GCE A LEVEL MARKING SCHEME

AUTUMN 2020

A LEVEL
BIOLOGY - COMPONENT 1
A400U10-1

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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 A LEVEL COMPONENT 1
ENERGY FOR LIFE

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)		Absorption peak blue and red /peaks at 425 and 675 (1) less absorption in green/ minimal absorbance between 480-650 (1)	1	1		2		
		(ii)		Absorb over a greater range/ increased {rate/ efficiency} of photosynthesis NOT All light	1			1		
	(b)	(i)		Nitrogen/ magnesium (1)	1			1		
		(ii)		Hydrophobic tail + fatty acid hydrophobic regions membrane (1) Head hydrophilic (1) Holds chlorophyll head in optimum position for absorption of light (1) Accept reference to polar/ non-polar			3	3		
	(c)			Photolysis (1) Description or equation of (1)	2			2		
	(d)			No light for chlorophyll a (1) Chlorophyll b absorbs in blue region of spectrum only light to penetrate to this depth (1)			2	2		
	(e)	(i)		Ratio = 10 : 1 = 3 marks Ratio = 1.1304 : 0.1130 = 2 marks If incorrect award 1 mark for either of SA 4 x3.14 x 0.09. = 1.1304 (1) Vol 4/3 x 3.14 x 0.027 = 0.1130 (1)		3		3	3	

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		Any **three** (×1) from: Has a very large SA : Vol ratio. (1) Larger area for nutrients to diffuse (1) Small diameter (1) Short diffusion distance (1)	1		2	3		
	(f)	(i)		Stain with crystal violet (1) Decolourise with alcohol/ ethanol (1)	2			2		2
		(ii)		Gram -ve + outer lipopolysaccharide layer (1)	1			1		1
				Question 1 total	**9**	**4**	**7**	**20**	**3**	**3**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	*(a)*	(i)		Primary: Sequence of amino acids Secondary: Coiled into an alpha helix/ beta pleated sheet Tertiary, folded into a 3D shape Accept globular shape Quaternary, Two or more polypeptides joined together. **All** correct = **2** marks **2** correct = **1** mark	2			2		
		(ii)		Any **two** (×1) from Linear (1) triplet (1) nonoverlapping (1) degenerate (1) unambiguous (1) universal code (1)	2			2		
		(iii)		2		1		1		
	(b)	(i)		RUBP (1) CO_2 (1)		2		2		
		(ii)	I	Triose Phosphate	1			1		
			II	Nucleotide/ named nucleic acid	1			1		
			III	Amino acid/ protein	1			1		
				Question 2 total	**7**	**3**	**0**	**10**	**0**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	*(a)*			Anabolic reactions: protein synthesis / condensation reaction/ AVP (1) Catabolic reactions: digestion/ respiration/ hydrolysis/ named reaction		2		2		
	(b)	(i)		Energy is derived directly from a reaction/ break down of substrate (1) to combine ADP and Pi (1)	2			2		
		(ii)		Any **three** (×1) from H^+ flow from intermembrane space to matrix (1) through stalked particle/ protein channels (1) Energy provided to ATP synthase (1) ADP + Pi = ATP (1)	3			3		
	(c)			ATP binds to allosteric site / to enzyme but not to active site (1) Changes shape of active site. (1)		2		2		
	(d)	(i)		less proton gradient (1) therefore there are less protons to ATP synthetase so produce less ATP (1)			2	2		
		(ii)		Any **three** (×1) from Peppers increase release of heat energy, (increasing body temperature) (1) Increased sweating to reduce body temperature (1) BAT cells are found in the neck, shoulders and chest (1) Increased blood flow causing reddening (1)			3	3		
				Question 3 total	**5**	**4**	**5**	**14**	**0**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	*(a)*			1850-1950. stationary phase/ Carrying capacity/ or description of **and** sustainable fishing/ owtte (1) 1970 – 1990 rapid population decline/ population crash **and** overfishing (1) 1990 – 2010. Population recovery **and** due to banning of cod fishing (1)		3		3		
	(b)	(i)		Any **four** (×1) from Would have very little effect. (1) Bigger mesh size still catches older fish (1) Egg production reaches maximum at 12 years (1) Older fish produce far more eggs (1) Eggs from older fish far more likely to develop into embryos (1) ref to data. (1)			4	4		
		(ii)		Any **two for one mark from** Restrict fishing period/ Seasonal restrictions Have protected areas where no fishing Limit size of catch/ quotas Restrict number of boats	1			1		

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	(c)			**Any 5 (x1) from** A. More cod in a restricted area (1) B. Results Increase levels of ammonia / nitrates/ nitrites/ because of excretion (1) C. Eutrophication/ or description of (1) D. {Nitrates/ CO_2} increase rate of growth algae and plankton. (1) E. Increase CO_2 levels/ Oxygen depletion /decreased pH because of respiration (1) F. Death / faeces/ nutrients impact on numbers in food chain			5	5		
	(d)			Secondary succession (1) sediment/ organic matter still present (1) Larval stages/ seeds/ roots still present/ owtte (1)	1	2		3		
	(e)			increase temperature of water (1) one effect change to currents/melting ice caps/ affects distribution marine organisms/ Coral bleaching (1) OR Acidification/ lowering pH (1) corals die / crustacea exoskeleton / mollusc shell (1)	2			2		
				Question 4 total	**4**	**5**	**9**	**18**	**0**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	*(a)*	(i)		8.7×10^6		1		1	1	
		(ii)		C Overlapping. (1) E Statistically unsound/error in count cause large % error/ count unreliable Owtte (1) NOT inaccurate/ not representative		2		2		
	(b)			Different nutrients would affect growth rate (1) Different incubation periods would result in different colony sizes/ risk of merging (1) Variation of controlled variables will affect DV (1)		2		2		
	(c)			Temperature above boiling point	1			1		
	(d)			37 ºC. (1) Accept range 35 - 38 ºC anaerobic (1)		1	1	2		
				Question 5 total	**1**	**6**	**1**	**8**	**1**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	*(a)*	(i)		Prevent coloured fluid being pushed out		1		1		1
		(ii)		Equilibration of pressure inside apparatus Accept acclimatise		1		1		1
		(iii)		Ensure only anaerobic respiration/ use up all the oxygen		1		1		1
	(b)			CO_2 levels go up. (1) Pressure goes up/ pushes {meniscus/ fluid} down (1)		2		2		2
	(c)			Repeated with boiled and cooled yeast. (1) Keep all other conditions the same. (1) Control required to show that effects are being caused by yeast and no other factor. (1)		3		3		3
	(d)	(i)		SD = 3.54 (3) Award 2 marks for $\sqrt{\frac{50}{4}}$ Award 1 mark for $\sum(x-\bar{x})^2 = 50$		3		3	3	3
		(ii)		Headings, Time taken for meniscus to move 10 mm. Substrate / type of sugar (1) Units seconds / s. (1) reject secs SD transferred to same number of dp as rest of table (1)		3		3		3

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		Standard deviation indicates deviation from mean. (1) Any two (x1) from Smaller SD more reliable results. (1) Fructose results least reliable + glucose most. (1) OR Results from glucose and fructose are not significantly different as they overlap (1) Results from sucrose is significantly different to the other two (1) NOT accuracy		2	1	3	3	3
	(e)			Sucrose is a disaccharide (1) must be broken down / hydrolysed. (1)		2		2		2
	(f)			Would not move (1) Equal volumes of carbon dioxide produced as oxygen used/ no net change in volume (1)			2	2		1
				Question 6 total	**0**	**18**	**3**	**21**	**6**	**20**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7				**A. Energy flow and loss at each trophic level,** • Energy from the sun converted into energy in organic molecules by plants/ GPP • Plant breaks down sugars by respiration/ NPP • Energy in form of organic molecules is then passed from one trophic level to the next through the food chain when organisms are eaten. • Energy lost by plants e.g. energy lost by radiation/ reflection (not all wavelengths absorbed/ heat of evaporation. • Energy lost by animals e.g. Respiration/ Excretion/ Egestion; Energy which is left in form of organic molecules are stored or used for growth and available for the next trophic level. **B. Efficiency of transfer:** • Cellulose and lignin not easy to digest. • Large loss by egestion. • Protein and fats easy to digest, very little energy lost by egestion. • Higher energy lost by excretion ref urea. Egestion bone feathers. • High respiratory rate energy for movement. • Use of data	4	5	0	9		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				C. Improvement. • Grow varieties of autotrophs with higher GPP. • Breed animals with higher efficiency; • Animal feeds with less cellulose; • high energy supplements; • Reduce respiration by e.g. Reducing movement/ Warm buildings • Disease free; **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.*						

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				4-6 marks Indicative content of this level is detailed account of two areas or less detailed account of 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.* **1-3 marks** Indicative content of this level is any point of indicative content *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 7 total	**4**	**5**	**0**	**9**	**0**	**0**

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COMPONENT 1: ENERGY FOR LIFE

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	9	4	7	20	3	3
2	7	3	0	10	0	0
3	5	4	5	14	0	0
4	4	5	9	18	0	0
5	1	6	1	8	1	8
6	0	18	3	21	6	20
7	4	5	0	9	0	0
TOTAL	**30**	**45**	**25**	**100**	**10**	**31**

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