Mark scheme

Magnetism

Physics 0625 · Questions from Paper 3 and Paper 4

Total marks

65

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
8	4	6	4	6	7	5	7	7	11	**65**

Question 1 [8]

1 **(a)** idea of points to north (pole of Earth) M1

when freely suspended / floating on water A1

OR

repels (M1)

a (known) N pole (A1)

(b) **(i)** repulsive / repel B1

(ii) repulsive / repel B1

(iii) attractive / attract B1

(c) **(i)** S N B1

(ii) attractive / attract B1

(iii) attractive / attract B1

[Total: 8]

Question 2 [4]

2	1 (bar P–Q is a) (permanent) magnet	**M1**
	(because magnet) repels end Q	**A1**
	2 (bar R–S is an) unmagnetised magnetic material	**M1**
	(because magnet) attracts both ends (of R–S)	**A1**

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Question 3 [6]

3	(a)	(i)	needle inside coil	B1	
			current through coil OR connect battery/power supply	M1	
			direct current OR d.c.		
			OR a.c. and switch off before removing needle/ magnet	A1	
		(ii)	freely suspend/pivot and see which end points N (or equivalent)		
			OR see which end is repelled by N pole of a magnet	B1	
	(b)		4+ smooth curves leaving one end and going to the other (ignore any arrows)	B1	
			no lines crossing or meeting, even at ends	B1	[6]

Question 4 [4]

4(a)	any **one** from: • magnetic materials are attracted to magnets • non-magnetic materials are not attracted to magnets • magnetic materials experience a force in magnetic fields • non-magnetic materials don't experience a force in magnetic fields	**B1**
4(b)	any **one** from: • steel as it stays magnetised • steel makes a permanent magnet	**B1**
4(c)	N and S poles correctly labelled braille: north to south owtte	**B1**
4(d)	field lines close(r) indicates strong(er) (magnetic) field owtte ORA	**B1**

Question 5 [6]

5(a)	use of compass to give direction of field lines first method (use of plotting) compass(es) idea of mark arrow position **OR** move compass in direction of arrow	**B1**
	start from different position(s) **OR** join up marks / draw lines (to show pattern) **OR** alternative method (use of plotting) compass(es) place number of compasses around magnet idea that arrows line up to show pattern	**B3**
5(b)	steel	**B1**
5(c)	electric motors **OR** loudspeakers **OR** burglar alarms	**B1**

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Question 6 [7]

6(a)	N and S labelled at either end of magnet correct field line shown above magnet correct field line shown below magnet field points in direction N to S	**B4**
6(b)(i)	electromagnet	**B1**
6(b)(ii)	(soft iron) filings attracted, but (most) fall off when switch opened	**B1**
6(b)(iii)	(steel) (most / more / they) remain attached when switch opened	**B1**

Question 7 [5]

7 **(a)** brass: needle horizontal B1

magnet: needle vertical, N pole up B1

(b) **(i)** no forces/effect on needle B1

(ii) needle aligns with field OR N or S pole attracted along field line or to (magnetic) S or N
NOT points to N of Earth B1

(c) steel, accept cobalt, nickel, ferrite, Magnadur, Alnico
NOT iron B1

Question 8 [7]

8(a)(i)	(soft) iron	**B1**
8(a)(ii)	steel	**B1**
8(a)(iii)	magnet does not attract a non-magnetic material	**B1**
8(b)	any **four** from: (when switch closed) there is a complete circuit current in the circuit magnetic effect (of current / in coil) owtte (coil and nail become) electromagnet (springy) iron (strip) attracted to (nail / electromagnet) circuit broken owtte springy iron strip springs back / makes contact (again) owtte	**B4**

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Question 9 [7]

9(a)	3 lines from N face to S face middle line must be straight AND perpendicular to end faces	**B1**
	at least 1 arrow from N to S AND NO arrows from S to N	**B1**
9(b)(i)	needle perpendicular to end faces AND {arrow pointing to S OR correctly labelled N OR S}	**B1**
9(b)(ii)	compass / needle / it aligns with field OR compass / needle / it points in direction of magnetic field OR compass / needle / it points to S(outh)	**B1**
	N pole of needle attracted to S of magnet(s) OR N pole repelled by N of magnets OR unlike poles attract / like poles repel	**B1**
9(c)	heat OR hammer	**B1**
	with magnet lying (magnetically) E – W	**B1**
	OR place in coil / solenoid with a.c.	**(M1)**
	withdraw OR reduce current to 0	**(A1)**

Question 10 [11]

10(a)(i)	100 (Nm)	**B1**
10(a)(ii)	0.44 m ***OR*** 0.45 m	**A3**
	total clockwise moment = total anticlockwise moment	C1
	(d =) 100 / 225 ***OR*** (d =) 100 / (23 × 9.8) ***OR*** 100 / (23 × g × d)	C1
10(b)(i)	(barrier arm) rotates anticlockwise ***OR*** (RHS of barrier arm) moves upwards	**B1**
	(when the switch is closed) coil produces a magnetic field ***OR*** coil / core becomes an (electro)magnet	**B1**
	(coil/core/electromagnet) attracts (iron) bar (downwards)	**B1**
10(b)(ii)	statement: (barrier arm) moves slower / goes up (more) slowly	**B1**
	explanation: decreases strength of (magnetic) field / smaller force / smaller moment	**B1**
10(b)(iii)	steel would become permanently magnetised	**B1**
	(so when switch is opened) barrier would stay up ***or*** bar A will stay attracted (to soft iron core)	**B1**

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