GCE AS MARKING SCHEME

AUTUMN 2020

AS
BIOLOGY – COMPONENT 1
B400U10-1

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INTRODUCTION

This marking scheme was used by WJEC for the 2020 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

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EDUQAS AS COMPONENT 1
BASIC BIOCHEMISTRY AND CELL ORGANISATION

MARK SCHEME AUTUMN 2020

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statement. Award the middle mark in the level if most of the content statements are given and the communication statement is partially met. Award the lower mark if only the content statements are matched.

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Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
ecf = error carried forward
bod = benefit of doubt

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		Ester bond (1)	1			1		
		(ii)		Glycerol (1)	1			1		
		(iii)		A polymer is a chain of identical monomers/ triglyceride is not a chain/ ORA (1)	1			1		
		(iv)		Mix sample with ethanol and water (1) If triglyceride is present a {milky/ white} {precipitate emulsion} will form (1) Accept Sudan III/ alternative	2			2		2
		(v)		Saturated fatty acid (1) No c=c double bonds/ straight hydrocarbon chains (1)	1	1		2		
		(vi)		**Any 2 (x1) from** Increased LDL cholesterol levels (1) Increased incidence of atheroma/ plaque formation/ atherosclerosis (1) Reduces blood supply to heart muscle (1)	2			2		

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)			More energy (released per g) (1) Twice as much energy from 1g of lipid than carbohydrate / lipid releases 38 kj g^{-1}, carbohydrate releases 17 kj g^{-1} / correct use of data (1) Plant will germinate/ grow more quickly / smaller food store needed in seed/ seeds may be lighter (1)		2	1	3		
				Question 1 total	**8**	**3**	**1**	**12**	**0**	**2**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		Fluid mosaic model (1)	1			1		
		(ii)		(Water soluble) stain binds to phosphate heads (1) Because they are hydrophilic/ negatively charged (1) {Cannot bind to / repelled by} fatty acid tails/ hydrophobic centre / non polar (1)			3	3		
		(iii)		441/ 412 = 3 marks If incorrect award 2 marks for Actual diameter = $15 \times 10^6 / 34000$ 441.176 (not to nearest nm) OR Actual diameter = $14 \times 10^6 / 34000$ 411.7647 (not to nearest nm) If incorrect award 1 mark for Diameter on image = 15mm = 15×10^6 nm If measured inaccurately (e.g. 14.5mm) allow 2 marks for correct calculation (ECF)		3		3	3	
	(b)	(i)		Saprotrophic/ saprophytic (1)	1			1		
		(ii)		{Golgi apparatus / Golgi body} packages enzymes into vesicles (1) Vesicles move to cell surface membrane and fuse with cell membrane (1) release contents outside cell / exocytosis (1)	3			3		

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		(iii)		To produce large amounts of ATP (1) For protein synthesis / exocytosis (1)		2		2		
				Question 2 total	**5**	**5**	**3**	**13**	**3**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		Same {type of milk used/ pH of milk/ concentration of milk/ protein in milk} (1) Concentration of enzyme / protease (1)			2	2		2
		(ii)		Source of inaccuracy: Maintaining a constant temperature (1) + Use thermostatic / constant temperature water baths (1) Difficult to determine exactly when the milk has become clear (1) + Use a colorimeter to determine when the milk has become clear/ colour standard (1)			4	4		4
	(b)	(i)		Linear scale on both axes with values at origin (plots cover at least half of each axis) (1) x-axis labelled Temperature + unit and y-axis labelled mean time taken for milk to become clear + unit (1) correct plots (1) tolerance ± ½ small square plots joined (1) no extrapolation		4		4	4	4
		(ii)		**Any four (x1) from**: • The mean time taken for the milk to turn clear decreases until 42°C and then increases (1) • Due to increased kinetic energy (1) • Leading to more successful collisions/ owtte (1) • Ref to denaturing at higher temp / owtte (1) • Ref to optimum temperature (1)		4		4		4

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)		Tertiary/ Quaternary (1) (Structure maintained by) hydrogen/ ionic/ disulphide bonds/ hydrophobic interactions – any 2 (1)	2			2		
		(ii)		The shape is globular / specific (3D) shape (1) Reference to active site being complementary to substrate (1)	2			2		
				Question 3 total	**4**	**8**	**6**	**18**	**4**	**14**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		Protein/ glycoprotein/ carbohydrate (1)		1		1		
		(ii)		Phagocytosis (1)	1			1		
	(b)	(i)		Adenine+Thymine **and** cytosine+guanine (1) Hydrogen (1)	2			2		
		(ii)		2000 (2) 6800 x 10 / 34 (1)		2		2	2	
		(iii)		**Any four (x1) from:** • Cutting the DNA may disrupt genes (1) • Therefore genes will not be transcribed / {no/ different} mRNA produced (1) • No translation/ different polypeptide produced (1) • Proteins non functional/different function (1) • Cell fragments may not contain ribosomes/ golgi bodies (1)		4		4		
				Question 4 total	**3**	**7**	**0**	**10**	**2**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		P: Anaphase Q: Prophase R: Metaphase All correct for 1 mark		1		1		
		(ii)		Root tip is a growing region of the plant/ meristem (1) Many cells undergoing mitosis/ high rate of mitosis (1)	2			2		
	(b)			Interphase (1) more cells in T than in any other stage so this is the longest stage in the cell cycle (1)		2		2		
	(c)	(i)		Metaphase (1) Spindle microtubules cannot form so chromosomes cannot align (1) OR anaphase (1) chromatids cannot be separated OWTTA (1) OR Prophase (1) Spindle cannot form (1)		2		2		
		(ii)		Prevents cell division (1) {Growing regions/roots/shoots} would be most affected/ Plants would be {small / underdeveloped}/ plants can't grow (1)			2	2		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)		56 (1)		1		1		
		(ii)		Using mitosis daughter plant genetically identical to the parent plant (1) if meiosis was used it would result in increased genetic variation (1) mitosis - Favourable genes passed on to daughter plant / desirable characteristics retained / ORA for meiosis (1) Accept reference to support for new plant from parent plant/ faster production			3	3		
				Question 5 total	**2**	**6**	**5**	**13**	**0**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6				• Human cell's genetic material is DNA, virus has only RNA • Human cell has a cell membrane, virus has capsid • Human cell has nucleus with nuclear envelope, virus does not have a nucleus • Human cell has mitochondria, ribosomes, Golgi, rough/smooth E.R. (named organelle), virus has no organelles • Human cell has chromosomes, virus does not • RNA released from virus capsid inside host cell • RNA polymerase enzyme 'reads' base sequence on virus RNA • Free RNA nucleotides pair up with nucleotides on virus RNA • Complementary base pairing / C pairs with G, U pairs with A • RNA polymerase catalyses formation of RNA molecule • (Replicated) virus RNA attaches to ribosome • tRNAs match anti-codon to codons on virus RNA/ complementary base pairing • tRNAs bring amino acids to ribosome • amino acids joined by peptide bonds to form polypeptide • role of other cell organelles	5	4	0	9		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks Indicative content of this level is… Detailed comparison of the structure of virus and host cell Detailed explanation of virus RNA replication Detailed explanation translation of virus RNA *The candidate constructs an articulate, integrated account, correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses scientific conventions and vocabulary appropriately and accurately.* **4-6 marks** Indicative content of this level is… Any two from: Description of the structure of virus and host cell Explanation of virus RNA replication Explanation of translation of virus RNA *The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate usually uses scientific conventions and vocabulary appropriately and accurately.*						

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				1-3 marks Indicative content of this level is… Brief description of the structure of virus and host cell OR Brief explanation of virus RNA replication OR Brief explanation translation of virus RNA *The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate has limited use of scientific conventions and vocabulary.* **0 marks** *The candidate does not make any attempt or give a relevant answer worthy of credit.*						
				Question 6 total	**5**	**4**	**0**	**9**	**0**	**0**

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COMPONENT 1: BASIC BIOCHEMISTRY AND CELL ORGANISATION

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	**8**	**3**	**1**	**12**	**0**	**2**
2	**5**	**5**	**3**	**13**	**3**	**0**
3	**4**	**8**	**6**	**18**	**4**	**14**
4	**3**	**7**	**0**	**10**	**2**	**0**
5	**2**	**6**	**5**	**13**	**0**	**0**
6	**5**	**4**	**0**	**9**	**0**	**0**
TOTAL	**27**	**33**	**15**	**75**	**9**	**16**

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