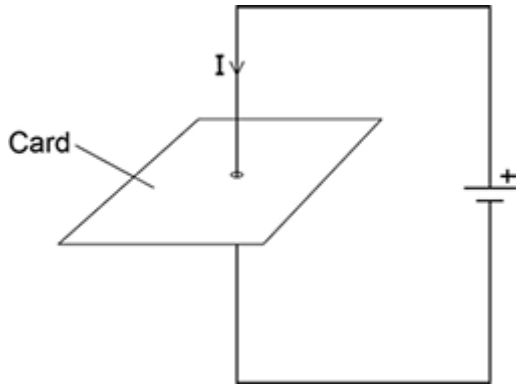
Q1.Figure 1 shows a straight wire passing through a piece of card.

A current (I) is passing down through the wire.

Figure 1



(a) Describe how you could show that a magnetic field has been produced around the wire.

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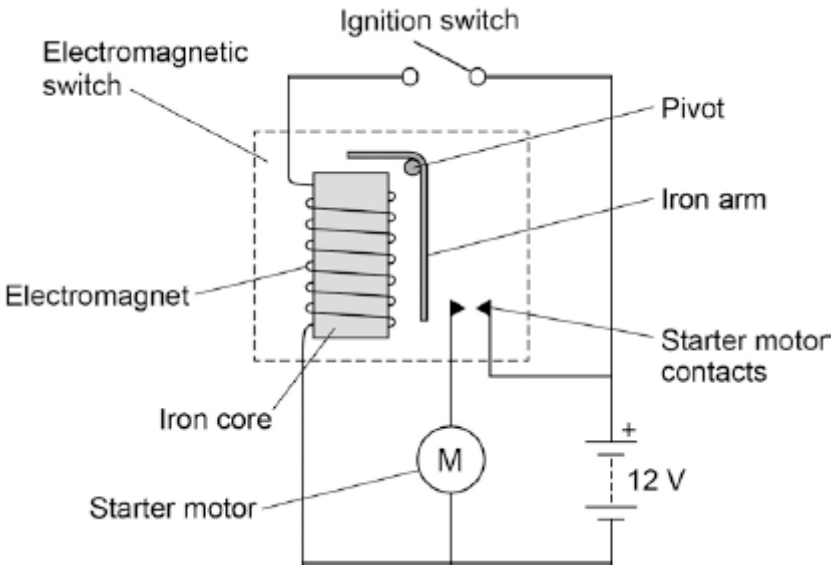
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(2)

(b) **Figure 2** shows the ignition circuit used to switch the starter motor in a car on.

The circuit includes an electromagnetic switch.

Figure 2



Explain how the ignition circuit works.

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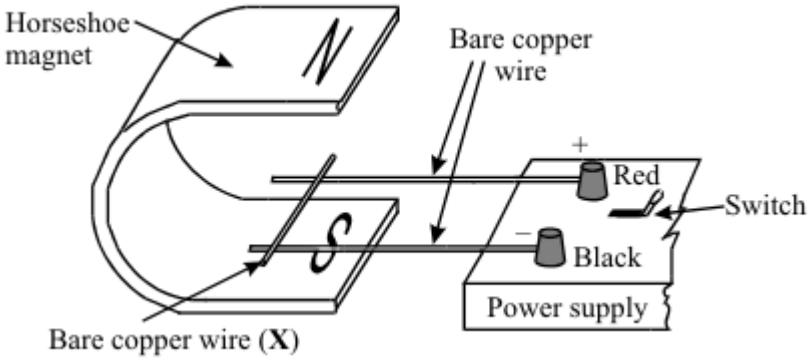
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(4)
(Total 6 marks)

Q2. The diagram shows apparatus used to demonstrate the motor effect. **X** is a short length of bare copper wire resting on two other wires.



(a) (i) Describe what happens to wire **X** when the current is switched on.

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(ii) What difference do you notice if the following changes are made?

A The magnetic field is reversed.

.....

.....

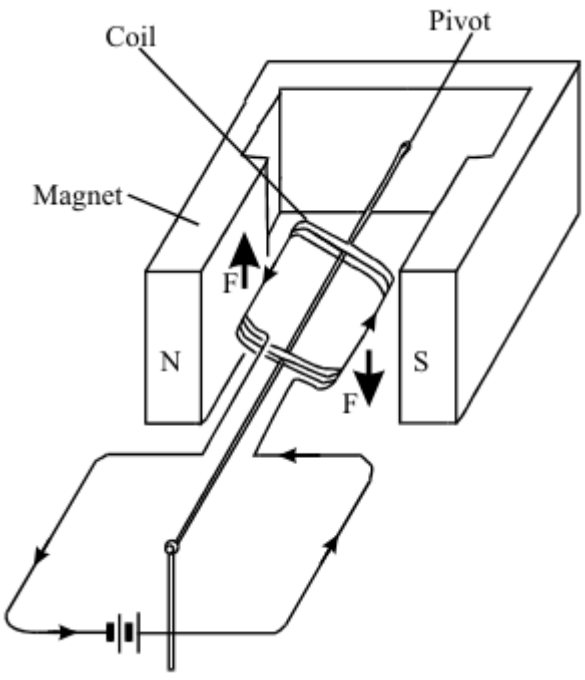
B The current is increased.

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.....

(3)

(b) The diagram shows a coil placed between the poles of a magnet. The arrows on the sides of the coil itself show the direction of the conventional current.



The arrows labelled **F** show the direction of the forces acting on the sides of the coil. Describe the motion of the coil until it comes to rest.

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(3)

(c) Most electric motors use electromagnets instead of permanent magnets. State three of the features of an electromagnet which control the strength of the magnetic field obtained.

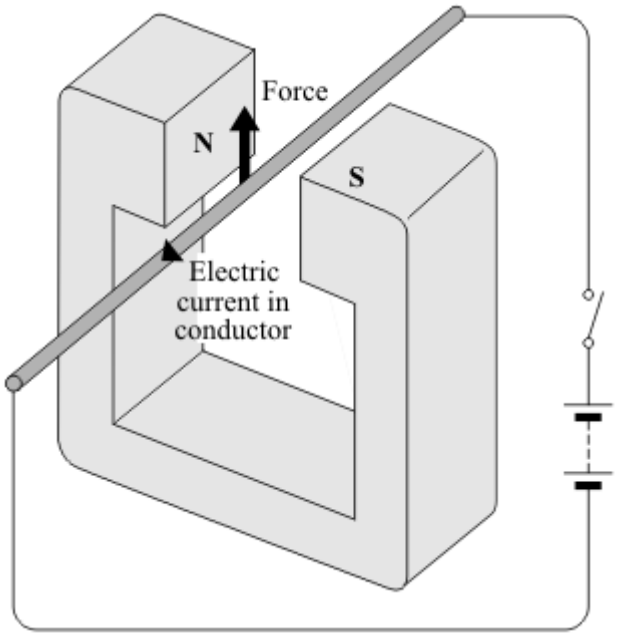
1 .....

2 .....

3 .....

(3)
(Total 9 marks

Q3. When a conductor carrying an electric current is placed in a magnetic field a force may act on it.



(a) State **two** ways in which this force can be increased.

1 .....

2 .....

(2)

(b) State **two** ways in which this force can be made to act in the opposite direction.

1 .....

2 .....

(2)

(c) In what circumstance will **no** force act on a conductor carrying an electric current and in a magnetic field?

.....

.....

(1)

(Total 5 marks)

Q4. Many electrical appliances use the circular motion produced by their electric motor.

(a) Put ticks (✓) in the boxes next to **all** the appliances in the list which have an electric motor.

electric drill ☐

electric fan ☐

electric food mixer ☐

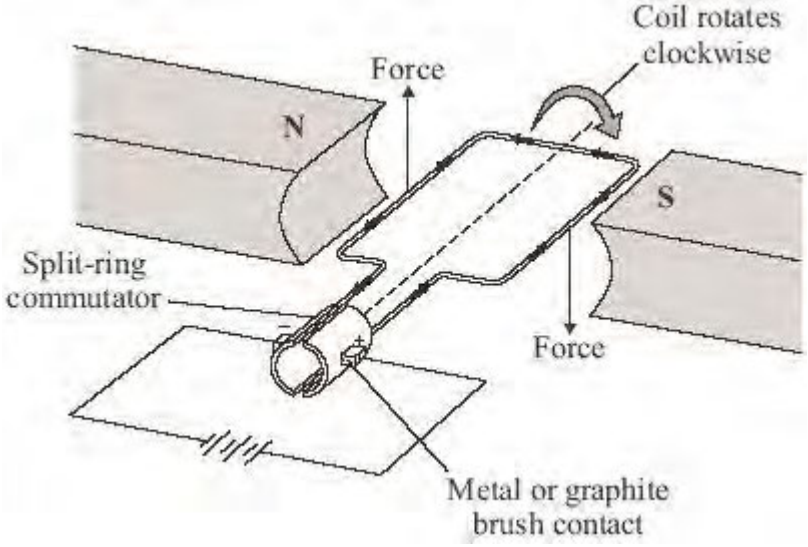
electric iron ☐

electric kettle ☐

electric screwdriver ☐

(2)

(b) One simple design of an electric motor is shown in the diagram. It has a coil which spins between the ends of a magnet.



(i) Give **two** ways of reversing the direction of the forces on the coil in the electric motor.

1 .....

.....

2 .....

.....

(2)

(ii) Give **two** ways of increasing the forces on the coil in the electric motor.

1 .....

.....

2 .....

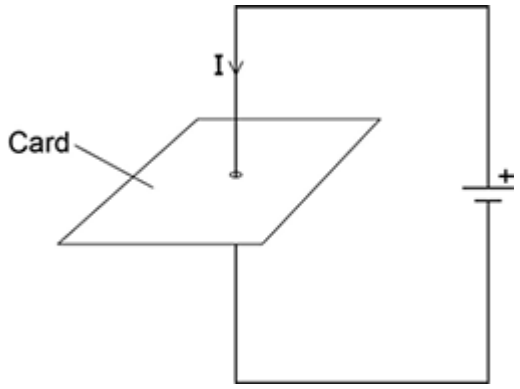
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(2)
(Total 6 marks)

Q5.Figure 1 shows a straight wire passing through a piece of card.

A current (I) is passing down through the wire.

Figure 1



(a) Describe how you could show that a magnetic field has been produced around the wire.

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.....

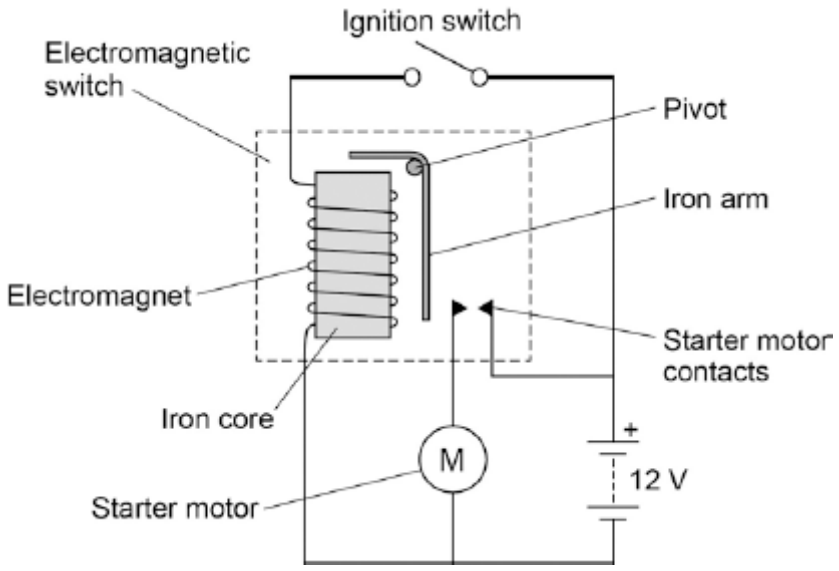
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(2)

(b) **Figure 2** shows the ignition circuit used to switch the starter motor in a car on.

The circuit includes an electromagnetic switch.

Figure 2



Explain how the ignition circuit works.

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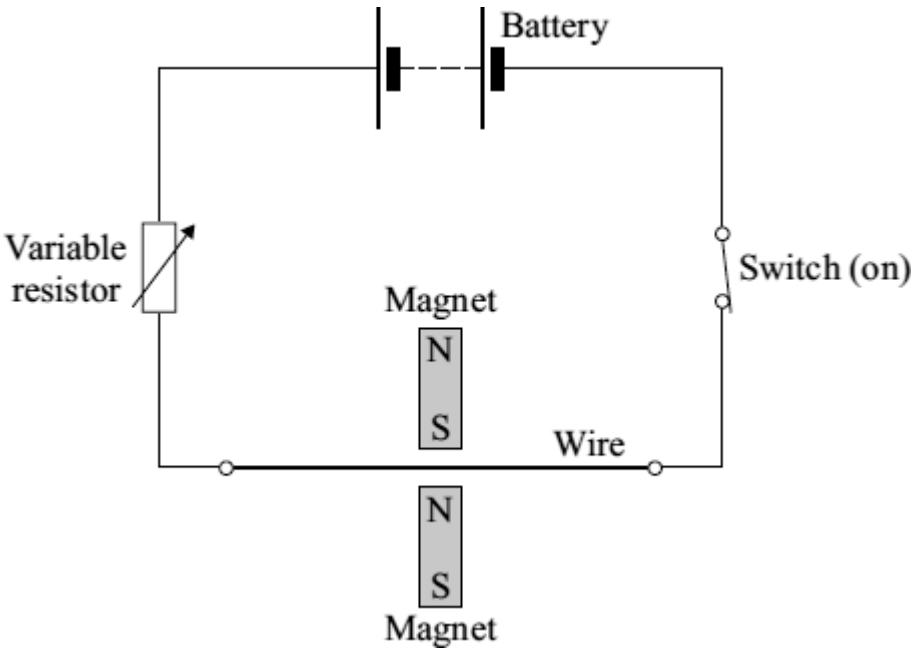
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(4)
(Total 6 marks)

Q6. A student investigates the electromagnetic force acting on a wire which carries an electric current. The wire is in a magnetic field.

The diagram shows the circuit which the student uses.

(a) Draw an **X** on the diagram, with the centre of the **X** in the most strongest part of the magnetic field.



(1)

(b) Give **one** change that she can make to the magnets to **decrease** the electromagnetic force on the wire.

.....

.....

(1)

(c) The student wants to change the electromagnetic force on the wire without changing the magnets or moving their position.

(i) Give **one** way in which she can **increase** the electromagnetic force.

.....

.....

(1)

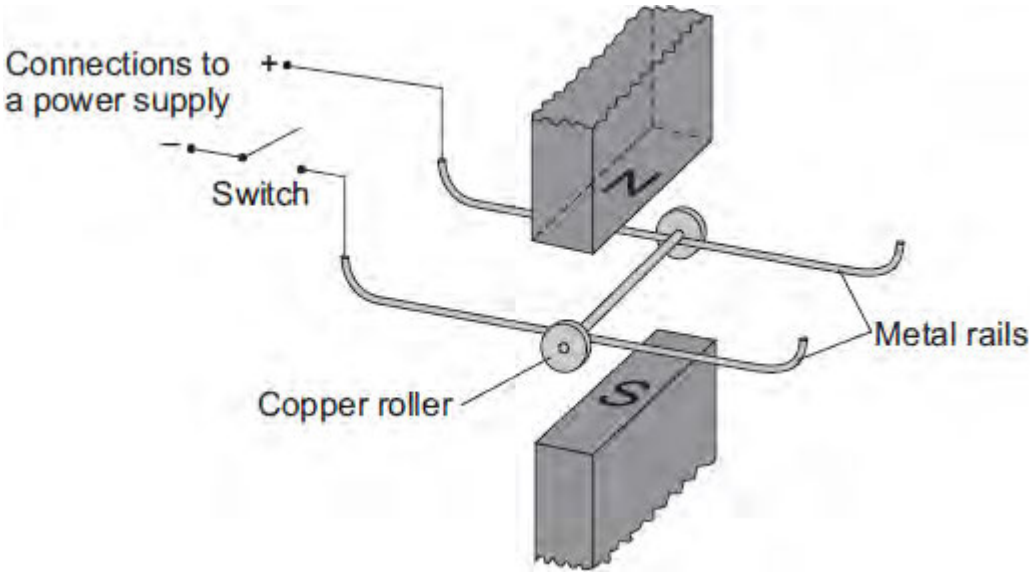
(ii) Give **one** way in which she can **reverse** the direction of the electromagnetic force.

.....

.....

(1)
(Total 4 marks)

Q7. (a) A science technician sets up the apparatus shown below to demonstrate the motor effect. He uses a powerful permanent magnet.



The copper roller is placed across the metal rails. When the switch is closed, the copper roller moves to the right.

(i) Complete the sentence by drawing a ring around the correct line in the box.

This happens because copper is

an electrical conductor.
an electrical insulator.
a magnetic material.

(1)

(ii) Suggest **one** change that the technician can make which will cause the copper roller to move faster.

.....

.....

(1)

(iii) Suggest **two** changes which the technician can make, each of which will separately cause the copper roller to move to the left.

1 .....

.....

2 .....

.....

(2)

(b) Many electrical appliances, such as vacuum cleaners, drills and CD players, contain electric motors. As more electrical appliances are developed, more electricity needs to be generated. Generating electricity often produces pollutant gases.

(i) Complete the sentence by drawing a ring around the correct line in the box.

Generating more electricity to power the increasing number of electrical appliances used

raises

an ethical
an environmental
a political

ssue.

(1)

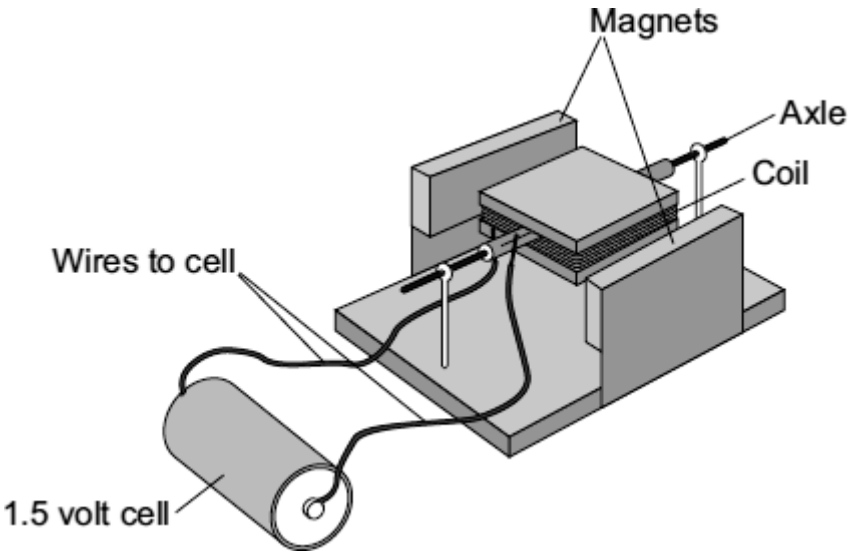
(ii) The number of electrical appliances used in the world's richest countries is increasing yet many people in the world's poorest countries have no access to electricity.

What type of issue does this inequality between people in different countries raise?

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(1)
(Total 6 marks)

Q8. (a) Complete the description of the device shown below by drawing a ring around the correct line in each box.



(i) The device is being used as

an electric motor.
a generator.
a transformer.

(1)

(ii) The coil needs a flick to get started. Then one side of the coil is pushed by the

cell
coil
force

and the other side is pulled, so that the coil spins.

(1)

(b) Suggest **two** changes to the device, each one of which would make the coil spin faster.

1 .....

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2 .....

.....

(2)

(c) Suggest **two** changes to the device, each one of which would make the coil spin in the opposite direction.

1 .....

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2 .....

.....

(2)

(Total 6 marks)