Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2017

Biology

Assessment Unit AS 1

assessing

Molecules and Cells

[AB111]

THURSDAY 25 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 Globular;
activation energy;
active site;
complementary;
induced fit; [5] 5

2 **(a)** Has one or more carbon-carbon double bonds/contains double bonds between carbon atoms; [1]

(b) **(i)** Glycerol; [1]

(ii) One fatty acid chain replaced with a phosphate group; [1]

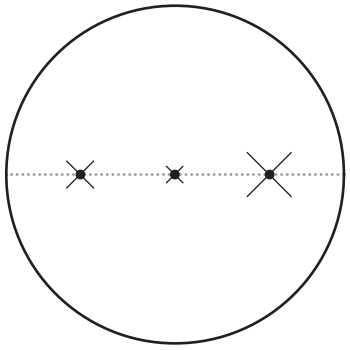
(c) **(i)** Synthesis: condensation;
breakdown: hydrolysis; [2]

(ii) Any **two** from:
- energy store/respiratory substrate
- insulation
- buoyancy
- organ protection
- water proofing [2] 7

3 **(a)** A. Mucosa;
B. Submucosa;
C. Muscularis externa;
D. Serosa; [4]

(b) C – peristalsis/contractions mix up the food and push it along the gut/ pendular movements;
D – protection/support; [2]

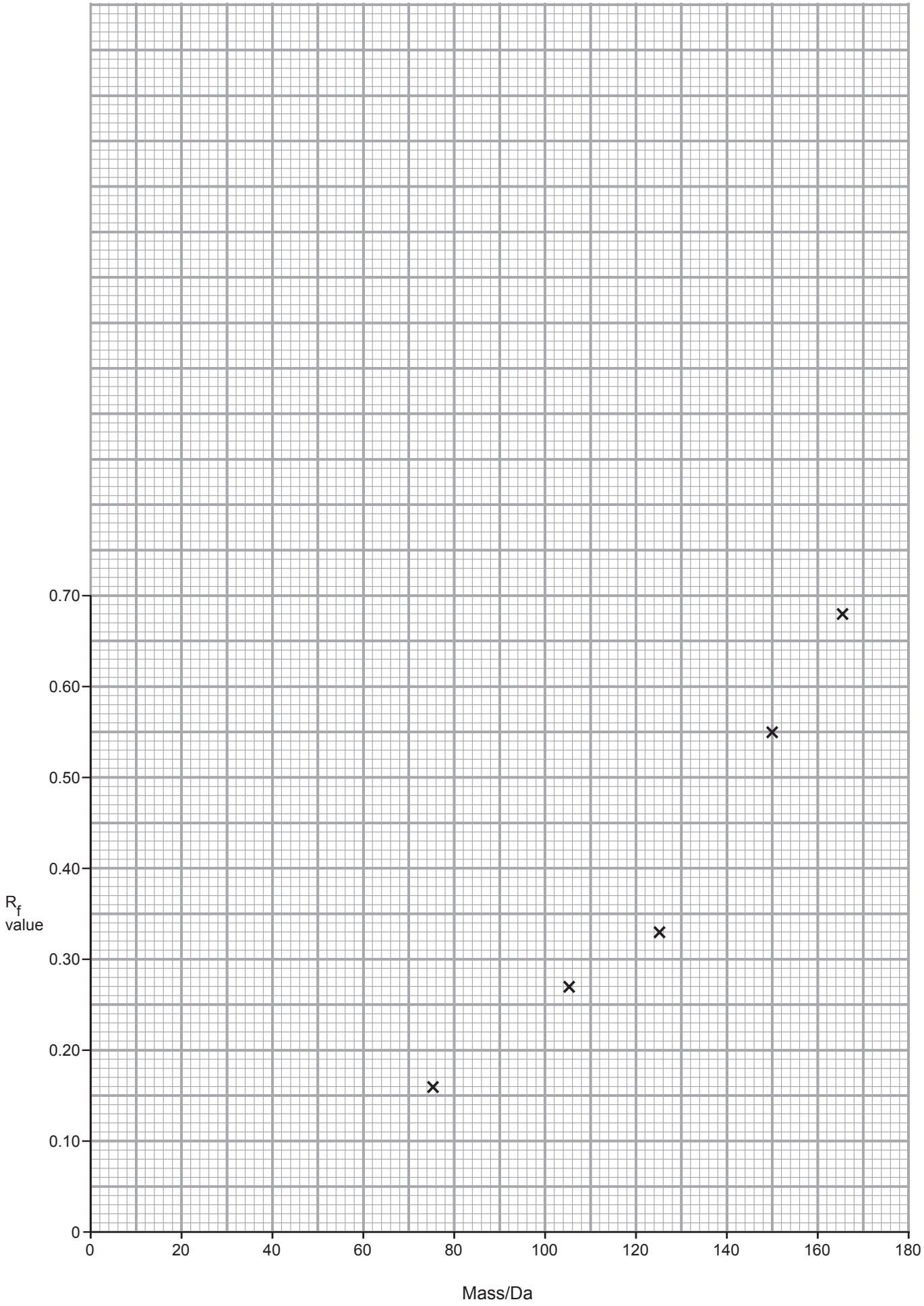
(c) Taken in different planes; [1] 7

				AVAILABLE MARKS
4	**(a)**	Metaphase;	[1]	
	(b)	One chromosome of each pair (any order); aligned with centromere on equator line; 	[2]	
	(c)	Independent assortment/random alignment of homologous chromosomes; resulting in new chromosome combinations in gametes; chiasmata; exchange of genetic information/recombination of genes between two chromatids/non sister chromatids/homologous chromosomes/new allelic combination;	[4]	
	(d)	Cleavage furrow/invagination/cytoplasm splits to form (two) daughter cells;	[1]	8
5	**(a)**	Calcium pectate; chlorophyll;	[2]	
	(b)	It consists of β-glucose monomers which join together to make straight chains/β1-4 bonds form; hydrogen bonds form cross-links between adjacent chains;	[2]	
	(c)	**(i)** Plasmodesmata/other appropriate response;	[1]	
		(ii) The thylakoids/grana may be destroyed/pushed to one side; less light can be absorbed (for photosynthesis);	[2]	
	(d)	Any two from: • both have double membrane • large internal surface area/many internal membranes • both contain DNA • both contain ribosomes	[2]	9

				AVAILABLE MARKS
6	**(a)**	**(i)**	Has a carbohydrate/sugar chain attached; [1]	
		(ii)	The net movement of water molecules from an area of higher water potential to an area of lower water potential, through a semi permeable membrane; [1]	
	(b)	**(i)**	Excessive; chloride ions are pumped out of cells/into lumen (due to action of the toxin); results in more negative/lower water potential in the lumen of the intestine; water follows by osmosis; [4]	
		(ii)	The water potential of the cell is decreased/becomes more negative; so water is drawn in/less water leaves the cells; [2]	
	(c)		Fewer chloride ions move out of the cell/more remain in the cells of the lung epithelium; so less water moves out of the cell/into the mucus layer; [2]	10

			AVAILABLE MARKS
7	**(a)**	Any **four** from: • make sure the chromatography paper is only handled at the edges/ use gloves when handling the chromatography paper/cut paper to fit the chromatography jar • draw a line a set distance from the bottom of the chromatography paper, above the solvent level • in pencil • ensure adequate spacing between each spot • make a concentrated spot for each amino acid/spot each amino acid three times [4]	
	(b) **(i)**	68 mm/100 mm; 0.68; [2]	
	(ii)	A different solvent was used to run this chromatogram/other appropriate response; [1]	
	(iii)	Taurine is not present (in the sample); [1]	
	(c) **(i)**	(Scatter diagram showing the) relationship between mass and Rf of amino acids; appropriate scaling; axes labelled including units; correct plotting of points (not joined by line); [4]	
	(ii)	Positive correlation between mass and Rf/the amino acids with the larger mass travel further up the chromatogram; larger amino acids are more soluble in the solvent used; [2]	14
		Section A	**60**

(Scatter diagram showing the) relationship between mass and Rf values of amino acids.



Section B

AVAILABLE MARKS

8 (a) Essential point plus any nine:

- the Polymerase Chain Reaction is used to amplify DNA
- sample is heated to 95 °C/hydrogen bonds are broken between strands of the double helix
- sample is cooled to between 40–60 °C
- primers are annealed to specific points on the DNA/allowing replication of DNA to begin
- solution is heated to 70 °C
- (free) nucleotides join to each strand by complementary base pairing rules/A–T, C–G
- thermostable DNA polymerase/Taq polymerase catalyses the formation of the new double helix
- many cycles of replication are carried out until sufficient quantities of DNA are produced
- the same restriction endonuclease enzyme is used to cut the sample and suspect DNA into different sized fragments/RFLP's
- primers are added to anneal either side of a known microsatellite repeat sequence/MRS within a RFLP
- RFLP's are separated by electrophoresis/larger RFLP's remain closer to the negative terminal (allow converse)
- use of radioactive/fluorescent probes complementary to the MRS
- **Essential point**: the distance moved and the density/thickness of the bars can be used to compare the amplified sample and suspect DNA
- other appropriate response [10]

(b) Any **three** from:

- precautions used to prevent cross contamination in the lab
- example of avoiding contaminant, e.g. wear gloves, secure storage
- amplification process will produce identical copies of DNA
- reference to control of specific temperatures
- amplify enough DNA to repeat tests [3]

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. Points are generally relevant and well structured. 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]

15

Section B **15**

Total **75**