



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2025**

Biology

Assessment Unit AS 1

assessing

Molecules and Cells

[SBY11]

FRIDAY 9 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

Where one response is required to gain a mark, candidates will not gain credit if a correct response is given alongside one or more incorrect response.
 This is referred to as listing.

Section A

- | | | | |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 1 | Glycosidic;
nucleolus;
plasmid;
retrovirus/HIV/other appropriate named virus;
cholesterol; | [5] | 5 |
| 2 | (a) Substrate binds to active site;
active site changes shape to fit the substrate; | [2] | |
| | (b) As temperature increases, enzyme activity increases (up to the optimum temperature) and then it decreases;
as temperature increases, kinetic energy increases and there are more collisions/more enzyme-substrate complexes form;
beyond the optimum, hydrogen bonds holding the active site in shape are broken so it is no longer complementary/fewer enzyme – substrate complexes form; | [3] | |
| | (c) (i) Activation energy; | [1] | |
| | (ii) Line the same shape but drawn at a level lower than X; | [1] | 7 |
| 3 | (a) (i) (In a new DNA molecule) one strand is conserved from the original (parent)/molecule;
the other strand is newly synthesised/formed (from free nucleotides); | [2] | |
| | (ii) Hydrogen bonds; | [1] | |
| | (b) (i) One intermediate band after one generation;
two bands, one light and one intermediate after two generations; | [2] | |
| | (ii) One band will contain DNA with only 14N;
the other band will contain DNA with both 14N and 15N strands; | [2] | |
| | (iii) The light band will get much thicker;
the hybrid/intermediate band will stay the same (comparative language required); | [2] | |
| | (c) S/synthesis (phase); | [1] | 10 |

		AVAILABLE MARKS
4	<p>(a) Prophase and prophase 1 Similarity – chromosomes condense/nuclear membrane breaks down/ nucleolus disappears/centrioles move to opposite poles/spindles form; Difference – homologous chromosomes pair up/crossing over/chiasmata occurs in meiosis; (<i>accept converse for mitosis</i>)</p> <p>Metaphase and metaphase 1 Similarity – chromosomes align at the equator of the cell/spindle fibres attach to centromeres; Difference – homologous pairs/bivalents line up in meiosis/single chromosomes line up in mitosis;</p>	[4]
	(b) Plant cells – a cell plate forms (along the centre of the cell); animal cells – a cleavage furrow forms (and the cell membrane invaginates);	[2]
	(c) (i) Spindle fibres do not form during prophase;	[1]
	(ii) Fewer/no chromosomes will align on the equator; due to movement blocked/lack of spindle fibres;	[2]
	(d) Vincristine; inhibits microtubule formation;	[2]
		11
5	<p>(a) Any pair: Layer B has chloroplasts; for maximum photosynthesis/light absorption; or Layer B are bigger/upright; for maximum light transmission; or Layer A is transparent/thinner/has no chloroplasts; for maximum light transmission;</p>	[2]
	(b) The greater the percentage of spongy mesophyll containing air spaces the greater the average rate of photosynthesis; more air spaces present for the diffusion/movement of carbon dioxide (to the palisade layer); (comparative language required)	[2]
	(c) The air spaces in 1 align with the stomata; more carbon dioxide can diffuse in;	[2]
	(d) (i) Magnolia have more stomata in total than Acacia; Both species have fewer stomata on the upper surface; to conserve water/reduce transpiration;	[3]
	(ii) $210 \div 230$; $0.931 \times 100 = 91.3\%$;	[2]
		11

			AVAILABLE MARKS
6	(a)	(i) There is always some solute in the cell contents/only water with no solutes has a potential of zero; pressure potential is positive as it is the pressure exerted by the cytoplasm/cell membrane pushing against the cell wall;	[2]
		(ii) $\Psi_{\text{cell}} = \Psi_s + \Psi_p$;	[1]
		(iii) -1150 kPa;	[1]
	(b)	(i) Vacuoles have a more negative water potential than the surrounding soil water; so they can still take in water (allow converse);	[2]
		(ii) Water potential in external environment is less negative; water will enter the cells; and will become turgid/will taste less salty;	[3]
			9
7	(a)	Any two from: • aerobic respiration • protein/lipid synthesis • intracellular digestion	[2]
	(b)	(i) A large number/of mitochondria; folded inner membrane/presence of cristae;	[2]
		(ii) Single membrane; very small organelles;	[2]
	(c)	Calcium pectate;	[1]
			7
		Section A	60

Section B

AVAILABLE
MARKS

8 (a) Indicative content

- primary structure consists of a sequence of amino acids
- polypeptide joined with peptide bonds
- the type of protein formed depends on the order of the amino acids or the primary structure/R-group will determine bonds formed in higher level structures
- secondary structure involves hydrogen bonds
- α -helix and β -pleated sheets are formed
- bonds twist the amino acid chains into helical/spiral shape/amino acid chains are (anti) parallel to each other
- tertiary structure gives the protein its 3D shape/further folding of the chain
- hydrogen bonds, ionic bonds, disulfide bridges and hydrophobic interactions are all involved (must mention at least 3)
- quaternary structure occurs if two or more polypeptides are involved
- conjugated proteins contain prosthetic groups
- which is a non-protein group

Band	Response	Mark
3	Candidates use the most appropriate specialist terms to clearly give an account of the structure of proteins. At least seven points must be made. Spelling, punctuation and grammar and the form and style are of a high standard.	[7]–[9]
2	Candidates sometimes use appropriate specialist terms to clearly give an account of the structure of proteins. At least four points must be made. Spelling, punctuation and grammar and the form and style are of a good standard.	[4]–[6]
1	Candidates only briefly give an account of the structure of proteins. At least one point must be made. Spelling, punctuation and grammar and the form and style are of a basic standard.	[1]–[3]
0	Response not worthy of credit.	[0]

[9]

(b) Indicative content

- globular proteins have metabolic roles
- globular proteins have a (specific) 3D/roughly spherical shape
- globular protein's specific 3D shape is vital for their role as enzymes/ antibodies/carrier proteins/membrane receptors
- fibrous proteins have structural/support roles/provide tensile strength
- fibrous proteins form sheets/strands/rope-like structures
- fibrous proteins (usually) have quaternary structures
- consisting of polypeptide chains wound around each other/held together by hydrogen bonds
- named example of classified protein, e.g. collagen (fibrous)/any named enzyme/haemoglobin (globular)

Band	Response	Mark
3	Candidates use the most appropriate specialist terms to clearly distinguish between fibrous and globular proteins. At least five points must be made. Spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
2	Candidates sometimes use appropriate specialist terms to clearly distinguish between fibrous and globular proteins. At least three points must be made. Spelling, punctuation and grammar and the form and style are of a good standard.	[3]–[4]
1	Candidates only briefly distinguish between fibrous and globular proteins. At least one point must be made. Spelling, punctuation and grammar and the form and style are of a basic standard.	[1]–[2]
0	Response not worthy of credit.	[0]

[6]

Section B

Total

**AVAILABLE
MARKS**

15

15

75