



Practice paper – Set 2

A Level Biology A

H420/01 Biological processes

MARK SCHEME

Duration: 2 hours 15 minutes

MAXIMUM MARK 100

FINAL

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.
5. Work crossed out:

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 questions 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 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.

10. For answers marked by levels of response:

Read through the whole answer from start to finish, concentrating on features that make it a stronger or weaker answer using the indicative scientific content as guidance. The indicative scientific content 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 science content of the answer, first decide which set of level descriptors, Level 1, Level 2 or Level 3, **best** describes the overall quality of the answer using the guidelines described in the level descriptors in the mark scheme.

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 science content determines the level.**
- **The communication statement determines the mark within a level.**

Level of response questions on this paper are **16(c)** and **18(c)**.

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

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.

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

Question		Answer	Marks	Guidance
16	(a)	fitness ✓ mass / weight ✓ <i>idea of respiratory health</i> ✓ build ✓	2 max	DO NOT ALLOW age (because they are in the same school year) ALLOW level of exercise ALLOW colds / asthma / allergies ALLOW named build types e.g. ectomorph / endomorph
	(b)	(i)	2 max	ALLOW only if two pairs of data are provided
		<i>correct because:</i> no (clear) <u>correlation</u> from the graph ✓ figures to support with units ✓ <i>incorrect because:</i> sample size (20) too small to make valid conclusion ✓ students all the similar age so not representative ✓		
		(ii)	2	
	(c)*	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p><i>Read through the whole answer. (Be prepared to recognise and credit unexpected approaches where they show relevance.) Using a 'best-fit' approach based on the science content of the answer, first decide which of the level descriptors, Level 1, Level 2 or Level 3, best describes the overall quality of the answer.</i></p> <p><i>Then, award the higher or lower mark within the level, according to the Communication Statement (shown in italics):</i></p> <ul style="list-style-type: none"> ○ <i>award the higher mark where the Communication Statement has been met.</i> ○ <i>award the lower mark where aspects of the Communication Statement have been missed.</i> <p>In summary:</p> <ul style="list-style-type: none"> ● The science content determines the level. ● The Communication Statement determines the mark within a level. 		

Question	Answer	Marks	Guidance
	<p>Level 3 (5–6 marks) Full and detailed description and explanation of the features of the mammalian respiratory system. Candidate demonstrates a detailed understanding of the different features and explains the adaptations of each one to maximise the efficiency of gaseous exchange.</p> <p><i>There is a well-developed description and explanation of the majority of relevant features. The information presented is relevant and clearly explained.</i></p> <p>Level 2 (3–4 marks) Clear description and explanation of the features of the mammalian respiratory system. Candidate demonstrates a reasonable understanding of most of the different features and includes explanations of the adaptations that maximise the efficiency of gaseous exchange.</p> <p><i>There is a well-developed description and explanation of some of the relevant features. The information presented is relevant and for the most part clearly explained.</i></p> <p>Level 1 (1–2 marks) An attempt at description and explanation of a limited number of the features of the mammalian respiratory system. Candidate demonstrates a limited understanding of the different features with some explanation of the adaptations that maximise the efficiency of gaseous exchange.</p> <p><i>There is a logical structure to the answer. The explanations, though basic, are clear.</i></p> <p>0 marks No response or no response worthy of credit.</p>	6	<p>Indicative scientific points may include:</p> <p><i>Nasal cavity</i></p> <ul style="list-style-type: none"> • large surface area and good blood supply , warms air • mucus secreting cells , trap dust and microbes • moist surfaces , increase humidity and reduce evaporation from surfaces in lung <p><i>Trachea</i></p> <ul style="list-style-type: none"> • cartilage rings , stop it from collapsing • ciliated epithelium and goblet cells secrete mucus , trap dust and microbes and move them towards stomach <p><i>Bronchi / bronchioles</i></p> <ul style="list-style-type: none"> • smooth muscle , allows air to move in and out and maintains high concentration gradient of O₂ / CO₂ <p><i>Alveoli</i></p> <ul style="list-style-type: none"> • thin (epithelial) wall , reduces diffusion distance • collagen / elastic fibres , elastic recoil to help squeeze air out during exhalation • large number / provide large surface area , to increase rate of diffusion • good blood supply / capillaries , maintains high concentration gradient • surfactant , allows gases to dissolve

Question			Answer	Marks	Guidance
					<i>Diaphragm / intercostal muscles</i> <ul style="list-style-type: none">• contract to increase volume in lungs , reduce pressure and cause inspiration <i>NB: Many of the features listed above are common to more than one structure and should be credited where appropriate.</i>
			Total	12	

Question		Answer	Marks	Guidance	
17	(a)	pyruvate ✓ Krebs ✓ liver ✓ link ✓ ATP ✓	5	ALLOW citric acid / tricarboxylic acid / TCA	
	(b)	(i)	1122.06 ✓✓	2	1 mark max if answer is not to 6 s.f. 1 mark max for rounding error If incorrect, ALLOW 1 mark for evidence of: $\frac{831 - 68}{68} \times 100$ ALLOW 1 mark for 91.8171
		(ii)	1.38×10^{25} ✓✓✓	3	2 marks max if answer is not to 3 s.f. If incorrect, ALLOW 1 mark for evidence of any of the following, up to a maximum of 2: <ul style="list-style-type: none"> conversion of 100g to 35g, e.g. $478 \times \frac{35}{100} = 167.3 \text{ kCal}$ conversion of kcal to kJ, e.g. $167.3 \times 4.18 = 699.31 \text{ kJ}$ conversion of moles to molecules $\times 6.02 \times 10^{23}$
		(iii)	(cheese is high in) fat which has , the highest / 831, kcal per 100g ✓ fatty acids have many H atoms ✓ can be oxidised many times in Krebs cycle ✓	2 max	ALLOW many turns of Krebs cycle

Question			Answer	Marks	Guidance
			(so) reduce many NAD / produce many NADH (in Krebs cycle) ✓		
			Total	12	

Question			Answer	Marks	Guidance
18	(a)	(i)	U ATP synthase ✓ Q electron carrier ✓	2	ALLOW ATP synthetase / F1 complex ALLOW cytochrome / proton pump
		(ii)	P inter-membrane space ✓ S matrix ✓	2	
		(iii)	R Krebs cycle ✓ T ATP synthesis ✓	2	ALLOW citric acid / tricarboxylic acid / TCA
	(b)	(i)	(mostly) impermeable to H ⁺ ions / protons ✓ large surface area ✓ presence of , ATP synthase / stalked particles ✓	2 max	DO NOT ALLOW H / hydrogen IGNORE ETC / cytochromes
		(ii)	pH decreases AND becomes more positive(ly charged) ✓	1	

(c)*	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p><i>Read through the whole answer. (Be prepared to recognise and credit unexpected approaches where they show relevance.) Using a 'best-fit' approach based on the science content of the answer, first decide which of the level descriptors, Level 1, Level 2 or Level 3, best describes the overall quality of the answer.</i></p> <p><i>Then, award the higher or lower mark within the level, according to the Communication Statement (shown in italics):</i></p> <ul style="list-style-type: none"> ○ <i>award the higher mark where the Communication Statement has been met.</i> ○ <i>award the lower mark where aspects of the Communication Statement have been missed.</i> <p><i>In summary:</i></p> <ul style="list-style-type: none"> ● <i>The science content determines the level.</i> ● <i>The Communication Statement determines the mark within a level.</i> 		
	<p>Level 3 (5–6 marks) Full and detailed explanation of how increased proton channels in inner mitochondrial membranes results in less likelihood of fat deposition in the body. Learner demonstrates a detailed understanding of the different processes involved and explains their implications.</p> <p><i>There is a well-developed line of reasoning supported by clear scientific detail. The information presented is relevant and clearly explained.</i></p> <p>Level 2 (3–4 marks) Generally clear explanation of how increased proton channels in inner mitochondrial membranes results in less likelihood of fat deposition in the body. Learner demonstrates a reasonable understanding of the different processes involved and explains their implications.</p> <p><i>There is an attempt at a line of reasoning supported by some scientific detail. The information presented is largely relevant and clearly explained.</i></p> <p>Level 1 (1–2 marks)</p>	6	<p>Indicative scientific points may include...</p> <ul style="list-style-type: none"> ● larger number of protons pores results in protons leaking back into matrix ● reduces yield of ATP from chemiosmotic gradients ● less ATP is made from oxidative phosphorylation ● more energy wasted as heat ● energy from chemiosmosis decoupled from ATP synthesis ● energy yield from aerobic respiration reduced per molecule of glucose ● food not converted to ATP as efficiently ● less excess energy intake in diet ● less deposition of fat ● fat stores may be respired for energy

		<p>Limited explanation of how increased proton channels in inner mitochondrial membranes results in less likelihood of fat deposition in the body. Learner demonstrates a limited understanding of the different processes involved and explains their implications.</p> <p><i>There is little attempt at a line of reasoning supported by basic scientific detail. The information presented may be unclear and lack organisation.</i></p> <p>0 marks No response or no response worthy of credit.</p>		
			Total	15

19	(a)		M ✓	1	
	(b)		<p>salted crisps AND boiled sweets reduce water potential of blood (because of high sugar / salt content) ✓</p> <p>osmoreceptors in hypothalamus , detect change in water potential in blood / cause increased release of ADH ✓</p> <p>ADH causes production of aquaporins in collecting duct so more water is reabsorbed (into capillaries) ✓</p> <p>bread / milk / chocolate , increase water potential of blood ✓</p> <p>causes reduced ADH release ✓</p>	4 max	IGNORE descriptions of graph
	(c)	(i)	<p>ribosomes ✓</p> <p>mitochondria ✓</p> <p>(rough / smooth) endoplasmic reticulum ✓</p> <p>Golgi apparatus ✓</p> <p>vesicle ✓</p> <p>centriole ✓</p>	3 max	IGNORE organelles not present in this cell, e.g. flagellum / chloroplast
		(ii)	<p><u>one</u> cell drawn AND clear continuous lines ✓</p> <p>correct proportions ✓</p> <p>uses ≥50% of area provided ✓</p> <p><i>labels:</i></p> <p>label lines drawn with a ruler to correct feature ✓</p> <p>cell membrane AND nucleus AND cytoplasm ✓</p>	4 max	<p>DO NOT ALLOW more than one cell</p> <p>DO NOT ALLOW ragged lines / any shading</p> <p>ALLOW if it is clear which cell the candidate has attempted to draw</p> <p>IGNORE any annotations not mentioned here</p> <p>DO NOT ALLOW arrow heads</p>
			Total	12	

20	(a)	(i)	-28.77 is incorrect -19.19 ✓✓✓	3	IGNORE units (would not be written into table) 2 marks maximum if answer is not to 2 d.p. (so it is in the same format as the table) If incorrect, ALLOW 1 mark for evidence of: $\frac{2.78 - 3.44}{2.78} \times 100$
		(ii)	(any value from) 1.1 - 1.5 (inclusive) mol dm ⁻³ ✓	1	DO NOT ALLOW if units not included ALLOW any range within this range (inclusive)
		(iii)	water potential ✓	1	
	(b)		line graph ✓ (because) both variables are continuous ✓ concentration on x / horizontal axis , because it is independent variable AND (%) change in mass on y / vertical axis , because it is dependent variable ✓ separate line plotted for each vegetable (with key) ✓	3 max	ALLOW scatter graph / scattergram
	(c)		<i>improvement:</i> at least , two repeats / three replicates ✓ <i>explanation:</i> allows for (named) statistical test / identify anomalies / improves repeatability ✓	6	ALLOW reproducibility

		<p><i>improvement:</i> more intermediate values (of sucrose solution) ✓</p> <p><i>explanation:</i> allows trend to be identified more clearly / allows solute concentration of cells to be identified more <u>accurately</u> ✓</p> <p><i>improvement:</i> keep pieces (of vegetable) the same size ✓</p> <p><i>explanation:</i> reduces effect of <u>surface area</u> (on osmosis) ✓</p>		<p>ALLOW stated examples of intermediate values</p>
	(d)	protein / polypeptide ✓	1	<p>ALLOW cysteine</p> <p>IGNORE (other named) amino acids</p>
		Total	15	

21	(a)	<p>cookie <u>2</u> is protein cookie ✓ RQ of cookie 2 is 0.94 AND RQ of cookie 1 is 0.98 ✓ lower RQ means (cookie 2) must have more protein ✓ RQ closer to 1.0 means more carbohydrate ✓</p>	3 max	ALLOW ORA
	(b)	<p>maggots will not produce CO₂ , during <u>lactate</u> fermentation ✓ yeast will produce CO₂ , during alcoholic fermentation ✓ measuring RQ requires CO₂ production / RQ value (for maggots) will be lower than normal ✓</p> <p>OR</p> <p>2 minutes not long enough for , yeast / maggots , to , break down / respire , cookie ✓ CO₂ produced (by yeast) is not from respiration of cookie ✓ RQ (comparison) will be invalid ✓</p>	3	IGNORE “maggots will die” because experiment is only for 2 minutes
	(c)	<p>maggots are smaller so have greater <u>surface area to volume ratio</u> (than adult flies) ✓ shorter diffusion distance ✓ <i>idea that</i> maggots less active so lower metabolic demand for O₂ ✓ no (hard) exoskeleton so can absorb oxygen by diffusion through , skin / cuticle ✓</p>	3	ALLOW ORA throughout ALLOW SA:V <u>ratio</u>
		Total	9	

22	(a)	<p>results suggest action of plant , hormone / growth factor ✓ (observations suggest) apical dominance ✓ (which is mediated by) IAA / auxin ✓ <i>idea that</i> all plants / not just bonsai , will show apical dominance / will be affected by IAA / auxin ✓</p>	3 max	i.e. student statement refers only to effect on bonsai	
	(b)	<p>(large) gaps / holes , in tissue / between cells ✓ cell death ✓ <i>idea that</i> usual structure of liver tissue is not present ✓</p>	2 max	e.g. sinusoids not present, etc.	
	(c)	(i)	<p>peritoneal wall is made up of living cells ✓ (so) produces ATP to carry out active transport ✓ dialysis <u>membranes</u> , only allow diffusion / cannot do active transport ✓</p>	2 max	
		(ii)	<p><i>advantage:</i> does not require repeated dialysis OR diet less limited OR better quality of life / no longer chronically ill ✓</p> <p><i>disadvantage:</i> <i>idea of</i> difficulty finding donor organ OR risks of surgery OR risks from , organ rejection / long term immunosuppressant drugs ✓</p>	2	ALLOW ORA
	(d)	test urine ✓	1		
		Total	10		