New Specification

Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2017

Biology

Assessment Unit AS 2

assessing

Organisms and Biodiversity

[SBY21]

TUESDAY 6 JUNE, AFTERNOON

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

/ 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

1 **(a)** A – Prokaryote;
B – Protoctista;
C – Fungi;
D – Animalia;
E – Plantae; [5]

(b) Domain/super-kingdom; [1] 6

2 **(a)** Any **four** from:
- SAN send a wave of depolarisation/excitation across the atria causing them to contract
- wave cannot pass directly to the ventricle, due to the non-conductive tissue of AV-valves
- wave reaches the AVN (in the septum)
- passes down bundle of His
- up the Purkinje fibres, causing ventricular systole [4]

(b) Oxygen supply to tissues is reduced as there are fewer heartbeats per minute/unit time; [1] 5

3 **(a)** Description – increasing the concentration of chemical causes an increase in the value for Simpsons' index;
Reduction in biodiversity;
Removes food/habitats/bioaccumulation;
reduces animal spp/numbers/biodiversity/chemicals kill animals [4]

(b) Cut hedges September – February;
No nests/no removal of winter food sources;
or
Don't cut when nests/berries are there;
More birds/chicks survive; [2] 6

				AVAILABLE MARKS
4	**(a)**	The (external) intercostal muscles and diaphragm contract; increasing the volume in the thorax; thus reducing the pressure; [3]		
	(b)	**(i)** Expiration/breathing out; [1]		
		(ii) Any **two** from: • more breaths per unit time • breathing is deeper • breathing is less consistent/more variable [2]		
		(iii) Taking exercise; so more oxygen for the extra respiration; [2]		
	(c)	**(i)** D; [1]		
		(ii) Patient C has a higher; and increasing breathing rate; Any **two** from: • patients with emphysema have a reduced alveolar surface area; • allowing less oxygen to enter the blood (with each breath) • increased breathing rate is compensating for this [4]		13
5	**(a)**	**(i)** Phloem; [1]		
		(ii) Sucrose; [1]		
	(b)	Any **two** from: • more radioactivity in leaf/stem closest to leaf where $^{14}CO_2$ absorbed • it is transported up and down the stem • more transported down the stem Any **two** from: • organic compounds made in leaf where $^{14}CO_2$ absorbed • (small amount) moved up to growing regions • (most) moved down to storage regions in root/storage organ [4]		6

				AVAILABLE MARKS
6	**(a)**	**(i)**	Arrow at 20 metres; [1]	
		(ii)	The oxygen content decreased dramatically when polluted (and then increased further downstream); Any **three** from: • slurry contains a rich source of organic nutrients and bacteria • bacteria population increases exponentially • (bacteria) respire aerobically/increasing BOD/using up/reducing the oxygen in the water [4]	
	(b)	**(i)**	7.0 – 1.6 = 5.4; 5.4 ÷ 1.6 x 100 = 337.5%; [2]	
		(ii)	Dilution from rainfall/other waterways/seepage from fields/ sedimentation/turbulence of water/fewer bacteria (as less decomposable nutrients)/other appropriate response; [1]	
		(iii)	Samples could have been taken at smaller intervals; [1]	
	(c)		Pollution due to fertiliser run-off has a longer time sequence; since algal bloom and death are relatively slow; **and/or** pollution due to fertiliser is longer lasting/slurry shorter lasting; due to continuous fertiliser run-off/slurry more likely a one-off event; **and/or** other appropriate difference; with explanation; [4]	13

				AVAILABLE MARKS
7	(a)	(i)	Extensive network with large SA/narrow lumen to slow down blood flow; [1]	
		(ii)	Contains more carbon dioxide/more heat/less glucose; due to respiration in the liver; **or** more/less glucose; due to glucagon/insulin/converted to glycogen; **or** more urea; deamination of amino acids/urea produced in liver; **or** lower pressure; pressure lost travelling through capillary in liver; **or** other appropriate difference; explanation of difference; [2]	
	(b)	(i)	Fibrinogen is not converted to fibrin; because prothrombin is not converted to thrombin; [2]	
		(ii)	Unable to prevent excessive blood loss/serious blood loss; [1]	
	(c)	(i)	The mole lives in an environment with a low partial pressure of oxygen; so needs to be able to load at low partial pressure/has a higher affinity; [2]	
		(ii)	The shrew has a high metabolic rate so higher respiratory needs; unloads oxygen more readily/at higher partial pressures/has a lower affinity for oxygen; to ensure adequate/higher levels of oxygen reach the tissues; [3]	11
			Section A	**60**

Section B

AVAILABLE MARKS

8 (a) Indicative content

A. arenaria

- creates a more humid environment (around stomata)
- fewer stomata
- reduced area over which water can be lost
- thick (waxy) cuticle reduces evaporation/transpiration
- due to waterproofing
- store large quantities of water in leaf
- due to sand having poor water retention/poor access to water

N. alba

- to prevent water entering through stomata (on lower surface)
- to increase buoyancy
- leaf is at surface for light/photosynthesis/maintain gas exchange

Band	Response	Mark
3	Candidates use the most appropriate specialist terms to clearly identify and explain two leaf adaptations expected to be found in *A. arenaria* and one in *N. alba* using a minimum of **six points** of indicative content. Spelling, punctuation and grammar are excellent and the form and style are of a high standard.	[5]–[6]
2	Candidates use appropriate specialist terms to clearly identify and explain two leaf adaptations expected to be found in *A. arenaria* and *N. alba* using a minimum of **four points** of indicative content. Spelling, punctuation, grammar and the form and style are of a good standard.	[3]–[4]
1	Candidates partially identify and explain one or more leaf adaptations in *A. arenaria* and/or *N. alba* using a minimum of **two points** of indicative content. Spelling, punctuation, grammar and the form and style are of a basic standard.	[1]–[2]
0	Response not worthy of credit.	[0]

[6]

(b) Indicative content

temperature:
- increasing temperature increases the rate of transpiration
- water molecules gain more kinetic energy
- more evaporation of water from spongy mesophyll cells/more diffusion through stomata

humidity:
- increasing humidity decreases the rate of transpiration
- high concentration of water molecules in air (outside stomata)
- smaller/no diffusion gradient

air currents:
- increasing wind speed increases the rate of transpiration
- wind removes diffusion shells outside stomata
- increasing the diffusion gradient

light intensity:
- increasing light intensity increases the rate of transpiration
- (more) stomata open/stomata fully open
- (more 'gateways') for water molecules to diffuse out of the leaf

soil water availability:
- lack of soil water availability leads to decrease in rate of transpiration
- stomata close

Band	Response	Mark
3	Candidates use the most appropriate specialist terms to clearly identify and explain three external factors that influence transpiration using a minimum of **nine points** of indicative content. Spelling, punctuation and grammar are excellent and the form and style are of a high standard.	[7]–[9]
2	Candidates use appropriate specialist terms to clearly identify and explain two/three external factors that influence transpiration using a minimum of **five points** of indicative content. Spelling, punctuation, grammar and the form and style are of a good standard.	[4]–[6]
1	Candidates partially identify and explain one or more external factors that influence transpiration using a minimum of **one point** of indicative content. Spelling, punctuation, grammar and the form and style are of a basic standard.	[1]–[3]
0	Response not worthy of credit.	[0]

[9] 15

Section B **15**

Total **75**

AVAILABLE MARKS