



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018**

Biology

Assessment Unit AS 1

assessing

Molecules and Cells

[SBY11]

THURSDAY 24 MAY, 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) (i) -1230 kPa; [1]
 (ii) Arrow to show water movement into the cell; [1]

(b)

Statements	Net movement of water		
	Into the cell	Out of the cell	No net movement
Carrot tissue does not gain or lose mass after 20 minutes in a sugar solution			✓
An animal cell ($\Psi_{\text{cell}} = -825 \text{ kPa}$) is immersed in a solution ($\Psi_{\text{s}} = -974 \text{ kPa}$)		✓	
An animal cell shows evidence of crenation when immersed in a salt solution		✓	

[3]

5

- 2 (a) (i) Prion; protein; [2]
 (ii) BSE/Scrapie; [1]
 (b) (i) Eating prion-rich food/spontaneous transformation from normal to disease-causing prion/inherited genetic mutation; [1]
 (ii) Changes to secondary structure, forming more β -pleated sheets replication of disease-causing prions/conversion of enough normal to disease-causing prions to cause symptoms; [1]
 (c) Contain DNA/RNA/nucleic acids; [1]

6

			AVAILABLE MARKS	
3	(a)	X anywhere within G ₂ phase;	[1]	8
	(b) (i)	Anaphase;	[1]	
	(ii)	Centriole;	[1]	
	(iii)	Centromeres split/spindle fibres contract;	[1]	
	(c) (i)	Vincristine inhibits microtubule formation; so there is no spindle fibre formed;	[2]	
	(ii)	The damage/mutation will be replicated in S phase; all future daughter cells affected;	[2]	
4	(a)	Condensation reaction glycosidic bond;	[1]	7
	(b)	Structure: made from α- glucose monomers; starch is comprised of two polymers while glycogen is comprised of one polymer/glycogen is more highly branched than starch; Function: storage polymers/store glucose for energy; glucose is more readily released from glycogen than starch;	[4]	
	(c)	Provides support/structural polymer; long, parallel unbranched chains/fibrils joined by hydrogen bonds;	[2]	
	(a) (i)	B; D; F;	[3]	
	(ii)	Any three from: <ul style="list-style-type: none"> • Spongy mesophyll/in the lower portion of the leaf/between the palisade layer and lower epidermis • creates a continuous pathway between stomata/atmosphere and the photosynthetic tissue • facilitates the diffusion of gases • allows maximum number of tightly packed photosynthetic cells in palisade layer 	[3]	
	(b) (i)	Guard cells;	[1]	11
	(ii)	Any two from: <ul style="list-style-type: none"> • reduced turgidity of X • causes stomata to close/decreases pore size • this reduces transpiration/water loss 	[2]	
	(c)	As stomatal density increases, the stomatal area decreases; ensuring sufficient carbon dioxide enters for effective photosynthesis;	[2]	

6 (a) Circle drawn around any nucleotide consisting of organic base, deoxyribose sugar and a phosphate group; [1]

(b) DNA is larger/longer molecule/DNA is millions of bases long; associated with histone proteins; [2]

(c) (i)

Organism	Approximate percentage of bases in organism's DNA/%			
	Adenine	Guanine	Cytosine	Thymine
<i>E. coli</i>	24		26	24

; [1]

(ii) Sequence of bases are different; [1]

(d) (i) Each new DNA molecule contains one template strand and one new DNA strand; [1]

(ii) DNA helicase; breaks the hydrogen bonds between strands; DNA polymerase; joins the nucleotides of new strand together; (functions must be linked to the correct enzyme) [4]



(ii) The light band (top one) will be thicker (while the hybrid band (intermediate) will stay the same); all new DNA produced will consist of two light (¹⁴N) strands (while the amount of hybrid (¹⁴N/¹⁵N) DNA will remain the same); [2]

- 7 (a) Angiotensin 1 fits exactly into/complementary fit with the active site of the ACE/ACE active site moulds to fit around angiotensin 1; bonds are made/broken within angiotensin 1 which changes its shape; angiotensin 2 (product) no longer fits the active site so is released; [3]
- (b) Competitive and non-competitive inhibition; inhibitor may occupy the active site so that angiotensin 1 cannot bond/ inhibitor has a similar shape to angiotensin 1; inhibitor may interact with another site on the enzyme changing the shape of the active site; [3]
- (c) (i) Any **two** from:
- troponin increases to a much higher level than CK
 - CK levels start to decrease sooner (after 27 hours) than troponin (which reaches its peak at 35 hours)
 - troponin remains in the blood in high levels for longer/no creatine kinase after 50 hours
 - troponin decreases at a slower rate than CK [2]
- (ii) if blood is not tested within a couple of days then the rise in CK may be missed; CK levels may not increase enough to be detected; [2]

AVAILABLE
MARKS

10

8 (a) **Indicative content**

- Fluid mosaic model structure
- Phospholipid bilayer
- Phospholipids consist of fatty acid chains and a phosphate head
- Fatty acid chains are hydrophobic, while phosphate heads are hydrophilic (orientated towards cytoplasm)
- Allows passage of hydrophobic/nonpolar substances across the bilayer
- Can allow small hydrophilic/polar molecules such as water to pass through/large polar molecules cannot cross
- Cholesterol within the membrane influences the fluidity of the membrane
- (Intrinsic and extrinsic) proteins occur throughout membrane
- Some are receptors for specific molecules
- Glycocalyx is comprised of carbohydrate attached to proteins or lipids
- Proteins may be carriers for specific molecules
- (Gated) channel proteins allow passage of polar/water-soluble substances
- Some cells/organelles contain more protein to act as carriers/receptors depending on their role

Band	Response	Mark
3	Candidates use appropriate specialist terms to fully describe the structure of the membrane and how it determines selectivity using a minimum of seven 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.	[7]–[9]
2	Candidates sometimes use appropriate specialist terms to describe the structure of the membrane and how it determines selectivity using a minimum of four points of indicative content. They must use satisfactory spelling, punctuation and grammar and the form and style are of a good standard.	[4]–[6]
1	Candidates partially describe the structure of the membrane and how it determines selectivity using a minimum of one point of indicative content. They must use limited correct spelling, punctuation and grammar and the form and style is of a basic standard.	[1]–[3]
0	Response not worthy of credit.	[0]

[9]

(b) Indicative content

- Exocytosis involves transport out of the cell, endocytosis involves transport into the cell;
- In exocytosis, a substance is packaged within a vesicle;
- Vesicle moves to and fuses with the plasma membrane;
- Endocytosis may be phagocytosis or pinocytosis;
- Phagocytosis involves the transport of solid material (into the cell);
- Pinocytosis involves the transport of fluid (into the cell);
- Cell surface membrane invaginates/infolds around the substance to form a vesicle;

Band	Response	Mark
3	Candidates use appropriate specialist terms to fully describe the movement of substances into and out of the cell using a minimum of five 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.	[5]–[6]
2	Candidates sometimes use appropriate specialist terms to describe the movement of substances into and out of the cell using a minimum of three points of indicative content. They must use satisfactory spelling, punctuation and grammar and the form and style are of a good standard.	[3]–[4]
1	Candidates partially describe the movement of substances into and out of the cell using a minimum of one point of indicative content. They must use limited correct spelling, punctuation and grammar and the form and style is of a basic standard.	[1]–[2]
0	Response not worthy of credit.	[0]

[6]

Total

**AVAILABLE
MARKS**

15

75