



*Rewarding Learning*

**ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2024**

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## **Biology**

**Assessment Unit AS 2**

*assessing*

**Organisms and Biodiversity**

**[SBY21]**

**THURSDAY 23 MAY, MORNING**

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**MARK  
SCHEME**

## General Marking Instructions

### **Introduction**

The main purpose of the mark scheme is to ensure that examinations are marked accurately, consistently and fairly. The mark scheme provides examiners with an indication of the nature and range of candidates' responses likely to be worthy of credit. It also sets out the criteria which they should apply in allocating marks to candidates' responses.

### **Assessment objectives**

Below are the assessment objectives for Biology.

Candidates should be able to demonstrate:

- AO1** Knowledge and understanding of scientific ideas, processes, techniques and procedures.
- AO2** Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:
- in a theoretical context
  - in a practical context
  - when handling qualitative data
  - when handling quantitative data.
- AO3** Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:
- make judgements and reach conclusions
  - develop and refine practical design and procedures.

### **Quality of candidates' responses**

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 17 or 18-year-old which is the age at which the majority of candidates sit their GCE examinations.

### **Flexibility in marking**

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

### **Positive marking**

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 17 or 18-year-old GCE candidate.

### **Awarding zero marks**

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

### **Marking Calculations**

In marking answers involving calculations, examiners should apply the 'own figure rule' so that candidates are not penalised more than once for a computational error. To avoid a candidate being penalised, marks can be awarded where correct conclusions or inferences are made from their incorrect calculations.

/ denotes alternative points  
 ; denotes separate points  
**comments on mark values are given in bold**  
*comments on marking points are given in italics*

AVAILABLE  
MARKS

**Section A**

<b>1</b>	<ul style="list-style-type: none"> <li>• Tissue fluid;</li> <li>• Myoglobin;</li> <li>• Squamous epithelium;</li> <li>• Emphysema;</li> <li>• Bohr effect/shift;</li> </ul>	[5]	5
<b>2</b>	<p><b>(a)</b> <b>A:</b> epidermis; <b>B:</b> cortex;</p> <p><b>(b)</b> <b>Y:</b> suberin; <b>Z:</b> lignin;</p> <p><b>(c)</b> Any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>• pit does not contain cytoplasm, plasmodesma does</li> <li>• pit is located in xylem wall, plasmodesma in other cell walls</li> <li>• water (and ions) travels through pit, plasmodesma also enables organic molecule transport</li> </ul>	[2]	6
<b>3</b>	<p><b>(a)</b> 3 and 4 (<i>both needed</i>);</p> <p><b>(b)</b> Diaphragm muscles contract so diaphragm moves down; (external) intercostal muscles contract so ribcage moves up/out; volume of thorax/chest cavity increases;</p> <p><b>(c)</b> Mass transport/mass flow;</p>	[1]	5
<b>4</b>	<p><b>(a)</b> Kidney;</p> <p><b>(b)</b> <b>(i)</b> (In aorta) blood loss will be much greater/blood is under higher pressure (<i>must be comparative</i>); whole body is deprived of oxygenated blood (not just one leg);</p> <p><b>(ii)</b> Platelets activated/release clotting factors/thromboplastin; prothrombin is converted to thrombin; requires Ca<sup>2+</sup>/Vit K/clotting factors (minimum of two); fibrinogen is converted to fibrin (to form a mesh which traps blood cells);</p> <p><b>(iii)</b> Pressure is too high;</p>	[1]	8

			AVAILABLE MARKS			
5	(a) (i)	Fungi;	[1]	13		
	(ii)	Both have a cell wall; fungal cell wall made of chitin, plant cell wall made of cellulose;	[2]			
	(b) (i)	Reduce photosynthetic activity; due to blocked pathway for carbon dioxide;	[2]			
	(ii)	Hyphae block xylem in vascular tissue; reduced transport of water to the leaf;	[2]			
	(c) (i)	$(68 \div 2680) \times 100$ ; 2.54%;	[2]			
	(ii)	Ash trees replanted in the same location may get reinfected; replacement native trees provide suitable/alternative food source/habitat for native animals;	[2]			
	(iii)	Advantage – lower risk of developing ash dieback disease; Disadvantage – higher risk of drought/water shortage/damage by fire/ OAR;	[2]			
	6	(a)	Improving drainage; hydrophytes are best adapted to habitat with high water content/will be outcompeted in drier habitats;		[2]	15
		(b)	Edaphic;		[1]	
		(c) (i)	A; Simpson's diversity index had greatest decrease in A;		[2]	
(ii)		$5122 + 3422 + 2070 + 182 + 756 = 11\,542$ ; $11\,542 \div (218 \times 219)$ ; 0.24;	[3]			
(iii)		Higher biodiversity than A, B or C; this bog has been protected/undamaged by human activity;	[2]			
(d) (i)		<b>A</b> – order <b>B</b> – family; ( <i>both needed</i> )	[1]			
(ii)		<b>X</b> – animalia/animal <b>Y</b> – <i>Coenonympha</i> <b>Z</b> – <i>tullia</i> 3 correct for [2] marks, 2 correct for [1] mark	[2]			
(iii)		<i>Coenonympha pamphilus</i> ; since it is the same genus;	[2]			

- 7 (a) (i) As maximum photosynthetic rate increases so does stomatal length/positive correlation; (*accept converse*) [1]
- (ii) As stomatal density increases, stomatal length decreases/negative correlation; (*accept converse*) plants with high density of stomata have smaller stomata to conserve water; [2]
- (iii) Inversely proportional/as stomatal density increases, maximum photosynthetic rate decreases; (*accept converse*) [1]
- (b) (i) Any **two** from:
- thin to reduce diffusion distance
  - air spaces to create diffusion pathway
  - spongy mesophyll to provide large surface area
  - layer of moisture around (spongy) mesophyll cells allows gases to dissolve; [2]
- (ii) Xerophytes – sunken/in pits; [2]  
Hydrophytes – (predominately) on upper surface;

**Section A**

**AVAILABLE  
MARKS**

8

**60**

## Section B

AVAILABLE  
MARKS

- 8
- blood moves from capillaries (in ileum) into venules/small veins
  - travels to the liver via hepatic portal vein
  - blood in veins is under low pressure
  - valves in the veins prevent backflow
  - surrounding muscle contractions push blood along the veins
  - exits liver via hepatic vein
  - returns to heart via vena cava and enters right atrium
  - during diastole, blood enters atrium/ventricles fill passively
  - semi-lunar valves are closed
  - atrial systole decreases atrial volume/increases atrial pressure/causes atrial pressure to exceed ventricular pressure
  - blood enters ventricle through atrio-ventricular valve
  - ventricular systole increases ventricular pressure (above atrial pressure), closing the ventricular valve
  - chordae tendinae prevent AV valve from blowing inside out
  - (ventricular systole causes) right ventricular pressure to rise above pulmonary artery
  - ventricular pressure exceeds arterial pressure so semi-lunar valve opens
  - ventricular diastole causes pressure to drop below arterial pressure and semi-lunar valve closes
  - arterial blood is under high pressure
  - (pulmonary) artery diverges to form arterioles/small arteries
  - passes along capillaries on alveoli
  - returns to heart via pulmonary vein and enters left atrium
  - (ventricular systole causes) left ventricular pressure to rise above that of aorta
  - blood exits heart via aorta/pulmonary artery
  - enters mesenteric/intestinal artery (then arterioles) and returns to capillaries of ileum

Band	Response	Mark
3	Candidates use appropriate specialist terms to describe fully the sequential pathway and cause of unidirectional blood flow using a minimum of <b>eleven</b> points of indicative content. They must use good spelling, punctuation and grammar and the form and style are of a very good or better standard.	[11]–[15]
2	Candidates sometimes use appropriate specialist terms to describe fully the sequential pathway and cause of unidirectional blood flow using a minimum of <b>six</b> points of indicative content. They must use satisfactory spelling, punctuation and grammar and the form and style are of a good standard.	[6]–[10]
1	Candidates partially describe the sequential pathway and cause of unidirectional blood flow using a minimum of <b>one</b> point of indicative content. They must use limited correct spelling, punctuation and grammar and the form and style are of a basic standard.	[1]–[5]
0	Response not worthy of credit.	[0]

[15]

**Section B**

**Total**

**AVAILABLE  
MARKS**

15

15

75