CAMBRIDGE
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Cambridge IGCSE™

BIOLOGY **0610/42**

Paper 4 Theory (Extended) **October/November 2025**

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2025 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

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GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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	<u>'List rule' guidance</u> 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 standard isation 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
	incorrect or 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
	correct awarding one mark from marking point or marking group 1. similar numbered ticks are used for marking point or marking groups 2, 3, 4 etc.

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Annotation	Meaning
	pages are linked together
	used to highlight part of the response
	used to highlight parts of an extended response
	used to highlight parts of an extended response
	Point already given
	Maximum mark reached
	Key point attempted / working towards marking point / incomplete answer / response seen but not credited / blank page seen
	Maximum number of marks for a marking point has been awarded.

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Mark Scheme Abbreviations:	
;	separates marking points
/	alternative responses for the same marking point
R	reject the response
A	accept the response
I	ignore the response
ecf	error carried forward
AVP	any valid point
ora	or reverse argument
AW	alternative wording
underline	actual word given must be used by candidate (grammatical variants excepted)
( )	the word / phrase in brackets is not required but sets the context
max	indicates the maximum number of marks that can be given
MP	marking point

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Question	Answer	Marks	Guidance
1(a)	the breakdown of food into smaller, pieces / AW **;** without chemical change (to the food molecules) **;**	**2**	
1(b)	**B ;** **C ;** **F ;**	**3**	
1(c)	*ref. to* emulsification of fat **;** *ref. to* increased surface area (of fat) **;** (*idea of* increased surface area / more droplets) for, action of enzymes / action of lipase / chemical digestion **;**	**3**	
1(d)	*any two from:* incisor for, grabbing / piercing / cutting / tearing / slicing / biting / AW **;** canine for, grabbing / piercing / cutting / tearing / slicing / biting / AW **;** premolar for, grinding / chewing / crushing / AW **;** molar for, grinding / chewing / crushing / AW **;**	**2**	
1(e)	**X** are microvilli **;** **(X)** increased / provides large, surface area for absorption (of nutrients) **OR** **(X)** for, attachment of / release of / contains, enzymes / maltase **;** **Y** is the lacteal **;** **(Y)** absorption of, products of fat digestion / AW **;**	**4**	

Question	Answer	Marks	Guidance
2(a)(i)	*any two from:* multicellular / AW **;** producer / *ref. to* photosynthesis / (presence of) chloroplasts or chlorophyll **;** cellulose cell wall **;** non-motile **;** reproduces asexually, and / or, sexually **;** **AVP ;**	**2**	

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Question	Answer	Marks	Guidance
2(a)(ii)	*any two from:* animal ; fungi ; protoctist ; prokaryote ;	**2**	
2(b)	(vascular bundles) would be in a ring / AW ;	**1**	
2(c)	root hair labelled ; xylem correctly drawn and labelled ; phloem correctly drawn and labelled ;	**3**	
2(d)	*any two from:* transport / AW, of water ; transport / AW, of (mineral) ions / minerals ; support / AW ;	**2**	
2(e)	*any five from:* **1** girdled trees produced a greater mass of fruit / **ora** ; **2** comparative data manipulation ; **3** phloem transports, sucrose / amino acids ; **4** leaves, photosynthesise / produce (named), carbohydrates / sugars ; **5** sugars / sucrose / amino acids, used for growth of fruit ; **6** *idea that* (in girdled tree) sucrose / sugar / amino acids, stays in the branch / cannot be transported downwards ; **7** *ref*. to translocation ; **8** leaves are the source ; **9** (growing) fruit is the sink ;	**5**	
2(f)	pectinase ;	**1**	**A** amylase / cellulase

Question	Answer	Marks	Guidance
3(a)	increases the rate of a (chemical) reaction ; (and is) not changed (during the reaction) / AW ;	**2**	

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Question	Answer	Marks	Guidance
3(b)(i)	*any six from:* **1** amylase breaks down starch **;** **2** iodine (solution) turns blue-black in the presence of starch **;** *idea that at 0 °C / at the start* **3** least, starch break down / enzyme activity / amylase activity **;** **4** fewest, successful collisions / enzyme substrate-complexes formed **;** **5** *idea that* particles do not have sufficient (kinetic) energy **;** *idea as temperature increases* **6** the kinetic energy (of particles) increases **;** **7** (starch and amylase) collide more, frequently / successfully or more enzyme-substrate complexes form **;** **8** faster break down of starch **;** **9** 40 °C is the optimum temperature **;**	**6**	
3(b)(ii)	*any two from:* *ref to* specificity **;** *idea that* protease has a different shaped active site (to amylase) / starch and the active site (of protease) are not complementary **;** unable to bind / unable to form an enzyme-substrate complex **;**	**2**	
3(c)	pH / **AVP ;**	**1**	

Question	Answer	Marks	Guidance
4(a)(i)	grasshopper / marmot **;**	**1**	
4(a)(ii)	grass → grasshopper → marmots / (corsac) fox → (steppe) eagle **;**	**1**	

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Question	Answer	Marks	Guidance
4(a)(iii)	*any two from:* *idea that* energy is lost between each trophic level ; named example of energy loss ; if less energy available then less biomass can be supported ;	**2**	
4(b)(i)	*any three from:* **1** little genetic variation ; **2** increased risk of, genetic / inherited, disease ; **3** inbreeding / inbred ; **4** decreased heterozygosity / greater chance that an organism may be homozygous (recessive) ; **5** less likely to adapt to changes in the, environment / AW ; **6** increased susceptibility to (transmissible) disease ; **7** **AVP** ;	**3**	
4(b)(ii)	*any four from:* **1** (named) protection of habitat ; **2** ref to legislation protecting species / banning hunting ; **3** monitoring / tracking / named example of monitoring ; **4** education / awareness campaigns ; **5** provision of (named), food / nutrients / veterinary care ; **6** removal of predators ; **7** removal of invasive species ;	**4**	
4(c)	**X** – fertilisation ; **Y** – mitosis / cell division ; **Z** – implantation ;	**3**	

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Question	Answer	Marks	Guidance
5(a)	*any three from:* **1** less land required / AW, (than extensive farming) **;** **2** (so) fewer trees cut down / less deforestation **;** **3** more land available for named use **;** **4** improved <u>yield</u> **;** **5** more efficient named farming practice **;** **6** cheaper (named), products / food / meat / milk **;** **7** idea of consistent, quality / growth, of product **;** **8** increased food security **;** **9** (increased) profits (for farmer) **;** **10** **AVP ;**	**3**	
5(b)	*any two from:* treat / prevent, (spread of) bacterial, disease / infection **;** caused by close proximity / overcrowding / AW **;** **AVP ;**	**2**	
5(c)(i)	**D and F ;**	**1**	**A** in either order
5(c)(ii)	54 **;;;**	**3**	MP1 correct readings from the graph i.e. 400 and 260 MP2 correct calculation to any number of significant figures e.g. (140 ÷ 260) × 100 = 53.846 MP3 correct rounding to two significant figures **ecf** from previous MP

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Question	Answer	Marks	Guidance
5(c)(iii)	*any four from:* **1** *ref. to* (resistance due to) mutation ; **2** antibiotics kill non-resistant bacteria / resistant bacteria survive ; **3** (resistant bacteria / bacteria that survive the antibiotic) reproduce ; **4** passing on alleles (for resistance) ; **5** *idea that* over time this increases, the proportion of population of bacteria that is resistant / frequency of resistant allele ; **6** *ref. to* natural selection ; **7** **AVP** ;	**4**	

Question	Answer	Marks	Guidance
6(a)	20 ; 90 ; muscles / blood ; debt ; liver ; oxygen ; aerobic ;	**7**	
6(b)(i)	liver ;	**1**	
6(b)(ii)	kidney ;	**1**	
6(c)	$C_6H_{12}O_6 \rightarrow$; $2C_2H_5OH + 2CO_2$;	**2**	products in either order
6(d)	bread / **AVP** ;	**1**	

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