

Mark Scheme

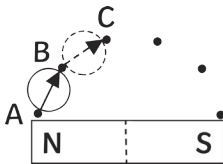
Combined Science GCSE

Magnetism and the Motor Effect

(Levels 4-9)

	Answer	Marks
1. (a)	1 mark for showing like poles repel N Repel N or S Repel S 1 mark for showing opposite poles attract N Attract S or S Attract N	(2)
1. (b)	Any 2 from: iron, steel, nickel or cobalt	(1)
1. (c)	Non-contact force.	(1)
1. (d)	Arrows need to go from north to south pole. Force field is strongest where the lines are closest together. Uniform field is shown by the straight line between the north and south pole.	(3)

(Total for Question 1 = 7 marks)

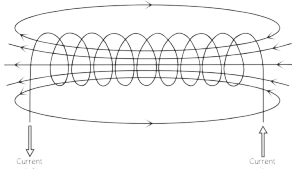
	Answer	Marks
2. (a)	Permanent magnets produce their own magnetic field whereas an induced magnet only produces a magnetic field when in a magnetic field.	(1)
2. (b)	Place the bar magnet on a plain piece of paper and draw around it. Put a plotting compass on the paper near the magnet and mark with a pencil a small dot at each end of the needle. Remove the plotting compass and place it so that one end of the needle is pointing towards the top mark made last time and again place a dot and the top point of the needle.  Repeat this method to plot several different field lines.	(4)

2. (c)	Any 4 from: doorbells, fridge/cupboard doors, speakers, microphones, cranes Any other reasonable answer.	(2)
2. (d)	What is the earth's magnetic field caused by? ✓ the correct answer ✓ Liquid iron movement in the earth's outer core. A permanent magnet in the earth's core. The earth's gravitational field.	(1)

(Total for Question 2 = 8 marks)

	Answer	Marks
3. (a)	The right hand thumb rule: point your thumb in the direction of the current and the way the fingers curls indicated the direction of the field .	(1)
3. (b)	Field direction clockwise.	(1)

(Total for Question 3 = 2 marks)

	Answer	Marks
4. (a)	A coil of wire.	(1)
4. (b)	An electromagnet.	(1)
4. (c)	 Field lines going through and around coil. correct direction.	(2)
4. (d)	any 4 points from below: An electromagnetic can be switched on and off Easy to pick up Release cars where desired Can increase strength of magnet Pick up vehicles of a greater mass	(4)

4. (e)	Inside a solenoid the field from individual coils form a strong field along the centre of the solenoid and give a weak field outside the solenoid.	(2)
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(Total for Question 4 = 10 marks)

	Answer	Marks
5. (a)	B	(1)
5. (b)	T or tesla	(1)
5. (c)	Fleming's left hand rule Point 1st finger in direction of magnetic field Point 2nd finger in direction of the current Thumb will point in the direction of the force	(3)
5. (d)	1 mark for correct equation, 2 marks for all 4 correct units or 1 mark for at least 2 correct units $F(N) = B(T) \times I(A) \times l(m)$	(3)
5. (e)	$F(N) = B(T) \times I(A) \times l(m)$ convert cm to m = $50 \div 100 = 0.5$ $F = 3 \times 2 \times 0.5 = 3 \text{ N}$	(2)

(Total for Question 5 = 13 marks)

Question	Answer	Marks
6. (a)	The trains use magnetic repulsion and therefore the trains appear to float along the track.	(2)
6. (b)	i) Method Wrap the wire around the iron nail. Attach the end of the wire to the battery and the nail should start picking up the paper clips.	(6)

	ii) Increase the number of coils around the nail. Increase the current. iii) The nail is no longer magnetic and the paperclips will fall off.	
6. (c)	Reversing the current or reversing the field.	(2)

(Total for Question 6 = 10 marks)