Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2024

Biology

Assessment Unit AS 1

assessing

Molecules and Cells

[SBY11]

FRIDAY 10 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)

Protein Structure	Type of bond			
	Hydrogen	Peptide	Ionic	Disulfide
Primary		✓	✗	✗ ;
Secondary		✓	✗	✗ ;
Tertiary		✓	✓	✓ ;

[3]

(b) (Overall folding produces) active site;
reference to substrate specificity; [2] 5

2 (a) **X** – Phosphate;
Y – deoxyribose (sugar); [2]

(b) (DNA) helicase;
breaks the hydrogen bonds between the two strands; [2]

(c) (i)

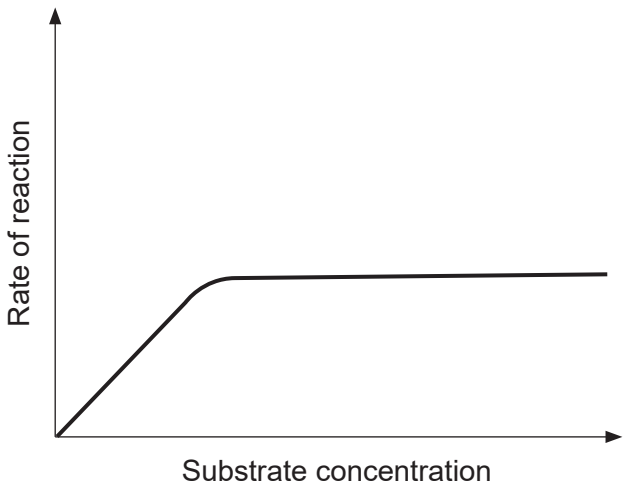
Organism	**Percentage of bases in DNA**			
	Adenine	**Cytosine**	**Guanine**	**Thymine**
Sea Urchin			17	33 ;
Human	22	28	28	;

[2]

(ii) Uracil (replaces thymine);
percentages indicate no base-pairing/single-stranded; [2] 8

				AVAILABLE MARKS
3	**(a)**	–752 = ψs + 212; ψs = –964 kPa;	[2]	
	(b)	Arrows from A to C and B to C; no arrows between A and B;	[2]	
	(c)	Cell will crenate/shrink; external solution has a more negative water potential;	[2]	
	(d) **(i)**	As the solute potential of the external solution decreases, the percentage mass change of the sweet potato decreases; (allow converse)	[1]	
	(ii)	There will be a less negative solute potential (than sweet potato); as starch is insoluble;	[2]	
	(e) **(i)**	There is always some solute in the cell contents/only water with no solutes has a potential of zero;	[1]	
	(ii)	0 kPa;	[1]	11
4	**(a)**	Any **two** from: • the cell has reached a critical size • there are enough nutrients available • required growth factors are in place • no DNA damage	[2]	
	(b) **(i)**	Prevents DNA synthesis; as no nucleotides containing thymine available to bond with adenine;	[2]	
	(ii)	Damaged DNA would not be repaired/damaged DNA would be copied;	[1]	
	(iii)	1 Can be complementary in shape to active site; so preventing access for substrate; 2 May attach to another part of enzyme; which will change the shape of active site (so no longer complementary to substrate);	[4]	9

5 (a) (i)



; [1]

(ii) Ionic bonds broken;
causing changes to shape of active site;
fewer successful collisions will occur/fewer enzyme-substrate complexes form; [3]

(b) (i) Attached to inert surfaces by weak forces;
bonds less likely to break apart; [2]

(ii) Any **two** from:
- continuous downstreaming
- enzyme free/contamination free product
- enzymes can be retained and reused
- increased thermostability [2]

(c) (i) 1.85 – 0.43 = 1.42;
1.42 × 24 = 34.08;
= 34.1;
or 44.4 – 10.32 = 34.08 = 34.1;;; [3]

(ii) Method of immobilisation is different for the sources of glucose; [1]

(iii) Lower ethanol production;
the active sites of the enzyme were unavailable (due to entrapment)/ these sources contain less glucose/more time taken for these sources to diffuse through (entrapped enzyme system); [2]

AVAILABLE MARKS

14

				AVAILABLE MARKS
6	**(a)**	Moving the villi; greater contact with products of digestion;	[2]	
	(b)	Mucosa;	[1]	
	(c)	**(i)** Facilitated diffusion; involves carrier protein and transports substances along a concentration gradient;	[2]	
		(ii) Fewer amino acids absorbed; the amino acids will not be able to bind (in the binding sites)/ join the carrier protein;	[2]	
		(iii) Active transport;	[1]	
	(d)	**(i)** A build-up of fatty acids in the blood vessels could lead to blockages/ increased viscosity of the blood/will not dissolve in the blood plasma;	[1]	
		(ii) Exocytosis; secretory vesicles fuse with cell surface membrane (and release products);	[2]	
		(iii) Smooth endoplasmic reticulum, synthesises lipids/triglycerides;	[2]	13
		Section A		**60**

Section B

AVAILABLE MARKS

7 Indicative content

Mitochondria
- the site of ATP synthesis during aerobic respiration
- has a double membrane/envelope
- inner membrane has cristae
- which extend into the matrix
- cristae give a greater surface area (for enzymes)

Chloroplasts
- site of photosynthesis
- have a double membrane/envelope
- grana are composed of thylakoid membranes
- in the stroma
- thylakoids/grana contain chlorophyll

Rough Endoplasmic Reticulum
- have ribosomes involved in (primary) protein synthesis
- consists of (enclosed flattened) sacs/cisternae
- continuous with the nuclear membrane
- secondary and tertiary structure develops/proteins transported through the cisternae

Golgi apparatus
- modify proteins/by example
- consist of flattened sacs/cisternae
- vesicles enter the cis face
- vesicles/lysosomes (with modified protein) leave the trans face

Nucleus
- contains DNA which codes for synthesis of proteins
- has a double membrane/envelope with pores
- DNA is associated with histones (which help support and protect it)
- contains decondensed chromosomes/chromatin (unless in a dividing cell)
- contains (1 or more) nucleoli which contains DNA that codes for ribosomes

Band	Response	Mark
3	Candidates use the most appropriate specialist terms to clearly describe and explain the structure and function of the listed organelles, using a minimum of **eleven** points of indicative content. Spelling, punctuation and grammar and the form and style are of a high standard.	[11]–[15]
2	Candidates use appropriate specialist terms to clearly describe and explain the structure and function of the listed organelles, using a minimum of **six** points of indicative content. Spelling, punctuation and grammar and the form and style are of a good standard.	[6]–[10]
1	Candidates partially describe and explain the structure and function of the listed organelles, using a minimum of **one** point of indicative content. Spelling, punctuation and grammar and the form and style are of a basic standard.	[1]–[5]
0	Response not worthy of credit.	[0]

[15] 15

Section B **15**

Total **75**