Name: _____

Edexcel Electromagnetism

Date:

Time:

Total marks available:

Total marks achieved: _____

Questions

Q1.

(a) All metals are good conductors of electricity.

Which of these non-metals can conduct electricity?

(1)

☒ **A** carbon

☒ **B** chalk

☒ **C** plastic

☒ **D** rubber

(b) The current in a metallic conductor is a flow of

(1)

☒ **A** negatively charged electrons

☒ **B** negatively charged protons

☒ **C** positively charged electrons

☒ **D** positively charged protons

(c) Some metals and alloys are magnetic.

Which of these is magnetic?

(1)

☒ **A** aluminium

☒ **B** copper

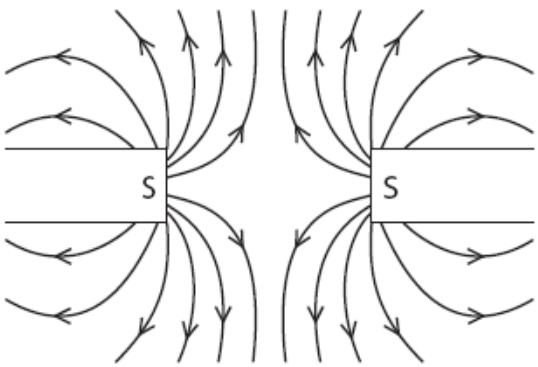
☒ **C** gold

☒ **D** steel

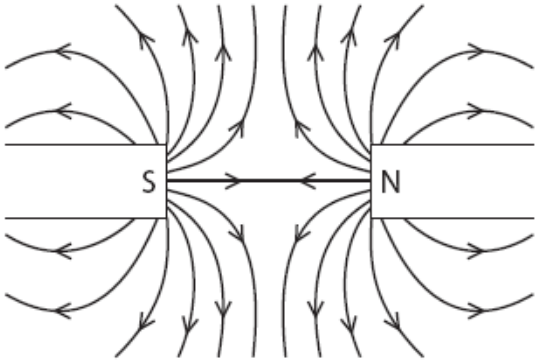
(d) Which of these field patterns is correct?

(1)

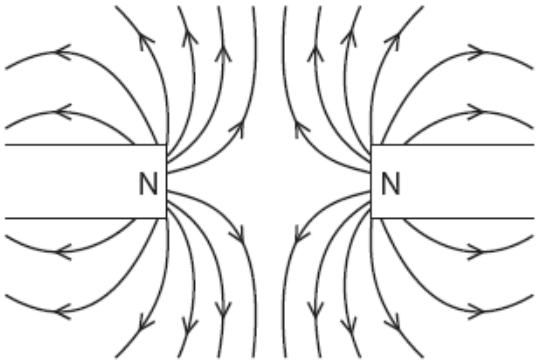
☒ **A**



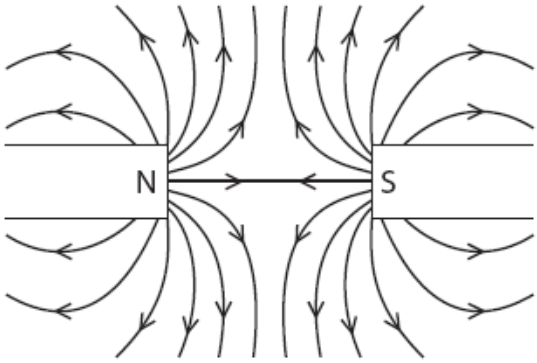
☒ **B**



☒ **C**



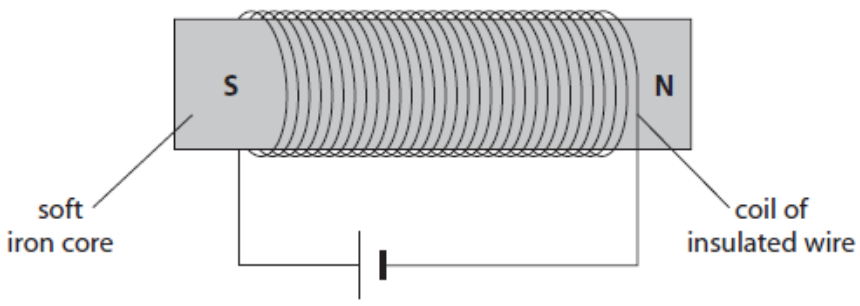
☒ **D**



(Total for question = 4 marks)

Q2.

(a) The diagram shows a solenoid with a soft iron core connected in an electric circuit.



(i) On the diagram, draw field lines to show the shape and direction of the magnetic field

produced by the solenoid.

(3)

(ii) Explain the effect of the soft iron core.

(1)

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(b) A solenoid with a steel core can be used as an electromagnet.

When the current is switched on, the electromagnet picks up some steel paper clips.

Explain why the steel paper clips remain attached to the steel core when the current is switched off.

(2)

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(Total for question = 6 marks)

Q3.

This photograph shows an electromagnetic device used to keep a door open.

The electromagnet attracts the metal plate to hold the door open.

The electromagnet is connected to a fire alarm circuit.

When the fire alarm sounds, the door is released and it closes.

(a) State why the metal plate is made of iron.

(1)

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(b) Describe the construction of an electromagnet.

You may draw a diagram to help your answer.

(3)

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(c) Describe the changes that allow the electromagnet to release the door when the fire alarm sounds.

(2)

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(Total for question = 6 marks)

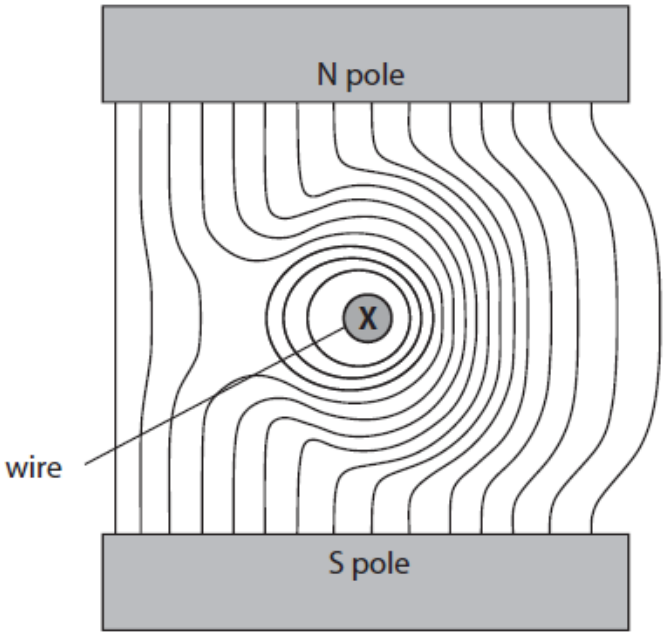
Q4.

Magnetic field lines show the shape and direction of a magnetic field.

(a) The diagram shows a cross-section through a wire placed between two magnetic poles.

The wire carries electric current into the page at **X**.

The shape of the magnetic field is shown.



(i) Add arrows to two of the magnetic field lines to show the direction of the magnetic field.

(1)

(ii) Draw an arrow on the diagram to show the direction of the force on the wire.

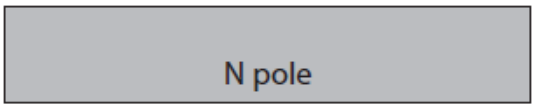
Label this arrow **F**.

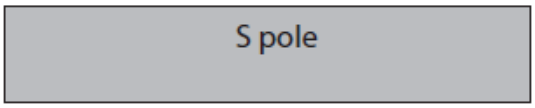
(2)

(b) The wire is removed and the magnetic field between the poles changes.

Sketch the new magnetic field.

(2)





(c) Explain how you could use a plotting compass to investigate the magnetic field around a bar magnet.

You may draw a diagram to help your answer.

(3)

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(Total for question = 8 marks)

Q5.

Diagram 1 shows some of the apparatus used to investigate the force on a current-carrying wire, XY, in a magnetic field.

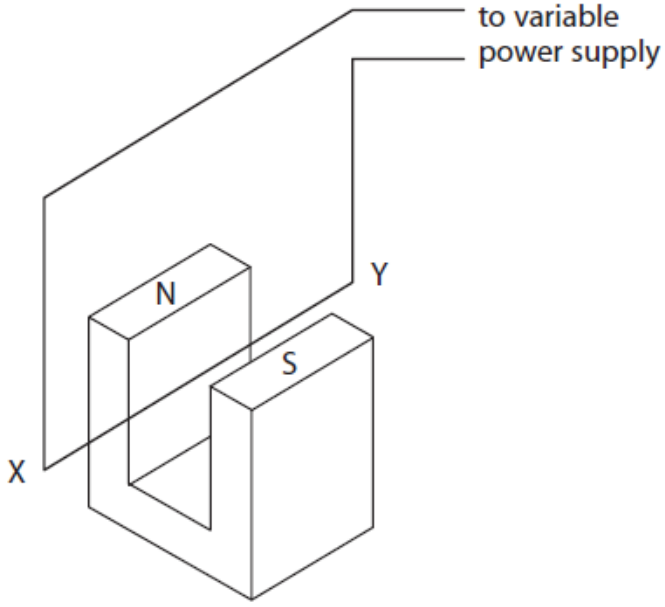

Diagram 1

(a) Diagram 2 shows the poles of the magnet viewed from above.

Draw the uniform magnetic field between the poles.

(2)

Diagram 2

(b) The current-carrying wire XY is at right angles to the magnetic field.

The current in the wire is 10 A.

(i) Suggest why the wire used in this investigation must be thick.

(1)

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(ii) Explain why the wire XY experiences a force when there is a current in the circuit.

(3)

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(iii) State two ways in which this force can be reduced.

(2)

1 .....

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2 .....

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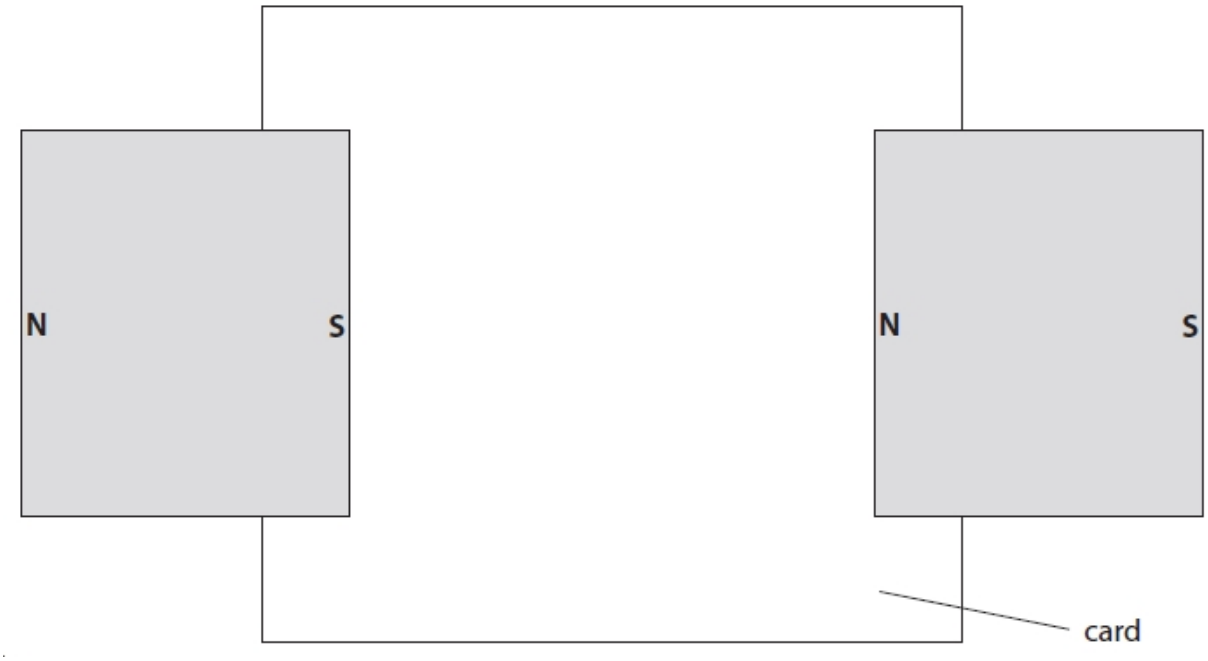
(Total for question = 8 marks)

Q6.

The diagram shows a piece of card and two wide bar magnets.



(a) (i) Add to the diagram to show the shape and direction of the magnetic field pattern between the magnets.

(3)

(ii) Describe how to investigate the shape and direction of the magnetic field between the magnets.

(3)

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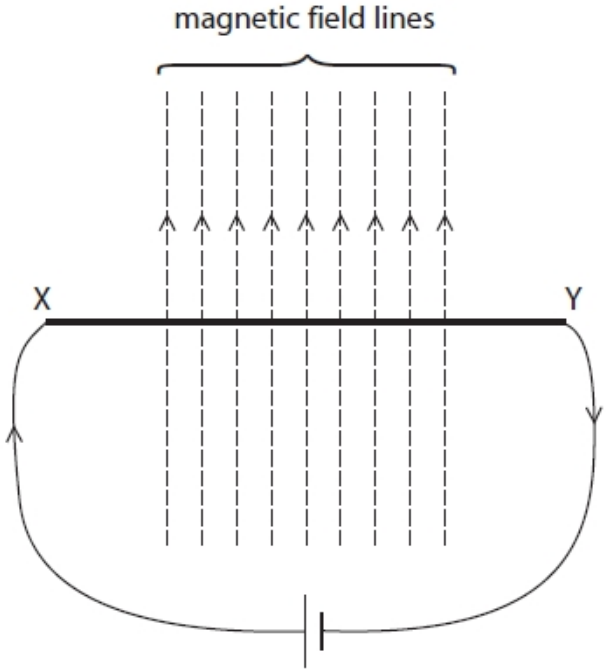
(b) A metal rod, X Y, is placed in a magnetic field as shown.

Wires from a cell are connected to the ends of the rod so that there is a current from X to Y.



(2)

Describe the effect on the rod.

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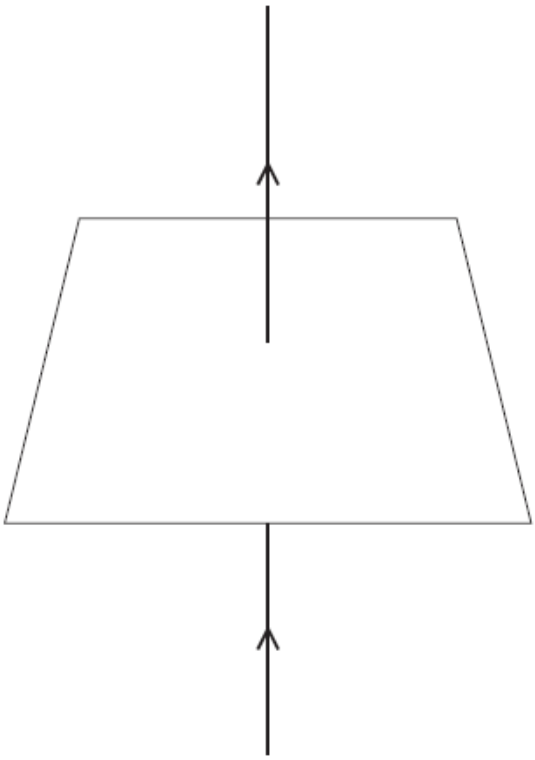
(Total for question = 8 marks)

Q7.

(a) A student passes a thick wire vertically through the centre of a horizontal card.

He then passes a current through the wire in an upwards direction, as shown in the diagram.



(i) On the diagram, draw the shape and direction of the magnetic field produced by the current in the wire.

(3)

(ii) Describe a method that the student could use to show that a magnetic field is produced by the current in the wire.

(2)

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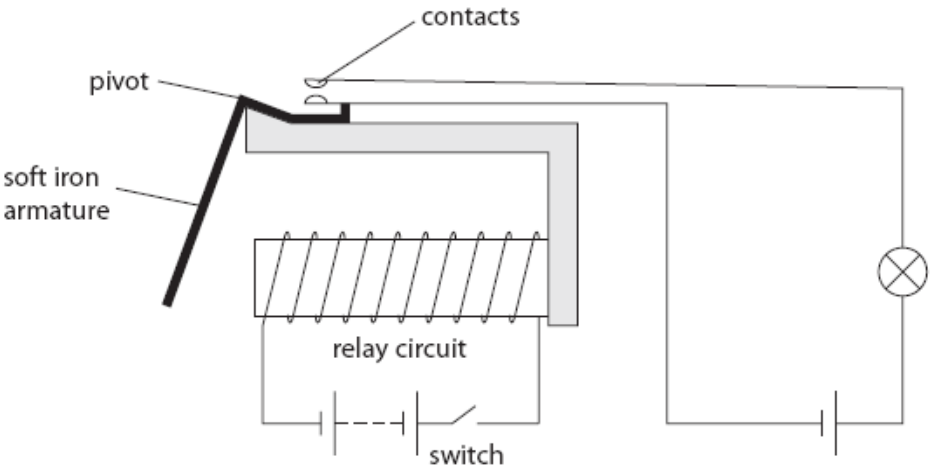
(b) In a relay, an electromagnet is used to operate a switch.

The diagram shows how the relay is used to turn a lamp on and off in another circuit.



(i) The table gives some statements about how the relay works.

Put numbers in the boxes to show the correct order sequence needed to turn on the lamp.

One has been done for you.

(3)

Statements	Order
the switch is closed	
the lamp is on	6
the armature is attracted	
the contacts are pushed together	
the electromagnet is magnetised	
the armature rotates	

(ii) Explain why the lamp turns off when the switch is opened.

(2)

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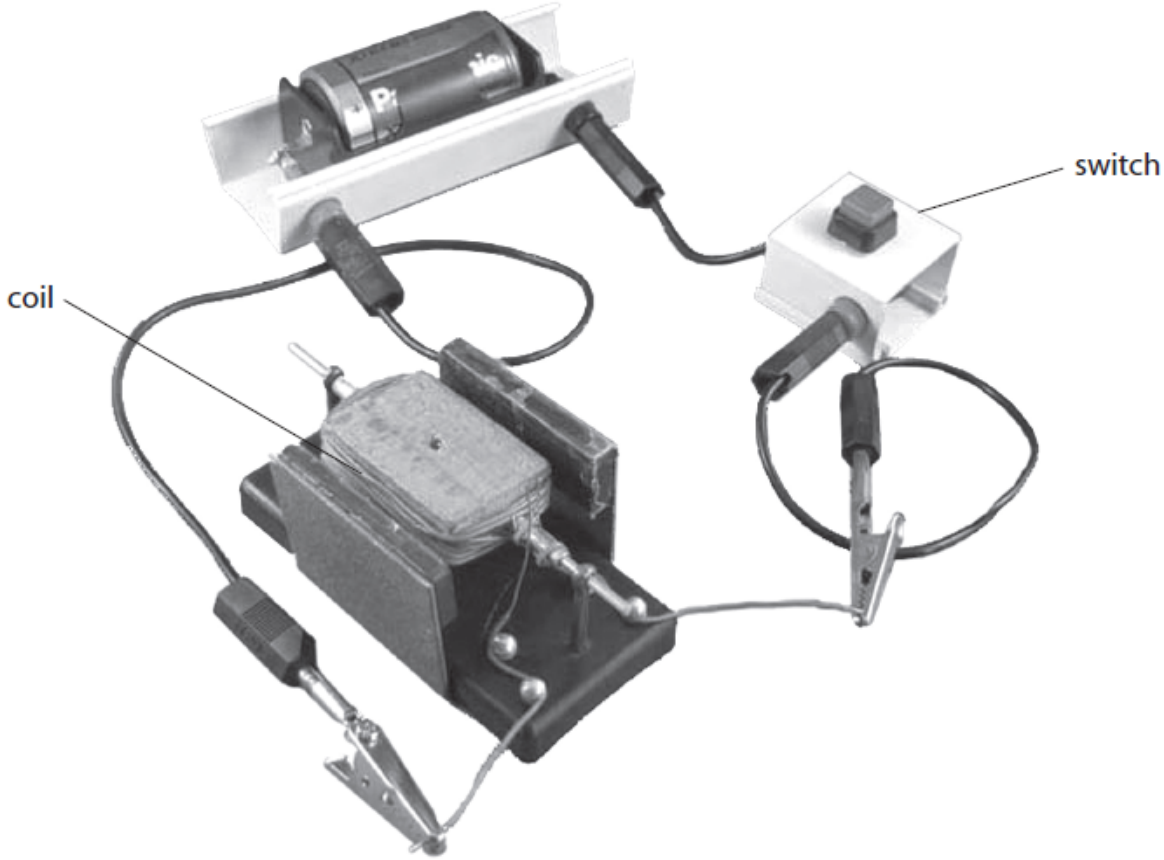
(Total for question = 10 marks)

Q8.

The photograph shows a small electric motor.



(a) Explain why the coil starts to spin when the switch is closed.

(4)

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(b) (i) Suggest how to make the coil spin in the opposite direction.

(1)

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(ii) Suggest how to make the coil spin more slowly.

(1)

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(Total for question = 6 marks)

Q9.

(a) A direct current passes around a flat, circular coil as shown.

On the diagram, sketch the magnetic field caused by the current in the coil.

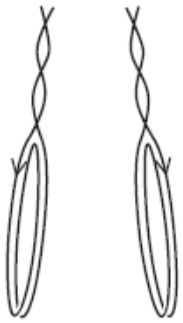
(3)

(b) The coil is suspended vertically so that it is free to swing.

A second, identical coil is placed beside it.

When direct currents pass, as shown, the two coils move together.

When the current in the right-hand coil is reversed, the two coils move apart.



Explain why the coils move in this way.

(3)

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(Total for question = 6 marks)