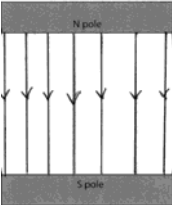
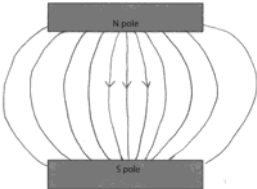
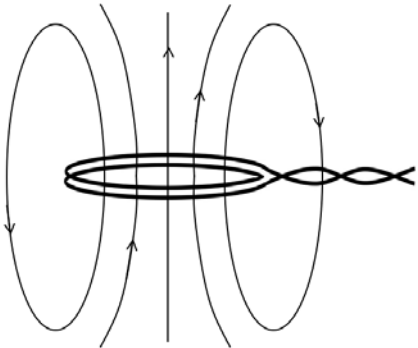


Question number	Answer	Notes	Marks
1 (a) (i)	arrows on two or more {lines from N to S and/or clockwise on loops around wire};	accept arrows beside lines showing correct directions  reject contradicting arrows (i.e. one correct and one incorrect)	1
(b)	<p>(ii) horizontal arrow (by eye);  pointing to the left;</p> <p>EITHER:</p> <p><b>Uniform field drawn</b> MP1. single straight line drawn perpendicular to and between poles; MP2. additional straight lines drawn either side that are parallel and evenly spaced (by eye);</p> <p>OR</p> <p><b>Non-uniform field drawn</b> MP1. central straight line(s) drawn perpendicular to and between poles; MP2. correctly curved lines drawn either side of the centre and drawn symmetrically (by eye);</p>	<p>Lines can start/end at faces or edges of poles</p>   <p>ignore all arrows on lines</p>	2

(c)	<p>MP1. place compass around magnet and note / mark its direction;</p> <p>MP2. place compass in <b>new position</b> and note / mark its direction again;</p> <p>MP3. directions linked together to find a field line / pattern;</p>	<p>ignore references to iron filings</p> <p>award marks if clear in diagram</p> <p>if contradiction between words and diagram, go by the diagram</p> <p>allow use of additional compass(es)</p>	3
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**Total 8 marks**

Question number		Answer	Notes	Marks
2	a	<b>one</b> of: iron is (soft) magnetic; iron loses its magnetism easily;	allow RA for steel	1
	b	<b>these can be shown on a labelled diagram</b>  MP1. current carrying (insulated) wire;  MP2. wrapped into coil;  MP3. wrapped on <b>iron</b> core;	allow  wire shown connected to a battery solenoid = MP2 only	3
	c	Any two <b>ideas</b> from:  MP1. current/ voltage reduces OR eq;  MP2. magnetic field of em reduces;  MP3. (magnetic) force holding the iron plate to the magnet no longer present;	do not give marks for <ul style="list-style-type: none"> <li>• 'the door closes'/eq</li> <li>• electricity</li> <li>• power</li> </ul> allow current stops circuit broken  <ul style="list-style-type: none"> <li>• iron plate no longer magnetised</li> </ul>	2
			total = 6 marks	

Question number	Answer	Notes	Marks
3 (a)	<p>MP1. at least one straight, vertical central field line;</p> <p>MP2. any field line drawn circling the wire / at least one peripheral field loop;</p> <p>MP3. field directions correct and consistent throughout and shown on at least two lines;</p> 	<p>ignore breaking of field lines as they pass through the centre of the coil by eye</p> <p>condone spiral drawn round wire</p>	3
(b)	<p>any 3 from:</p> <p>MP1. idea of magnetic fields interacting;</p> <p>MP2. idea of (magnetic) attraction or repulsion;</p> <p>MP3. reversing current reverses direction of magnetic field / force;</p> <p>MP4. some comparison with magnets, e.g. like poles repel, unlike poles attract;</p>	<p>allow field lines crossing</p> <p>ignore 'cutting'</p> <p>reject mention of electrostatic force or charge</p> <p>mention of having 'poles'</p>	3

**Total 6 marks**

Question number	Answer	Notes	Marks
4 (a)	Rods magnetised; And repel;	Reject ideas of charge for one mark only	2
(b)	MP1. A named magnetic material e.g.(soft) iron; MP2. because the material is capable of being magnetised;  MP3. DOP (iron only) but does not retain its magnetism;	ACCEPT steel, mu-metal, nickel, cobalt  accept RA steel would stay magnetised/apart	3
(c)	any two from- MP1. field (in coil) switches polarity; MP2. field (in rods) weaker;  MP3. (since) field alternates with current or at 50 Hz;  MP4. rods may not have time to become fully magnetised;	allow • 100 times a second or mains frequency  • hysteresis ideas • domain theory • reluctance ideas	2

Total 7 marks