OCR | A-LEVEL PHYSICS | H556/01

Modelling physics

June 2025 exam series

MARK SCHEME

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GCE

Physics A

H556/01: Modelling physics

A Level

Mark Scheme for June 2025

Oxford Cambridge and RSA Examinations

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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MARKING INSTRUCTIONS

PREPARATION FOR MARKING
RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training*; *OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor.

3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **number of required** standardisation responses.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the RM Assessor messaging system.

5. **Crossed Out Responses**
   Where a candidate has crossed out a response and provided a clear alternative then the crossed-out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed-out response where legible.

   Rubric Error Responses – Optional Questions
   Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM Assessor, which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

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Multiple-Choice Question Responses
When a multiple-choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).
When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses
When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only one mark per response)
Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth two or more marks)
If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)
Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there, then add the annotation 'SEEN' to confirm that the work has been seen and mark any responses using the annotations in section 11.

7. There is a NR (**No Response**) option. Award NR (No Response):
   - if there is nothing written at all in the answer space
   - OR if there is a comment which does not in any way relate to the question (e.g., 'can't do', 'don't know')

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- OR if there is a mark (e.g., a dash, a question mark) which is not an attempt at the question.

Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

8. The RM Assessor **comments box** is used by your team leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:
    a. **To determine the level** – start at the highest level and work down until you reach the level that matches the answer
    b. **To determine the mark within the level**, consider the following

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

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11. **Annotations**

Annotation		Meaning
✓	Correct response	Used to indicate the point at which a mark has been awarded (**one tick per mark awarded**).
✗	Incorrect response	Used to indicate an incorrect answer or a point where a mark is lost.
AE	Arithmetic error	Do not allow the mark where the error occurs. Then follow through the working/calculation giving full subsequent ECF if there are no further errors.
BOD	Benefit of doubt given	Used to indicate a mark awarded where the candidate provides an answer that is not totally satisfactory, but the examiner feels that sufficient work has been done.
BP	Blank page	Use BP on additional page(s) to show that there is no additional work provided by the candidates.
CON	Contradiction	No mark can be awarded if the candidate contradicts himself or herself in the same response.
ECF	Error carried forward	Used in numerical answers only, unless specified otherwise in the mark scheme. Answers to later sections of numerical questions may be awarded up to full credit provided they are consistent with earlier incorrect answers. Within a question, ECF can be given for AE, TE and POT errors but not for XP.
L1	Level 1	L1 is used to show 2 marks awarded and L1^ is used to show 1 mark awarded.
L2	Level 2	L2 is used to show 4 marks awarded and L2^ is used to show 3 marks awarded.
L3	Level 3	L3 is used to show 6 marks awarded and L3^ is used to show 5 marks awarded.
POT	Power of 10 error	This is usually linked to conversion of SI prefixes. Do not allow the mark where the error occurs. Then follow through the working/calculation giving ECF for subsequent marks if there are no further errors.

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Annotation		Meaning
SEEN	Seen	To indicate working/text has been seen by the examiner.
SF	Error in number of significant figures	Where more SFs are given than is justified by the question, do not penalise. Fewer significant figures than necessary will be considered within the mark scheme. **Penalised only once in the paper.**
TE	Transcription error	This error is when there is incorrect transcription of the correct data from the question, graphical read-off, formulae booklet or a previous answer. Do not allow the relevant mark and then follow through the working giving ECF for subsequent marks.
XP	Wrong physics or equation	Used in numerical answers only, unless otherwise specified in the mark scheme. Use of an incorrect equation is wrong physics even if it happens to lead to the correct answer.
^	Omission	Used to indicate where more is needed for a mark to be awarded (what is written is not wrong but not enough).

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Annotation	Meaning
/	Alternative and acceptable answers for the same marking point
✓	Separates marking points
Not	Answers which are not worthy of credit
Ignore	Statements which are irrelevant
Allow	Answers that can be accepted
( )	Words which are not essential to gain credit
___	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

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12. **Subject Specific Marking Instructions**

CATEGORISATION OF MARKS

The marking schemes categorise marks on the MACB scheme.

M marks These are method marks upon which **A**-marks (accuracy marks) later depend. For an **M**-mark to be scored, the point to which it refers must be seen in the candidate's answers. If a candidate fails to score a particular **M**-mark, then none of the dependent **A**-marks can be scored.

A marks These are accuracy or answer marks, which either depend on an **M**-mark, or allow a **C**-mark to be scored.

C marks These are compensatory method marks which can be scored even if the points to which they refer are not written down by the candidate, providing subsequent working gives evidence that they must have known it. For example, if an equation carries a **C**-mark and the candidate does not write down the actual equation but does correct working which shows the candidate knew the equation, then the **C**-mark is given.

B marks These are awarded as independent marks, which do not depend on other marks. For a **B**-mark to be scored, the point to which it refers must be seen specifically in the candidate's answers.

SIGNIFICANT FIGURES

If the data given in a question is to 2 sf, then allow an answer to 2 or more significant figures.
If an answer is given to fewer than 2 sf, then penalise once only in the entire paper.
Any exception to this rule will be mentioned in the Guidance.

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SECTION A

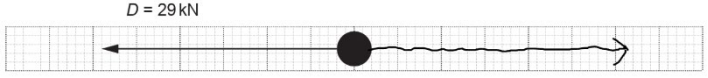
Question	Answer	Marks	Guidance
1	D	1	
2	C	1	
3	B	1	
4	C	1	
5	A	1	
6	B	1	
7	B	1	
8	B	1	
9	A	1	
10	C	1	
11	D	1	
12	B	1	
13	C	1	
14	D	1	
15	B	1	
	Total	15	

SECTION B

General rule: For substitution into an equation, allow any subject - unless stated otherwise in the guidance

Question			Answer	Mark	Guidance
16	**(a)**	**(i)**	Reference to area (under the curve) Construct rectangle or square plus triangle/ trapezium	B1 B1	 Allow: reference to counting squares. Accept: annotation on the graph such as shapes Ignore: reference to integration Accept for 2 marks: Attempt to calculate number of squares (under the curve) and multiply by area of one square (even if the candidate has got the area of one square wrong)
		(ii)	Tangent drawn at (12, 54) Change in y / change in x =1.4	M1 A1	 Allow value that rounds to 2sf in the range 1.3 - 1.7 to 2sf
		(iii)	Change in velocity = 56 ms^{-1} Change of momentum = 56 × 1700 = 95000 (kg ms^{-1})	C1 A1	 Answer is 95200 to 3sf
	(b)	**(i)**			Accept ‘air resistance’ or ‘friction’ for ‘drag’ throughout

Question			Answer	Mark	Guidance
			Any two from: Drag force is increasing (so resultant decreases) (Zero resultant when or towards end) drag = driving force/friction from wheels Idea that drag force is increasing at a decreasing rate (so resultant decreases at a decreasing rate)	 B1 B1 B1	 Accept reference to drag force function ($F = kv^2$)
		(ii)	(Area under graph =) impulse / related to the product of time and force / change in momentum	B1	
	(c)	(i)	 Tyre (or wheel) exerts a force on the road backwards / to the left / opposite to direction of motion Road exerts (equal and) opposite force (of the same type) on the tyre / AW	 M1 A1	Check diagram Allow “car” for “tyre” Accept alternatives such as “forward” or “to the right”
		(ii)	Candidate’s gradient from 1(a)(ii) × 1700 evaluated	B1	 Allow 1.5 (from stem) × 1700 = 2600 N NOTE: range in acceptable gradients for (a)(ii) gives force between 2210-2720
		(iii)	F = Resultant (2400) + D = 31000(N) = 31 (kN)	B1	Ignore PoT on answer line

Question			Answer	Mark	Guidance
			Arrow drawn from the circle to the right to scale i.e. 	B1	Allow ECF for resultant from part (ii) and/or D If using 1.5 from stem, F=32000 to 2sf Allow +/- half a small square by eye i.e. 31-32 squares Allow candidate's arrow consistent with number on answer line
			Total	14	

Question			Answer	Mark	Guidance
17	**(a)**	**(i)**	Constant horizontal speed/ Constant horizontal (component of) velocity/ Zero horizontal force (however expressed)/ Zero horizontal acceleration	A1	Allow any alternate wording
		(ii)	Use of $s=\frac{1}{2}at^2$ with s=2500 and with a=9.8(1) or a=g Consistent algebra that arrives at $t^2 = 2 \times 2500 /g$ **and** evaluation of t as a decimal e.g. t = 22.6(....)	M1 A1	Allow alternate using v2 = u2 + 2as and then v = u + at NOT s = ½ vt with v = 220 found by v = u + at (i.e. use of t = 23 to find v) Allow $t^2 = 509.6....$ for $t^2 = 2 \times 2500/g$ Allow $t = \sqrt{(2 \times 2500/g)}$ for $t^2 =2 \times 2500/g$ Allow 9.8(1) for g Responses with u = 220 are XP

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Question			Answer	Mark	Guidance
		(iii)	Vertical v = gt = 220 ms^{-1} v = $(220^2 + 220^2)^{0.5}$ v = 310 (ms^{-1}) Angle = 45°	C1 C1 A1 A1	ECF for their value of t ECF for their value of vertical v Allow answer that rounds to 3sf to be in range 310-315 (m s-1) Allow '220' for 'maintaining this speed' NOT left as a surd NOT left as a trigonometric expression Allow answer in range 44-45 Allow answer in range 135-136 NOT left as a trigonometric expression NOT left as a surd ECF for their vertical velocity and use of trigonometry NOTE acute answer above 45.0 is incorrect
		(iv)	Reference to drag or air resistance or friction Thrust required for zero horizontal net force / thrust = drag	B1 B1	Accept reference to work done against resistive forces (either named or unnamed) Accept thrust allow to keep constant: vertical acceleration / horizontal velocity / horizontal speed Accept AW for "thrust" e.g. driving force

Question			Answer	Mark	Guidance
	(b)	(i)	g is proportional to $1/r^2$ $(6400 / 6410)^2 > 0.991$	M1 A1	Allow $g=GM/r^2$ Accept calculation of value of g at altitude Accept calculation of g at altitude divided by g at ground to give a number greater than 0.991 NOTE: 6400/6410 giving 0.9984 is XP NOTE: ratios that use the same value of r is XP
		(ii)	Aircraft and passengers have the same acceleration(g) No contact force(s on passenger from seat/body of the aircraft)	B1 B1	Accept passenger is (also) moving as a projectile Accept relative acceleration between aircraft and passenger is zero Accept reaction for contact NOT: idea that there no forces on passenger
			Total	13	

Question			Answer	Mark	Guidance
18	(a)	(i)	upthrust = weight (of drum or of water displaced)	B1	
		(ii)	Volume of water displaced = (m ÷ ρ) = 1200 ÷ 1000= 1.2 m^3 *d* = (volume ÷ area) = 1.2 m^3 ÷ 0.79 =1.5(2) (m)	C1 C1 A1	Accept approach: h × rho × g = weight / A (C1) h = weight / (A rho g) or substitution(C1) Accept approach: Density of drum = 1200/1.58 (C1) Ratio of densities gives fraction of drum underwater = 760/1000(C1) Depth of drum underwater = height of drum × ratio of densities = 1.5(2) (m) (A1)
		iii	Any two from: There is a distance between upthrust and the line of weight force or the centre of mass/ centre of weight/ centre of gravity Cause a net moment Equilibrium requires no resultant moment	 B1 B1 B1	 Allow diagram showing non-co-linear W down and U up / weight and upthrust are not at the same point Allow curved labelled arrow to show net moment Allow sum of moments must = zero Allow the force and weight form a couple for both marks

Question			Answer	Mark	Guidance
	(b)	(i)	(Additional upthrust = $xA\rho g$)=x × 0.79× 1000 × 9.81	M1	Accept candidate substituting in a number for x
			k = **additional upthrust** ÷ x =7800 or 7750	A1	Accept candidate's value for x and/or value for additional upthrust NOTE: Candidate's value for k is insufficient evidence for the A1 mark.
		(ii)	(Resultant) Force or acceleration is proportional to displacement	B1	
			The acceleration or force is in the opposite direction to the displacement	B1	Accept: the force is a restoring force Accept: directed to the centre of oscillation or to the equilibrium position
		(iii)	ω^2 = k/m = 7800 /1200	C1	ECF from (b)(i) for k
			($f = \frac{\omega}{2\pi}$ =) 0.41 Hz (0.406)	A1	Ignore use of ω = 8000 gives f >1 kHz Accept use of k = 8000 gives 0.411 Accept use of k = 7750 gives 0.404 Accept approach: acceleration divided by displacement gives omega squared C1

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Question			Answer	Mark	Guidance
18	(c)		**Level 3 (5–6 marks)** A valid conclusion with sound and detailed reasoning. Clear description of data collection. Annotations with few or no omissions. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** Some valid reasoning for the discussion with **one from:** • Clear description of data collection **or** annotations with few omissions • Some description **and** some annotations *There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.*	B1 x 6	**Indicative scientific points may include:** **Description of data collection** • Measure the frequency with appropriate equipment e.g. oscilloscope, stopwatch • Control amplitude of the waves • Discussion of suitable range of frequencies i.e. either side of the natural frequency • Measure the amplitude of the drum • Rule/marked depth gauge • Suitable method such as video analysis, position sensor and voltmeter for surface of water **Annotation of graphs** • f_0 / natural frequency labelled on x axis • Value of natural frequency labelled (check 18bii) • Amplitude on y axis • (Driving) frequency on x axis **Discussion** • Design B more heavily damped than design A • Energy being removed from the design B more effectively (as electrical output) • Damping is very heavy as peak has shifted “a lot” to the left • Design A has larger oscillations so more energy available

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Question			Answer	Mark	Guidance
			Level 1 (1–2 marks) No conclusion or conclusion without valid reasoning with one of: • Some description **or** some annotation • Limited description **and** limited annotation *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.* **0 marks** *No response or no response worthy of credit.*		• Conclusion consistent with candidate's discussion
			TOTAL	18	

Question			Answer	Mark	Guidance
19	(a)		Energy transfers from higher temperature to lower / AW	B1	Allow oxygen and surroundings are not in thermal equilibrium Allow idea that tank is cooler than the surroundings
	(b)		The potential energy (of the particles) is increasing The kinetic energy (of the particles) is constant	B1 B1	Accept to provide latent heat 'not increasing' is insufficient
	(c)		Energy transferred = 3600 × 1300 (= 4.68 MJ) / AW Mass vaporised = 4.68 MJ ÷ 214 000 (=21.9 kg) /AW V = 21.9 ÷ 1140 seen and evaluated to 0.019(2) (m^3)	M1 M1 A1	Alternate E = mL = ρVL and Pt = ρ VL (M1) V = Pt ÷ ρL = (1300 × 3600) ÷ (1140 × 214000) (M1) V = 0.0192 (A1) allow 0.019

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Question			Answer	Mark	Guidance
	(d)		Volume occupied by gas= 0.2 + 0.019 = 0.22 m^3 p=((nRT)/V) = 710 x 8.31 x (-183+273) / 0.22 p=2410 (kPa)	C1 C1 A1	Rearrangement and substitution NOTE: use of incorrect volume data in the question e,g, V = 9.8 + 0.2 = 10, V = 9.8 can still score this substitution and rearrangement mark but nothing else. No ECF. ECF incorrect addition or non-addition of volumes e.g use of either 0.2 or 0.02 or 0.019 for 2 marks. Treat incorrect conversion to kelvin as AE and allow ECF Non-conversion of temperature to kelvin is XP so cannot score second and third mark.
			TOTAL	9	

Question			Answer	Mark	Guidance
20	**(a)**		7.1 or 7.2	B1	2sf answer required
	(b)		Correct plotting at (7.2, 250) within half a small square Straight line of best fit with balanced spread of points either side of the line.	B1 B1	ECF allowed from (a)
	(c)		Relationship • s.h.c is directly proportional to the number of particles per unit mass Explanation Any three from: • Straight line **through the origin** • s.h.c. is the energy required to increase temperature of unit mass by unit temperature • Increasing temperature requires increasing <u>KE</u> of particles • More particles (per unit mass) will therefore require more energy	 B1 B1 B1 B1 B1	 Do not allow inversely proportional to molar mass Allow equation with correct constant (3.4×10^{-23}) Allow ‘kg’ for ‘unit mass’ and ‘degree or kelvin’ for ‘unit temperature’ Allow equation with terms defined Allow both number of particles and required energy are both directly proportional to mass
			TOTAL	7	

Question			Answer	Mark	Guidance
21			**Level 3 (5–6 marks)** Detailed explanation of dark lines. Differences between lines discussed with explanation. Correct conclusion with reasoning *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** Some explanation of dark lines with some differences between lines Or Detailed description of dark lines Or Detailed description of the differences in line *There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.* **Level 1 (1–2 marks)** **Either** Limited explanation of dark lines **or** a difference in lines given with an unsupported conclusion or no conclusion at all	B1 x 6	**Indicative scientific points may include:** **Dark lines** • Dark lines show wavelengths absorbed • Star produces a continuous spectrum • Atmosphere of star absorbs light • Photons are absorbed by electrons increasing/moving 'up' energy levels • Energy of photons match differences in energy levels of atoms • Light is re-emitted by atoms in star atmosphere • Light is re-emitted in random directions **Differences (number of lines and intensities)** • Tau Ceti has extra lines/Vega has fewer lines • Lines in common are different intensities (stronger/weaker) • Tau Ceti has more elements • Different proportions of hydrogen **Analysis/conclusion** • Vega is younger/Tau Ceti is older • Tau Ceti has had more time to fuse heavier elements

Question			Answer	Mark	Guidance
			There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant. **0 marks** *No response or no response worthy of credit.*		• Tau Ceti has a lower proportion of hydrogen because it has been fusing/using it for longer • Accept that idea Vega may be older than Tau Ceti if Tau Ceti has more mass
			TOTAL	6	

Question			Answer	Mark	Guidance
22	(a)	(i)	$T_{asteroid}^2 = 3.5^3$ T = 6.5 (yr)	C1 A1	Accept substitution of given formula with AU in metres (giving time in seconds) Answer to 3sf is 6.55 (yr)
		(ii)	R = 3.5 AU = 3.5 × 1.5 × 10^{11} = 5.3 × 10^{11} (m) v = 2πR/T = 16 (kms^{-1}) KE = ½ mv^2 = 1.3 × 10^9 J	C1 C1 A1	 ECF from (a)(i) for T Note: v = R/T is XP Allow ECF from v Allow 1.2 × 10^9 (J) if no premature rounding in calculation Answer is 1.26 × 10^9 (J) to 3sf Alternative method $mv^2/r = GMm/r^2$ (C1) ½ mv^2 = m × ½ GM/r = ½ of GPE (C1) = 1.3 × 10^9 J from graph (A1)
	(b)	(i)	Potential difference from graph = 0.9 – 0.25 = 0.65GJ kg^{-1} GPE = mass × potential difference = 6.5 GJ	C1 A1	If calculated value is 0.89-0.25 Ignore sign Allow ECF from the graph
		(ii)	The Sun is at one focus	B1	
			TOTAL	8	

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Question			Answer	Mark	Guidance
23	(a)		$\Delta\lambda =$ 656.3 - 654 (nm) or 2.3 (nm) $v = c \times \Delta\lambda / \lambda = 3 \times 10^8 \times 2.3 / 656.3$ $=1050$ km s^{-1}	C1 C1 A1	Allow between 2.25 and 2.35 Check denominator is 656.3 and not 654 (XP) Ignore minus sign Accept 1100 (km s^{-1})
	(b)		$d=v/H_0 = 1050000 \div 2.5 \times 10^{-18} = (4.2 \times 10^{23}$ m) 4.2×10^{23} m $\div 9.5 \times 10^{15} = 4.4 \times 10^7$ light years	C1 A1	ECF from (a) Using 1100 km s^{-1} gives 4.6×10^7 ly
	(c)		Absolute uncertainty in $\Delta\lambda$ in range of 0.4-1.2 nm % Uncertainty = (candidate's abs uncertainty ÷ 2.3) × 100= 21%	C1 A1	Allow value that if rounded to 1sf would be in the range Accept 1sf answer Allow in range 17 – 52 %

Question			Answer	Mark	Guidance
	(d)		Any two from: Hubble's law assumes/predicts all galaxies moving away / AW (from evidence in question) M87 is blue shifted/moving towards the Milky Way / AW Idea that M87 may 'gravitationally associated' with Milky Way/Local cluster/Virgo supercluster Suitable comment comparing absolute uncertainty with difference in velocities or percentage uncertainty with percentage difference	 B1 B1 B1 B1	 i.e. correct statement of Hubble's law Accept has a negative recession velocity Allow any reasonable alternative E.g. percentage uncertainty from change in wavelength s larger than the percentage difference in the quoted distance and the calculated distance
	e		One from • Cosmic microwave background evidence • Very few galaxies are blue shifted	 B1	 Allow decipherable truncations or acronyms e.g. CMBR, MBR Allow other reasonable ideas that supports model (e.g. nucleosynthesis ratios, He:H ratio enhancement (extra helium), universe may not be uniform and/or isotropic, no other model is consistent with the evidence, universe is still expanding)
			TOTAL	10	

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