

MARK SCHEME

GCSE

PHYSICS

AQA - COMBINED SCIENCE

P7 - TEST 2

MAGNETISM AND ELECTROMAGNETISM

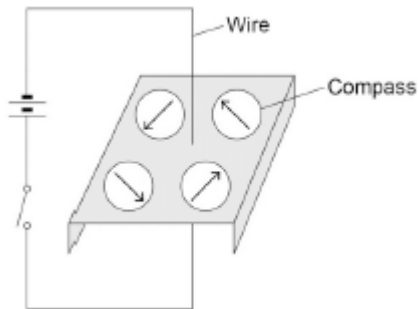
Beginner

Mark schemes

- 1.** (a) a 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' 2
- (c) reverse the (polarity) of the cell
allow 'turn the cell the other way round'
accept battery for cell 1
- reverse the (polarity) of the magnet
allow 'turn the magnet the other way up' 1
- [5]**
- 2.** (a) S – top, N – bottom 1
- (b) touch / attracted to magnet **A** 1
- (c) the magnetic needles point to the north pole 1
- because The Earth has a magnetic field 1

accept the needles align to the Earth's magnetic field for 2 marks

(d)



1

(e) point in the opposite direction

change direction is insufficient

1

(f) uniform field lines through the wire coil.

1

field lines curving round the top and bottom of the wire coil.

1

arrows indicating direction from N to S

*do **not** accept conflicting arrows*

1

[9]

3.

(a) correct plotting of all points

allow 1 mark for three or four correctly plotted points

allow $\pm \frac{1}{2}$ a square

2

line of best fit

1

(b) as (number of) turns increases, number of paperclips increases

allow positive correlation

1

(c) no paperclips would be picked up

1

(electro)magnet would not have been strong enough

or

magnetic field would not have been strong enough

1

(d) take repeat readings (1)

to allow a mean to be calculated (1)

allow to identify / exclude anomalies

allow to reduce the effect of random errors

allow to assess the repeatability of the data

or

extend range of data (1)

to see if pattern continues (1)

allow to identify / exclude anomalies

or

use smaller intervals for number of turns (1)

to be able to see the pattern in the data more clearly (1)

allow to identify / exclude anomalies

or

use smaller paperclips (1)

to be able to detect smaller changes in strength of magnetic field

or so fewer turns required to pick up one paperclip (1)

or

increase strength of electromagnet (1)

allow increase current

so fewer turns required to pick up one paperclip (1)

Max 2 marks

(e) the distance from the electromagnet

1

the size of the current through the wire

1

[10]

4.

(a) field

correct order only

1

current

1

force

accept motion

accept thrust

1

- (b) (i) arrow pointing vertically downwards 1
- (ii) increase current / p.d. 1
accept voltage for p.d.
- increase strength of magnetic field 1
accept move poles closer together
- (iii) reverse (poles of) magnets 1
- reverse battery / current 1
- (c) (i) 1.5 or 150% 2
efficiency = $120 / 80 (\times 100)$
gains 1 mark
an answer of 1.5 % or 150
gains 1 mark
- (ii) efficiency greater than 100% 1
or
output is greater than input
or
output should be 40 (W)
- (iii) recorded time much shorter than actual time 1
accept timer started too late
accept timer stopped too soon

[12]

- 5.** (a) the direction of the magnetic field 1
- (b) decreases 1
- (c) the distance between the field lines 1
allow the closer the lines the stronger the field for 2 marks
is smaller where the field is stronger
allow where the lines are close the field is strong for 1 mark
- (d) straight line drawn within 1 mm of all points on the graph 1

(e) 1.3 – 0.9

1

0.4 arbitrary units

1

(f) increase the current through the solenoid

if more than 2 boxes are ticked deduct 1 mark for each extra box ticked

1

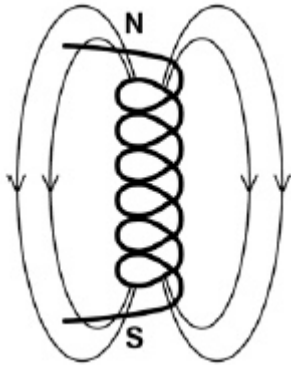
increase the potential difference across the solenoid

1

(g) at least one field line on each side of the solenoid

1

an arrow to indicate the field going from North to South pole



1

(h) add an iron core

*allow a description of this, eg wrap the wire around an iron nail
adding a core is insufficient*

1

[12]