

## Mark schemes

<b>1</b>	A	no effect ✓	1 (L3)
	B	they attract ✓	1 (L3)
	C	they repel ✓	1 (L4)
	D	they attract ✓	1 (L3)

*if more than one box is ticked award no mark*

**[4]**

<b>2</b>	(a)	there is current in the coil <i>accept 'a current flows' or 'electricity flows' or 'circuit completed'</i>	1
		it becomes an electromagnet <b>or</b> iron core becomes magnetised	1
		iron bolt is attracted to the electromagnet <i>accept 'iron core' or 'magnet' for electromagnet</i>	1
	(b)	any <b>two</b> from <ul style="list-style-type: none"><li>the current stops <i>do not accept 'electricity switched off' or 'circuit breaks'</i></li><li>there is no more magnetism</li><li>bolt pushed back by spring</li></ul>	2

**[5]**

3

- (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]

4

- (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]