GCE AS MARKING SCHEME

SUMMER 2019

AS (NEW)
BIOLOGY - COMPONENT 1
B400U10-1

© WJEC CBAC Ltd.

INTRODUCTION

This marking scheme was used by WJEC for the 2019 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.

© WJEC CBAC Ltd.

EDUQAS AS COMPONENT 1
UNIT 1 - BASIC BIOCHEMISTRY AND CELL ORGANISATION

MARK SCHEME SUMMER 2019

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.

© WJEC CBAC Ltd.

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

© WJEC CBAC Ltd.

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		Purine (1) NOT named purine	1			1		
		(ii)		**Any three (×1) from:** Found in (all cells, of)all organisms (1) (Common) source of energy (in reactions) (1) High energy bonds/ Energy stored in bonds between phosphate ions (1) released when {bonds between phosphate break / hydrolysed} / exergonic (1)	3			3		
		(iii)		Adenosine (1) Guanine (1)	1	1		2		
	(b)	(i)		Mitochondria **and** chloroplasts (1)	1			1		
		(ii)		Endergonic + energy needed for reaction (1)	1			1		
		(iii)		14.2 ($kJmol^{-1}$)		1		1	1	
				Question 1 total	**7**	**2**	**0**	**9**	**1**	**0**

© WJEC CBAC Ltd.

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			Same molecular formula, different {arrangement of atoms/ structure} (1)		1		1		
	(b)	(i)		**X** amino acid **and Y** fatty acid (1) Accept carboxylic for **Y**	1			1		
		(ii)		Variable / functional group (1)	1			1		
		(iii)		Lipids (1) Accept fats **and** oils shake with Ethanol, in equal volume of water (1) Becomes white cloudy / forms emulsion (1) Accept correct alternative eg: Sudan III (1) forms red layer / film on surface (1) / filter paper test,goes translucent (1)	3			3		3
		(iv)		Accept range between 261 248 to 268 083 (μm^3) 2 marks $\frac{4}{3}\pi.40.^3$ 1 mark Accept standard form		2		2	2	
		(v)		White fat cell: large lipid vacuole + thermal insulation (1) Brown fat cell: Many mitochondria + release heat during respiration (1)			2	2		
				Question 2 total	**5**	**3**	**2**	**10**	**2**	**3**

© WJEC CBAC Ltd.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		Bond X: glycosidic (1) ignore reference to bond number Reaction: hydrolysis (1)	2			2		
		(ii)		C_1 has hydroxyl group {above / upwards orientation} (1)	1			1		
	(b)	(i)		Shape: Galactose is similar to {lactose/ substrate} / complementary to <u>active site</u> **and** prevent {successful collisions/ enzyme substrate complexes} (1)		1		1		
		(ii)		Correct data points (1) Correct line (1)		2		2	2	2
		(iii)		Rate reduced at lower concentration (1) Accept ORA Reach the same rate at high concentration as 'without inhibitor' (1)			2	2		2
		(iv)		Reduced rate at all concentrations/ maximum rate not achieved (1)		1		1		
	(c)	(i)		{Stability/ protection} from {increased / higher} temperature / more energy required to overcome weak bonds/ Reference to bonds forming stability (1) shape of <u>active site</u> is maintained at higher temperatures (1)		2		2		
		(ii)		Substance used for immobilisation must not affect the shape of the active site / does not react with enzyme or substrate (1)		1		1		
				Question 3 total	**3**	**7**	**2**	**12**	**2**	**4**

© WJEC CBAC Ltd.

<table>
<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>4</td><td>(a)</td><td>(i)</td><td></td><td>All three for 1 mark,
mRNA D
tRNA C
rRNA E</td><td>1</td><td></td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td><table><tr><th>Base Sequence</th><th>Name of the sequence</th><th>Bases in the sequence</th></tr><tr><td>X</td><td>codon</td><td>UUU</td></tr><tr><td>Y</td><td>anticodon</td><td>GAC</td></tr></table>All four correct for 2 marks
Any 2 for 1 mark</td><td></td><td>2</td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>{Three bases / codon} code for one amino acid (1)
Change in sequence of bases, could result in a different amino acid/ ref to different tRNA molecule binding (1)
May result in a difference in the sequence of amino acids (in the polypeptide chain) (1)</td><td></td><td>3</td><td></td><td>3</td><td></td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td></td><td>Some proteins are made of more than one polypeptide/ some genes code for more than one polypeptide (1)
Not all proteins are enzymes (1)</td><td></td><td>2</td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>(d)</td><td></td><td></td><td><u>DNA helicase</u>,{unzips DNA helix / breaks hydrogen bonds between complementary base pairs} (1)
One strand of DNA acts as a template / exposing unpaired bases (1)
<u>RNA polymerase,</u> adding complementary (RNA) nucleotides or named examples and forming bonds between them (1)</td><td>3</td><td></td><td></td><td>3</td><td></td><td></td></tr>
</table>

© WJEC CBAC Ltd.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(e)	(i)		Coding: exon **and** Non-coding: intron (1)	1			1		
		(ii)		Splicing: (cutting the pre-mRNA), to remove introns and join exons (1) More than one / alternate arrangements of {exons / mRNA} can be made (1) Each protein has a unique sequence of amino acids/ protein folded differently / globular / tertiary structure (1)		1	2	3		
				Question 4 total	**5**	**8**	**2**	**15**	**0**	**0**

© WJEC CBAC Ltd.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		Domain: Eukaryota (1) A: Eukarya Kingdoms: Fungi, Plantae, Animalia (1)	2			2		
	(b)	(i)		Female: 8 (1) Male: 64 (1)		2		2		
		(ii)		**Meiosis** Genetic variation / production of haploid cells (1) Accept Halving the chromosome number **Mitosis** Large numbers of gametes (1)		1	1	2		
		(iii)		Asexual reproduction produces clones by mitosis (1) Any **two** (×1) from Genetic variation achieved by random sperm fertilising with random egg / random parents (1) {Crossing over / chiasmata} (during prophase I of meiosis) (1) Independent assortment (at equator during metaphase I and II) (1)	3			3		
				Question 5 total	**5**	**3**	**1**	**9**	**0**	**0**

© WJEC CBAC Ltd.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		Water is a polar molecule and the {centre of the membrane/ fatty acids are} hydrophobic region (1)	1			1		
		(ii)		S is non-polar/ hydrophobic (R groups) as it is adjacent to the fatty acids (1)		1		1		
	(b)	(i)		At incipient plasmolysis pressure potential = 0 because cell membrane is just pulled away from cell wall (1)		1		1		
		(ii)		Between -1 053 and -1 321 (kPa) (1)		1		1	1	1
		(iii)		plot, percentage plasmolysed against solute potential (of solution) / solute potential on X axis and % plasmolysed on Y axis (1) read down from 50% plasmolysed to solute potential (this is also the water potential) (1)			2	2	2	2
		(iv)		Any **one** from each Reliability: {observe more pieces of onion (tissue from each solution) / count more cells (in each piece of tissue)} AND calculate a mean Accuracy: narrower range {around 50% plasmolysis/ 0.4-0.6} (1)			2	2		2
		(v)		S = turgid T = plasmolysed	1			1		1
		(vi)		External {solute/water} potential more negative than cell {solute /water} potential (1) (So) water moves out of cell by <u>osmosis</u> (1)		2		2		
				Question 6 total	**2**	**5**	**4**	**11**	**3**	**6**

© WJEC CBAC Ltd.

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
7	Comparison to prokaryotes - Presence of circular DNA used for self-replication - Presence of 70S ribosomes used for production of proteins - Double membrane (cf prokaryotes) - Comparable size (1 – 10 μm) - Chloroplasts share presence of chlorophyll similar to photosynthetic bacteria - Bacteria have mesosomes which may be involved in cellular respiration similar to cristae Endocytosis - Infoldings / extensions of plasma membrane to form vesicle - Organelles engulfed / membrane surrounds organelles - Double membrane produced / Bacterial cell membrane surrounds organelle membrane - Vesicle formed and moves through cell, taking in organelles - Organelles eventually a permanent feature of cell Endosymbiotic advantages - Initially provided a temporary benefit, eventually became an evolutionary advantage. - Compartmentalisation - Protection of mitochondria and chloroplasts - Raw materials supplied to the organelles - Internalised nutrient supply for bacteria via photosynthesis - Internalised energy source		5	4	9		

© WJEC CBAC Ltd.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks Indicative content of this level is… Detailed account of all three areas *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… Detail from any two areas or less detailed account from three areas *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.*						

© WJEC CBAC Ltd.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				1-3 marks Indicative content of this level is… Content from any one area *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	**0**	**5**	**4**	**9**	**0**	**0**

© WJEC CBAC Ltd.

COMPONENT 1: BASIC BIOCHEMISTRY AND CELL ORGANISATION

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	**7**	**2**	**0**	**9**	**1**	**0**
2	**5**	**3**	**2**	**10**	**2**	**3**
3	**3**	**7**	**2**	**12**	**2**	**4**
4	**5**	**8**	**2**	**15**	**0**	**0**
5	**5**	**3**	**1**	**9**	**0**	**0**
6	**2**	**5**	**4**	**11**	**3**	**6**
7	**0**	**5**	**4**	**9**	**0**	**0**
TOTAL	**27**	**33**	**15**	**75**	**8**	**13**

© WJEC CBAC Ltd.