

# MARK SCHEME

# GCSE

## PHYSICS

## AQA - COMBINED SCIENCE

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P7 - TEST 5

MAGNETISM AND ELECTROMAGNETISM

Advanced

## Mark schemes

1.

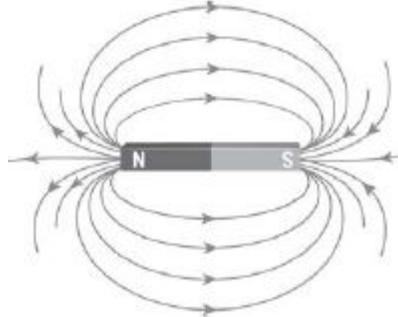
- (a) continuous field lines that start and finish on the poles

1

direction of arrow from North to South

1

*the diagram:*



scores 2 marks

- (b) **Level 2:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.

3-4

**Level 1:** The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.

1-2

**No relevant content**

0

**Indicative content**

- place the magnet on a piece of paper
- draw around the magnet
- mark north and south poles
- place the compass by a pole of the magnet
- make a dot at the tip of the compass needle
- move the compass tail to the new dot
- make a dot at the tip
- repeat until the compass reaches the other pole of the magnet
- draw a line through the dots
- add arrow to show direction of field line (from north to south)
- repeat for different starting positions at the poles

- (c) compass needle is a (small bar) magnet

1

(so) the compass / needle and bar magnet exert a force on each other

1

**or**

(so) the compass / needle is attracted / repelled by the bar magnet

- (d) cobalt 1
- (e) (magnetic north / south) poles are changing position  
*allow reference to compass needle changing direction  
 (over time)* 1

direction of magnetic field has reversed  
*allow magnetic patterns in rocks (at constructive plate  
 boundaries)*  
*allow changing migration patterns of birds / animals* 1

- (f) (molten) iron moving 1
- in (Earth's outer) core 1

[13]

- 2.** (i) away from magnet  
*arrow should be perpendicular to field lines and current as judged  
 by eye* 1

- (ii) current in wire creates magnetic field around wire 1
- two fields interact **or** combine giving a resultant force (on the wire) 1
- [3]

- 3.** (a) motor (effect) 1

- (b) (i) wire kicks further (forward)  
*accept moves for kicks*  
*accept moves more*  
*accept 'force (on the wire) increased'* 1

- (ii) wire kicks back(wards) / into (the space in) the (horseshoe) magnet  
*accept moves for kicks*  
*accept 'direction of force reversed'* 1
- [3]

4.

- (a) place thumb and first two fingers (of left hand) at right angles to each other

1

first / index finger indicates (direction of) magnetic field

*allow forefinger for first/index finger*

*do **not** accept electric field*

1

second / middle finger indicates (direction of) current

1

thumb (then) shows (direction of) force

*allow motion / thrust*

1

*a clearly labelled diagram can score up to 4 marks*

- (b) there is a downwards force on the magnets

1

(because when there is a current in the wire) there is a magnetic field around the wire

1

which interacts with the magnetic field of the (permanent) magnets

1

- (c)  $0.00214 = B \times 0.32 \times 0.048$

*this mark may be awarded if  $F$  is incorrectly / not converted*

1

$$B = \frac{0.00214}{0.32 \times 0.048}$$

*this mark may be awarded if  $F$  is incorrectly / not converted*

1

0.1393 (T)

*an answer that rounds to 0.14 (T) scores 3 marks*

1

0.14 (T)

*allow answer consistent with their incorrectly / not converted  $F$  to 2 significant figures*

*allow an answer from an incorrect calculation to 2 significant figures*

1

*an answer of 0.14 (T) scores 4 marks*

*an answer of 140 scores 3 marks*

[11]