

# Perm + Include Magnetism, Magnetic Forces & Fields

## Mark Scheme

|                  |  |
|------------------|--|
| Level            | GCSE (9-1)   |
| Subject          | Combined Science: Trilogy - Physics                |
| Exam Board       | AQA  |
| Topic            | 6.7 Magnetism and Electromagnetism                 |
| Sub-Topic        | Perm + Include Magnetism, Magnetic Forces & Fields |
| Difficulty Level | Gold Level   |
| Booklet          | Mark Scheme  |

Time Allowed: 27 minutes

Score: /25

Percentage: /100

Grade Boundaries:

- M1.(a)** thumb, index finger and third finger are held mutually at right angles 1
- index finger shows the direction of the magnetic field from North to South, third finger shows the direction of the current from positive to negative terminal 1
- the thumb then shows the direction of the force acting on the copper rod 1
- so the copper rod will move from left to right 1
- (b) any **one** from:
- use a stronger magnet
  - increase the magnetic flux density
  - increase the length of the copper rod in the magnetic field
  - coil the copper rod
- 1
- (c)  $W = 9.8 \times 4 \times 10^{-4} = 3.92 \times 10^{-3}$  1
- conversion of the length 7cm to 0.07m 1
- $3.92 \times 10^{-3} = B \times 1.12 \times 0.07$  1

$$B = 3.92 \times 10^{-3} / 0.0784$$

1

$$B = 0.05 \text{ (T)}$$

1

*allow 0.05 (T) without working shown for the 5 calculation marks*

[10]



1

*correct formulae of products*

1

*correct balancing*

1

(b)   iron loses oxygen – reduction

1

carbon gains oxygen – oxidation

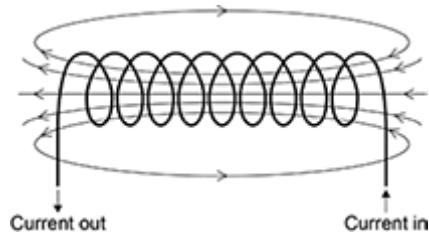
1

(c)   any **four** from:

- resources for manufacture are limited
- recycling reduces the use of resources
- reduces energy consumption in extraction / manufacture
- reduces waste from processing and extraction
- reduces environmental impact of extraction

4

(d)



*field lines going through and around coil*

1

*correct directional arrows*

1

(e) any **two** from:

*1 mark for suggestion, 1 mark for correctly linked explanation*

- use many coils **or** tight coils **or** long wire (1)
- to give a strong magnetic field for lifting heavy objects (1)  
*explanation must be correctly linked to the suggestion to gain the mark*

**or**

- add an iron core
- to increase field circuit for lifting

**or**

- include a switch in circuit
- so can drop / pick up cars

max. 4

[15]