

...day June 20XX – Morning/Afternoon

AS Level Biology A

H020/02 Depth in biology

PRACTICE MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 70

Final

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:
- where a candidate crosses out an answer and provides an alternative response, the crossed-out response is not marked and gains no marks
 - 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 an annotation 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 **2(c)** and **3(b)(ii)**.

11. Annotations

Annotation	Meaning
DO NOT ALLOW	Answers that are not worthy of credit
IGNORE	Statements that are irrelevant
ALLOW	Answers that can be accepted
()	Words that 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	(a)	(i)	fossils ✓ <i>idea that</i> fossils deeper in the ground are older than those near the surface ✓	2	ALLOW reference to radiometric dating IGNORE refs to carbon dating as time-scale is too great
		(ii)	Any two from similar tail segments lateral spines ✓	1	
		(iii)	no scale given on figure ✓ <i>idea that</i> comparison in absolute length cannot be made ✓ <i>idea that</i> comparison in relative length (compared with body length) could be valid ✓ maturity / age , of specimen unknown ✓ <i>idea that</i> only one individual of each species observed ✓	2	
		(iv)	<i>adaptation and explanation must both be present to be awarded the mark</i> tail for , swimming / movement ✓ OR segments , for flexibility / moving tail / swimming ✓	1	ALLOW streamlined shape for movement in water
	(b)		<i>biological molecule</i> nucleic acid / (nuclear) DNA / mtDNA / RNA ✓ <i>idea that</i> in samples from two species sequence similarity in any of the above can imply an evolutionary relationship , difference / divergence in sequence implies evolutionary distance ✓ <i>biological molecule</i> proteins / polypeptides / cytochrome C / haemoglobin ✓	4	ALLOW named proteins commonly used

Question			Answer	Marks	Guidance								
			<i>idea that</i> in the same protein from two species , amino acid / primary sequence similarity implies evolutionary relationship , difference / divergence in sequence implies evolutionary distance ✓										
	(c)		<table><tr><th>Deduction</th><th>Supporting observation(s)</th></tr><tr><td>characteristics are passed on to the next generation</td><td>E ✓</td></tr><tr><td>there is a struggle for existence</td><td>G and H ✓</td></tr><tr><td>individuals with beneficial characteristics are among the few who survive</td><td>F and G and H ✓</td></tr></table>	Deduction	Supporting observation(s)	characteristics are passed on to the next generation	E ✓	there is a struggle for existence	G and H ✓	individuals with beneficial characteristics are among the few who survive	F and G and H ✓	3	
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characteristics are passed on to the next generation	E ✓												
there is a struggle for existence	G and H ✓												
individuals with beneficial characteristics are among the few who survive	F and G and H ✓												
			Total	13									

Question			Answer	Marks	Guidance
2	(a)		<i>idea of</i> more transects in different parts of area 1 and 2 ✓ (collect at) different, times of day / times of year / weather conditions ✓ method of ensuring that individuals not counted again ✓ (use a method to) capture individuals ✓ (use a method to) correctly identify species ✓	3	ALLOW example of appropriate method, e.g. (butterfly) net ALLOW e.g. photograph / use of key
	(b)	(i)	(Area) 2 (because it) has , more / 6 , species ✓	1	

Question		Answer	Marks	Guidance																																																		
	(ii)	(Area) 2 <i>idea that the range of n is smaller ✓</i>	1	ALLOW use of figures to exemplify																																																		
	(iii)	<table border="1"> <thead> <tr> <th></th><th>Area 1</th><th colspan="3">Area 2</th></tr> <tr> <th>Species of butterfly</th><th>Number of individuals (n)</th><th>Number of individuals (n)</th><th>n/N</th><th>(n/N)²</th></tr> </thead> <tbody> <tr> <td>Grayling</td><td>2</td><td>5</td><td>0.125</td><td>0.0156</td></tr> <tr> <td>Large heath</td><td>16</td><td>10</td><td>0.250</td><td>0.0625</td></tr> <tr> <td>Gatekeeper</td><td>9</td><td>7</td><td>0.175</td><td>0.0306</td></tr> <tr> <td>Green hairstreak</td><td>3</td><td>5</td><td>0.125</td><td>0.0156</td></tr> <tr> <td>Silver-studded blue</td><td>0</td><td>2</td><td>0.050</td><td>0.0025</td></tr> <tr> <td>Small heath</td><td>8</td><td>11</td><td>0.275</td><td>0.0756</td></tr> <tr> <td></td><td></td><td>N = 40</td><td></td><td>0.2024</td></tr> <tr> <td>Simpsons Index</td><td>0.7131</td><td></td><td></td><td>0.7976</td></tr> </tbody> </table> <p>any successful calculation of $(n/N)^2$ ✓ $(\Sigma(n/N)^2 =) 0.2024$ ✓ $(1 - \Sigma(n/N)^2 =) 0.7976$ ✓ answer given to 4 significant figures ✓</p>		Area 1	Area 2			Species of butterfly	Number of individuals (n)	Number of individuals (n)	n/N	(n/N) ²	Grayling	2	5	0.125	0.0156	Large heath	16	10	0.250	0.0625	Gatekeeper	9	7	0.175	0.0306	Green hairstreak	3	5	0.125	0.0156	Silver-studded blue	0	2	0.050	0.0025	Small heath	8	11	0.275	0.0756			N = 40		0.2024	Simpsons Index	0.7131			0.7976	4	<p>Correct answer given to 4 sig. fig. with no working shown = 4 marks</p> <p>ALLOW correct answer with different sig. figs ALLOW correct answer with different sig. figs</p>
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	(c)	<p>For answers marked by levels of response:</p> <p>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.</p> <p>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.</p> <p>Once the level is located, award the higher or lower mark.</p> <p>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.</p> <p>The lower mark should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in italics) are missing.</p> <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. 		
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	<p>Level 3 (5–6 marks) Full and detailed evaluation of the students' conclusion taking into account the validity of the method used and the implications of the data collected. Learner demonstrates a holistic judgement of the information including evidence for and against the claim. The candidate makes a judgement that there is not enough evidence to support the students' conclusion.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) An evaluation of the students' conclusion taking into account the validity of the method used and/or the implications of the data collected. Learner demonstrates a holistic judgement of the information including evidence for and against the claim. The candidate makes a judgement in line with the argument they have presented.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks) An evaluation of the claim is attempted including discussion of either the validity of the method or the implications of the data. The answer includes evidence for or against the claim. A definitive judgement may not be present.</p> <p><i>A basic structure and some relevant information is provided, although a clear line of reasoning may not be present. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p>0 marks No response or no response worthy of credit.</p>	6	<p>Indicative scientific points may include...</p> <p>Evidence to support the conclusion (that fencing increased biodiversity)</p> <ul style="list-style-type: none"> • calculated Simpson's Index of Diversity is higher in fenced area • high Simpson's Index means high biodiversity • greater number of species/ higher species richness in fenced area • Silver-studded blue only occurs in fenced area. <p>Students' conclusion may be overdrawn because...</p> <ul style="list-style-type: none"> • difference in Simpson's Index of Diversity between two areas is small (12%) • range of number of individuals is greater in Area 1 (0 - 16) than Area 2 (2 – 11) • Higher number of individuals of 'Large heath' and 'Gatekeeper' butterflies sighted in Area 1. • Do not know length of time Area 2 has been fenced off. • <i>limitations of method</i> <ul style="list-style-type: none"> ○ samples taken on only two days ○ samples only taken in one season ○ no method to prevent recounting ○ observation at a distance might have led to mis-identification.
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			Total	15	
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Question			Answer	Marks	Guidance																		
3	(a)	(i)	(branches of) coronary artery ✓	1																			
		(ii)	(cardiac / heart) muscle ✓	1																			
		(iii)	<table><tr><th>Feature</th><th>Visible</th></tr><tr><td>AV valve</td><td>✓</td></tr><tr><td>bundle of His</td><td>X</td></tr><tr><td>left ventricular wall</td><td>✓</td></tr><tr><td>Pulmonary vein</td><td>X</td></tr><tr><td>Purkyne fibres</td><td>X</td></tr><tr><td>SA node</td><td>X</td></tr><tr><td>semi-lunar valve</td><td>✓</td></tr><tr><td>septum</td><td>✓</td></tr></table>	Feature	Visible	AV valve	✓	bundle of His	X	left ventricular wall	✓	Pulmonary vein	X	Purkyne fibres	X	SA node	X	semi-lunar valve	✓	septum	✓	3	4 correct ticks = 3 marks 3 correct ticks (and no more than 1 incorrect) = 2 marks 2 correct ticks (and no more than 2 incorrect) = 1 mark
Feature	Visible																						
AV valve	✓																						
bundle of His	X																						
left ventricular wall	✓																						
Pulmonary vein	X																						
Purkyne fibres	X																						
SA node	X																						
semi-lunar valve	✓																						
septum	✓																						
	(b)	(i)	line clearly rises and falls at the same time as the left ventricle line ✓ peak between 2 and 15 kPa ✓	2																			

Question	Answer	Marks	Guidance
	<p>(ii) For answers marked by levels of response:</p> <p>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.</p> <p>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.</p> <p>Once the level is located, award the higher or lower mark.</p> <p>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.</p> <p>The lower mark should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in italics) are missing.</p> <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) Describes fully the behaviour of the chambers and valves at W, X, Y and Z, and relates these behaviours to changes in pressure, at all of points W-Z.</p> <p><i>There is a well-developed connection between the events and causes at all four points, which is clear and logically structured and uses scientific terminology at an appropriate level.</i></p> <p>Level 2 (3–4 marks) Describes the behaviour of the chambers or valves, and relates some of these behaviours to changes in pressure, at all of the points W-Z.</p> <p><i>There is a developed connection between the events and causes discussed, which is clear and logically structured and uses scientific terminology at an appropriate level.</i></p> <p>Level 1 (1–2 marks) Describes the behaviour of the chambers or valves, or describes the pressure changes, at some of points W-Z.</p> <p><i>The description provided is clear and unambiguous and uses scientific terminology at an appropriate level.</i></p> <p>0 marks No response or no response worthy of credit.</p>	6	<p>Indicative scientific points may include...</p> <p><i>Chambers</i></p> <ul style="list-style-type: none"> • ventricles begin to contract at Y • ventricles are relaxing between W and Y • atria relaxed at W, X, Y and Z • atrial contraction completed before Y. <p><i>Valves</i></p> <ul style="list-style-type: none"> • A-V / bicuspid , valve closes at Y and opens at X • semilunar / aortic , valve opens at Z and closes at W. <p><i>Pressure</i></p> <ul style="list-style-type: none"> • At W ventricular pressure falls below aortic pressure • At X ventricular pressure falls below atrial pressure • At Y ventricular pressure rises above atrial pressure • At Z ventricular pressure rises above aortic pressure.
	(c)	(i)	-14 ± 1 % ✓✓✓	3	<p>ALLOW 3 marks for correct answer Max 2 if no negative sign If answer is incorrect award 1 mark for 64.5 ± 1 (bpm)</p>

Question			Answer	Marks	Guidance
		(ii)	only one (full) cardiac cycle / heartbeat , shown ✓ could be anomalous / atypical ✓ <i>idea that</i> measurement of cycle from different points gives different values ✓ mean (of several cycles) would be better ✓	3	
		(iii)	longer T-wave or broader R wave ✓	1	
			Total	20	

Question			Answer	Marks	Guidance
4	(a)		breakdown product is (fatty) acid ✓ pH falls as more breakdown occurs / AW ✓	2	
	(b)	(i)	66.0 ✓✓	2	ALLOW 1 mark for 66 or any answer between 65.9 and 66.
		(ii)	<i>limitation</i> <i>idea that</i> end point is subjective / difficult to judge ✓ <i>improvement</i> use of pH meter ✓	2	ALLOW other valid limitations e.g. fat separates to top of solution ALLOW other valid improvements e.g. keep mixing throughout experiment
	(c)	(i)	<i>formula M</i> (no mark) <i>because</i> high ratio of hydrogen to oxygen / N has (approximately) 2 H to 1 O ✓	1	

Question		Answer	Marks	Guidance
	(ii)	hydrophilic head and hydrophobic tails ✓ hydrophobic part / tails , repelled / AW , by water ✓ head / hydrophilic part , forms H bonds with water ✓ <i>idea that</i> medium outside / inside plasma membrane is aqueous ✓ <i>idea that</i> hydrophobic nature of tails results in their facing towards each other ✓	3	
	(d)	(m)RNA transported out of nucleus ✓ (m)RNA transported to / associates with ribosome ✓ translation / protein synthesis , occurs at ribosome ✓ (t)RNA brings specific amino acids or (t)RNA described ✓ peptide bonds form between adjacent amino acids or peptide bonds described ✓ polypeptide / protein processed through Golgi apparatus ✓	4	
		Total	14	

Question		Answer	Marks	Guidance
5	(a)	mobile vector / insect , moving / flying from tree to tree AW ✓ low genetic diversity / lack of resistance ✓ fungal spores carried by the wind AW ✓ climate favouring fungal growth / spread of vector ✓ overcrowding of trees / small distance between trees ✓	2	
	(b)	vector ✓	1	ALLOW carried by insects
	(c)	<i>Plasmodium</i> ✓ Protista / Protoctista ✓ Eukaryota / Eukarya ✓	3	ALLOW <i>falciparum</i>

Question			Answer	Marks	Guidance
	(d)		mosquito mouthparts pierce skin / AW ✓ pathogen injected (directly) into <u>blood</u> ✓	2	
			Total	8	

PRACTICE