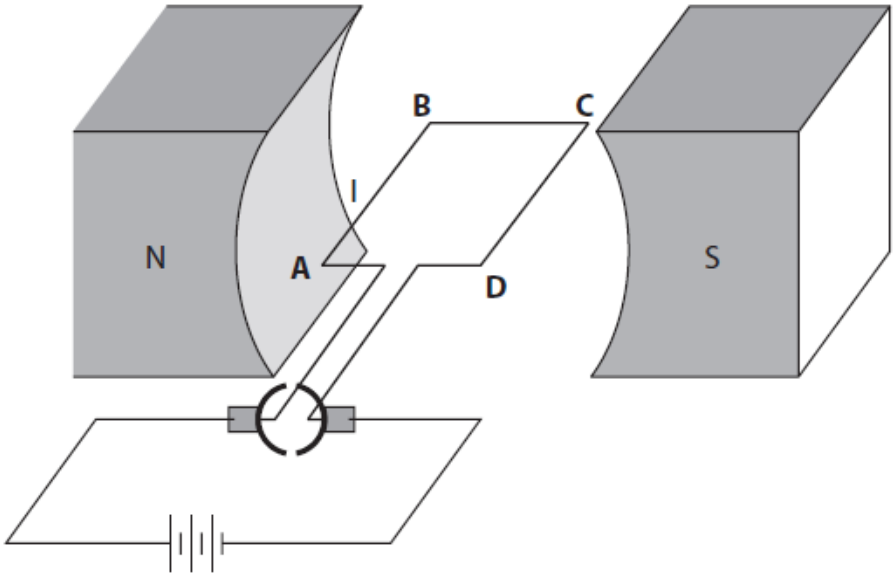
Questions

Q1.

The diagram shows part of an electric motor connected to a battery.

The coil is shown as **ABCD**.
The direction of the current, I, is from **A** to **B**.



(a) Draw an arrow showing the direction of the force on side **CD** of the coil.

(1)

(b) Give **one** change that can be made to the equipment that will make the motor spin in the opposite direction.

(1)

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(c) Give **two** changes that can be made to the equipment that will make the motor spin slower.

(2)

1 .....

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2 .....

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(Total for question = 4 marks)

Q2.

The passage describes some of the properties of magnets and magnetic fields.

Use words from the box to complete the passage.

aluminium	copper	hard	negative	
north	positive	soft	south	steel

Each word may be used once, more than once or not at all.

(5)

The north pole of one magnet will repel the ..... pole of another magnet.

There is attraction between ..... and magnets.

Materials that are difficult to magnetise are called ..... magnetic materials.

The direction of the magnetic field lines for a magnet is from ..... to south.

Iron is a ..... magnetic material.

(Total for question = 5 marks)

Q3.

This question is about magnetic fields.

(a) Describe an experiment to investigate the magnetic field pattern around a permanent bar magnet.

You may draw a diagram to help your answer.

(3)

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(b) The diagram shows two bar magnets.

Complete the diagram to show the magnetic field pattern.

(3)

(Total for question = 6 marks)

Q4.

A student investigates a transformer.

This is the student's method.

- use a primary coil with 10 turns
- connect the primary coil to a constant maximum input voltage
- measure the output voltage across the secondary coil
- repeat using an increasing number of turns on the primary coil

The table shows the student's results.

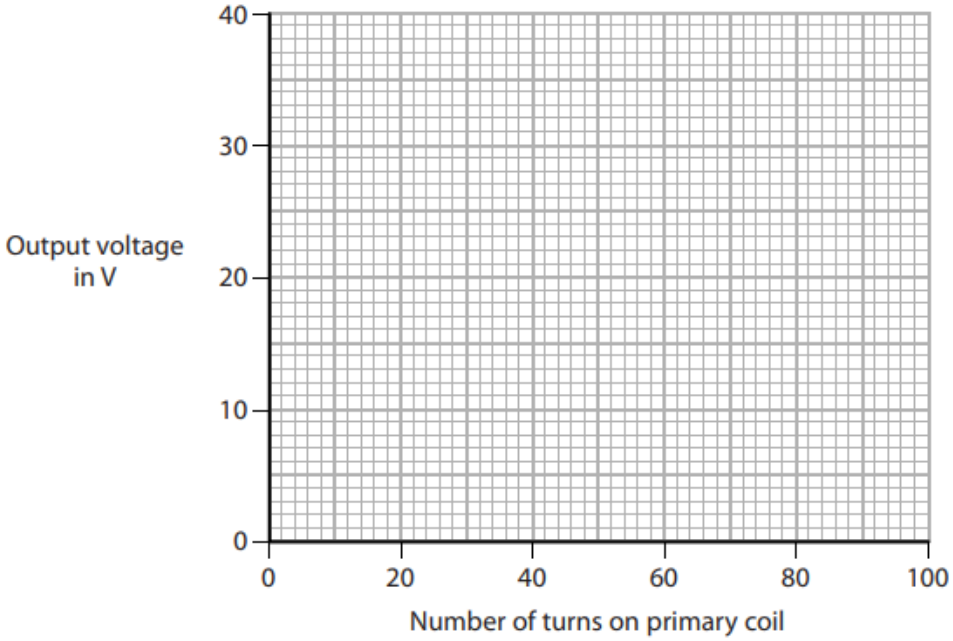
Number of turns on primary coil	Output voltage in V
10	39.6
20	19.7
40	9.9
60	6.6
80	5.0
100	4.0

(a) (i) Plot a graph of the student's results on the grid.

(1)

(ii) Draw a curve of best fit.

(1)



(iii) Describe the relationship between the output voltage and the number of turns on the primary coil.

(2)

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(b) (i) State the formula linking input and output voltages and the turns ratio for the transformer.

(1)

(ii) The input voltage of the transformer is 6.8 V.

Calculate the number of turns on the secondary coil.

(2)

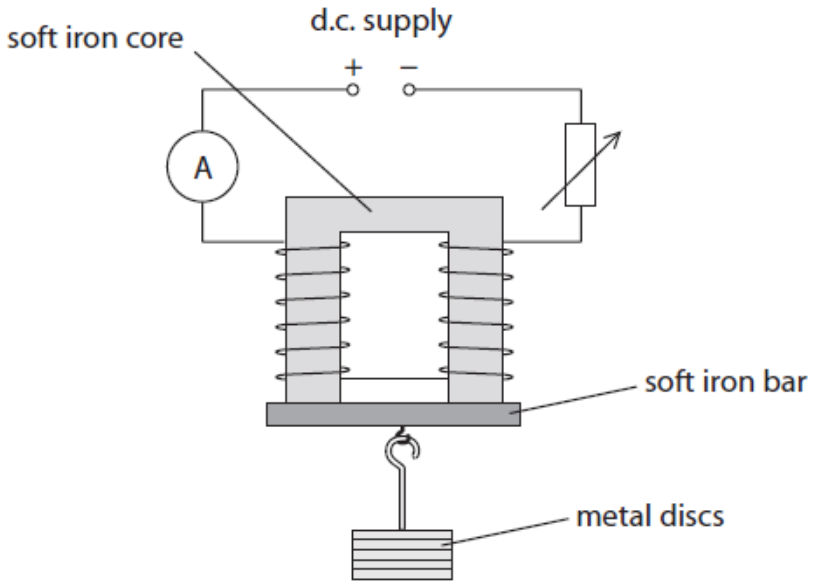
number of turns = ...

(Total for question = 7 marks)

Q5.

A student investigates how the minimum current required to support a load using an electromagnet varies as the load is increased.

He uses metal discs to increase the load and changes the current using a variable resistor.



(a) (i) State the independent variable in this investigation.

(1)

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(ii) Give a reason for using a core and a bar made from soft iron.

(1)

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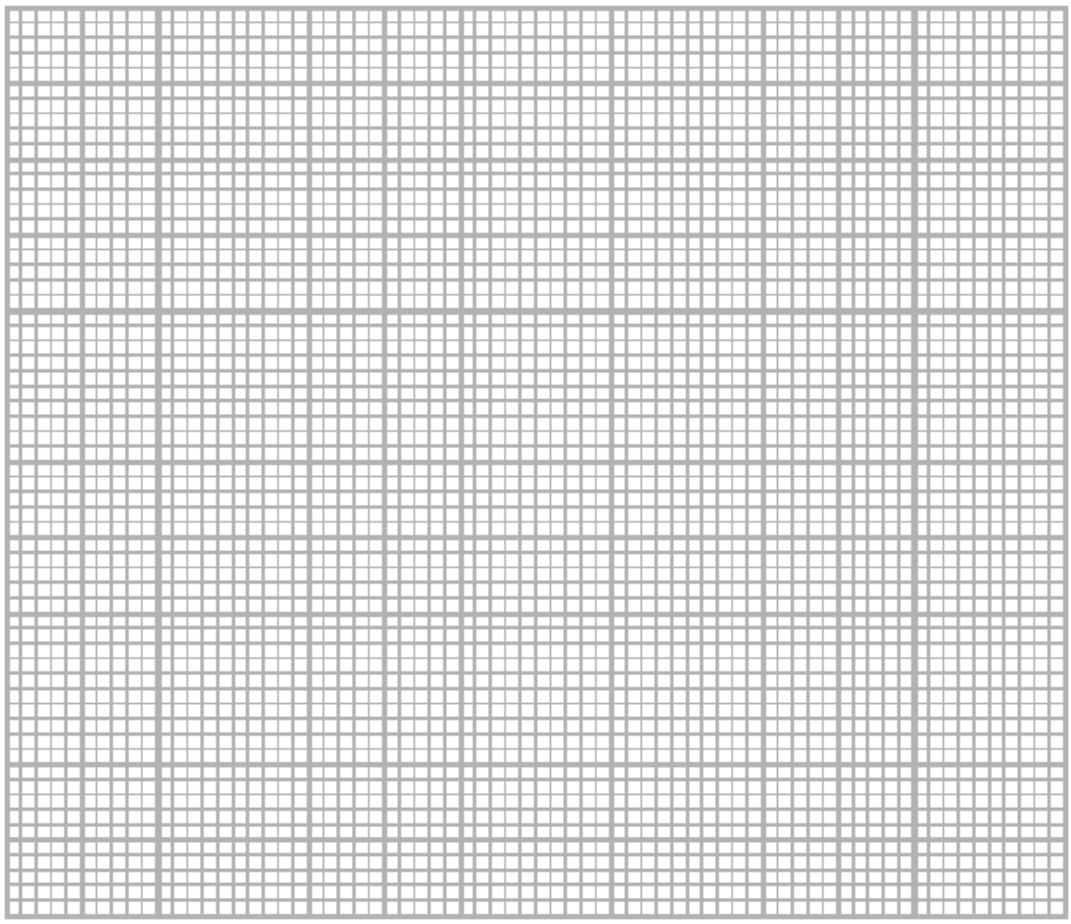
(b) The student's results are given in the table.

Number of metal discs	Minimum current / mA
0	30
2	48
5	75
6	78
7	93
10	120

(i) On the grid, draw a bar chart of current against number of metal discs.

(4)



(ii) State why a current is needed when there are no metal discs added to the load.

(1)

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(iii) Explain how the student can improve his results.

(3)

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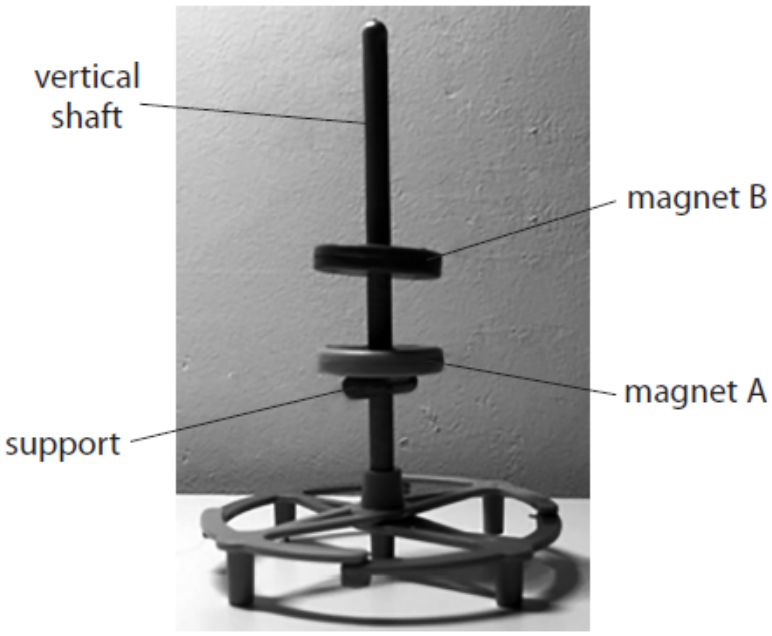
(Total for question = 10 marks)

Q6.

Photograph 1 shows a child's toy.

The toy has two magnets on a vertical shaft.



Photograph 1

(a) Magnet A rests on a support near the bottom of the vertical shaft.

A student places magnet B at the top of the vertical shaft and releases it from rest.

Magnet B is repelled by magnet A causing it to come to rest again at the position shown.

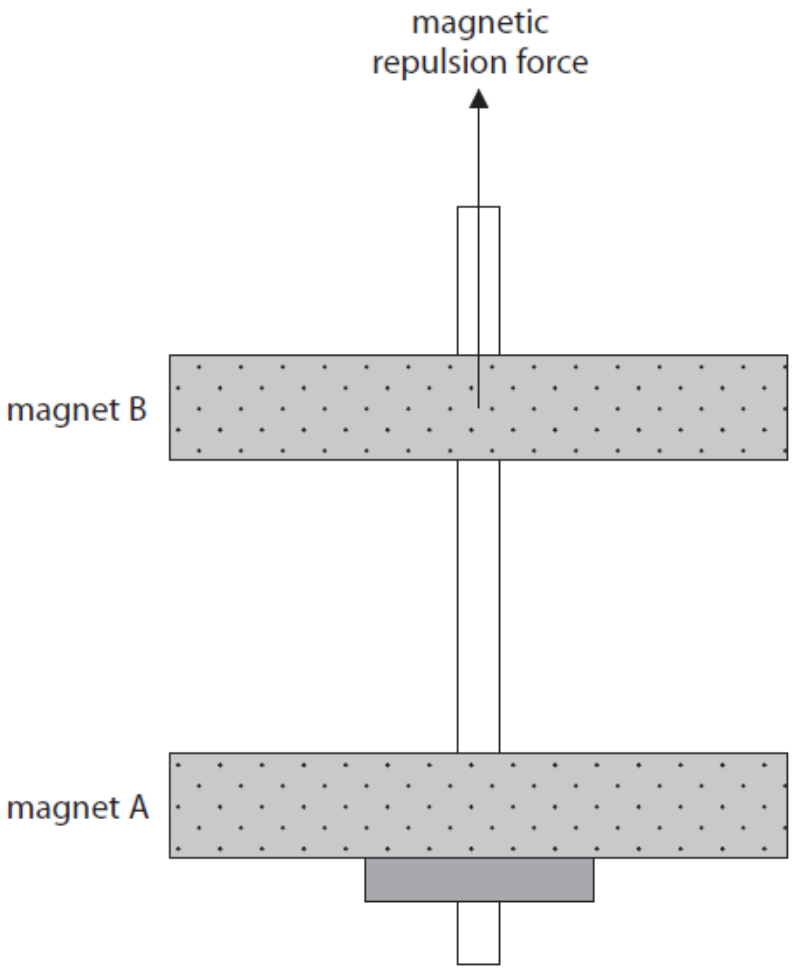
The table shows some energy stores in magnet B.

Put ticks (✓) in the correct boxes to show whether the amount of energy in each store of magnet B increases, decreases or stays the same when compared to its value at the top of the vertical shaft.

(3)

Energy store in magnet B	Increases	Decreases	Stays the same
gravitational			
magnetic			
kinetic			

(b) This is a diagram of the toy shown in photograph 1.



One of the forces acting on magnet B is shown.

Draw another labelled arrow on the diagram to show the other force acting on magnet B.

(2)

(c) The student adds a 10 g mass on top of magnet B when it is stationary above

magnet A and observes that the distance between the magnets decreases.

He carries out an investigation to see how the distance changes as more masses are added.

In your answer, you should refer to

- the measuring equipment required
- the independent and dependent variables
- a way to check the reliability of the data

You may draw a diagram to help your answer.

(5)

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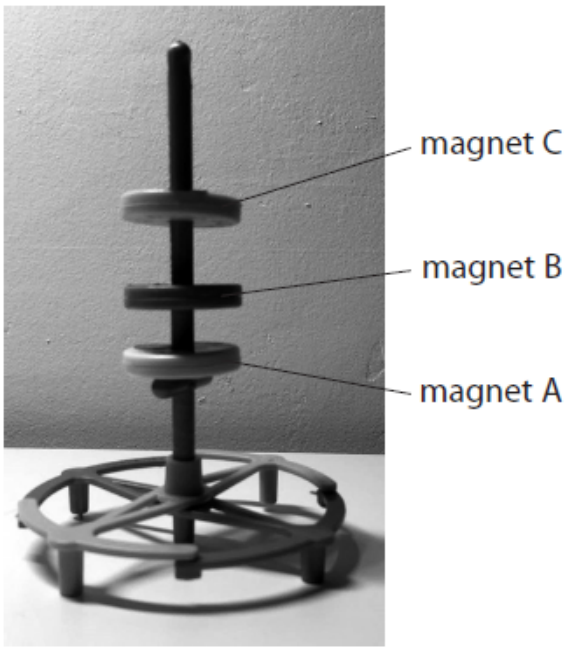
(d) The student removes the masses from magnet B.

He then adds magnet C on to the vertical shaft.



Photograph 2

Photograph 2 shows that when magnet C is added, magnet B moves further down the shaft until it is at rest again.

Explain why the distance between magnet A and magnet B has decreased.

(3)

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(Total for question = 13 marks)

Q7.

Wind is a renewable resource used to generate electricity.

(a) (i) State **one** advantage and **one** disadvantage of producing electricity using wind turbines.

(2)

Advantage .....

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Disadvantage .....

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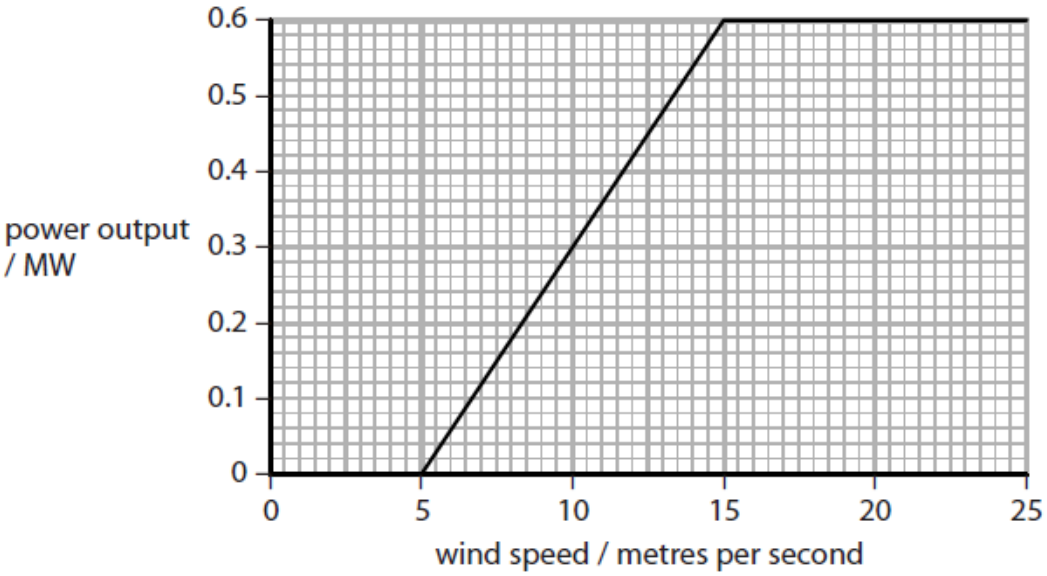
(ii) The graph shows how the power output of a wind turbine varies with wind speed.



Describe how the power output of a wind turbine varies with wind speed.

You should use data points from the graph in your answer.

(3)

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(b) A wind turbine produces an alternating voltage of 600 V.

The voltage needs to be increased to 132 kV before transmission to a nearby town.

The size of the voltage is changed using a transformer.

Describe the structure and operation of a suitable transformer.

You may use a diagram in your answer.

(5)

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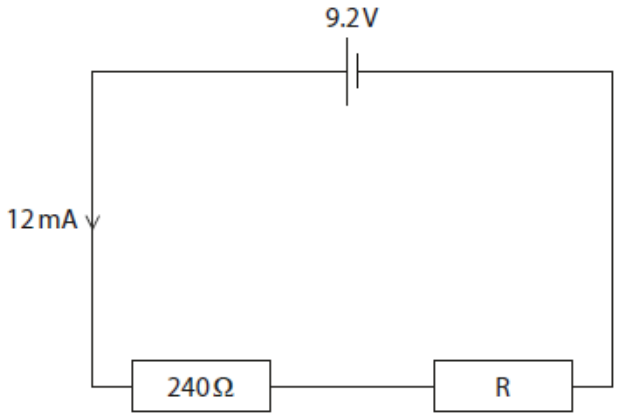
(Total for question = 10 marks)

Q8.

This question is about voltage and current.

(a) The diagram shows two resistors connected to a battery.



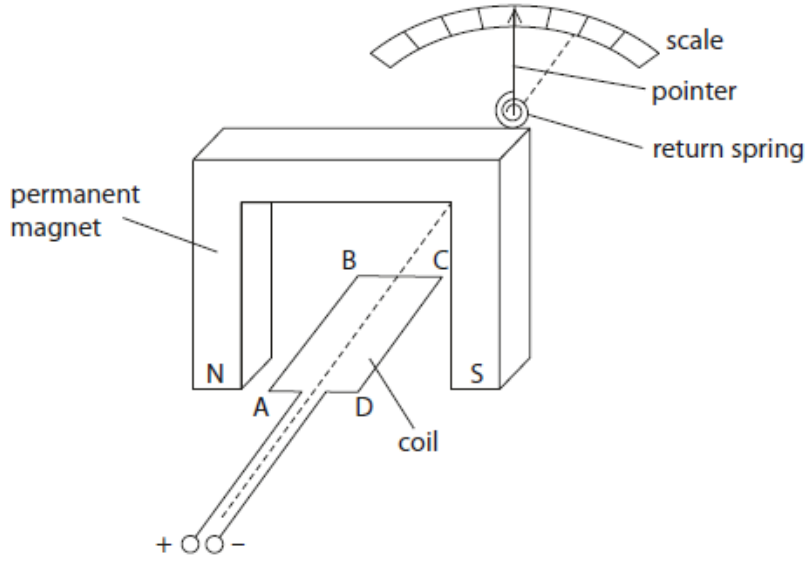
Calculate the voltage across resistor R.

(4)

voltage = ... V

(b) The diagram shows the parts of an ammeter.

The pointer is connected to the coil so they can move together.



(i) Explain what happens when there is a current in the coil.

(3)

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(ii) Draw an arrow on the diagram to show the force acting on side CD of the coil when there is a current in the coil.

(1)

(iii) Explain how the ammeter could be changed so that it could measure smaller currents.

(3)

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(Total for question = 11 marks)