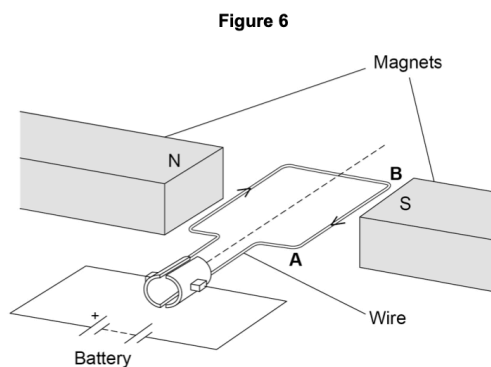
Q3. (2021)

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



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

Figure 6 shows a simple electric motor.



a)

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]

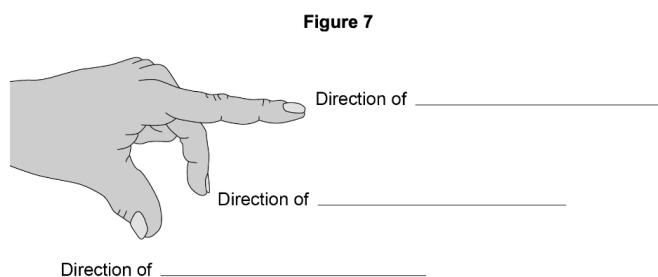
b)

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]



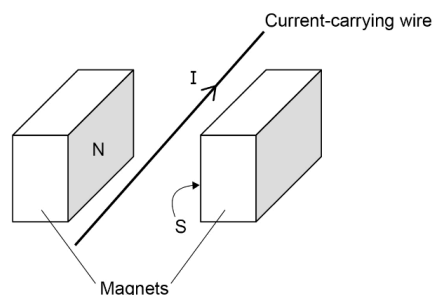
Q4. (2022)

0 4

A teacher demonstrated the motor effect.

Figure 5 shows the equipment used.

Figure 5



a)

0 4 . 1

Explain why there is a force on the wire when there is a current in the wire.

[2 marks]

b)

0 4 . 2

Explain how the direction of the force on the wire can be predicted.

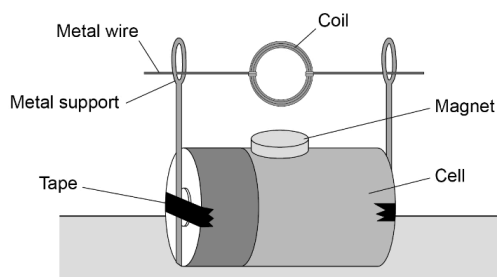
[3 marks]

Q5. (2022)

0 4 . 3

Figure 6 shows a simple electric motor.

Figure 6



Explain **one** way that the motor could be changed to increase the rate at which the coil rotates.

[2 marks]

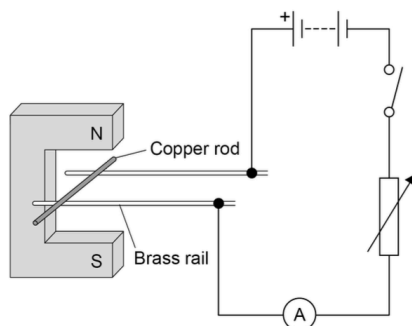
Q6. (2023)

0 4

A teacher demonstrated the motor effect.

Figure 5 shows the equipment used. The equipment includes a permanent magnet.

Figure 5



When the switch is closed the copper rod accelerates.

a)

0 4 . 2 In which direction will the copper rod accelerate?

[1 mark]

Tick (✓) **one** box.

↓	☐
→	☐
↑	☐
←	☐

b)

0 4 . 3 Explain **one** way the teacher could increase the acceleration of the copper rod.

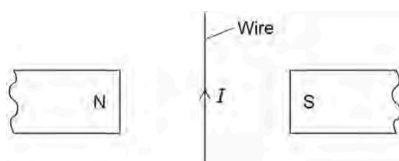
[2 marks]

Q7. (2024)

0 4 Figure 6 shows two magnets and a wire.

There is a current in the wire.

Figure 6



a)

0 4 . 1 A force acts on the wire in Figure 6.

What is the direction of the force on the wire?

[1 mark]

Tick (✓) **one** box.

Into the page	☐
Out of the page	☐
To the left	☐
To the right	☐

b)

0 4 . 2 The length of the wire in the magnetic field between the magnets is 80 mm.

The current in the wire is 4.6 A.

The force on the wire is 0.092 N.

Calculate the magnetic flux density between the magnets.

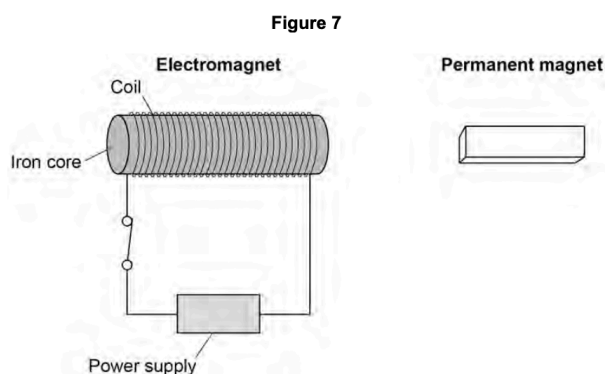
Use the Physics Equations Sheet.

Give the unit.

[4 marks]

Q8. (2024)

Figure 7 shows an electromagnet close to a permanent magnet.



a)

0 4 . 3 The electromagnet exerts a force on the permanent magnet.

The permanent magnet exerts an equal and opposite force on the electromagnet.

Which law is this an example of?

[1 mark]

Tick (✓) **one** box.

Newton's first law

☐

Newton's second law

☐

Newton's third law

☐

b)

0 4 . 4 Give **two** changes to the electromagnet that would increase the force exerted on the permanent magnet.

[2 marks]

1 _____

2 _____

c)

0 4 . 5 Give **two** changes to the electromagnet that would reverse the direction of the force exerted on the permanent magnet.

[2 marks]

1 _____

2 _____