CAMBRIDGE
OCR

Sample Assessment Material

Cambridge OCR Level 3 Advanced Subsidiary GCE in Biology A

H020/02 Depth in biology

MARK SCHEME

MAXIMUM MARK 70

Duration: 1 hour 30 minutes

Version – 3.0
Last updated: June 2026

This document consists of 16 pages

Marking Instructions

Preparation For Marking

1. RM Assessor

- Access and complete the on-screen marking training packages: OCR Examiner Training (RMA3).
- Read the mark scheme and question paper for this component or unit.
- The mark scheme and question paper are available in RM Assessor or on your Component Page if you use the Training Platform for standardisation.
- Log in to RM Assessor and mark the **required number** of practice scripts and the **required number** of standardisation scripts.

Marking

2. General Guidance

- Mark strictly to the mark scheme.
- Marks awarded must relate directly to the marking criteria.
- If you are in any doubt about applying the mark scheme, consult your Team Leader by phone, email or via the RM Assessor messaging system.
- It is **essential** that you meet the RM Assessor 50% and 100% batch deadlines. For traditional marking this will be 40% and 100%. If you experience problems, contact your Team Leader without delay.
- 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.
- The RM Assessor **comments box** is used by your Team Leader to explain the marking of the practice responses. Use these comments when checking your practice responses. **Do not use the comments box for any other reason.**
- **Before the end of the marking period** send a brief report on the performance of candidates to your Team Leader via email. The report should contain notes on strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

3. No Response and Crossed-out Answers

Using the No Response (NR) option. Only mark as NR if:

- the answer space is blank
- there is only a comment not related to the question (e.g., 'can't do', 'don't know')
- there is only a mark (e.g., a dash, a question mark) which is not an attempt at the question.

Note: Enter 0 marks for an attempt that earns no credit (including copying out the question). Do **not** use NR.

Crossed-out answers

If a candidate has crossed out an answer and written a clear alternative, do **not** mark the crossed-out answer.
If a candidate has crossed out an answer and **not** written a clear alternative, mark the crossed-out answer if it is readable.

4. Responses with more answers than needed

- **Multiple-choice question answers**

  When a multiple-choice question has only **one** correct answer and a candidate has written two or more answers (even if one of these answers is correct), do **not** award a mark.
  When a multiple-choice question asks candidates to select **more than** one option the marking guidance from your Principal Examiner will ensure consistency of approach.

- **Contradictory answers in points-based questions**
  Do **not** award any marks, even if one of the answers is correct.

- **Rubric error answers** – optional questions

  Where candidates have a choice of question/s and they provide more answers than required, all responses are marked and entered into RM Assessor. The highest mark allowable within the rubric will automatically be selected.

- **Questions that ask for a set number (including 1) of short answers or points**
  Mark only the **first set number** of answers/points. (e.g. **two** reasons for something)
  First mark the answers/points against printed numbers on the answer lines. Mark the first answer/point against each printed number. **Second**, if candidates have not followed the printed numbers, mark the answers/points from left to right on each line. **Third,** mark line by line until the set number of answers/points have been marked. Do **not** mark any remaining answers/points.
  Examiners should use their own judgement to decide if a 'second answer' on the same line is adding more detail to the first answer, or if it is a completely separate answer.

- **Short Answer Questions** (requiring a more developed response, worth two or more marks)
  If the candidates are required to provide a description of, for example, three items and four items are provided, mark line by line until the set number of descriptions have been marked (it is unlikely a candidate will provide more than one response on each line in this scenario).

- **Longer Answer Questions** (requiring a developed response)
  If a candidate has written two or more answers to a question that only requires one (developed) answer, only mark the first answer (which has not been crossed out).

5. Questions using levels of response (LOR):

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 **4(b)** and **5(b)**.

6. Annotations available in RM Assessor

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
	Blank page

7. Abbreviations, annotations and conventions used in the mark scheme (including subject-specific conventions).

Abbreviation / Annotation	Meaning
/	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

8. Subject-specific Marking Instructions

Introduction

Your first task is to familiarise yourself with:

- the specification, especially the assessment objectives
- the question paper and any inserts or resource booklets
- the mark scheme, including annotation requirements
- the administrative procedures related to the marking process.

The administrative procedures are set out in the OCR booklet **Instructions for Examiners**.
If you are examining for the first time, please read **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.
All relevant training materials are accessed from the Training Platform.
Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

Question			Answer	Marks	Guidance
1	(a)		(gill) filament(s) ✓	1	**ALLOW** lamella(e)
	(b)		*Max three from* many / AW, lamellae / structure A, provide large surface area ✓ (presence of) secondary lamellae on main lamellae provide large surface area ✓ short distance between blood and, water / outside ✓ idea that blood maintains diffusion gradient ✓ *any of above linked to* faster diffusion (of oxygen, carbon dioxide) ✓	**Max 4**	**ALLOW** only if linked to another marking point. **IGNORE** refs to squamous cells as not visible on image
	(c)		tissue has, one / few, types of cell **and** performs, one / few, functions ✓ *idea that* bone has, one / few, types of cell **or** *idea that* bone performs, one / few, functions ✓ organs consist of, several / a group of / two or more tissues ✓ gills contain two or more (named) tissues ✓	**Max 3**	**ALLOW** tissues are made of a group / collection of cells **ALLOW** bone, blood, epithelial, connective.
			Total	**8**	

Question			Answer	Marks	Guidance
2	(a)	(i)	**FIRST CHECK ANSWER ON ANSWER LINE** **If answer =** 32 mmol dm^{-3} min^{-1} **award 2 marks** 16 / 0.5 (min) 32 ✓ mmol dm^{-3} min^{-1} ✓	2	**ALLOW** 32 mmol dm_{-3}/min , 0.53 mmol dm_{-3}/s **DO NOT ALLOW** mmol dm_{-3} / min_{-1}' , mmol dm_{-3}/s_{-1} , or 'mmol dm_{-3} per , min / minute / sec
		(ii)	(initial rate likely to be) greater ✓ *because…* higher concentration of, substrate / amylose, molecules (at start) ✓ more chance of, substrate / AW, entering <u>active site</u> ✓	3	**ALLOW** 'starch'
	(b)	(i)	competes (with substrate) / competitive ✓ enters / fits in / binds to / blocks, active site ✓ prevents substrate from entering active site ✓	3	**ALLOW** non-competitive
		(ii)	there is lower rate of maltose production at all substrate concentrations compared with no inhibitor ✓	1	**IGNORE** idea that increased substrate concentration overcomes the inhibition as answer must refer to evidence from the graph.
	(c)	(i)	specify volume of starch and amylase to be added to the tubes ✓ specify volume (in ml) of the solution that should be removed for testing ✓ stir before taking the sample ✓ test with iodine ✓ all carried out at same temperature ✓	Max 3	**DO NOT ALLOW** 'amount' for volume **ALLOW** concentration of starch and amylase

Question			Answer	Marks	Guidance
		(ii)	ionic / hydrogen, bonds, disrupted / broken ✓ (by) high concentration of, hydrogen <u>ions</u> / H^+ ✓ tertiary structure / shape of active site, changed ✓ substrate no longer fits into active site ✓ (enzyme) denatured ✓	**Max 4**	**ALLOW** active site denatured **ALLOW** can no longer form enzyme substrate complex
		(iii)	*Evidence, two from* idea that optimum could be anywhere between pH 6 and pH 8 ✓ only one value between pH 6 and pH 8 tested ✓ idea that shape of data implies optimum less than pH 7 ✓ *Improvement* repeat at more pH values between 6 and 8 ✓	**Max 3**	
	(d)		cofactor ✓	**1**	**IGNORE** coenzyme
			Total	**20**	

Question			Answer	Marks	Guidance
3	(a)		antibodies produced (by person being vaccinated) ✓ activation of (named) lymphocytes (of person being vaccinated) ✓ (specific) memory cells remain (in person being vaccinated) ✓	Max 2	
	(b)	(i)	**FIRST CHECK ANSWER ON THE ANSWER LINE** **If answer** = 108 **award 1 mark** (177 + 56 + 92) / 3 108 ✓	1	**ALLOW** 108.3
		(ii)	**FIRST CHECK ANSWER ON THE ANSWER LINE** **If answer =** 28 **award 2 marks** (108 - 78) / 108 = 0.2777777 x 100 = 27.777777 ✓ = 28 ✓	2	**ALLOW** 28.0 or 27.8 **ALLOW** 1 mark if correct answer given to incorrect number of decimal places **ALLOW** 1 mark for any number divided by the candidate's answer to part (i) **ALLOW** ECF from part (i)
		(iii)	*idea that* average of several years would have been a better indicator ✓ *idea that* level might fluctuate ✓ use of processed data to support any of the above ✓	3	E.g. In 2006, the rate is 84% which is 3% higher than 2005 so the confirmed cases have increased. In 2002, the same percentage of children vaccinated has a lower number of confirmed cases.

	(c)		*max two from* different pathogens have different antigens ✓ antigens have specific shape ✓ shape of antibody must be complementary to (specific) antigen ✓ *any of the above linked to* different antibody needed for each pathogen ✓	**Max 3**	
			Total	**11**	

Question			Answer	Marks	Guidance
4	(a)	(i)	2.8 (kPa) ✓	1	**ALLOW** answer in the range of 2.8–3.0 kPa
		(ii)	(llama) haemoglobin needs higher affinity for oxygen ✓ (so) can pick up oxygen at lower partial pressure (of oxygen) / high altitudes ✓	2	
	(b)*		*Please refer to marking instructions on p5* **Level 3 (5–6 marks)** Describes differences and similarities of llama and camel haemoglobin at all four levels of protein structure with correct reference to bonding. *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)** Describes differences and similarities of llama and camel haemoglobin in some levels of protein structure with some reference to bonding. *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)** Describes a difference or similarity of llama and camel haemoglobin at a level of protein structure. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.*	6	**Indicative scientific points include:** <u>primary structure</u> • difference in primary structure • different amino acid / polypeptide sequence • one amino acid changed. <u>secondary structure</u> • amino acid change could cause change to secondary structure • initial coiling or folding of polypeptide chain • α-helix • β-pleated sheet • hydrogen bonding. <u>tertiary structure</u> • amino acid change could cause change to tertiary structure • further coiling of secondary structure • ionic bonding • disulphide bonds • hydrophilic/hydrophobic bonds • 3D shape.

Question			Answer	Marks	Guidance
			0 marks No response or no response worthy of credit.		quaternary structure • amino acid change has not changed quaternary structure • alpha and beta subunits still able to form haemoglobin in both camel and llama.
	(c)		insoluble ✓ strong / AW ✓ unreactive / AW ✓	**3**	**IGNORE** flexible
	(d)		add biuret / NaOH and $CuSO_4$, solution / reagent to urine ✓ observe colour change (from blue to purple) ✓ compare with, control / blank (urine containing no protein) ✓	**Max 2**	**IGNORE** biuret test unqualified
			Total	**14**	

Question			Answer	Marks	Guidance
5	(a)	(i)	similar, niche / lifestyle / AW ✓ similar <u>selection pressure</u> ✓ *idea that* wings are advantage for survival in both bats and birds ✓ alleles for 'wings' more likely to be passed to next generation ✓	Max 3	**ALLOW** 'same' **ALLOW** 'same' **ALLOW** 'genes'
		(ii)	*idea that* echolocation not needed for an animal active during the day where reduced visibility is not an issue ✓	1	

	(b)*		*Please refer to marking instructions on p5* **Level 3 (5–6 marks)** Full and detailed evaluation of the claim using all of the data in the table. Learner demonstrates a holistic judgement of the data providing evidence for and against the claim. *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)** Detailed evaluation of the claim using most of the data in the table. Sound judgement is made on a range of aspects of the data. *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)** An evaluation of the claim is attempted using some of the information in the table. Simple conclusions are drawn citing limited aspects of the data.	**6**	**Indicative scientific points may include:** **Support for conclusion (that common and soprano pipistrelle are distinct species)** • echolocation ranges do not overlap • genetic basis for echolocation suggests genetic difference between populations • idea that different species are likely to have genetic differences. **Information that could be used in support or to challenge** • Mean wing span is very similar • Could indicate difference, though not significant • Could be due to environmental factors, where the populations live. • Habitats overlap • Could indicate same species in different areas • Could be different species adapted to slightly different environments.

Question			Answer	Marks	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.		**Against the conclusion** • same mean body mass, could be same species • same colour, could be same species • potential environmental cause of body mass variation implies weak challenge to conclusion. **ALLOW** a comment on whether the researcher's conclusion is supported
			Total	**10**	

Question			Answer	Marks	Guidance
6	(a)		adenine / A pairs with thymine / T **and** cytosine / C pairs with guanine / G ✓ (because of) hydrogen bonding ✓ *idea that* purine can only bind with pyrimidine because they are different sizes ✓ *idea that* if one base is known it can pair with only one other base ✓	**Max 3**	**ALLOW** 2 H bonds between A and T and 3 H bonds between C and G.
	(b)	**(i)**	(involves) DNA polymerase ✓ sugar-phosphate backbone (re)forms/condensation reaction between phosphate and sugar ✓ DNA winds into double helix ✓	**3**	**ALLOW** higher level answers e.g. role of DNA ligase in joining sugar-phosphate backbone lagging strand filled in with Okazaki fragments.
		(ii)	(new molecule consists of) one old strand and one new strand ✓	**1**	
			Total	**7**	

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