MARKING SCHEME

1. (a) • it will go down 1
   accept ‘it will tip anticlockwise’
   accept ‘it will tip towards A’
   accept ‘end B will go up’
   ‘tip’ is insufficient

1. (b) • 1
   all three balls are required for the mark
   ignore any shading and size

1. (c) • 100 1
1. (d) (i) • carbon ✓ 1 (L4)
   if more than one box is ticked, award no mark

(ii) any one from 1
   • steel contains iron
   • brass does not contain iron
   • iron is magnetic or sticks to a magnet
   • cooper and zinc are not magnetic or will not stick to a magnet

   accept ‘steel contains iron and carbon’
   the answer must relate to the elements
   ‘steel is magnetic’ is insufficient
   ‘copper is not magnetic’ is insufficient
   ‘zinc is not magnetic’ is insufficient

PEAK SUCCESS EDUCATION
‘brass is not magnetic’ is insufficient
‘copper and zinc are not magnets’ is insufficient

2. (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

(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

(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

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

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(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'

3. (a) (i) · add more coils or turns

accept 'put coils or turns closer together'
do **not** accept 'move it closer'

· increase the current

accept 'increase the number of cells or batteries'
accept 'increase the voltage or power'

(ii) **all four poles must be correct for the mark**

(b) (i) any one from

- steel stays magnetised
- iron loses its magnetism
- the switch would stay closed
- the switch would not spring open
(ii) copper is a better conductor than iron

   accept the converse
   accept ‘copper has a lower resistance’
   accept ‘iron or the reed switch has a greater resistance’

[5]

4. (a) they will repel or it will push the magnet away or it will push the coil

   accept ‘it will change the direction of the force’
   accept ‘it will make the magnet twist around and attract’
   do not accept ‘the magnet moves away’

(b) (i) any one from

   • because the magnet is heavier or the paper clip is lighter

   accept ‘because the magnet is heavy’

   • so the moments are equal

(ii) current in the coil produces a magnetic field

   accept ‘the coil becomes an electromagnet’
   or ‘the coil is magnetised’

   • the magnet is attracted or repelled

   accept ‘the field or coil exerts a force on the magnet’

(iii) any one from

   • the straw is deflected more or moves more

   • the reading is higher or goes up

   any one from

   • it increases the magnetic field

   • it makes the electromagnet stronger

   • it attracts or repels the magnet more strongly

[6]
5. (a) any two from

- on each side of the pivot, the like poles repel
  
  *accept 'like poles repel' or 'N repels N and S repels S'*
  
  *do not accept 'the poles of the magnet repel' or 'opposites attract'*

- on each magnet the two poles are of equal strength
- if the N pole is tipped downwards, the N poles repel more strongly
- if the S pole is tipped down, the S poles repel more strongly
- the two poles which are closest together repel more strongly
- the moments are balanced or the forces are equal when the bar magnet is horizontal
  
  *accept 'the forces balance when the bar is level'*

(b) (i) any one from

- the right hand end will tip down
  
  *only accept 'it will tip' if the correct direction is indicated*

- the left hand end will tip up
- the S pole will move down
- the N pole will move up

any two from

- the coil weakens the S pole of the horseshoe magnet
  
  *accept 'the S pole of the horseshoe magnet becomes an N pole' or 'the S pole is cancelled out'*

- the repulsion between the S poles is weaker
  
  *accept 'the S pole of the bar magnet is now attracted'*

- the coil strengthens the N pole of the horseshoe magnet
  
  *accept 'the coil reinforces the N pole' or 'the N pole becomes stronger'*

- the repulsion between the N poles is stronger
(ii) it tips the other way or the N pole tilts down  
   do not accept ‘the opposite will happen’  

(iii) it rocks  
   accept ‘it would vibrate’ or ‘it would oscillate’ or ‘it would move back and forth’  
   accept ‘the N or S pole goes up and down’  
   do not accept ‘it goes up and down’  

6. (a) (i)  

   award one mark for each correctly drawn arrow  
   the arrows must be drawn in the compasses  

(ii)  

   the arrow must be drawn in the tube  

(iii) North  
   do not accept ‘the same direction’  

(b) any one from  
   • reverse the battery  
   • wind the coil in the other direction  
   accept ‘connect the battery the other way round’ or ‘change the direction of the flow of electricity’ accept ‘reverse the coil’  
   do not accept ‘turn the glass tube around’  

(c) (i)  

   all four poles are required for the mark
(ii) they attract each other

accept ‘they attract’ or ‘unlike poles attract’
do not accept ‘they are magnetised’