GCE A LEVEL MARKING SCHEME

SUMMER 2024

A LEVEL
BIOLOGY – COMPONENT 2
A400U20-1

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About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

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EDUQAS GCE A LEVEL BIOLOGY

COMPONENT 2: CONTINUITY OF LIFE

SUMMER 2024 MARK SCHEME

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)		**Any two (x1) from** • {stimulates the growth / owtte} of the uterus (to accommodate the growing foetus) (1) • stimulates the {growth / development} of the mammary glands (during pregnancy) / owtte (1) • inhibitory effect on {FSH / LH} (1)	2			2		
		(ii)		Maternal blood in {direct contact / bathes} with chorionic villi / fewer membranes(1) Shorter diffusion distance (1)		2		2		
	(b)	(i)		It measures variation around the mean / how varied the sample is from the mean		1		1	1	1
		(ii)		{SD / it} takes {the sample size into account / all values into account not just the highest and lowest / owtte} / range includes {outliers / owtte} / largest or smallest may be anomalies /		1		1	1	1
		(iii)	I	Award three marks for 2.5 cm thick (2.501) **If incorrect award two marks** 25 mm 1227/3.14x156.25 1227/3.14x12.5 x12.5 **If incorrect award one mark** 1227/3.14x 625 (diameter) 0.62 (use diameter)		3		3	3	
			II	Second Trimester (1) Ecf from calculation ECF: 1*st*: 8.8 – 16.2 2*nd* 19.6 – 30.8 3*rd* 31.3 – 45.5			1	1		

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iv)		**Any three (×1) from** A. The conclusion is not reliable for {weeks / gestational ages} because standard deviations overlap (1) B. better for trimesters as standard deviations don't overlap / only useful in the middle of a trimester(1) C. the mean placental thickness {is the same / decreases} between some weeks / or example of data comparing thickness(1) D. fewer trimesters so less chance of overlap / many weeks so more chance of overlap (1) E. Less data available for 1st trimester / owtte Allow one mark for conclusion not reliable for weeks but is reliable for trimester (no reference to SD)(F)			3	3		2
	(c)	(i)		**Both correct for 1 mark** **A** (Umbilical) vein **B** (Umbilical) artery		1		1		1
		(ii)		molecules — A or B oxygen and glucose — A urea — B **One mark for two correct**		1		1		
	(d)	(i)		(Stimulates) contraction of {uterus (wall) / myometrium} (1) ignore endometrium	1			1		
		(ii)		(Stimulates) production of milk (1)	1			1		
	(e)			Umbilical cord only contains cells from baby / placenta is mother and baby's cells.		1		1		
				Question 1 total	**4**	**10**	**4**	**18**	**5**	**5**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		**Any two (×1) from** • Cannot match samples and individuals (1) • volunteers wouldn't know if they had {problem / owtte} genes (1) • they will not be discriminated against / refused {life insurance / job opportunities} (1)		2		2		2
		(ii)		**Any two (×1) from** • Locates "problem" genes (1) • it will allow greater use of gene therapy (1) • {Tailoring / targeting} treatment to an {individual / specific condition} (genomic medicine) (1)		2		2		
	(b)	(i)		Contains more than one polypeptide {bonded / joined} together	1			1		
		(ii)	I	{They / introns} are non- coding regions / only exons code / introns {are removed / ref to splicing}		1		1		
			II	same amino acid may be coded for by more than one triplet / DNA code is degenerate (1) Accept different codon for same amino acid		1		1		
	(c)	(i)		312 Allow for stop/ start codon 315/ 318		1		1		
		(ii)		All organisms {respire / use ATP/ have cytochrome c} / not all have haemoglobin		1		1		

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)		Used to break the hydrogen (allow H) bonds.		1		1		
		(ii)		more closely related (to chimps than orangutans) / share more recent common ancestor / ORA (1) More similar DNA (base sequences) / more complementary bases / ORA (1) So more hydrogen bonds {form / need to be broken} / ORA (1)		2	1	3		
		(iii)		(Same species) have different {alleles / base sequences / introns} / Some may have mutations		1		1		
	(e)			Human cells do not have cell wall (1)		1		1		1
				Question 2 total	**1**	**13**	**1**	**15**	**0**	**3**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		<u>mitochondria</u> are {needed for / site of} <u>oxidative phosphorylation</u> (1) Therefore they {do not have / have fewer} co-enzymes (from oxidative phosphorylation and so are not protected) (1)			2	2		
		(ii)		**Any two for one mark** DNA / RNA / ATP / NAD / FAD / ADP / AMP / NADP	1			1		
	(b)	(i)		(Expression /appearance /characteristic due to) genes / genotype / allele(s) (1) environment / epigenetics (1)	2			2		
		(ii)		{Parents without deficiency / carriers / mothers } have {offspring / sons} with deficiency / owtte} (1) Example : (1 and 2) produce 6 / (3 and 4) produce 9 / (7 and 8) produce 11 (1)		2		2		
		(iii)		4 $X^G X^g$ 5 $X^G Y$ 6 $X^g Y$ 10 $X^G X^G$ **and** $X^G X^g$ All 4 correct = 3 3 correct =2 2 correct = 1		3		3		
		(iv)		1 in 4 / 25% / 0.25 / ¼ NOT 1:4		1		1	1	
				Question 3 total	3	6	2	11	1	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			Breed the offspring (1) If young are produced offspring are fertile (1)	2			2		
	(b)	(i)		0.847 = 2 marks 0.846875 0r 0.85 = 1 mark		2		2	2	
		(ii)		(Fish) may be different {sizes / volume / mass}		1		1		1
		(iii)		More {energy / ATP} (1) To be used for {growth / reproduction / correct named process} (1) OR Less energy needed (1) Doesn't need to eat as much food (1)			2	2		
		(iv)		In different areas / geographical isolation / there is a physical barrier (1) Which prevents interbreeding / gene flow (1)	2			2		
		(v)		**Any two (x1) from** • {Changes in allele frequencies / loss of an allele} are due to chance (1) • (a small population / gene pool) is more susceptible to {small / random} changes / Small change in gene pool can result in large changes in allele frequency / owtte (1) • easier for alleles to be lost from the gene pool (in small populations) (1)	2			2		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			• (Increased methylation leads) to {non-production of eyes / blindness} (1) • Switches genes off / genes not expressed / or description of effect of methylation / {prevents / less} transcription (which are needed to produce eyes) (1) • epigenetic (factor) (1)	1		2	3		
				Question 4 total	**7**	**3**	**4**	**14**	**2**	**1**

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<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>5</td><td>(a)</td><td>(i)</td><td></td><td>Must be comparable statements:<table><tr><td>Saturated</td><td>Unsaturated</td></tr><tr><td>No {Carbon-carbon double bond / C=C bonds} / has C-C bonds</td><td>Has C-C double bond / C=C bonds} (s) /</td></tr><tr><td>{More / maximum} H</td><td>Less H</td></tr></table></td><td>1</td><td></td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>Add Biuret AND turns (from blue to) {violet / purple / lilac}
Accept copper sulfate + sodium hydroxide
Reject heat</td><td>1</td><td></td><td></td><td>1</td><td></td><td>1</td></tr>
<tr><td></td><td>(b)</td><td></td><td></td><td>Any two (×1) from
• (Results in) dispersal / owtte (1)
• Reduces competition / more chance of new plant growing / owtte (1)
• (Seed underground) so escapes fire / has better conditions for growth / owtte} (1)
• Prevents seed being eaten (by other animals) (1)</td><td></td><td></td><td>2</td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td></td><td>allows {imbibition / water to enter} (the seed) (1)
for aqueous reactions to take place / mobilisation of enzymes (1)
OR
Allows oxygen into the seed (1)
for (aerobic) respiration / to make ATP (1)
MP2 linked to MP1</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>More light available / {less / no} competition for light (1)
{Ash / burnt remains} provides {nutrients / minerals} (1)</td><td></td><td></td><td>2</td><td>2</td><td></td><td></td></tr>
</table>

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)			**Any three (x1) from:** (Nitrites / nitrates) enter the {water / rivers / lakes} (1) (nitrites) converted to nitrates (1) Used in {protein / DNA / named nitrogenous compound} production (1) Resulting in {cell division / increased reproductive rate} (1)	2	1		3		
				Question 5 total	**4**	**3**	**4**	**11**	**0**	**1**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		Metaphase	1			1		1
		(ii)		**Any three (×1) from** • replication of DNA (1) • {Organelles / named organelles} produced (1) • {Protein / enzyme} synthesis (1) • {RNA / nucleotide} synthesis (1) • {respiration / ATP synthesis} (1) Ignore growth	3			3		
	(b)	(i)		Explanation must refer to method **Reliable:** Count many cells / fields of view / larger sample size / owtte (1) To calculate a mean (1) **Accurate:** Method of dealing with parts of cells at edge / ref to half cells / description of (1) To Standardise count / owtte (1) OR Use well stained / owtte / thin enough samples (1) To ensure (correct) identification of stages (1) OR Using higher {magnification / resolution} (1) To ensure (correct) identification of stages (1)			4	4		4
		(ii)		Award two marks for 4.79 If incorrect award one mark for 4.789 25 / 522 x 100		2		2	2	2
		(iii)		(Faster growing so has) {more cells in mitosis / less in interphase}		1		1		

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iv)		**Any three (×1) from** Breed (1) Age (1) Diet (1) Fitness / exercise (1) Disease / genetic disorder / Something other than cancer may have killed the dog. (1) Stage of diagnosis / stage of treatment / different treatments (1)			3	3		3
	(c)	(i)		Award two marks for 498 / 499 If incorrect award one mark for any one of: 498.45 / 498.39/ 498.40 0.05 × 24 = 1.2 2.72 ×1.2 = 3.320 150 × 3.323 150 x $2.72^{0.05 \times 24}$ 498.0175 / 498.02 (done on calculator with e^x)		2		2	2	
		(ii)		Less (access to) {nutrients / named nutrients} (for growth) / some cells {may die / killed} / reference to role of immune system		1		1		
	(d)	(i)		Fastest growing take up greatest amounts of thymine. (1) (as cells dividing most) synthesise DNA (1)			2	2		
		(ii)		Thymine is {only present in DNA / not in RNA} (1) Guanine is present (in DNA and) RNA (1) Accept T and G for the bases		2		2		
	(e)			Faster results / easier method. Cost / safety for vets			1	1		
				Question 6 total	**4**	**8**	**10**	**22**	**4**	**10**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7				mRNA: A1 take mRNA from a <u>cell producing GFP</u> A2 reverse transcriptase A3 used to produce {cDNA strand / cDNA fragment / complementary single stranded DNA} A4 DNA polymerase A5 used to produce double stranded DNA Problems overcome: B1 No need to locate gene (on jellyfish chromosome) B2 Restriction enzymes / endonucleases (not used) B3 which could cut GFP gene {making it useless / into non-functional fragments} B4 Removes the problem of introns B5 Removes the problem of post-transcriptional {processing / splicing / modification} (to produce functioning mRNA) Gene therapy C1 (GFP) {gene / marker} can be combined with {desired / functioning human / owtte} gene C2 {Cells / bacteria} containing the {functioning gene / recombinant / owtte} can be identified C3 these {Cells / bacteria} are allowed to replicate C4 Cells without gene discarded C5 Stops the problem of antibiotic resistance (genes) being passed to other organisms / ORA / antibiotic resistance (genes) cannot be used in human cells / C6 Faster (than using antibiotic resistance markers)	7	2	0	9	0	0

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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 content from 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 detailed content from two 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 correct statement from the 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	**7**	**2**	**0**	**9**	**0**	**0**

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COMPONENT 2: CONTINUITY OF LIFE

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	4	10	4	**18**	5	5
2	1	13	1	**15**	0	3
3	3	6	2	**11**	1	**0**
4	7	3	4	**14**	2	1
5	4	3	4	**11**	0	1
6	4	8	10	**22**	4	9
7	7	2	0	**9**	0	0
TOTAL	**30**	**45**	**25**	**100**	**12**	**19**

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