

Name:

Date:

## P7 - Test 3

# MAGNETISM AND ELECTROMAGNETISM

## Intermediate

# GCSE

# PHYSICS

# AQA - Combined Science

Mark

Grade

### Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

### Instructions

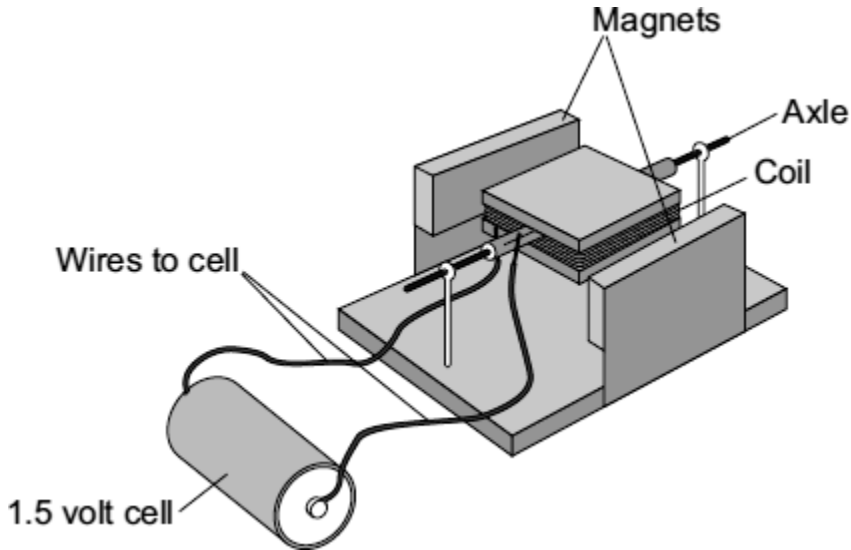
- Answer all questions
- Answer questions in the space provided
- All working must be shown

### Information

- The marks for the questions are shown in brackets

1.

(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. \_\_\_\_\_
- \_\_\_\_\_
- 2. \_\_\_\_\_
- \_\_\_\_\_

(2)

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

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

(2)

(Total 6 marks)

2.

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

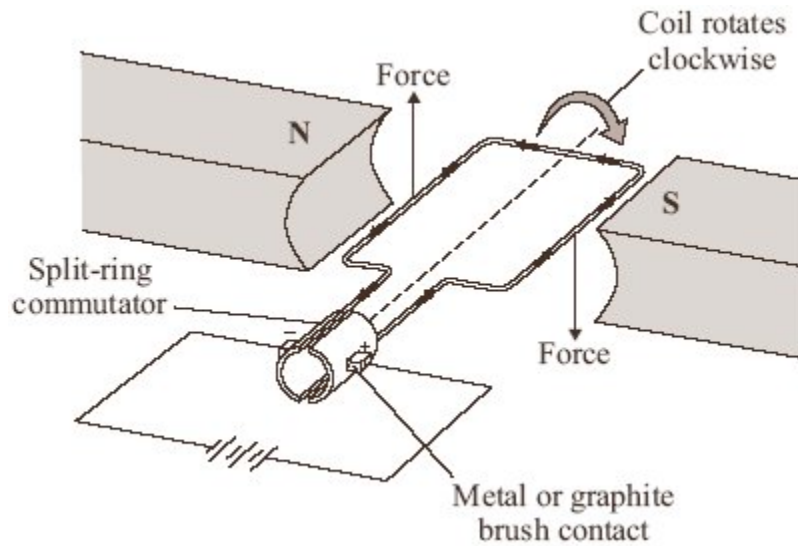
electric iron

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. \_\_\_\_\_

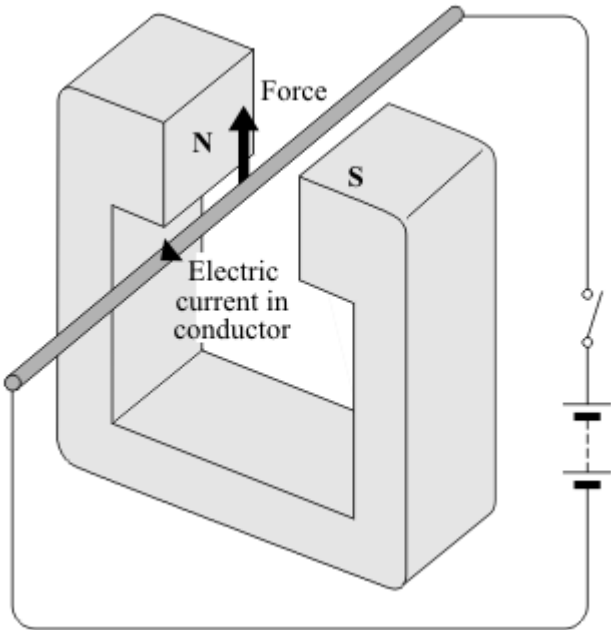
\_\_\_\_\_

(2)

(Total 6 marks)

3.

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?

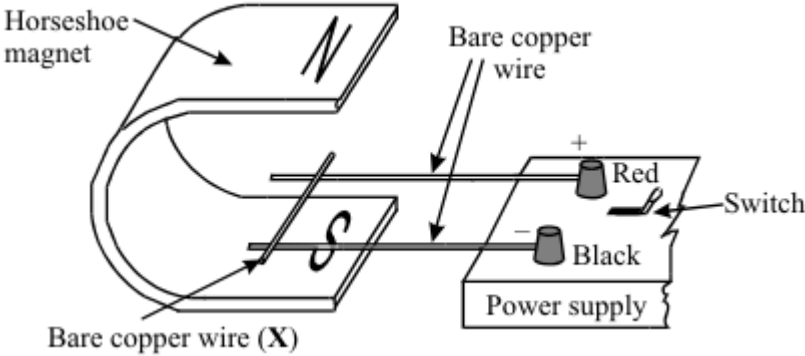
\_\_\_\_\_  
\_\_\_\_\_

(1)

(Total 5 marks)

4.

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.

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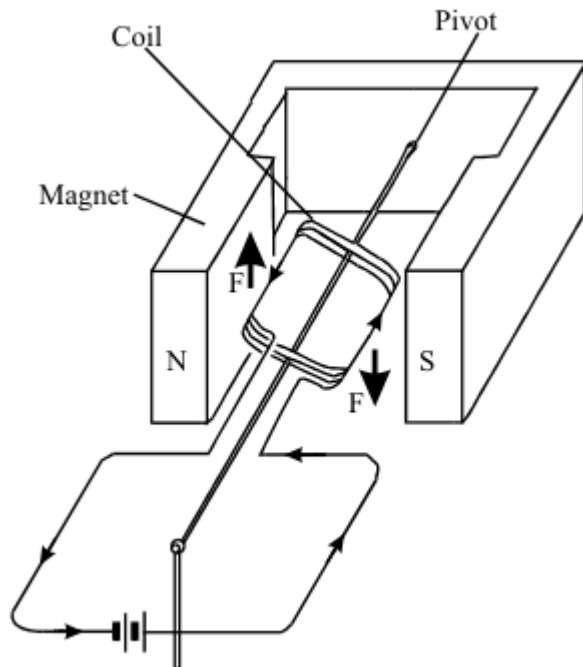
B The current is increased.

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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)

**5.**

- (a) Electromagnets are often used at recycling centres to separate some types of metals from other materials.

Give **one** reason why an electromagnet would be used rather than a permanent magnet.

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(1)

- (b) **In this question you will gain marks for using good English, organising information clearly and using scientific words correctly.**

Some students want to build an electromagnet.

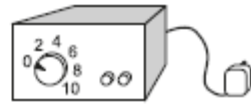
The students have the equipment shown below.



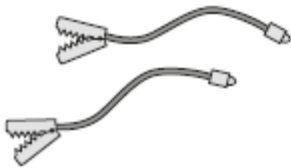
Insulated wire



Iron nail



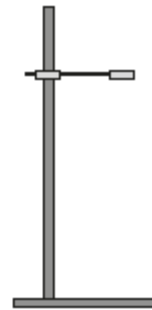
Power supply



Connecting leads



Steel paperclips



Wooden clamp and stand

Describe how the students could build an electromagnet. Include in your answer how the students should vary and test the strength of their electromagnet.

(6)

(Total 7 marks)