CAMBRIDGE
International Education

Cambridge O Level

BIOLOGY **5090/21**

Paper 2 Theory **May/June 2026**

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

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General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: • the specific **content** defined in the mark scheme • the specific **skills** defined in the mark scheme or in the level descriptions • the **standard of response** required as exemplified by the standardisation scripts.
2	Examiners must award **whole marks** (not half marks, or other fractions).
3	Examiners must award marks **positively**. This means that: • marks are not deducted for errors or omissions • marks are awarded for correct/valid answers as defined in the mark scheme and also for **other valid answers** which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate • the quality of spelling, punctuation and grammar are judged **only** when the mark scheme indicates that these features are **specifically assessed** in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must **consistently** apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the **full range of marks** defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and **must not** award marks with grade thresholds or grade descriptions in mind.

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Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	'List rule' guidance For questions that require ***n*** responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards ***n***. • Incorrect responses should not be awarded credit but will still count towards ***n***. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

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6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

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Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	correct point or mark awarded
	incorrect point or mark not awarded
	information missing or insufficient for credit
	allow or accept
	insufficient point ignored while marking the rest of the response
	contradiction in response, mark not awarded
	benefit of the doubt given
	error carried forward applied
	point has been noted but no credit has been given or blank page seen

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Annotation	Meaning
	correct idea but not specific enough
	used to highlight parts of an extended response
	key point attempted / working towards marking point
Ruler	allows lengths to be measured
Protractor	allows angles to be measured
Multi-line Overlay	overlays graphs
	correct, awarding one mark from marking point 1.
	correct, awarding one mark from marking point 2, similar numbered ticks are used for marking point 3, 4, 5 etc.

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Question	Answer	Marks	Guidance
1(a)			Two fruits with the mechanisms can be either way round. To award mechanism mark it must be linked to correct fruit.
	A ;	**1**	
	(hooks on the fruit) attaching it to hair or fur ;	**1**	**A** idea of fruit attaching to animal
	C ;	**1**	
	being eaten and passing out with the faeces / egested ;	**1**	
1(b)	any **two** from: reduces competition ; to obtain more nutrients / minerals / light / water ; colonise new areas ; **Max 2**	**2**	**A** to prevent inbreeding

Question	Answer	Marks	Guidance
2(a)	bronchiole ;	**1**	
2(b)(i)	external intercostal ; up(wards) and out(wards) ; diaphragm ;	**3**	**A** either way round
2(b)(ii)	any **two** from: increase in the volume of the chest / thorax ; so the pressure in the chest / thorax decreases ; pressure in the chest / thorax is lower than atmospheric pressure / outside ;	**2**	 **A** lungs for thorax/chest once only

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Question	Answer	Marks	Guidance
2(c)(i)	(goblet cells) produce mucus which traps pathogens / microorganisms ; ciliated cells / cilia waft / move mucus away / up / out (of the lungs) ;	**2**	**I** germs
2(c)(ii)	any **three** from: destruction of cilia / cilia slowed down ; mucus not cleared from P / mucus builds up in P / increased mucus production ; increased infection / bronchitis ; (lung) cancer ; **Max 3**	**3**	**I** emphysema / heart disease

Question	Answer	Marks	Guidance
3(a)	sucrose ; cellulose ; vitamin D ; urea ;	**4**	
3(b)	*glycogen is* used as a store of glucose / energy ;	**1**	
	glucagon is (a hormone) used to increase blood glucose / sugar level ;	**1**	**A** controls blood sugar level / converts glycogen to glucose **R** decreases blood sugar level
3(c)	any **three** from: to make it specific to a substrate ; (active site) has complementary <u>shape</u> to substrate ; so that the substrate can fit into active site ; to allow enzyme-substrate complex to form ; **Max 3**	**3**	**R** active site has the same shape as the substrate If no other mark is awarded, allow one mark for reference to lock and key hypothesis

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Question	Answer	Marks	Guidance
4(a)(i)	krill ;	**1**	
4(a)(ii)	four ;	**1**	
4(a)(iii)	population might go up **+** as fewer squid to eat it / fewer predators / fewer fish; or population might decrease **+** as penguins might eat more krill ;	**2**	
4(b)(i)	correct gametes of black and white penguin = Aa ; correct genotypes of offspring ; probability = 50% / ½ / 0.5 / 1 in 2 / 1:1 ;	**3**	**A** 2 in 4
4(b)(ii)	idea that the black and white penguins are better camouflaged ; black and white penguins are more likely to survive / less likely be eaten (by seals) ; they will be more likely to reproduce / mate / have offspring ; and pass on the A allele ;	**4**	**A** converse for all white penguins for each MP. **I** pass on the A gene

	a	a
A	Aa	Aa
a	aa	aa

Question	Answer	Marks	Guidance
5(a)	blockage / narrowing of the coronary arteries ; less blood / glucose / oxygen to the heart <u>muscle</u> ; therefore, cannot contract correctly / cannot pump blood ;	**3**	

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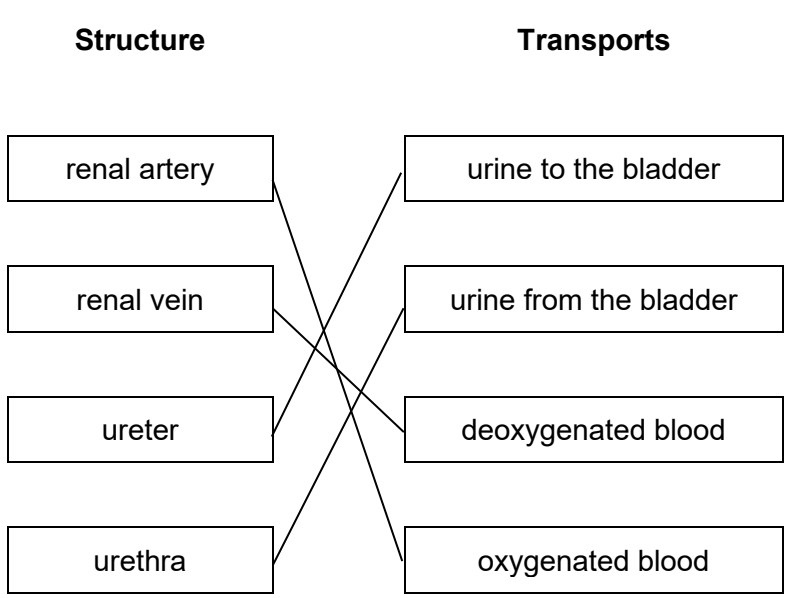
Question	Answer	Marks	Guidance
5(b)(i)	gender / sedentary lifestyle / stress / diet ;	**1**	**A** sex **I** exercise **I** lifestyle unless qualified **A** high blood pressure **I** genetic disposition / pollution
5(b)(ii)	CHD has a genetic link / can be affected by genes / hereditary ;	**1**	**A** similar lifestyles to parents **A** passed from parents to children
5(b)(iii)	B scored 12 points ; equal risk ;	**2**	incorrect number of points = no marks

Question	Answer	Marks	Guidance
6(a)(i)	virus ;	**1**	
6(a)(ii)	idea that the mother could have the virus in her blood ; virus could pass across the placenta ;	**2**	**R** blood is passed across the placenta
6(b)	any **two** from: HIV causes reduced lymphocyte numbers / destroys lymphocytes ; body is unable to produce/does not have enough antibodies ; weakens the immune system ; **Max 2**	**2**	
6(c)(i)	any **two** from: after some time CMV may not be in the blood ; CMV may only be inside cells ; the body/lymphocytes will have made antibodies against CMV (which will be in the blood) ; **Max 2**	**2**	

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Question	Answer	Marks	Guidance
6(c)(ii)	192 000 ;;;	**3**	**A** 0.192 million / 1.92×10^5 0.192 = 2 marks 0.48 million or 480 000 = 1 mark 9.6 million or 9 600 000 = 1 mark 40% of 480 000 = 2 marks 288 000 = 2 marks (two correct calculations but using 60% rather than 40%)

Question	Answer	Marks	Guidance
7(a)		**3**	all correct = 3 marks three correct = 2 marks two correct = 1 mark
7(b)(i)	Bowman's capsule ;	**1**	
7(b)(ii)	glucose is reabsorbed / glucose is absorbed back into the blood ; selectively / by active transport ;	**2**	**I** taken back into the blood selective reabsorption = 2 marks

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Question	Answer	Marks	Guidance
7(b)(iii)	when the temperature is high / line Y, the person will sweat / loses more water ; so more water is reabsorbed / absorbed back into the blood ;	**2**	**A** converse for X **A** converse for X

Question	Answer	Marks	Guidance
8(a)	any **two** from: contraction/beating of the heart ; protein synthesis ; cell division / mitosis / meiosis ; active transport ; growth ; passage of electrical impulses ; maintaining body temperature ; contraction of muscles for breathing ; contraction of muscles for peristalsis ; **Max 2**	**2**	**I** muscle contraction unless correctly qualified **I** homeostasis
8(b)(i)	drops at a decreasing rate ;	**1**	
8(b)(ii)	$(C_6H_{12}O_6) + 6O_2 \rightarrow 6CO_2 + 6H_2O$	**2**	One mark for correct substances and one for balancing.
8(b)(iii)	32.3 (g) ;;;	**3**	210 = 1 mark 0.64615 etc. = 1 mark 32.3076923 = 2 marks Any incorrect answer shown to be converted to 3 sig figs = 1 mark

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Question	Answer	Marks	Guidance
9(a)	any **three** from: hair/fur on their body ; give birth to live young ; feed young from mammary glands ; have external ears ; **Max 3**	**3**	 **A** feed milk to young
9(b)	*Positive effects of closing these power stations: (Max 5)* 1 less burning of fossil fuels reduces the release of carbon dioxide; 2 so less greenhouse gas released ; 3 reduces global warming / reduces climate change ; 4 less melting of ice caps / less flooding / less extreme weather / fewer droughts ; 5 less minerals released reduces eutrophication ; 6 more oxygen in the water ; 7 more fish/organisms can survive ; *Negative effects of closing these power stations:* 8 manatees will not survive if the water is not warm enough ; 9 they may become extinct ; 10 idea that disrupts food webs ; **Max 7**	**7**	**A** answers that discuss the negative effects of not closing power stations **A** less acid rain **A** reduced biodiversity

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