

APOLLO

Electric and magnetic fields

HL

Physics

First assessment 2025

23 questions | mark schemes

Mark-scheme answers

Physics HL | Paper 1A | May 2025 TZ1 | Q26 | 1 marks

26. A

Physics HL | Paper 1A | May 2025 TZ1 | Q27 | 1 marks

27. D

Physics HL | Paper 1A | May 2025 TZ1 | Q28 | 1 marks

28. A

Physics HL | Paper 1A | May 2025 TZ1 | Q29 | 1 marks

29. C

Physics HL | Paper 1A | May 2025 TZ1 | Q30 | 1 marks

30. B

Physics HL | Paper 1A | May 2025 TZ2 | Q22 | 1 marks

22. B

Physics HL | Paper 1A | May 2025 TZ2 | Q23 | 1 marks

23. C

Physics HL | Paper 1A | May 2025 TZ2 | Q24 | 1 marks

24. B

Physics HL | Paper 1A | May 2025 TZ2 | Q27 | 1 marks

27. A

Physics HL | Paper 1A | May 2025 TZ3 | Q29 | 1 marks

29. D

Physics HL | Paper 1A | May 2025 TZ3 | Q30 | 1 marks

30. B

Physics HL | Paper 1A | May 2025 TZ3 | Q31 | 1 marks

31. C

3.	a		r ✓ because it gives the most uniform field in space between coils/across the magnet OR $2r$ gives a lower magnitude of the field OR $0.5r$ gives a greater magnitude of the field but not uniform across magnet ✓		[2]
3	b		B_H will be perpendicular to B_{coils} ✓ the deflection of the magnet will allow for the determination of B_H ✓ gives the maximum possible deflection of the magnet ✓	MP2 can be given for use of deflection to measure B_H .	[2] max
3	c		$\tan 24^\circ = B_H/B_{coils}$ ✓ $B_H = \llcorner 7.5 \times 10^{-5} \text{ T} \times \tan 24^\circ \Rightarrow 3.3 \times 10^{-5} \text{ T} \llcorner$ ✓	Watch for ECF from a). For MP2: for $2r$, $B_H = 1.3 \times 10^{-5} \text{ T}$ for $0.5r$, $B_H = 4.5 \times 10^{-5} \text{ T}$	[2]

Mark-scheme answers

Physics HL | Paper 1A | Nov 2025 TZ1 | Q26 | 1 marks

26. D

Physics HL | Paper 1A | Nov 2025 TZ1 | Q27 | 1 marks

27. B

Physics HL | Paper 1A | Nov 2025 TZ3 | Q30 | 1 marks

30. D

Physics HL | Paper 1A | Nov 2025 TZ3 | Q31 | 1 marks

31. C

Physics HL | Paper 1A | Specimen 2025 | Q24 | 1 marks

24. A

Physics HL | Paper 1A | Specimen 2025 | Q26 | 1 marks

26. B

Physics HL | Paper 1A | Specimen 2025 | Q27 | 1 marks

27. B

Physics HL | Paper 1A | Specimen 2025 | Q31 | 1 marks

31. C

Physics HL | Paper 1A | Specimen 2025 | Q32 | 1 marks

32. A

9.	a	i	equally spaced arrows «by eye» all pointing down ✓ edge effects also shown with arrows ✓		2
9.	a	ii	$E = \frac{V}{d} = \frac{960}{8.0 \times 10^{-3}} \checkmark$ $E = 1.2 \times 10^5 \text{ «NC}^{-1}\text{»} \checkmark$		2
9.	b		friction transfers electron(s) to or from drop AND through collisions/ interaction with air molecules in the tube OR through collisions/interaction with wall of tube ✓		1
9.	c	i	weight of oil drop is $\rho_o g V \checkmark$ $\frac{F_b}{W} = \frac{\rho_a g V}{\rho_o g V} = \frac{\rho_a}{\rho_o} \checkmark$ $\frac{F_b}{W} = \frac{1}{730} \Rightarrow 1.4 \times 10^{-3}$ OR Ratio of F_b to W is much less than 1 ✓		3

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SPEC/4/PHYSI/HP2/ENG/TZ0/XX/M

9.	c	ii	Weight vertically down AND electric force vertically up ✓ Of equal length «by eye» ✓		2
9.	c	iii	Mass of drop is $\rho_o V \checkmark$ $qE = (\rho_o V)g \checkmark$ «hence answer»	MP1 must be shown implicitly for credit.	2
9.	c	iv	Negative ✓		1
9.	d	i	Net force is zero ✓ Acceleration of the oil drop is zero ✓ OR For terminal velocity drag must equal weight ✓ weight = $\rho_o g V$ and drag = $6\pi\eta r v \checkmark$		2

9.	d	ii	$q = \frac{6\pi\eta rV}{E} \checkmark$ $q = \frac{6\pi \times 1.60 \times 10^{-5} \times 1.36 \times 10^{-6} \times 1.40 \times 10^{-4}}{1.2 \times 10^5} \checkmark$ $q = 4.79 \times 10^{-19} \text{ «C» } \checkmark$	Answer must be shown to 3+ sf.	3
9.	d	iii	charge is quantized $\checkmark$ so, the charges must be 1e and 2e $\checkmark$		2

Question	Answers	Notes	Total
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