GCE A LEVEL MARKING SCHEME

SUMMER 2025

A LEVEL
PHYSICS – UNIT 4
1420U40-1

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

GCE A LEVEL PHYSICS

UNIT 4 – FIELDS AND OPTIONS

SUMMER 2025 MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks
Examiners must mark in red ink.
One tick must equate to one mark (except for the extended response question).
Question totals should be written in the box at the end of the question.
Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules
All work should be seen to have been marked.
Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.
Crossed out responses not replaced should be marked.
Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question
A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statement.

Marking abbreviations
The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
ecf = error carried forward
bod = benefit of doubt

SECTION A

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
1	(a)		$\cos 5° \approx 1$ **OR** equivalent e.g. $0.996 T = mg \cos$(small angle) ≈ 1 Accept small angle means adjacent is approximately same as hypotenuse NOT $T = mg \cos 5$ NOT because the tension is nearly vertical NOT because the angle is small (by itself) NOT small angle so $T \sin 5° \approx T$		1		1	1	
	(b)		using correct horizontal forces e.g. $T \sin 5$ seen or implied i.e. correct use of $\sin 5^o$ (1) Also accept $\tan 5^o$ Mass × 9.81 seen (1) Answer = 0.00232 [N] **OR** final substitution seen (0.996) × 0.0027 × sin 5° (1) Beware, non-perfect answer using sin and cos: $T = mg\cos 5^o$ = 0.02639 [N] $T \sin 5^o$ = 0.00230 [N] award 2 marks		3		3	3	
	(c)		Use of $F = \frac{kq_1q_2}{r^2}$ (1) Rearrangement i.e. $r^2 = \frac{kq_1q_2}{F}$ (1) so $r^2 = \frac{(9 \times 10^9) \times (125 \times 10^{-9}) \times (125 \times 10^{-9})}{0.0023}$ = 0.06 hence r = 0.25 or 0.265 [m] (1) Deduct 1 mark for power of 10 slips e.g. 8 mm for 2 N	1	1 1		3	2	
	(d)	(i)	Work done per unit charge accept WD on unit charge (1) Bringing charge from infinity to that point (1)	2			2		
		(ii)	Use of $V = \frac{kq}{r}$ (1) Adding potentials correctly as scalars (1) Correct answer = 22 300 V (1) **unit mark** C F^{-1} or J C^{-1}	1	1 1		3	2	
			Question 1 total	**4**	**8**	**0**	**12**	**8**	**0**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
2	(a)		{Force **OR** (gravitational) pull **OR** 230 N) at that point (accept "there") (1) per unit mass (1) Accept per kilogram(me) or on 1 kg NOT just kg^{-1} **Alternative:** Acceleration at that point (1) Inertial mass = gravitational mass **OR** equivalence principle **OR** any mass (1)	2			2		
	(b)		Equipotentials (min 2) are concentric circles (about star) (1) Don't award this mark if anticlockwise or clockwise arrow Radial field lines are symmetrical (min 4) (1) Arrows towards the star (1)	3			3		
	(c)		Use of $g = \frac{GM}{r^2}$ (1) Rearrangement i.e. $M = \frac{gr^2}{G}$ (1) So: $M = \frac{230 \times (1.20 \times 10^9)^2}{6.67 \times 10^{-11}}$ = 4.97 × 10^{30} k[g] **OR** final substitution seen (1)	1	1 1		3	2	
	(d)		Use of $r = \frac{m}{M+m} d$ **OR** $r = \frac{m}{M} d$ (1) So: $r = \frac{7.2 \times 10^{27}}{4.97 \times 10^{30} + 7.2 \times 10^{27}} \times 4.0 \times 10^{10}$ = 58 000 k[m] (1) NOTE: 3.994 × 10^{10} gets a mark (masses wrong way round) N.B. No credit for mixing up d and r	1	1		2	1	
	(e)	(i)	Substitution: $T = 2\pi\sqrt{\frac{d^3}{G(M+m)}}$ **OR** $2\pi\sqrt{\frac{(4 \times 10^{10})^3}{G(5 \times 10^{30})}}$ (1) Period = 2.76 × 10^6 [s] (1)	1	1		2	1	

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
		(ii)	Valid equation for speed e.g. $v = \frac{2\pi r \textbf{ ecf}}{T \textbf{ ecf}}$ **OR** $v = r\omega$ **and** $\omega = \frac{2\pi}{T}$ (1) Valid equation for Doppler e.g. $\frac{\Delta\lambda}{\lambda} = \frac{v}{c}$ (1) Convincing answer seen 0.29 p[m] **OR** 0.00029 n[m] QED **OR** 2.9×10^{-13} (1) NOTE 137.2 m s^{-1} gets 2nd mark (using 0.3 pm backwards) NOTE: 91 400 m s^{-1} gets 1st mark (right equation wrong r) NOTE: $\Delta\lambda = 2 \times 10^{-10}$ or 0.2 nm gets 2 marks (or even 3 if **ecf** from (d))		3		3	2	
	(f)		Statement {Solomon / he used} $v = H_0 D$ **OR** using the equation (1) Giving $D = 60 \times 10^{18}$ [m] **OR** $2.2 \times 10^{-18} \times 60 \times 10^{18} = 132$ (1) NOTE: 0.3 pm gives 6.2×10^{19} m (award 1st 2 marks) Wrong because not cosmic expansion **OR** galaxy redshifts **OR** anything to do with galactic motion **OR** recessional velocity is constant (1) NOTE: "should have used recessional speed" not enough - it just means moving away Due to a planet **OR** orbit **OR** rotational velocity **OR** should have taken mean speed / shift **OR** the velocity is not constant **OR** anything suggesting orbital motion (1) **Alternative for last 2 marks:** Has used radial rather than recessional velocity **OR** reverse (1) Star also has tangential velocity **OR** reverse (1)			4	4	2	
	(g)		Assumption of constant velocity (after Big Bang) (1) Then $D = vT$ (1) And $v = H_0 D = H_0 vT$ leading to $T = \frac{1}{H_0}$ (1) ACCEPT D and d magically cancelling NOTE: just comparing $v = H_0 D$ and $v = \frac{D}{T}$ gives $H_0 = \frac{1}{T}$	3			3	2	
			Question 2 total	**11**	**7**	**4**	**22**	**10**	**0**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
3			**Indicative content:** K1 • Planets orbit in ellipses • With Sun at a focus • Only 1 focus for a circle / at centre K2 • Equal areas swept in equal time • For line between Sun and planet • Constant speed for a circle K3 • $T^2 \propto r^3$ • Period and semi-major axis named (as the variables) • r is the radius for a circular orbit **OR** K3 • $T^2 \propto r^3$ • Period and radius named (as the variables) • Radius replace by semi-major axis for ellipse	6			6		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
			5-6 marks All 3 laws well covered expect 2 points for each law as a minimum. *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.* **3-4 marks** All 3 laws poorly covered OR 2 covered well and 1 poor OR 2 covered well and 1 not covered. *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure.* **1-2 marks** 1 OR 2 laws poorly covered OR 1 law well covered *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with little structure.* **0 marks** *No attempt made or no response worthy of credit.*						
		Question 3 total		**6**	**0**	**0**	**6**	**0**	**0**

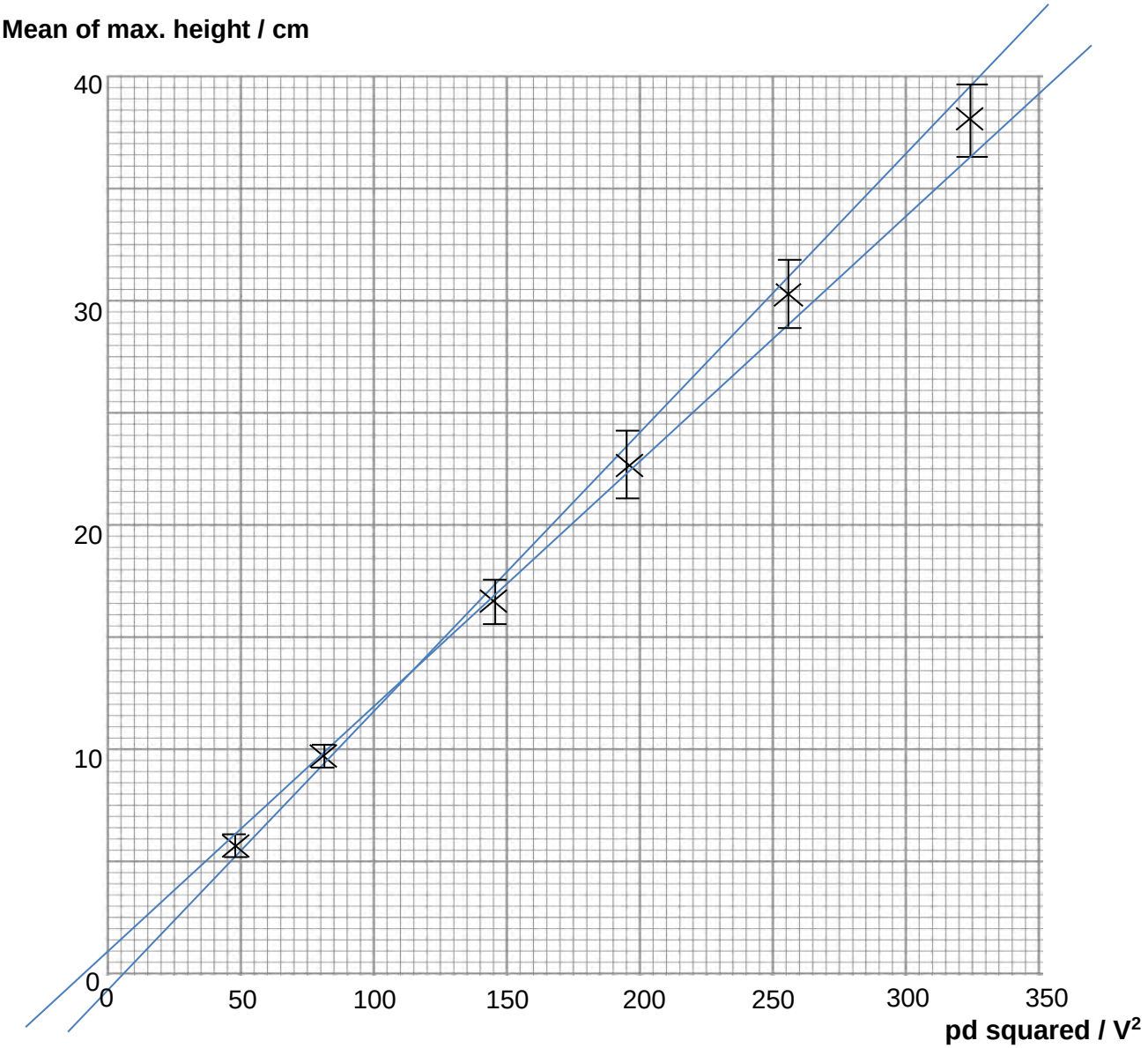
Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)	Centripetal force / circular motion identified ACCEPT force towards middle (1) $Bq\omega r$ is the force on a (moving) charge carrier in a B-field **OR** the LHR force **OR** is Bqv ACCEPT Lorentz force (1) Magnetic force provides / causes the centripetal force **OR** Bqv is the <u>resultant</u> force (1)	1	1 1		3		
		(ii)	Rearrangement of equation e.g. $\omega = \frac{Bq}{m}$ (1) Correct substitution and use of $\omega = 2\pi f$ (1) Correct answer = 0.78 or 0.79 or 0.80 [T] (1) Award 2 marks for 4.3×10^{-4} [T]		3		3	3	
	(b)		Multiplying by e (1) Correct answer = 1.9[2] $\times 10^{-16}$ [J] (1) Allow 1 mark for power of 10 slips and calculator slips only		2		2	1	
	(c)	(i)	Use of $v = \omega r$ (1) (gives 3.4×10^{7} m s^{-1}) OR equivalent (1) Use of $\frac{1}{2}mv^2$ (gives 9.6×10^{-13} J) (1) no ecf on m_e ALLOW marks for working backwards using 1 pJ			2	2	2	
		(ii)	Divide energy by answer to (b) **AND** dividing by 2 (gives 2500 cycles) (1) **ecf** on (b) Correct answer = 0.21 m[s] and comment **ecf** on mass (1) NOTE: 0.4 ms and 0.8 ms score 1 mark i.e. slips for full marks -1			2	2	1	

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		**Any 2 × (1) from:** – Mention of any particle accelerator use e.g. cathode ray tube / TV – X-ray tubes – Light source (neon, laser etc.) – Valid medical use (e.g. radioisotope production) – [Magnetron) for radar / microwave – Discovery of new particles (e.g. Higgs) – Other scientific / technical developments / discoveries – Provides jobs – International collaboration – Knowledge for the sake of knowledge OR research itself is good – CERN costs billions – No guarantee of success – Money spent on other named cause e.g. hospitals, education, energy			2	2		
			Question 4 total	**1**	**7**	**6**	**14**	**7**	**0**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)		[Induced] emf is rate of change of flux [linkage] / Faraday's law mentioned (1) Flux [linkage] is increasing in 1 **OR** rate of change of flux is positive (1) Flux [linkage] is maximum in 2 [hence emf = 0] **OR** momentarily no change in flux [linkage] (1) Conditions in 3 opposite to 1 stated **OR** flux linkage is decreasing **OR** rate of change of flux is negative **OR** moving away **OR** due to Lenz (1) **Alternative:** [Induced] emf is rate of cutting of flux / Faraday's law mentioned (1) Flux cut [more] on top side of loop at position 1 (1) Flux cut in and out of loop [equally] at 2 [hence emf = 0] **OR** cut same at top and bottom (1) Conditions in 3 opposite to 1 stated **OR** bottom side does more cutting **OR** moving away **OR** due to Lenz (1)	1	1 1 1		4		
	(b)		Use of $V = \frac{\Delta N \Phi}{\Delta t}$ (1) Change of flux correct i.e.1.47 – 0.84 [= 0.63 Wb turn] (1) Correct answer = 48 [V] (1) ALLOW 1 mark for 175 V or 88 V (i.e. 1st mark for trying equation)	1	1 1		3	2	
			Question 5 total	**2**	**5**	**0**	**7**	**2**	**0**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)	Use of $C = \frac{\epsilon A}{d}$ (1) Combined with $A = \pi r^2$ (1) Correct answer = 1.96×10^{-8} [F] **and** comment - wrong (1)			3	3	2	
		(ii)	Rearrangement of $E = \frac{V}{d}$ (1) Correct answer = 8.9 [V] (1)		2		2	1	
	(b)	(i)	Max line correct (1) Min line correct (1) ½ small square tolerance If both lines forced through origin 0 marks		2		2	2	2
		(ii)	Gradient method good (implied by correct answers) (1) Max gradient correct (expect 0.00125) (1) Min gradient correct (expect 0.00109) (1) Mean correct (around 0.00117) (1) **ecf** % correct (expect 7% ± 2%) (1) **ecf**		5		5	4	5
		(iii)	Substitution into given equation (1) Efficiency = 0.46 **OR** 46(%) **OR** using max grad (0.00125) (1) Adding uncertainties **OR** using min capacitance (0.0045) (1) Final uncertainty 19% **OR** using max mass (0.102) (1) Correct answer = (46 ± 9) hence possible **OR** 56% and comment (1) **No sig fig penalty** **Alternative:** Substituting efficiency = 0.5 into equation (1) Obtaining expected gradient = 0.00127 **OR** other e.g. MAX gradient (0.00143 using 5.5 mF and 98 g) (1) Using 4.5 mF for MIN expected gradient (1) Using 102 g for MIN expected gradient (1) Stating gradient within range of (b)(ii) **and** YES (1) **Alternative using data points: (max 4 marks)** Putting data points in equation for gradient (V^2 and h) (1) Obtaining a value of efficiency (1) Obtaining a correct max value **and** conclusion (1) Obtaining another max value of efficiency (1)			5	5	4	5

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
		(iv)	Calculating the time constant [2 s] **OR** $e^{-10/RC}$ (1) Many time constants ($5RC$) **OR** 0.0067 factor seen **OR** 99.3% seen **OR** equivalent AND a valid comment e.g. OK (1) Note that the 2nd mark will imply the 1st mark **Alternative:** Putting valid ratio into $t = -RC\ln(1 - \frac{Q}{Q_0})$ **OR** $t = RC\ln(\frac{Q_0}{Q_0 - Q})$ (1) e.g. $t = -RC\ln(0.01)$ **OR** $t = RC\ln(100)$ Obtaining good t value **and** conclusion (1) e.g. $\frac{Q_0}{Q_0 - Q} = 100$ gives t = 9.21 [s] ALLOW this even if $t = -RC\ln(\frac{Q}{Q_0})$ used e.g. $\frac{Q}{Q_0} = \frac{1}{100}$ gives t = 9.21 s, e.g. $\frac{Q}{Q_0} = \frac{1}{10}$ gives t = 4.6 [s] DON'T penalise wrong or missing minus sign			2	2	2	2
			Question 6 total	**0**	**9**	**10**	**19**	**15**	**14**



Option A – Alternating Currents

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)	Measure peak height / count divisions (or twice this for precision) (1) Multiply by volts/div **OR** y-sensitivity or equivalent (1) (can be awarded from (iii)	2			2		
		(ii)	Find distance / count divisions for 1 waveform or peak to peak etc. (1) Multiply by time/div or x-sensitivity etc. (1)	2			2		
		(iii)	Distance of horizontal line/dot above centre or ground AND multiply by volts/div	1			1		
	(b)	(i)	Substituting into $2\pi fL$ (1) Correct answer = 47 [Ω] (1)	1	1		2	1	
		(ii)	Equating R **and** $\frac{1}{2\pi fC}$ (1) Correct answer = 141 k[Hz] (1)		2		2	2	
		(iii)	Understanding $V_R^2 + V_C^2 = 2^2$ (1) Correct answer = 1.41 [V] (1)		2		2	2	
		(iv)	Q = 1 (1) f = 141 k[Hz] (1)		2		2		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
		(v)	X_C-X_L is the same OR vector diagram OR calculation attempted correctly (1) Reference to impedance equation being unchanged (since squared) **OR** two correct calculations (1)		2		2		
	(c)		Converting frequency to omega (16.96×10^6 s^{-1}) or implied (1) Using resonance frequency to find L (1) Correct answer = 4.24×10^{-5} [H] (1) Using $\frac{\omega L}{R}$ OR $\frac{1}{\omega CR}$ to get R (1) Correct answer = 7.99 [Ω] (1)			5	5	5	
			Question 7 total	**6**	**9**	**5**	**20**	**10**	**0**

Option B – Medical Physics

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
8	(a)	(i)	$V = \frac{hc}{e\lambda}$ (correct arrangement) (1) V = 62 k[V] (1)		2		2	2	
		(ii)	Same shape but higher in all places including line spectra **and** smaller minimum wavelength (not at 0,0)		1		1		
		(iii)	Line spectra in <u>different</u> places	1			1		
		(iv)	**Any 2 × (1) from:** – CT have a camera(s) / detectors that rotate giving 3D images – Very high dose of ionising radiation – More expensive	1	1		2		
	(b)	(i)	Alternating {voltage / current} causes piezoelectric crystal to oscillate (1) This produces sound with the same frequency as the voltage (1)	2			2		
		(ii)	Z_1 = 442 (1) Z_2 = 1 709 250 (1) Fraction = 0.999 (1) Most / all reflected from skin / air boundary (1) Need a coupling gel with density / ultrasound velocity closer to acoustic impedance of skin (1)			5	5	3	
	(c)	(i)	**Any 2 × (1) from:** – Short half-life so disappears quickly while being able to do what is required – Gamma emitter so can be detected outside the body (& not too ionising) – Behaves (chemically) as required inside the body	2			2		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
		(ii)	Activity after 30 hours = 47.5 [Bq] (1) Activity per ml = 0.0043 × 2 = 0.0086 [Bq] OR correct use of ratios (1) Volume of blood = 5 523 ml (cm^3) with units (1)		3		3	3	
	(d)		[Hydrogen nuclei need to] <u>precess</u> so $f = 42.6 \times 10^6 \times 1.5 = 6.39 \times 10^7$ (1) Wavelength = $\frac{3 \times 10^8}{6.39 \times 10^7}$ = 4.7 [m] (1)		2		2	2	
			Question 8 total	**6**	**9**	**5**	**20**	**10**	**0**

Option C – The Physics of Sports

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
9	(a)	(i)	Moment of inertia $I = \sum mr^2$ (1) m is the mass (elements of the golf club head) need the equation to award mark **OR** explained as mass of the club (head and arm) (1) r is the distance from the {axis / shoulder / neck / arm and club} (1) Accept radius of rotation but not radius by itself	1	1 1		3		
		(ii)	Relative speed [of club and ball] after [the collision] (1) = 0.83 × Relative speed [of club and ball] before the collision (1) **Or** $\frac{\text{Relative speed [of club and ball] after [the collision] (1)}}{\text{Relative speed [of club and ball] before [the collision]}}$ = 0.83 (1) If relative not included award 1 mark only	2			2		
	(b)		Horizontal and vertical components of velocity calculated correctly i.e. v_{vert} = 21 [m s^{-1}] and v_{horiz} = 28 [m s^{-1}] (can be implied from calculations (1) Using $x = ut + \frac{1}{2}at^2$ or $v = u + at$ (1) Using range = v_{horiz} × time (1) Time of flight = 4.30 [s] (1) (accept 4.08 s if horizontal component used) Range = 120 [m] **and** comment – 8 iron is suitable / will clear the lake (no ecf on incorrect time) (1) Alternative – comparison of horizontal / vertical components of velocity **and** comment for final mark			5	5	5	
	(c)	(i)	Using rotational KE = $\frac{1}{2}I\omega^2$ (1) Rotational kinetic energy = 2.3 [J] (1) **ecf** Total kinetic energy = 2.3 + 18 = 20.3 [J] (1) (allow **ecf** on horizontal component of 28 m s^{-1} only)	1	1 1		3	2	

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
		(ii)	Labelled diagram indicating the forces: (Weight) Lift, Drag / Air resistance – can be implied from answer e.g. lift acts upwards and air resistance opposes motion (1) Backspin provides lift (1) Ball will achieve greater maximum height **or** longer (hang) time in air (1) Horizontal range will change **OR** ball stops more quickly (1)	1	1 1 1		4		
		(iii)	Recalling equation for drag force $F = \frac{1}{2}\rho A v^2 C_D$ (1) Realising factor = 1.42^2 (1) Change in drag force = 2.02× or doubled (1) Don't accept doubled by itself	1	1 1		3	3	
			Question 9 total	**6**	**9**	**5**	**20**	**10**	**0**

Option D – Energy and the Environment

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
10	(a)		Friction of moving parts (1) KE of incoming air not reduced to zero (1) Accept air turbulence created by other wind turbines Use of $P = \frac{1}{2}A\rho v^3$ to give P_{IN} = 3.26 ×10^6 W (1) × 0.46 = P_{OUT} = 1.50 ×10^6 W (1) $\frac{50\text{MW}}{1.5\text{ MW}} = 33.3$ so 34 turbines (1)	1 1	 1 1 1		5	3	
	(b)		m per second = $\rho \times V$ per second = 1 000 × 6.8 (1) ΔPE per second = 6 800 × 9.81 × 370 = 24.6 × 10^6 W (1) P_{out} = $\frac{90}{4.5}$ = 20 ×10^6 W (1) $\frac{20\text{MW}}{24.6\text{ MW}} \times 100 = 81\%$ (1) **Alternatively:** V = 6.8 × 4.5 × 3 600 = 1.1 × 10^5 m^3 (1) $m = \rho V$ = 1 000 × 1.1 × 10^5 = 1.1 × 10^8 kg (1) ΔPE = $mg\Delta h$ = 1.1 × 10^8 × 9.81× 370 = 4 × 10^{11}J (1) $\frac{90\times10^6\times3600}{4\times10^{11}} \times 100 = 81\%$ (1)		4		4	4	
	(c)		**Any 2 × (1) from:** – Commissioning costs – Lack of appropriate sites – Environmental restrictions / National park / SSI etc		2		2		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)	Hydrogen ions move through the electrolyte (1) Electrons move around circuit doing work / transferring energy (1) Hydrogen combines with oxygen to produce water (1)	3			3		
		(ii)	**Discussion of any 2 × (1) from:** – No CO2 produced from operation of fuel cell – Hydrogen fuel often obtained from hydrocarbons producing CO2 – Hydrogen fuel produced using electricity from non-fossil fuels			2	2		
	(e)	(i)	Rate of energy transfer is 0.18 J s^{-1} through an area of 1 m^2 for a temperature difference of 1 K	1			1		
		(ii)	Use of $P = UA\Delta\theta$ to give $P_{\text{original wall}}$ = 36.45 [W] (1) $P_{\text{wall}} + P_{\text{window}}$ = 32.4 W + 28.35 W = 60.75 [W] (1) $\frac{60.75}{36.45} = 1.7$ so claim is approximately correct / incorrect as it is not doubled (1) **Alternatively for second mark** $P_{\text{difference with window}}$ = 24.3 [W] $P_{\text{original wall}} + P_{\text{difference with window}}$ = 36.45 + 24.3 = 60.75 [W]			3	3	3	
			Question 10 total	**6**	**9**	**5**	**20**	**10**	**0**

A2 UNIT 4 - FIELDS AND OPTIONS

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	4	8	0	12	8	0
2	11	7	4	22	10	0
3	6	0	0	6	0	0
4	1	7	6	14	7	0
5	2	5	0	7	2	0
6	0	9	10	19	15	14
7	6	9	5	20	10	0
8	6	9	5	20	10	0
9	6	9	5	20	10	0
10	6	9	5	20	10	0
TOTAL	**30**	**45**	**25**	**100**	**52**	**14**