OCR
Oxford Cambridge and RSA

…day June 20XX–Morning/Afternoon

A Level Biology A

H420/01 Biological processes

SAMPLE MARK SCHEME

Duration: 2 hours 15 minutes

MAXIMUM MARK 100

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This document consists of 20 pages

MARKING INSTRUCTIONS

PREPARATION FOR MARKING

SCORIS

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris 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 posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

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

   YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

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 scoris 50% and 100% (traditional 50% 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 scoris messaging system.

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5. Work crossed out:

   a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks

   b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.

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 a tick to confirm that the work has been seen.

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 isn't an attempt at the question.

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

8. The scoris **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.**

   If you have any questions or comments for your Team Leader, use the phone, the scoris messaging system, or email.

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.

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10. For answers marked by levels of response:

- Read through the whole answer from start to finish.
- Decide the level that **best fits** the answer – match the quality of the answer to the closest level descriptor.
- To select a mark within the level, consider the following:

  Higher mark: A good match to main point, including communication statement (in italics), award the higher mark in the level
  Lower mark: Some aspects of level matches but key omissions in main point or communication statement (in italics), award lower mark in the level.

Level of response questions on this paper are **17(c)(iii) and 19(b)(ii)**.

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11. **Annotations**

Annotation	Meaning
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

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12. **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.

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Section A

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

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Section B

Question			Answer	Marks	Guidance
16	(a)	(i)	*normal rate* 78.9 bpm ✓ *rate for tachycardia* 125 bpm ✓ *percentage increase* 58 (%)✓✓	4	**ALLOW** 1.3 bps. **ALLOW** 2.1 bps. **ALLOW 2 marks** for percentage increase correctly calculated using candidate's figures for rates and answer given to nearest whole number. **ALLOW 1 mark** for correct working [(125 – 78.9) ÷ 78.9 x 100 or correct use of candidate's figures for rates] **or** a correctly calculated but unrounded answer **DO NOT ALLOW** answers that divide by the rate for tachycardia as a percentage **increase** is asked for.
		(ii)	*two from* lower (Q)R(S) peak ✓ P and T equal in height ✓ width of T wave greater ✓	2	
	(b)		*three from* no distinct, P curve / atrial depolarisation ✓ irregular / weak, atrial contraction ✓ insufficient blood forced into ventricles ✓ although ventricles contract there is less blood forced from the heart ✓	3	
			Total	9	

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Question			Answer	Marks	Guidance
17	(a)		**A** hepatic vein as blood leaving liver ✓ **B** hepatic artery as blood entering liver through narrow vessel ✓ **C** hepatic portal vein as blood (from gut) entering liver through branched vessel ✓	3	
	(b)	(i)	mitochondrion ✓	1	**ALLOW** mitochondria.
		(ii)	*either* facilitated diffusion ✓ conversion of ornithine into citrulline creates concentration gradients **or** (molecules are not lipid soluble so) require protein channels to cross membrane ✓ ***or*** active transport ✓ ornithine and citrulline need to be moved into and out of **D** more quickly than would be met by diffusion ✓	2	
		(iii)	deamination / removal of NH_2 group from amino acid ✓	1	
		(iv)	ATP ✓	1	
	(c)	(i)	*two from* pH temperature substrate/hydrogen peroxide concentration ✓	1	Two answers required for 1 mark. **DO NOT ALLOW** an answer that includes mass of liver/enzyme concentration.
		(ii)	*pH* take pH reading/ensure hydrogen peroxide is same pH for all enzymes concentrations tested ✓ *temperature*	1	

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Question			Answer	Marks	Guidance
			use liver tissue and hydrogen peroxide at room temperature/same temperature for all enzyme concentrations tested ✓ *substrate concentration* use same concentration and volume of hydrogen peroxide for all enzyme concentrations tested ✓		
		(iii)*	**Level 3 (5–6 marks)** Deduction includes coherent interpretation of the evidence, clearly linking all ideas to explain why and how activity is regulated. *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)** Deduction includes clear use of some evidence to support conclusion but ideas may not be clearly linked for both how and why. *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)** A simple deduction about how or why based on a limited interpretation of the evidence. *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**	**Relevant points include:** *Why* • large quantities of hydrogen peroxide and high turnover number of catalase would mean vigorous reaction and lots of oxygen produced very quickly. *How* • isolation of catalase in peroxisomes • released in small quantities • cells can limit expression of catalase • this effectively limits enzyme concentration and therefore reduces reaction rate • cells have no control over temperature or substrate concentration so enzyme concentration is the only method of control.

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Question			Answer	Marks	Guidance
			Total	**16**	

Question			Answer	Marks	Guidance
18	**(a)**	**(i)**	increased photosynthetic activity during daylight ✓ as light intensity increases there is increased activity of the light dependent reaction ✓	**2**	No marks available for describing the shape of the curve.
		(ii)	daytime temperatures generally higher than night time ✓ rate of respiration increases with increased temperature as its enzymes are temperature-dependent ✓	**2**	No marks available for describing the shape of the curve.
		(iii)	compensation point(s) / carbohydrate produced by photosynthesis equal to carbohydrate used in respiration ✓	**1**	
	(b)	**(i)**	*for all crops* initial increase in assimilation with increasing temperature ✓ at higher temperatures the assimilation decreases ✓	**2**	**DO NOT ALLOW** accounts that describe the curve for each crop individually.
		(ii)	*C3* 34.5 **and** *C4* 73.5 ✓ CO_2 kg ha^{-1} h^{-1} ✓	**2**	**1 mark for both means calculated correctly.** **1 mark for correct units given for both.**
		(iii)	C3 plants assimilate less carbon dioxide than C4 plants ✓ **ora**	**1**	**ALLOW** a conclusion cannot be drawn because there is not enough data on each type of plant.

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Question			Answer	Marks	Guidance
		(iv)	*Sugar cane* C4 crop 2 ✓ *Barley* C3 crop 1 ✓	2	
	(c)	(i)	deactivation of RuBisCO will reduce**,** carbon dioxide fixation / light independent reaction ✓ the light dependent reaction will reduce when the supply of NADP is reduced ✓ reduction in stomatal aperture will reduce carbon dioxide available for fixation ✓	3	
		(ii)	*four from* damage to chlorophyll / reduction in pigment ✓ which will reduce the light dependent stage ✓ damage to membranes in chloroplast / reduction in sites for light capture ✓ which will reduce the light dependent stage ✓ damage to membranes in chloroplast / reduction in reaction sites for electron transfer ✓ which will reduce**,** photophosphorylation / ATP production in the light dependent stage ✓ damage to membrane around chloroplast / release of enzymes ✓ which will reduce**,** light independent stage / Calvin cycle ✓	4	**Award 1 mark for the alteration of the ultrastructure (max 2) and 1 further mark for details of its effect on photosynthesis (max 2).**
			Total	19	

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Question			Answer	Marks	Guidance
19	(a)	(i)	sucrose is soluble so can be transported in sap ✓ but metabolically (relatively) inactive so no**,** used / removed**,** during transport ✓	2	
		(ii)	*similar – one of* solutes carried in solution in both ✓ both carry mineral salts ✓ both use**,** mass flow / generated hydrostatic pressure ✓ *different – one of* transport in phloem can take place in different directions **and** transport in xylem only takes place up the plant ✓ phloem carries carbohydrates **and** xylem does not ✓ phloem transport uses living cells **and** xylem does not ✓ xylem uses**,** capillary action / cohesion and adhesion**, and** phloem does not ✓	2	
	(b)	(i)	certain parts can store and then release carbohydrates when needed ✓ suitable examples include root or leaf, which can act as sink or source at different times of year ✓	2	

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Question			Answer	Marks	Guidance
		(ii)*	**Level 3 (5–6 marks)** A clear, thorough explanation, showing a good understanding of the principles of loading into phloem, incorporating use of the diagram. *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)** A partial explanation showing some understanding of the principles of loading into phloem. *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 attempt including some correct principles, but likely to be confused, showing limited understanding of the principles of loading into phloem. *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	**Relevant principles include:** • **B** / sucrose**,** pumped from companion cell into phloem sieve tube • by active transport • H^+ / proton**,** co-transport of sucrose • reduces water potential of sieve tube • **A** / water**,** enters sieve tube from companion cell • **C** / water**,** enters sieve tube from xylem • increased pressure forces flow of sap down phloem • through the pores in the sieve plates.

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Question			Answer	Marks	Guidance
	(c)	(i)	glycosidic	1	
		(ii)	*two from* 19 × greater in modified ✓ 1811% increase in modified compared with unmodified ✓ standard deviation indicates greater spread of data for modified ✓	2	
		(iii)	*two from* sucrose unloaded at sinks and invertase converts sucrose into**,** glucose / monosaccharide ✓ increases sucrose concentration gradient between phloem and sink ✓ causes increased unloading of sucrose from phloem ✓ *two from* increases solute gradient between source and sink ✓ removal of water from phloem increases pressure gradient between source and sink ✓ contributes to increased movement in phloem ✓	4	
		(iv)	modified produce fewer **and** larger tubers ✓ **ora** modified produce greater mass of tuber ✓ **ora** 109.34 g for modified **and** 89.04 g for not modified ✓	3	
			Total	22	

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<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>20</td><td>(a)</td><td>(i)</td><td>two of
ACTH
cortisol
adrenaline ✓</td><td>1</td><td>Two answers required for 1 mark.</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>
<table>
<tr><td>Sino-atrial node</td><td>increases rate of firing impulses ✓</td><td>increased heart rate circulates blood more quickly ✓</td></tr>
<tr><td>Liver cell</td><td>increases glycogenolysis ✓</td><td>makes more glucose available for respiration ✓</td></tr>
<tr><td>Erector muscle in skin</td><td>contraction of muscle ✓</td><td>(causes hairs to be raised and so) makes animal look larger / more aggressive ✓</td></tr>
</table>
</td><td>6</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td>catalyses synthesis of cyclic AMP from ATP ✓
cyclic AMP activates enzymes responsible for conversion of glycogen to glucose ✓</td><td>2</td><td></td></tr>
</table>

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Question			Answer	Marks	Guidance
		(iv)	*two from* prolonged high blood pressure can lead to cardiovascular problems ✓ prolonged high blood sugar can lead to**,** problems with blood sugar regulation / diabetes ✓ suppression of the immune system can lead to susceptibility to**,** disease / infection ✓	**2**	
	(b)	**(i)**	**D** pyruvate ✓ **E** lactate ✓	**2**	
		(ii)	is a hydrogen acceptor / removed hydrogen from reduced NAD ✓	**1**	
		(iii)	*two from* for glycolysis to take place**,** NAD / **G,** is needed ✓ there is a limited amount of NAD in the cell ✓ formation of**,** NAD / **G,** allows**,** glycolysis to continue / some ATP to be formed ✓	**2**	
		(iv)	liver **and** in the blood ✓	**1**	Both required for 1 mark.
	(c)		*two from* cells are able to tolerate**,** high levels of lactate / acidity / low pH ✓ have high phosphocreatine stores ✓ use of stored ATP ✓	**2**	
			Total	**19**	

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