

# MARK SCHEME

# GCSE

## PHYSICS

## AQA - COMBINED SCIENCE

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P7 - TEST 3

MAGNETISM AND ELECTROMAGNETISM

Intermediate

## Mark schemes

- 1.** (a) (i) an electric motor 1
- (ii) force 1
- (b) any **two** from:
- more powerful magnet  
*do not allow 'bigger magnet'*
  - reduce the gap (between magnet and coil)
  - increase the area of the coil
  - more powerful cell  
*do not allow 'bigger cell'*  
*accept battery for cell*  
*accept add a cell*  
*accept increase current / potential difference*
  - more turns (on the coil)  
*allow 'more coils on the coil'*  
*do not allow 'bigger coil'*
- (c) reverse the (polarity) of the cell 2  
*allow 'turn the cell the other way round'*  
*accept battery for cell* 1
- reverse the (polarity) of the magnet 1  
*allow 'turn the magnet the other way up'*
- [6]**
- 2.** (a) electric drill, electric fan, electric food mixer and electric screwdriver  
*all four ticked and no others (2)*  
*either all four of these ticked and only one other (1)*  
*or any three of these ticked and none/one/two of the others (1)* 2
- (b) (i) reverse (the direction of the) current (1)  
*or reverse the connections (to the battery)*
- reverse (the direction of the) magnetic field (1)  
*or reverse the (magnetic) poles /ends*  
*do not credit 'swap the magnets (around)'* 2

(ii) any **two** from:

- increase the strength of the magnet(s)/(magnetic) field  
*do not credit 'use a bigger magnet'*
- increase the current  
*allow 'increase the voltage/p.d.'*  
*allow add cells/batteries*  
*allow increase the (electrical) energy*  
*allow increase the power supply*  
*allow 'decrease the resistance'*  
*allow 'increase charge'*  
*allow 'increase the electricity'*  
*do not credit 'use a bigger battery'*
- reduce the gap (between coil/armature and poles/magnets)  
*allow increase the (number of) coils*
- increase the turns (on the coil/armature)  
*do not credit 'use a bigger coil'*

2

[6]

3.

(a) increase the current (1)

*credit increase the p.d./voltage*  
*credit reduce the resistance*  
*credit have thicker wiring*  
*credit add extra / more cells*

1

increase the magnetic field (strength) (1)

*credit 'have stronger magnet(s)'*  
*do not credit 'bigger magnets' either order*

1

(b) **either** reverse polarity

**or** connect the battery the other way round

1

**either** reverse direction of the magnetic field

**or** put the magnet the other way round / reverse the magnet

*do not give any credit to a response in which both are done at the same time*  
*either order*

1

(c) **either**

conductor parallel to the magnetic field

**or** lines of magnetic force and path of electricity do not cross

1

[5]

4.

(a) (i) it moves or experiences a force horizontally to the right  
*for 1 mark*

1

(ii) A – moves in opposite direction or force reversed e.c.f.  
B – faster movement or larger force  
**(not** move further)  
*for 1 mark each*

2

(b) turns clockwise  
oscillates/reverses  
comes to rest facing field/at 90° to field/vertically  
*for 1 mark each*

3

(c) number of turns or linear number density of turns current core  
*for 1 mark each*

3

[9]

5.

(a) an electromagnet can be switched off  
*accept a permanent magnet cannot be switched off*

**or**  
an electromagnet is stronger  
*accept control the strength*

1

- (b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should apply a 'best-fit' approach to the marking.

**Level 3 (5 – 6 marks):**

there is a description of how the electromagnet is made

**and**

there is a description of how the strength of the electromagnet can be varied

**and**

there is a description of how the strength of the electromagnet can be tested

**Level 2 (3 – 4 marks):**

there is a description of how the electromagnet is made

**and either**

there is a description of how the strength of the electromagnet can be varied

**or**

there is a description of how the electromagnet can be tested

**Level 1 (1 – 2 marks):**

there is a basic description of how to make an electromagnet

**or**

there is a basic description of how the strength of the electromagnet can be varied

**or**

there is a basic description of how the electromagnet can be tested

**Level 0 (0 marks):**

No relevant / correct content

## examples of the points made in the response

Details of how to make an electromagnet

- wrap the wire around the nail
- connect the wire to the power supply (with connecting leads and croc clips)
- switch on the power supply

*accept a current should be sent along the wire*

Details of how to vary the strength of the electromagnet

- change the number of turns (on the coil)
- change the current (through the coil)
- change the separation of the turns

*allow change the potential difference (across the coil)*

*accept wrap the coil more tightly*

Details of how to test the electromagnet

- suspend paperclips from the electromagnet
- the more paperclips suspended, the stronger the electromagnet is
- clamp the electromagnet at different distances from the paperclip(s)
- the further the distance from which paperclips can be attracted the stronger the electromagnet is
- test before and after making alterations to change the strength
- compare the results from before and after making alterations
- use de-magnetised paper clips

*accept count the number of paperclips*

*with different current **or** p.d. **or** no. of turns*

***or** core and see if the number changes/increases*

6

[7]