GCE

Biology A

H420/03: Unified biology

A Level

Mark Scheme for June 2025

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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 **required number** of 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.)*

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')
   - 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:
    Read through the whole answer from start to finish, using the Level descriptors to help you decide whether it is a strong or weak answer. The indicative scientific content in the Guidance column indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance. Using a 'best-fit' approach based on the skills and science content evidenced within the answer, first decide which set of level descriptors, Level 1, Level 2 or Level 3, best describes the overall quality of the answer.

    Once the level is located, award the higher or lower mark:
    The **higher mark** should be awarded where the level descriptor has been evidenced and all aspects of the communication statement (in italics) have been met.
    The **lower mark** should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in italics) are missing.

    In summary:
    The skills and science content determines the level.
    The communication statement determines the mark within a level.

    Level of response questions on this paper are **3(a)** and **6(b)**

11. **Annotations**

Annotation	Meaning
	Correct response
	Incorrect response
	Omission mark
	Benefit of doubt given
	Contradiction
	Rounding error
	Error in number of significant figures
	Error carried forward
	Level 1
	Level 2
	Level 3
	Benefit of doubt not given
	Noted but no credit given
	Ignore

Annotation	Meaning
	Blank page

12. **Subject Specific Marking Instructions**

Abbreviations, annotations and conventions used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

Annotation	Meaning
I	alternative and acceptable answers for the same marking point
✓	Separates marking points
DO NOT ALLOW	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

13. **Subject-specific Marking Instructions**

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

Question			Answer	Marks	AO Element	Guidance
1	(a)		A = sieve tube (element) ✓ B = xylem (vessel) ✓	2	2.3	 **ALLOW** xylem cell
1	(b)	(i)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 0.4 : 1 award three marks** surface area of the root hair = 2 x π x 5 x (5 + 800) = 25,289.8208614 ✓ volume of the root hair = π x 5^2 x 800 = 62,831.8530718 ✓ SA:V of root hair = 25,289.82 / 62,831.853 = 0.4025 = 0.4 : 1 ✓	3	2.2	**2 marks** for '0.4' alone **or** '0.40 : 1' **or** '0.4025 : 1' **or** '0.403 : 1' **or** '2 : 5' **or** '1 : 2.5' **or** '4 : 10' **or** '161 : 400' **or** any other correct ratio as final answer **If final answer incorrect, award marks for correct SA or volume calculations.** **ALLOW** standard form and correct rounding to minimum of 5 significant figures in working **ALLOW** 25,211.28 (area of circle deducted) **or** 25,277 (using 3.14 as π) **or** 25,293.1 (using 3.142) **or** 25,300 (using 22/7) **or** 8050π **ALLOW** 62,800 (using 3.14 as π) **or** 62,840 (using 3.142) **or** 62,857.14286 (using 22/7) **or** 20,000π **ECF marks:** 0.2:1 (diameter used in both calculations) = **1 mark** 0.8:1 (diameter in SA calculation) = **2 marks** 0.1:1 (diameter in vol calculation) = **2 marks** 4:1 (not squaring in vol calculation) = **2 marks**

Question			Answer	Marks	AO Element	Guidance
1	(b)	(ii)	increases / fast(er) , uptake of , water / (named) minerals / (named) ions ✓	1	1.2	**ALLOW** more , water / minerals / ions , absorbed / taken up / move(s) in **IGNORE** helps **ALLOW** more diffusion of water from soil **ALLOW** more osmosis (of water) into cells **ALLOW** greater (active) transport of , minerals / ions , into roots **ALLOW** 'assimilates / nutrients' for 'minerals' **IGNORE** 'diffusion / osmosis' unqualified e.g. no mark for 'increased diffusion of water' **CON** short(er) diffusion distance
1	(c)		**1** (transported as) sucrose ✓ **2** (moves between cells from palisade cells) through , plasmodesmata / symplast (pathway) **OR** (or moves between cells) through , cell walls / inter-cell spaces / apoplast (pathway) ✓ **3** protons / H^+ (ions) , actively transported / pumped , out of companion cell ✓ **4** co-transport (of , sucrose / carbohydrates) with , protons / H^+ (ions) , into companion cell ✓ **5** <u>activ</u>e <u>load</u>ing (of sucrose into companion cells) ✓	3 max	1.2	**IGNORE** 'palisade' throughout **NOTE:** mp2, 3, 4, and 5 can be awarded without sucrose being mentioned **ALLOW** 'facilitated diffusion of carbohydrate, together with protons, into companion cell' **ECF** from MP3 if an ion other than H^+ is used **DO NOT ALLOW** 'active transport of sucrose'

Question			Answer	Mark	AO Element	Guidance
2	(a)	(i)	ATP has one more phosphate ✓	1	1.1	**ORA** **ALLOW** ATP has three phosphates and ADP has two phosphates **IGNORE** molecule / ion **ALLOW** ATP has an extra phosphoanhydride bond **ORA**
2	(a)	(ii)	adrenaline cannot bind to receptor ✓ adenylyl cyclase , remains inactive / not stimulated / AW ✓ adenylyl cyclase cannot , catalyse / convert , ATP to cAMP ✓ AVP ✓	2 max	2.5	**ALLOW** 'adenyl' and 'adenylate' for 'adenylyl' throughout **CON** if context is 'change of shape of the receptor / allosteric effect' **ALLOW** adenylyl cyclase is not activated **NOTE**: 'adenyl cyclase is not triggered to convert ATP to cAMP' scores **MP2 and MP3** e.g. G-protein , is not activated / does not work / is not switched on / does not split **NOTE**: 'G-protein does not activate adenyl cyclase' scores **MP2 and MP4** **NOTE** 'adrenaline (normally) binds to receptors to stimulate adenylyl cyclase. This **cannot happen** when the receptors are blocked' scores **2 marks**

Question			Answer	Mark	AO Element	Guidance
2	(b)		***supporting (why beta blockers are less effective) :***	**4 max**	3.1 3.2	
			1 *idea that* beta blockers have a higher risk in **all** comparisons ✓			**ORA** other drugs have lower risk in **all** cases **ALLOW** (beta blockers RR) >1 in **all** cases
			2 beta blockers have significantly higher risk (of stroke) , in 2 cases / than W and Z ✓			**ORA** W and Z have significantly lower risk (of stroke)
			***not supporting (why beta blockers are effective)*:**			
			3 only , significant differences / significant results / significantly higher risk (of stroke) , in two cases / (compared) with W and Z ✓			**ALLOW** error bars (generally) overlap with RR of 1
			4 no significant , results / difference(s) , for heart attack (in all cases) ✓			
			5 no significant , results / difference(s) , (compared) with two drugs / with drugs X and Y ✓			
			***additional information needed*:**			
			6 other (named) cardiovascular conditions not assessed ✓			**ALLOW** does not assess CVD in general
			7 *idea of* comparison to people not having treatment ✓			**ALLOW** control group given no drug is needed / placebo is needed **IGNORE** 'control group' unqualified
			8 age / gender / (initial) level of illness / exercise / diet / other drugs , of patients ✓			
			9 no , sample size / number of patients (stated) ✓			**IGNORE** no statistical tests

Question			Answer	Mark	AO Element	Guidance
2	(c)		*peripheral because…* connects , CNS / brain / spinal cord , to, the heart / rest of body / effector **OR** it is (largely) outside / not part of , CNS / brain / spinal cord **OR** it contains, sensory / motor , neurones ✓ *autonomic because…* (control of heart rate is / it controls responses that are) involuntary **or** connected to / AW , medulla oblongata ✓	**2**	2.1	**NOTE**: award marking points even when 'peripheral' and 'autonomic' are not mentioned **IGNORE** 'spine' alone **CON** relay neurones / interneurones **ALLOW** *idea of* transmits impulses , from receptors / to (named) effectors **ALLOW** 'nerve cells' for 'neurones' **ALLOW** 'unconscious / not conscious / needs no thought / requires no decision-making' for 'involuntary' **IGNORE** 'have no control over / automatic / subconscious'

3	**(a)**		***Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.***			
			Level 3 (5-6 marks) All tissues identified correctly with detailed evidence for each tissue. *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)** All tissues identified correctly with a piece of evidence for each tissue **or** A tissue identified correctly with detailed evidence for that tissue **or** No tissues identified but detailed evidence that matches each photo *There is a line of reasoning with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1-2 marks)** A tissue identified correctly with a piece of evidence included **or** No tissues identified but a piece of evidence that matches each photo *The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.* **0 marks** No response or no response worthy of credit.	**6**	2.3 3.1	**Indicative scientific points may include (but are not limited to):** **D** is smooth/**involuntary** *evidence*: • no , striations / sarcomeres / I bands / A bands • one nucleus per cell / uninucleated (cells) • no intercalated discs • small / spindle-shaped / tapering , cells • unbranched **E** is **skeletal** *evidence*: • striations / sarcomeres / I bands / A bands • several nuclei per , cell / fibre **or** multinucleated • no intercalated discs • tubular / long , cells • unbranched **F** is **cardiac** *evidence*: • striations / sarcomeres / I bands / A bands • intercalated discs • one nucleus per cell / uninucleated (cells) • tubular cells • branched **Aspects of the communication statement might not be met when information irrelevant to the question (e.g. locations of muscle tissue, function of muscles, and details of the sliding filament theory) has been included.**

Question			Answer	Mark	AO Element	Guidance
3	(b)		(M) **I N J K H L** ✓✓✓	**3**	1.1	If the order is incorrect, award: **one mark** for I first (second after M) **and** L last **one mark** for N, J, and K in the correct order (but not necessarily listed together). e.g. I N J H K L = 2 marks I J N K H L = 1 mark I N J H L K = 1 mark
3	(c)	(i)	autoimmune ✓	**1**	2.1	
3	(c)	(ii)	no / few(er) , Na^+ ions enter , sarcoplasm / muscle cell ✓ less / no , depolarisation of , sarcolemma / muscle cell membrane / T-tubules / sarcoplasmic reticulum / SR ✓ no / few(er) , Ca^{2+} released from , sarcoplasmic reticulum / SR ✓	**2 max**	2.5	**IGNORE** sodium / Na / calcium / Ca / Ca^+ **ALLOW** no / fewer , Na^+ channels open in , sarcolemma / muscle cell membrane **ALLOW** 'action potential in' for 'depolarisation of' **NOTE** 'normally, the T-tubules are depolarised, which causes the SR to release calcium ions. This **cannot happen** when the receptors are blocked' scores **2 marks** (MP2 and MP3)

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>AO Element</th><th>Guidance</th></tr>
<tr><td>4</td><td>(a)</td><td></td><td>
<table>
<tr><th>Property</th><th>Messenger RNA</th><th>Transfer RNA</th></tr>
<tr><td>Anticodons are present</td><td></td><td>✓</td></tr>
<tr><td>The nucleotide base sequence codes for a protein</td><td>✓</td><td></td></tr>
<tr><td>Uracil is bonded to adenine by hydrogen bonds within the molecule</td><td>(✓)</td><td>✓</td></tr>
<tr><td></td><td>✓</td><td>✓</td></tr>
</table>
</td><td>2</td><td>1.1
1.2</td><td>One mark per correct column

ALLOW ‘yes’ for ‘✓’

DO NOT ALLOW hybrid ticks</td></tr>
<tr><td>4</td><td>(b)</td><td></td><td>removal of , introns / non-coding mRNA ✓

joining / rearrangement , of , exons / coding mRNA ✓

RNA editing ✓

AVP ✓</td><td>2 max</td><td>1.2</td><td>ALLOW ‘spliced out’ for ‘removed’

ALLOW ‘spliced’ for ‘joined’

e.g. (5’) capping of mRNA or addition of poly-A tails in mRNA
e.g. ref. spliceosome</td></tr>
<tr><td>4</td><td>(c)</td><td>(i)</td><td>(grinding / it / step 1) breaks / AW , cell walls ✓

animal cells / they , do not have cell walls ✓</td><td>2</td><td>3.3</td><td>ALLOW detergent / step 2 , will , break down / emulsify , membranes / phospholipid bilayer</td></tr>
</table>

Question			Answer	Mark	AO Element	Guidance
4	(c)	(ii)	add protease **and** break down proteins , associated with / AW , DNA ✓ add salt **and** helps DNA precipitate / makes DNA less soluble / separates DNA from water ✓ add RNAase **and** breaks down RNA (in sample) ✓ cool / reduce temperature **and** prevent damage to DNA / reduce enzyme activity ✓ centrifuge **and** to separate DNA from , other cell components / cell debris ✓	**1 max**	3.3	**ALLOW** 'digest / hydrolyse' for 'break down' **ALLOW** 'breaks down histone (proteins)' **ALLOW** to pellet cell debris and leave DNA in the supernatant
4	(d)	(i)	**S1** buffer (solution) ✓ **E1** maintains / controls / for optimum , pH **or** carry / provides ions for , current (through gel) ✓ **S2** reference / marker / ladder , DNA (fragments in solution) ✓ **E2** (to) compare / know / observe / identify , position / mass / size (of sample fragments) ✓ **S3** dye / stain / fluorescent marker / fluorescent tag (solution) ✓ **E3** to , see / monitor progress of , bands / DNA / fragments ✓	**4 max**	3.3 3.4	**Only award an explanation mark when it is paired with the correct solution** *mark as prose* **IGNORE** a stated pH value **ALLOW** AW, e.g. 'allows charge to pass across (gel)' **ALLOW** DNA fragments of known , length / mass / size **IGNORE** probe / UV **ALLOW** radioactive marker / colour marker / colour tag **ALLOW** named dyes, e.g. ethidium bromide

Question			Answer	Mark	AO Element	Guidance
4	(d)	(ii)	homozygous sickle cell = 2 and 5 ✓ homozygous normal = 1 and 4 **AND** heterozygous = 3 ✓	**2**	3.1	**ALLOW 1 mark for**: homozygous sickle cell = 2 **or** 5 **and** homozygous normal = 1 **or** 4 **and** heterozygous = 3
4	(e)	(i)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 160,000 award two marks** (10^9 / 2500 =) 400,000 ✓ 400,000 x 0.4 = 160,000 ✓	**2**	2.6	 **ALLOW** 1.6 x 10^5 **ALLOW** 4 x 10^5
4	(e)	(ii)	temperature ✓ (use of) electroporation (instead of other transformation methods) ✓ use optimal pH ✓ (composition of) growth medium ✓ use small plasmids ✓ AVP ✓	**1 max**	3.3	**IGNORE** more , cells / plasmids (because this is unlikely to improve efficiency) **CON** decrease temperature **IGNORE** heat shock **ALLOW** descriptions; e.g. 'use electricity to make holes in bacterial membranes' concentration of Ca^{2+} / use bacteria in log phase (of population growth)

Question			Answer	Mark	AO Element	Guidance
5	(a)		micropipette / graduated pipette ✓	1	3.3	**ALLOW** volumetric pipette / syringe / calibrated pipette **ALLOW** burette / volumetric flask **IGNORE** 'pipette' unqualified / glass pipette / bulb pipette **IGNORE** conical flask
5	(b)		size / length / width / area , of , pepper / pieces ✓ time spent / method of , drying ✓	1 max	3.3	**ALLOW** presence or absence of pepper skin **ALLOW** same (variety / type / species / age / part , of) pepper **ALLOW** number of pieces (of pepper) **IGNORE** shape / amount / mass / volume **IGNORE** volume of sucrose solution / pH
5	(c)		*idea of* allows comparisons because initial mass will vary ✓	1	3.3	
5	(d)		**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 0.65 (mol dm^{-3}) award two marks**	2	2.4	**ALLOW** any answer in the range **0.60 to 0.70**, to 1 or 2 significant figures **ALLOW** 1 mark for correct answer in the range to more than 2 significant figures If answer incorrect, **ALLOW one mark** for evidence of extrapolating data points to find the intercept with the x-axis, using a straight line.

Question			Answer	Mark	AO Element	Guidance
6	**(a)**	**(i)**	(original is) alanine (new is) aspartic acid ✓	**1**	2.5	
6	**(a)**	**(ii)**	shorter (protein/chain) **and** (because early) stop codon (has been introduced) ✓	**1**	2.5	**ALLOW** 'unfinished / truncated / incomplete / fewer amino acids in the chain' for 'shorter' **ALLOW** 'nonsense mutation' for 'stop codon' **CON** frameshift / silent mutation / missense

6	**(b)***		***Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.***			
			Level 3 (5-6 marks) Detailed discussion of the advantages of gene editing **and** detailed discussion of the ethical issues shared by both forms of gene therapy. *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)** Description of advantages of gene editing **and** mention of an ethical issue shared by both forms of gene therapy. *There is a line of reasoning with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1-2 marks)** Description of an advantage of gene editing **or** mention of an ethical issue shared by both forms of gene therapy. *The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.* **0 marks** No response or no response worthy of credit.	**6**	2.5 3.2	**Indicative scientific points may include (but are not limited to):** *advantages of gene editing* • longer lasting / more permanent • reduced need for repeat treatments • editing of dominant alleles could treat dominant inherited conditions • standard gene therapy treats only disease caused by recessive alleles • no need for a (viral) vector • so fewer problems delivering the treatment to cells / more precise • reduce potential for , immune response / rejection *ethical issues* • relatively untested technologies • long-term / harmful , effects (unknown) • high costs could prevent access for certain groups of people • potential problems deciding which genes can be edited / added (e.g. cosmetic use / non-disease) • children cannot give consent for treatment (note: do not credit ref. to embryos) • religious objections **Aspects of the communication statement might not be met when information irrelevant to the question (e.g. references to germline therapy, ethical issues in the context of only one form of therapy) has been included.**

Question			Answer	Mark	AO Element	Guidance
7	(a)	(i)	number of diseases analysed ✓ how , climate change was / disease cases were , measured ✓ population (sizes) / numbers , of , animals / vectors ✓ whether , increases (in cases) / results / data / AW , were (statistically) significant ✓ *idea of* whether the data were regional or global ✓	**1 max**	3.2	**ALLOW** number of diseases that , did not increase / were reduced **ALLOW** time period over which climate change was assessed **ALLOW** time of year (when data were collected) **IGNORE** 'there are no statistical tests mentioned' unqualified
7	(a)	(ii)	increases / changes to , range / migration , of (named) , vector / host / animals ✓ **increases** , reproduction (rate) / population size / number , of (named) , vectors / pathogens ✓ more (standing) water for (named) vector breeding areas ✓	**1 max**	2.1	**ALLOW** vector present for a longer part of the year **ALLOW** vector / pathogen , can reproduce for more of the year **ALLOW** greater food supply for vector **CON** 'disease' for 'pathogen'
7	(b)	(i)	bone marrow ✓	**1**	1.1	

Question			Answer	Mark	AO Element	Guidance
7	(b)	(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 0.6 µmol dm^{-3} min^{-1} award three marks** ruled tangent following the trajectory of the initial curve from 0 ✓ correct calculation using the tangent (e.g. 14 µmol dm^{-3} / 25 min = 0.56 µmol dm^{-3} min^{-1}) ✓ units = µmol dm^{-3} min^{-1} ✓	3	2.8	**ALLOW** any value in the range **0.50 to 0.80** **ALLOW** any number of significant figures If answer incorrect, **ALLOW one mark** for evidence of using a tangent from time 0. **DO NOT ALLOW** if 2 tangents have been drawn and one does not go to 0 If answer incorrect, **ALLOW one mark** for units of µmol dm^{-3} min^{-1} **DO NOT CREDIT:** µmol dm^{-3} / min
7	(b)	(iii)	break down / hydrolyse / kill / digest / AW , pathogens ✓	1	2.1	**ALLOW** bacteria / viruses / microbes / fungi / protoctista / protozoa **IGNORE** foreign cell / antigens **IGNORE** damage / harm / disrupt
7	(b)	(iv)	opsonin(s) ✓	1	1.1	**NOTE**: must be a phonetic spelling (e.g. not 'oposnin', but 'opsanin' is acceptable) and should begin with 'o'
7	(c)		callose ✓ plasmodesma(ta) ✓ sieve pores ✓	3	1.1 1.2	**IGNORE** callus / callous **IGNORE** 'tube / plate' after 'sieve'

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