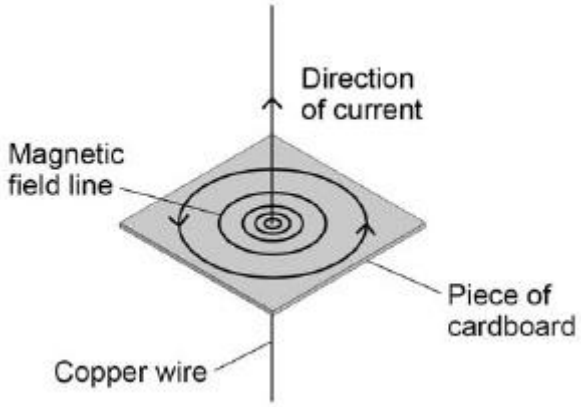
Name of the Student:_____

Max. Marks : 24 Marks **Time : 24 Minutes**

Q1.

Figure 1 shows the magnetic field around a copper wire carrying a current.

Figure 1



(a) What do the arrows on the magnetic field line represent?

_____

_____

(1)

(b) Complete the sentence.

Choose the answer from the box.

decreases	**increases**	**stays the same**

As the distance from the copper wire increases, the

magnetic field strength _____ .

(1)

(c) Suggest how the field lines on **Figure 1** show the variation in field strength.

_____

_____

_____

_____

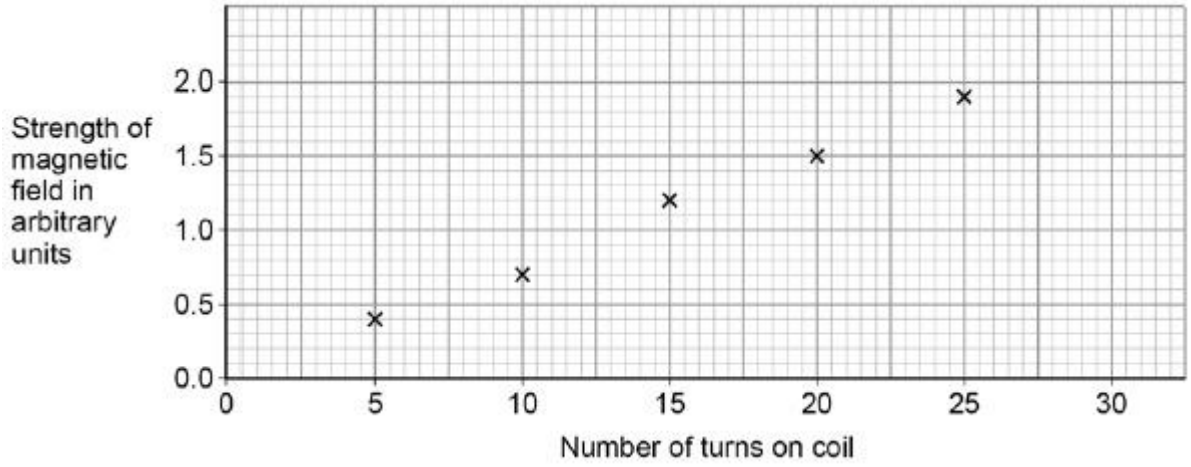
(2)

A student coiled the copper wire a different number of times to form a solenoid.

Each time the student measured the strength of the magnetic field inside the solenoid.

Figure 2 shows the results.

Figure 2



(d) Draw a line of best fit on **Figure 2**.

(1)

(e) Determine the increase in strength of magnetic field when the number of turns on the coil is changed from 12 to 18

_____

_____

_____

Increase in strength of magnetic field = _____ arbitrary units

(2)

(f) How could the strength of the magnetic field be increased?

Tick **two** boxes.

Increase the current through the solenoid.	☐
Increase the potential difference across the solenoid.	☐
Increase the temperature of the solenoid.	☐
Spread the turns of wire on the solenoid further apart.	☐
Use wire with a higher resistance to make the solenoid.	☐

(2)

(g) **Figure 3** shows the north and south poles of a solenoid.

Figure 3

Draw field lines to show the magnetic field around the solenoid.

(2)

(h) How can the solenoid be made into an electromagnet?

_____

_____

(1)

(Total 12 marks)

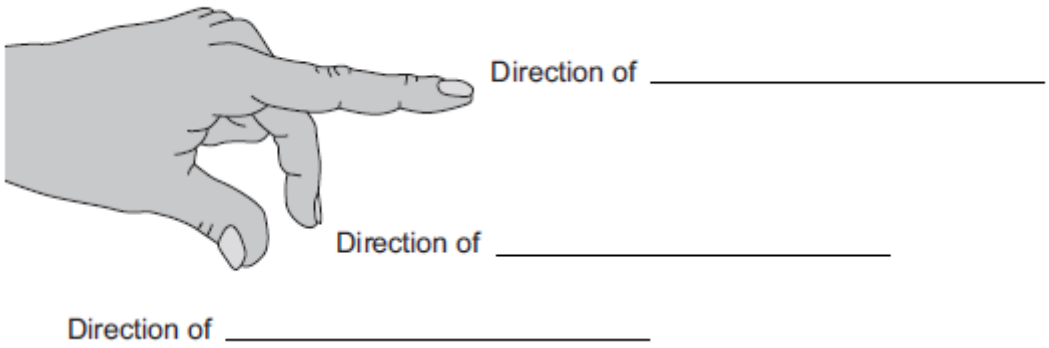
Q2.

The left-hand rule can be used to identify the direction of the force acting on a current-carrying conductor in a magnetic field.

(a) Use words from the box to label **Figure 1**.

current	**field**	**force**	**potential difference**

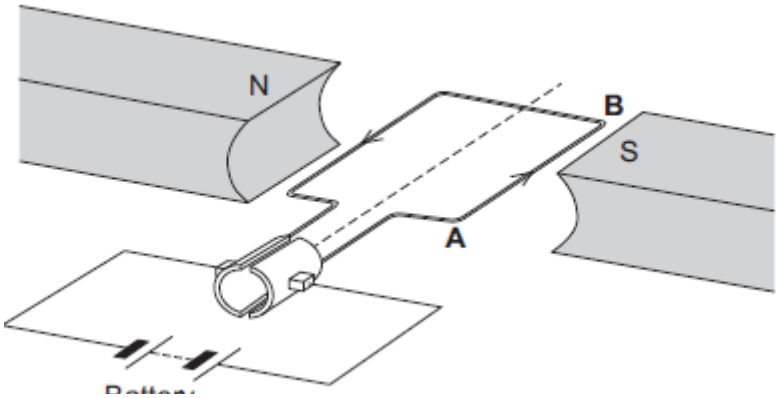
Figure 1



(3)

(b) **Figure 2** shows an electric motor.

Figure 2



(i) Draw an arrow on **Figure 2** to show the direction of the force acting on the wire **AB**.

(1)

(ii) Suggest **two** changes that would increase the force acting on the wire **AB**.

1. _____

2. _____

(2)

(iii) Suggest **two** changes that would reverse the direction of the force acting on the wire **AB**.

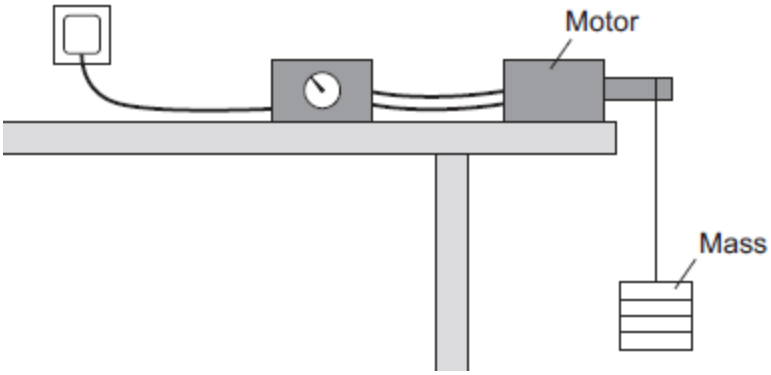
1. _____

2. _____

(2)

(c) A student used an electric motor to lift a mass. This is shown in **Figure 3**.

Figure 3



The student varied the electrical input power to the motor. For each different electrical input power, he recorded the time taken to lift the mass and calculated the output power of the motor.

The results are shown in the table.

Test	Electrical input power in watts	Work done lifting the mass in joules	Time taken to lift the mass in seconds	Output power in watts

A	20	24	2.4	10
B	40	24	1.2	20
C	60	24	0.8	30
D	80	24	0.2	120

The result for **Test D** is anomalous.

(i) Calculate the efficiency of the motor in **Test D**.

_____

_____

Efficiency = _____

(2)

(ii) Comment on your answer to part (c)(i).

_____

_____

(1)

(iii) Suggest a reason for this anomalous result.

_____

_____

(1)

(Total 12 marks)