

M1.(a) move a (magnetic / plotting) compass around the wire

1

the changing direction of the compass needle shows a magnetic field has been produced

OR

sprinkle iron filings onto the card (1)

tapping the card will move the filings to show the magnetic field (pattern) (1)

1

(b) **Level 2 (3–4 marks):**

A detailed and coherent explanation is provided. The response makes logical links between clearly identified, relevant points that explain how the ignition circuit works.

Level 1 (1–2 marks):

Simple statements are made. The response may fail to make logical links between the points raised.

0 marks:

No relevant content.

Indicative content

- closing the (ignition) switch causes a current to pass through the electromagnet
- the iron core (of the electromagnet) becomes magnetised
- the electromagnet / iron core attracts the (short side of the) iron arm
- the iron arm pushes the (starter motor) contacts (inside the electromagnetic switch) together
- the starter motor circuit is complete
- a current flows through the starter motor (which then turns)

4

[6]

- M2.** (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]

- M3.** (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]

- M4.** (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]

M5.(a) move a (magnetic / plotting) compass around the wire

1

the changing direction of the compass needle shows a magnetic field has been produced

OR

sprinkle iron filings onto the card (1)

tapping the card will move the filings to show the magnetic field (pattern) (1)

1

(b) **Level 2 (3–4 marks):**

A detailed and coherent explanation is provided. The response makes logical links between clearly identified, relevant points that explain how the ignition circuit works.

Level 1 (1–2 marks):

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0 marks:

No relevant content

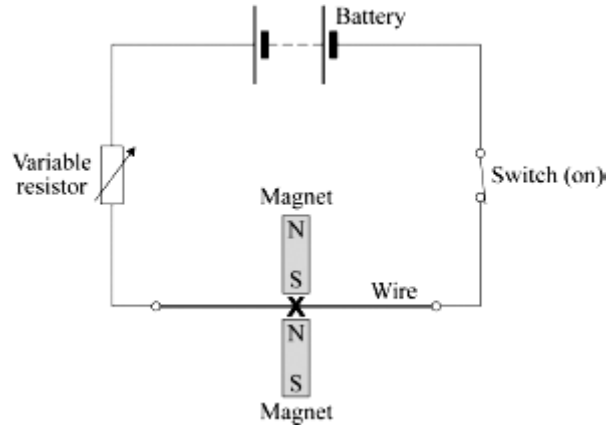
Indicative content

- closing the (ignition) switch causes a current to pass through the electromagnet
- the iron core (of the electromagnet) becomes magnetised
- the electromagnet / iron core attracts the (short side of the) iron arm
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4

[6]

- M6. (a) centre of the **X** midway between the poles
intention correct as judged by eye example



1

- (b) *move the poles further apart*
accept turn for move
accept ends / magnets for poles
accept use weaker magnets
 do **not** accept use smaller magnets

1

- (c) (i) *add more cells (to the battery)*
 do **not** accept 'use a bigger battery'
 accept increase the potential difference / voltage
 accept increase the current

or *reduce the resistance (of the variable resistor)*

do **not** accept any changes to the magnets, to the wire or to their relative positions

1

- (ii) *reverse (the polarity of) the battery*
accept turn the battery / cells round
accept swap the connections to the battery
 do **not** accept any changes to the magnets, to the wire or to their relative positions

1

[4]

- M7.** (a) (i) *an electrical conductor* 1
- (ii) *increase current*
accept increase p.d. / voltage
or use stronger magnets
accept move magnets closer
*do **not** accept use larger magnets* 1
- (iii) *reverse the poles / ends (of the magnet)*
either order 1
- reverse the connections (to the power supply)* 1
- (b) (i) *environmental* 1
- (ii) *ethical*
allow political (instability)
allow economic (migration) 1

[6]

M8. (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'

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

[6]