GCSE
COMBINED SCIENCE: SYNERGY
8465/2H

Higher Tier Paper 2 Life and Environmental Sciences

Mark scheme

June 2022

Version: 1.0 Final Mark Scheme

226G8465/2H/MS

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the examiner make their judgement
- the Assessment Objectives and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent (for example, a scientifically correct answer that could not reasonably be expected from a student's knowledge of the specification).

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**.
Alternative words in the mark scheme are shown by a solidus eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of errors / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution?

[1 mark]

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name **two** magnetic materials.

[2 marks]

Student	Response	Marks awarded
1	iron, steel, tin	1
2	cobalt, nickel, nail*	2

3.2 Use of symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, or uses symbols to denote quantities in a physics equation, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. At any point in a calculation students may omit steps from their working. If a subsequent step is given correctly, the relevant marks may be awarded.

Full marks are **not** awarded for a correct final answer from incorrect working.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

An error can be carried forward from one question part to the next and is shown by the abbreviation 'ecf'.

Within an individual question part, an incorrect value in one step of a calculation does not prevent all of the subsequent marks being awarded.

3.6 Phonetic spelling

Marks should be awarded if spelling is not correct but the intention is clear, **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

3.9 Ignore

Ignore is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

3.10 Do <u>not</u> accept

Do **not** accept means that this is a wrong answer which, even if the correct answer is given as well, will still mean that the mark is not awarded.

3.11 Numbered answer lines

Numbered lines on the question paper are intended to support the student to give the correct number of responses. The answer should still be marked as a whole.

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- Level of response mark schemes are broken down into levels, each of which has a descriptor.
- The descriptor for the level shows the average performance for the level.
- There are two marks in each level.

Before you apply the mark scheme to a student's answer, read through the answer and, if necessary, annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1: Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level.

The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer. Do **not** look to penalise small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level.

Use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 content.

Step 2: Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

An answer which contains nothing of relevance to the question must be awarded no marks.

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	heart muscle (cell) nucleus	in this order only	1	AO1 4.2.1.3 4.2.1.2 4.1.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	vena cava → right atrium → right ventricle → pulmonary artery		1	AO2 4.2.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	(the left ventricle) pumps blood a greater distance (so) needs to produce a greater force / pressure (of contraction) **or** (wall of the left ventricle) has more muscle (1) (because) pumps blood a greater distance (1)	allow pumps blood (all) around the body ignore thicker unqualified allow (because) pumps blood all around the body (1) ignore pumps blood to the body allow (because) pumps blood at a higher pressure (1)	1 1	AO2 4.2.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	to prevent blood flowing backwards	allow to keep blood flowing in one direction allow to prevent blood flow from ventricle to atrium	1	AO1 4.2.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	right atrium		1	AO1 4.2.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	controls the (resting) heart rate		1	AO1 4.2.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7		ignore heart rate decreases		
	cardiac output is similar	allow (only) increased by 2 (cm^3) allow increased slightly	1	AO3
	(because heart rate decreased and) the stroke volume has increased	allow (because heart rate has decreased and) the volume of blood pumped out of the heart each beat has increased	1	AO2 4.2.1.3

Question	Answers	Mark	AO / Spec. Ref.
01.8	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO2
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO1
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content	0	

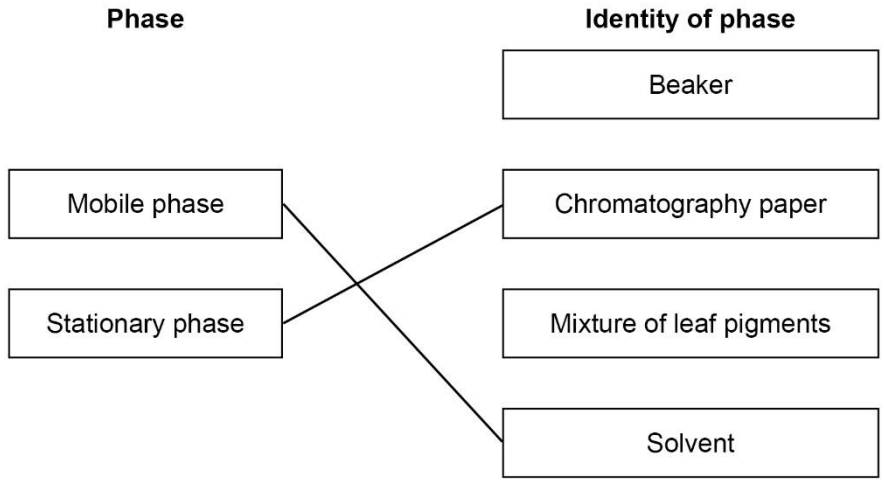
	Indicative content
	
	Diet risk factors and links:
	• high fat / energy diet
	  • overweight / obese
	  • coronary heart disease / attack
	
	• high (blood) cholesterol
	  • build-up of fatty material in (coronary) arteries
	  • coronary heart disease / attack
	
	• high sugar
	  • overweight / obese
	  • (type 2) diabetes
	
	• high salt
	  • high blood pressure
	
	• lack of vitamins / minerals / fibre
	  • deficiency diseases or named diseases
	
	Lifestyle risk factors and links:
	• lack of exercise / activity **or** sedentary **or** stressful lifestyle
	  • overweight / obese
	  • cardiovascular disease / CHD
	  • leads to poor mental health
	
	• smoking
	  • cancer
	  • lung disease eg emphysema / bronchitis / asthma
	  • cardiovascular disease / CHD
	
	• alcohol or (recreational) drugs
	  • damage to named organs eg liver / brain
	  • high blood pressure
	
	• exposure to UV light / ionising radiation
	  • skin cancer
	
	The main discriminator is the quality of linking.
	
	Both diet **and** lifestyle factors, with links, are needed for Level 3.
			4.3.1.1
			4.3.1.2
			4.3.1.3
			4.3.1.5
			4.2.1.3
			4.3.2.6

Total Question 1		**15**

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	so the colour change (of the iodine) can be seen		1	AO3 4.2.1.5 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	the white area went brown	allow the white area did not turn black	1	AO3
	(which means) there was no starch in the white area	allow turning black indicates starch formed	1	AO3
	(because it does not contain chlorophyll so) cannot photosynthesise	allow (because) cannot produce glucose / sugar allow starch is made during photosynthesis	1	AO2 4.2.2.5 4.2.1.5 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	 do **not** accept more than one line from a box on the left		1 1	AO1 4.2.2.4 RPA9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	the ink will separate	allow the ink will run / smudge	1	AO1 4.2.2.4 RPA9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	$0.24 = \frac{\mathbf{X}}{121}$ (**X** =) 0.24 × 121 = 29.04 = 29 (mm)	 allow a correctly calculated answer to 2 significant figures from an incorrect calculation which uses the values in the question	1 1 1 1	AO2 4.2.2.4 RPA9

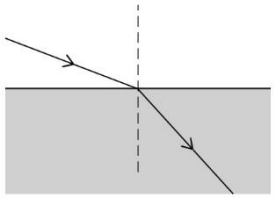
Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	brown		1	AO3 4.2.2.4 RPA9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	a different solvent was used		1	AO3 4.2.2.4 RPA9

Total Question 2		**13**

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	an alternating current		1	AO1 4.1.4.4 4.1.4.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2			1	AO1 4.1.4.5 4.1.4.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	any **two** from: • radio waves are transverse waves **and** sound waves are longitudinal waves **or** in radio waves the oscillations are perpendicular to the direction of energy transfer **and** in sound waves the oscillations are parallel to the direction of energy transfer • radio waves are electromagnetic waves, sound waves are not • radio waves can travel through space, sound waves cannot • radio waves travel at a (much) greater speed	allow in radio waves the oscillations are perpendicular to the direction of travel **and** in sound waves the oscillations are parallel to the direction of travel allow radio waves can travel through a vacuum, sound waves cannot allow radio waves do not need a medium to travel, sound waves do	2	AO1 4.1.4.1 4.1.4.3 4.1.4.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	(in all substances) the speed increases as the temperature increases		1	AO3 4.1.1.1 4.1.4.1
	as temperature increases the difference in the speed is greatest in steel	allow as temperature increases the difference in the speed is least in air	1	
	the speed is greater in steel than in air and water	allow the speed is greatest in steel / solid allow the speed is lowest in air / gas allow the speed is greater in a liquid than in a gas allow the speed increases as the density increases	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	waves on the photograph are stationary		1	AO3 4.1.4.1 4.1.4.2
	(so) a more accurate measurement of length can be made against the metre rule		1	RPA5
	(because) measuring the length across 5 wavelengths and using this to calculate a mean gives a more accurate value (of one wavelength)		1	

Total Question 3		**10**

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	any **one** from: • uncontrolled cell growth / division • a mutation • ionising radiation • a carcinogen • a virus	 allow change / damage to DNA / gene allow correct named type of radiation eg ultraviolet / UV allow named carcinogen	1	AO1 4.3.2.6 4.3.2.7 4.3.3.10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	any **two** from: • malignant tumour cells travel / spread / move (to other parts of the body) in the blood • malignant tumours can invade other body tissues • malignant tumours can form secondary tumours • malignant tumours do not stop growing	 allow benign tumours stay in the same place allow benign tumours do not invade other body tissues allow benign tumours stop growing (before they get too large) allow malignant tumours (usually) grow faster ignore references to level of harm ignore references to treatment	2	AO1 4.3.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	any **two** from: • drug injected at the same time each day • volume of drug • species / type mice • starting mass of the mice • starting volume / size of tumour • number of mice in each group • diet the mice are fed	ignore type of tumour ignore age / sex of mice ignore dose ignore size of mice	2	AO3 4.3.2.7 4.3.3.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	an injection with no drug in it	allow a placebo (injection) allow an injection of saline / water ignore no treatment	1	AO3 4.3.3.7 4.3.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	to be able to compare the effect of the drug (with no drug on the volume of tumour)	ignore to see if the drug works unqualified	1	AO3 4.3.3.7 4.3.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	2250 **and** 250 $\frac{2250 - 250}{250} \times 100$ = 800 (%)	 allow **2** marks for calculated percentage change in the range 790 to 799 (%)	1 1 1	AO2 4.3.3.7 4.3.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	any **two** from: • the greater the dose the more effective the drug • 0.060 (mg) reduced the volume of the tumour • 0.030 **and** 0.015 (mg) reduced the rate of growth of the tumour • 0.030 (mg) reduced the growth of the tumour more than 0.015 (mg)	allow 0.060 (mg) is the most effective (dose) if no other marks awarded allow **1** mark for 0.030 **and** 0.015 (mg) result in smaller tumours (than the control)	2	AO3 4.3.3.7 4.3.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	the tumours may be different / irregular shapes	allow description of irregular shape	1	AO3 4.3.3.7 4.3.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.9	any **one** from: • side effects • efficacy of the drug in the (whole) organism / mouse • the optimum dose	allow to see if it is safe (for animals) allow how effective the drug is in mice	1	AO3 4.3.3.7 4.3.2.7

Total Question 4		**14**

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	any **one** from: • to gain a representative sample • to avoid bias	ignore fair test allow the plants will not be evenly distributed	1	AO2 4.4.2.4 RPA12

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	*area of field* 9060 (m^2)		1	AO2 4.4.2.4 RPA12
	area of quadrat 0.25 (m^2)		1	
	number of quadrats $\left(\frac{9060}{0.25} = \right)$ 36 240	allow correct use of incorrectly calculated areas using the values given	1	
	total number of plants 36 240 × 2.8 = 101 472	allow correct use of student's calculated number of quadrats x 2.8	1	
		alternative method 4 quadrats = 1 m^2 (1) 2.8 × 4 = 11.2 (dandelions per m^2) (1) area field = 9060 m^2 (1) 11.2 × 9060 = 101 472 (1)		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	any **two** from: • different number of traps used in field **A** and **B** • uneven distribution of traps • only traps insects on the ground • only traps insects active during that part of the day • insects may crawl out • insects may be eaten • traps may flood	allow not enough traps to be representative allow description eg they are only around the edges allow will not trap flying insects allow some insects too big to get in	2	AO3 4.4.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	there is a greater number of (different) species in field **B** than field **A**	ignore there are more insects / organisms in field B allow there is a greater number of (different) species of plant in field **B** than field **A**	1	AO3 4.4.2.4 4.4.2.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	the number of birds would increase **or** the number of different species of birds would increase		1	AO3
	(because) of increase in food / habitat / shelter		1	AO2 4.4.2.7 4.4.2.5

Total Question 5		**10**

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	bite infected person **or** draws blood of an infected person	allow drink blood of infected person	1	AO1 4.3.3.1
	transfer protist / pathogen when it bites another person	ignore transfers malaria	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	any **one** from: • constant source of rats / food		1	AO3 4.4.2.2 4.4.2.3
	• temperature of the tunnels is constant	allow the tunnels are warm / warmer all year allow there are no seasons in the tunnels ignore references to weather		
	• can breed all year	allow can lay eggs all year		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	natural selection	ignore adaptation / mutation / speciation ignore survival of the fittest	1	AO1 4.4.4.2

Question	Answers	Mark	AO / Spec. Ref.
06.4	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO2
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO1
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content	0	

	Indicative content
	isolation
	• (geographical) isolation from mosquitos above ground
	
	variation
	• variation caused by (random) mutations
	• variation in the two populations of mosquitos
	• variation in the genes of the populations of mosquitos
	
	survival
	• some mosquitos are better able to survive underground
	• description of appropriate characteristic / behaviour in relation to ability to survive
	  ○ can feed on rat blood
	  ○ do not need to feed on blood before laying eggs
	  ○ can stay active all year
	
	reproduction
	• those that survive can reproduce
	• pass on their gene(s) / DNA / chromosomes / genetic material to offspring
	
	evolution
	• change over many generations
	
	speciation
	• cannot successfully interbreed / breed with mosquitos above ground to produce fertile offspring
	
	For **Level 3** link to mosquitos must be clear
			4.4.4.1
			4.4.4.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	feeding increases the body temperature (above optimum / 22 °C)		1	AO3
	(so) would cause loss of enzyme activity	allow would cause a decrease in enzyme activity / function allow would cause enzymes to denature allow (mosquito) enzymes work best at 22 °C	1	AO2
	(loss of enzyme activity) would cause cell damage / death	allow (loss of enzyme activity) would decrease cell reactions / metabolism	1	AO3 4.3.1.4

Total Question 6	**13**

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	−196 (°C)	do **not** accept 196 (°C)	1	AO2 4.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	(nitrogen) particles colliding with the (inside) walls of the cylinder		1	AO1 4.1.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	solid carbon dioxide changes to a gas (without forming a liquid)	do **not** accept gas to solid	1	AO1 4.1.1.1 4.1.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	when solid carbon dioxide sublimates no liquid is formed	ignore melting allow solid carbon dioxide will **not** make the food / packaging soggy	1	AO3 4.1.1.4 4.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	methane		1	AO3 4.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.6	any **two** from: • there are no forces shown (between the particles) • atoms are not solid spheres • atoms are not inelastic spheres • does not show particle movement	allow particles / molecules / atoms / ions ignore references to size / scale ignore bonding between atoms allow atoms are mostly empty space allow atoms will be vibrating / moving allow atoms are not 2-dimensional **or** allow solids / liquids / gases are not 2-dimensional	2	AO1 4.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.7	energy to change temperature = 4200 × 0.5 × 85		1	AO2 4.1.1.4
	energy to change temperature = 178 500	allow a correct calculation using an incorrectly / not converted value of mass **to gain subsequent marks energy to change temperature must be subtracted from total energy**	1	
	energy to change state = 1 320 000 − 178 500	allow a correct calculation using their value of energy to change temperature allow energy to change state = 1 141 500	1	
	1 141 500 = 0.50 x *L*	allow a correct substitution using an incorrectly / not converted value of mass allow a correct substitution using an incorrectly calculated value of energy to change state	1	
	$L = \frac{1\ 141\ \ 500}{0.5}$	allow a correct rearrangement using an incorrectly / not converted value of mass allow a correct rearrangement using an incorrectly calculated value of energy to change state	1	
	L = 2 283 000 (J/kg)	allow an answer consistent with an incorrectly / not converted value of mass allow an answer consistent with an incorrectly calculated value of energy to change state allow 2 280 000 or 2 300 000 (J/kg)	1	

Total Question 7		**13**

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	differentiation	ignore specialisation	1	AO2 4.2.2.1 4.1.3.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.2	any **two** from: • increase in height / length of the stem • increase in the width of the stem • increase in length of the roots • increase in the width of the roots • produce / develops leaves	allow produces / develops flowers or named tissue allow side shoots develop if no other marks awarded allow the plant gets bigger / taller for **1** mark	2	AO2 4.2.2.1 4.1.3.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	as the distance from the tip increases the number of cells in mitosis decreases (because) the cells have differentiated **/** specialised (and are no longer performing mitosis)	 allow (because) the meristem cells are only in the tip (of the shoot)	1 1	AO3 4.2.2.1 4.1.3.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.4	translocation		1	AO1 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	any **two** from: • phloem cells do **not** have lignin (in their walls) • phloem cells have cytoplasm • phloem cells have perforated end walls	ignore functions of cells allow xylem cells have lignin (in their walls) allow xylem cells do **not** have cytoplasm allow xylem cells do **not** have end walls allow xylem cells are hollow tubes allow sieve plates for end walls if no other marks awarded allow **1** mark for phloem cells are living **and** xylem cells are dead	2	AO2 4.2.2.7 4.2.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.6	sugars move against a concentration gradient (into the phloem cell)	allow the concentration of sugar in the phloem cell is greater than the concentration of sugar in the leaf cell	1	AO3
	(so) sugars move into the phloem cell by active transport	allow (so) sugars move into the phloem cell by active uptake	1	AO2
	(which) requires energy	do **not** accept energy is produced / made / created / used	1	AO2
	(and) the companion cell contains mitochondria where energy transfer occurs	allow the companion cell contains mitochondria where respiration occurs	1	AO3 4.2.2.7 4.1.3.2 4.2.1.1 4.1.3.3

Total Question 8		**12**