



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2014**

Biology

Assessment Unit AS 1

assessing

Molecules and Cells

[AB111]

FRIDAY 13 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.

Section A

			AVAILABLE MARKS
1	(a) Mucosa;	[1]	3
	(b) Paneth cells produce anti-microbial substances/to protect stem cells; goblet cells produce mucus;	[2]	
2	(a) Telophase I/Prophase II;	[1]	5
	(b) Any four from - homologous chromosomes pair up/bivalents form - chiasmata form/crossing over occurs (homologous pairs/bivalents) line up at the equator of the cell - spindle fibres attach to centromeres - homologous chromosomes are separated/pulled apart (as a result of spindle fibres shortening) - chromosomes may be enclosed in a new nuclear envelope	[4]	
3	(a) A: starch grain; B: tonoplast; C: middle lamella;	[3]	9
	(b) Magnified length = 115mm; = 115 000 μm ; $115\,000 \div 7500 = 15.33\, \mu\text{m}$;	[3]	
	(c) Large surface area of thylakoids (membranes); means more chlorophyll molecules can be accommodated;	[2]	
	(d) Specimens for TEM are thin, so not all structures are evident/this section does not transect the nucleus;	[1]	
4	(a) Activity increases between 5°C and 40°C, then falls sharply between 40°C and 45°C; increase at lower temperatures is due to the greater kinetic energy of enzyme/substrate molecules; causing more frequent formation of enzyme-substrate complexes; above 40°C, bonds within the tertiary structure are broken/the active site is distorted;	[4]	9
	(b) (i) There are two different enzymes present; each peak represents a different optimum temperature;	[2]	
	(ii) Allows enzyme activity to take place over a wide range of (washing) temperatures;	[1]	
	(c) From 45°C to 50°C, one enzyme is being denatured; from 50°C to 55°C, the activity of the second enzyme is increasing;	[2]	

- 5 (a) (i) Test solutions in left-hand column/top row;
reagents in next four columns/rows (in any order);
results as ✓ or ✗; [3]

Test solution	Benedict's reagent	Biuret reagent	Iodine	Clinistix
A	✓	✗	✗	✓
B	✗	✓	✗	✗
C	✓	✗	✗	✗
D	✗	✗	✓	✗
E	✗	✗	✗	✗

- (ii) A: glucose;
B: protein;
C: fructose/galactose/maltose/lactose/other mono- or disaccharide (except sucrose);
D: starch; [4]

- (iii) Mix a small amount of the test solution with an equal volume of Benedict's reagent and heat; [1]

- (b) Sucrose;
a non-reducing disaccharide/sugar which hydrolyses into glucose and fructose (reducing sugars); [2]

AVAILABLE MARKS

10

6	(a) (i) C, H, O, N (not S);	[1]	AVAILABLE MARKS
	(ii) The protein consists of two or more polypeptide chains;	[1]	
	(b) (i) Mucin; keratin/collagen; mucin/trypsin; trypsin;	[4]	
	(ii) The keratin is produced in cells, not within the hair/ amino acids are obtained from the diet, rather than applied to the body/other appropriate response;	[1]	
	(c) • Ribosomes are the site of production of a polypeptide chain; • Rough endoplasmic reticulum provides support for the ribosomes/ transports the polypeptide through the cell/is involved in folding the polypeptide into its tertiary structure; • Golgi body may add a prosthetic group (or by example)/packages proteins for transport or export;	[3]	
	(d) Exocytosis;	[1]	
	(e) Research groups working in different parts of the world can study the findings of other teams easily/may be of use to teams working on different areas of biology (or by example)/other appropriate response;	[1]	
7	(a) Lipid envelope/envelope proteins/spherical shape; genetic material is DNA/nucleic acid protected by capsid (protein coat)/ hexagonal capsid;	[2]	12
	(b) (i) PCR is expensive to undertake/virus infection may have been ruled out;	[1]	
	(ii) For reasons of accuracy; many causes of these signs other than viral infection;	[2]	
	(iii) Will only give a positive result if the virus is present; since the test detects specific sequences of DNA;	[2]	
	(c) (i) DNA polymerase/Taq (thermostable) polymerase;	[1]	
	(ii) 4;	[1]	
	(iii) TAG-TGG-CCG-TCT-GCA-TCC;	[1]	
	(iv) One primer is needed to bind to each strand of virus DNA;	[1]	
	(v) In order to ensure that the target sequence is not found in oyster DNA;	[1]	
			12

Section B

8 Any thirteen points:

- osmosis is the net movement of water across a partially (selectively) permeable membrane
- from an area of higher water potential to an area of lower water potential
- pure water has a water potential of zero
- addition of solutes decreases the solute potential / creates a negative solute potential
- by restricting the movement of free water molecules / by creating hydration shells
- so they decrease the water potential of a solution
- all cells contain a range of dissolved solutes
- if a cell has a lower water potential than its environment (neighbouring cells), then water will move in / if a cell has a higher water potential than its environment (neighbouring cells), then water will move out
- in animal cells, only the dissolved solutes contribute to the water potential
- if animal cells take in water, they may swell and lyse (burst)
- because they have no cell wall
- if animal cells lose water, they will crenate
- the presence of a cell wall in plant cells creates a pressure potential
- thus the water potential of a plant cell = solute potential + pressure potential ($\Psi_{\text{cell}} = \Psi_s + \Psi_p$)
- when plant cells absorb water, they become turgid / the wall resists the inward movement of excess water
- when plant cells lose water, the cell becomes flaccid / the cell membrane begins to pull away from the cell wall / the cell begins to plasmolyse
- however, the membrane remains attached at the plasmodesmata
- if the cell can gain water, it can recover
- further loss of water will result in complete plasmolysis / will result in the plasmodesmata breaking the connection with neighbouring cells
- other appropriate response [13]

AVAILABLE
MARKS

13

Quality of written communication:

2 marks: The candidate expresses ideas clearly and fluently through well-linked sentences, which present relationships and not merely list features. Points are generally relevant and well-structured. There are few errors of grammar, punctuation and spelling.

1 mark: The candidate expresses ideas clearly, if not always fluently. The account may stray from the point or may not indicate relationships. There are some errors of grammar, punctuation and spelling.

0 marks: The candidate produces an account that is of doubtful relevance or obscurely presented with little evidence of linking ideas. Errors in grammar, punctuation and spelling are sufficiently intrusive to disrupt the understanding of the account.

[2]

2

Total

75

