

Mark schemes

1

- (a) • iron

1 (L6)

- nothing happens

accept 'nothing' or 'no force' or 'it does not attract or repel'
both answers are required for the mark

copper

1 (L6)

- repel
a magnet

accept 'move apart'
both answers are required for the mark
do not accept 'magnetic'

1 (L6)

- (b) any **two** from

- more turns in the coil

accept 'more coils'

- increase the current **or** voltage

accept 'increase power'
accept 'add more cells or batteries'
'use another battery' is insufficient
accept 'use thicker wire'
'use more wire' is insufficient

- coils closer together

accept 'make the coils tighter'
'use less wire' is insufficient
'make the wire tighter' is insufficient
references to the iron rod are insufficient

2 (L6)

[5]

2

- (a)
- the core becomes magnetised
accept 'the disc becomes magnetised'
accept 'there is a magnetic field'
accept 'it becomes an (electro)magnet'
accept 'the stronger the current the stronger the magnet'
*do **not** accept 'the iron core becomes magnetic'*
*do **not** accept 'the magnet gets stronger'*

1 (L7)

any **one** from

- the core attracts the iron disc
accept 'the disc is pulled down'
'the disc moves down' is insufficient as it does not imply that a force is exerted
- there is more force on the iron disc
accept 'the magnet exerts a force on the disc'
'there is a force on the disc' is insufficient as it does not refer to the origin of the force

1 (L7)

(b) any **one** from

- it would melt
accept 'it would fuse'
'the coil would break' is insufficient
- it would get too hot
accept 'it could catch fire'
accept 'it would blow'
'it would get hot' is insufficient

1 (L7)

- (c) • the greater the current, the greater the force **or** field
accept the converse
answers must refer to a pattern describing a continuous variable
*do **not** accept 'it becomes more magnetic'*
- the more turns, the greater the force **or** field
accept the converse
*accept 'the more turns, the more powerful **or** stronger the magnet'*
answers must include a comparison
'the more turns, the more powerful it is' is insufficient
accept 'the electromagnet with 200 turns is stronger'
accept 'doubling the turns more than doubles the force'
award one mark if the answer refers to a number of coils rather than number of turns

2 (L7)

[5]

3

- (a) there is current in the coil
accept 'a current flows' or 'electricity flows'
***or** 'circuit completed'*
- it becomes an electromagnet
or iron core becomes magnetised
- iron bolt is attracted to the electromagnet
*accept 'iron core' **or** 'magnet' for electromagnet*

1

1

1

- (b) any **two** from
- the current stops
*do **not** accept 'electricity switched off' **or** 'circuit breaks'*
 - there is no more magnetism
 - bolt pushed back by spring

2

[5]

4

- (a) • both picked up the same number **or** four paper-clips
accept 'they both picked up the same number'
accept 'same amount of paper-clips'
accept 'there were 5 out of 9 paper-clips left for both'
accept 'the same mass of paper-clips'
'they hold the same clips' is insufficient

1 (L5)

(b) any **one** from

- it does not stay magnetised
- it can be turned off
accept 'you cannot turn steel off'
- objects do not stay attached to it
- iron loses its magnetism
- steel stays magnetised

1 (L6)

(c) (i) any **one** from

- the greater the distance the lower the reading
- the further away the smaller the reading
accept the converse
accept 'at big distance the field is weaker' or the converse
accept 'at 50 mm the reading is lower'
accept the converse
do not accept 'the bigger the distance the smaller the amps or current'

1 (L6)

(ii) • the greater the current the stronger the electromagnet

1 (L6)

(iii) any **one** from

- change the number of turns
- change the thickness of the wire
- change the diameter of the core
accept 'use more coils'
accept 'use fewer or less coils'
accept 'put the coils closer together' or the converse
accept 'change the metal of the coils'
accept 'use a different sized core'
accept 'use nickel or cobalt core'
accept 'use a different core'
'use bigger coils' is insufficient
'use more wire' is insufficient
do not accept 'add more batteries'

1 (L6)

[5]

5

(a) (i) iron 1 (L6)

(ii) iron **or** steel 1 (L6)

(b) (i) any **three** from 3 (L7)

- current flows in the coil
*do **not** accept 'the circuit is completed'*
- the core becomes magnetised
accept 'the coil becomes an electromagnet'
***or** 'the electromagnet is turned on'*
- the armature is attracted
- the armature pushes the contacts together
*do **not** accept 'the contacts come together'*

(ii) **the answer must show an understanding that the contacts remain closed**

because current continues through the contacts
or because the contacts keep the circuit complete

accept 'the contacts are in parallel with the switch'
***or** 'the contacts stay shut'*
*do **not** accept 'there is a complete circuit'*
***or** 'the current still flows'*

1 (L7)

[6]