CAMBRIDGE
International Education

Cambridge IGCSE™

BIOLOGY **0610/43**

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)	genus **AND** species **;**	**1**	
1(b)	fungus / fungi **;**	**1**	
1(c)(i)	*any two from:* **1** chloroplast **;** **2** cell wall **;** **3** (large permanent) vacuole **;** **4** AVP **;**	**2**	e.g. starch grains
1(c)(ii)	*any four from:* *species **X*** **1** fern **;** **2** spores **;** **3** fronds **;** *species **Y*** **4** monocotyledon **;** **5** narrow / long / AW, leaves **;** **6** parallel veins **;**	**4**	
1(c)(iii)	*any two from:* **1** use, base / amino acid / nucleotide / gene, sequences **OR** sequence, DNA / RNA / AW **;** **2** (crops with) recent ancestors / closely related species, will have more, sequences / genes / alleles in common / will have similar, sequences / genes / alleles **;** **3** **AVP** **;**	**2**	

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Question	Answer	Marks	Guidance
2(a)(i)	428 (%) **;;;**	**3**	MP1 correct selection of data i.e. 4090 and 775 **OR** 3315 and 775 MP2 correct calculation to any number of significant figures e.g. ((4090 – 775) ÷ 775) × 100 = 427.742 MP3 correct rounding to three significant figures **ecf** from previous MP
2(a)(ii)	*any two from:* **1** (chickens) can produce eggs, sooner / at an earlier age / younger / AW **; ora** **2** chicken reach, saleable size / have (more) meat, sooner / at an earlier age / younger / AW **; ora** **3** (chickens) can produce, chickens / chicks / offspring, sooner / at an earlier age / younger / AW **; ora** **4** increased / AW, profit **; ora** **5** **AVP ;**	**2**	e.g. to meet (high) demand for human consumption
2(a)(iii)	**1** breed / cross, chickens with the large(st) body mass together **;** **2** select offspring with the large(st) body mass to breed together **;** **3** (this process is) repeated for (many) generations **;** **4** **AVP ;**	**3**	e.g. ref. to artificial insemination

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Question	Answer	Marks	Guidance
2(b)	*any six from:* **1** run-off / washed into freshwater / AW **;** **2** chicken manure contains (increased availability of), nitrate / (mineral) ions **;** **3** eutrophication **;** **4** increased / rapid, growth of, producers / AW **;** **5** increased decomposition of dead, producers / AW **;** **6** increased aerobic respiration by (decomposers) **;** **7** (increased respiration causes a) reduction in (dissolved) oxygen (in water) **;** **8** death / migration / AW, of, (named aquatic) organisms requiring (dissolved) oxygen **;** **9** **AVP ;;**	**6**	e.g. (algal bloom / AW) results in other (named) limiting factors of photosynthesis / spread of diseases from faeces in water
2(c)	*any three from:* deamination **;** of excess amino acids **;** (deamination) in the liver **;** the removal of the nitrogen-containing part (of the amino acid) **;**	**3**	

Question	Answer	Marks	Guidance
3(a)	*any two from:* (enters) the root hair (cell) **;** moves through the (root) cortex (cells to the xylem) **;** **AVP ;**	**2**	e.g. through a partially permeable / cell (surface), membrane (by osmosis / diffusion)
3(b)(i)	5.8 (g per hour) **;**	**1**	

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Question	Answer	Marks	Guidance
3(b)(ii)	*any four from:* **1** as temperature increases, water loss / transpiration, increases **; ora** **2** comparative data manipulation with units **;** **3** higher kinetic energy (of water molecules) / description of molecules having more energy to, move / collide / AW **; ora** **4** increases (the rate of) evaporation (inside leaf) **; ora** **5** water evaporates from the surface of mesophyll cells **;** **6** increases (the rate of) diffusion (of water vapour) through the stomata **; ora** **7** more stomata open / stomata open wider, at high(er) temperatures **; ora**	**4**	
3(b)(iii)	increased rate of transpiration **;** increased concentration gradient (of water vapour for diffusion through the stomata) **;**	**2**	
3(b)(iv)	**1** (mineral) ions **;** **2** tube / vessel / AW **;** **3** lignin **;** **4** pull **;** **5** column / AW **;** **6** forces (of attraction) / attraction / AW **;**	**6**	
3(c)(i)	*any three from:* **1** (plants / cells) exposed to, extreme heat / high temperatures **;** **2** (plants / cells have) inadequate / not enough / no, water OR dehydration **;** **3** (rate of) water uptake is less than, (rate of) water loss / transpiration **; ora** **4** water moves out of cells (by osmosis) **;** **5** cells, become flaccid / lose turgor (pressure) / plasmolyse **;** **6** *ref. to* plants / leaves / cells, rely on (turgor) pressure of water on (inelastic) cell walls for, (structural) support / to stay firm / AW **;** **7** **AVP** **;**	**3**	e.g. wilting can occur because of a nutrient deficiency

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Question	Answer	Marks	Guidance
3(c)(ii)	*any one from:* **1** inner surface of leaf is folded / AW **;** **2** hairs / AW **;** **3** sunken stomata or stomata in, pits / AW **;** *any two from:* **4** trap moist air / water vapour / reduce air, flow / movement **;** **5** reduce water (vapour) diffusion gradient (out of stomata) **;** **OR** **6** curled / rolled / AW, leaf **;** **7** (rolling) traps air / reduce air movement / shields leaf from heat / reduces exposed surface **;** **8** reduce water (vapour) diffusion gradient (out of stomata) **;** **OR** **9** few stomata **;** **10** few sites where water exits the leaf / AW **;** **OR** **11** thick (waxy) cuticle **;** **12** reduces evaporation (from the leaf surface) / creates a waterproof layer **;**	**2**	

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>4(a)(i)</td><td>J ;
F ;</td><td>2</td><td>R each additional letter</td></tr>
<tr><td>4(a)(ii)</td><td>any two from:
1 (left ventricle / H) contains more muscle ; ora
2 (muscle) contracts / pumps, with more force ; ora
3 (contraction) creates a high(er) pressure ; ora
4 blood (leaving the ventricle) is required to move further / out of the heart / to aorta / to the (whole) body / left atrium is only pushing blood to the ventricle ;</td><td>2</td><td></td></tr>
<tr><td>4(a)(iii)</td><td>
<table>
<tr><th>description</th><th>sequence</th></tr>
<tr><td>blood enters C</td><td>4</td></tr>
<tr><td>blood enters E and then E contracts</td><td>6</td></tr>
<tr><td>blood enters M and then M contracts</td><td>1</td></tr>
<tr><td>blood travels to lungs</td><td>5</td></tr>
<tr><td>blood moves into G</td><td>7</td></tr>
<tr><td>blood moves into B</td><td>8</td></tr>
<tr><td>N opens</td><td>3</td></tr>
<tr><td>blood moves into K</td><td>2</td></tr>
</table>
;;</td><td>2</td><td>all correct = 2 marks
four correct / only 2 wrong = 1 mark</td></tr>
</table>

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Question	Answer	Marks	Guidance
4(b)(i)	*any five from:* **1** (exercise can lead to release of) adrenaline that increases heart rate **;** **2** (exercise results in) increased (rate of) blood (flow) to muscle (cells) **;** **3** needed for (delivery of), oxygen / glucose **OR** removal of carbon dioxide **;** **4** respiration releases energy **;** **5** energy required for (muscle) contraction **;** **6** (exercise can lead to) anaerobic respiration / production of, lactic acid / lactate **;** **7** correct ref. to oxygen debt **;** **8** (heart rate remains high after exercise) to remove, lactic acid / lactate (quickly) from muscles / to liver **OR** to continue supplying oxygen (to repay the oxygen debt) **;** **9** lactic acid / lactate, broken down / (aerobically) respired / converted to glucose / carbon dioxide and water / oxidised, in liver**;** **10 AVP ;**	**5**	e.g. increased, carbon dioxide / acidity, in the blood increases heart rate
4(b)(ii)	*any three from:* **1** diet **OR** a diet high in, salt / saturated fats / cholesterol **;** **2** (uncontrolled) stress **;** **3** smoking (tobacco) **;** **4** genetic (predisposition) **;** **5** (old) age **;** **6** sex **;** **7** and **8 AVP ;;**	**3**	e.g. high blood pressure / excessive alcohol consumption / obesity

Question	Answer	Marks	Guidance
5(a)(i)	$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$ **;;**	**2**	MP1 correct reactant and product molecules MP2 correct balancing of equation
5(a)(ii)	magnesium (ion) **;**	**1**	

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Question	Answer	Marks	Guidance
5(a)(iii)	starch ;	1	
5(b)(i)	(positive) phototropism ;	1	
5(b)(ii)	*any four from:* **1** auxin ; **2** (auxin) is made in / released from, the (shoot) tip ; **3** (auxin) moves by diffusion from (the shoot tip) ; **4** (auxin) is concentrated on, shaded / left / AW, side of the, shoot / plant ; **5** (auxin) stimulates cell elongation ; **6** shaded / left / AW, side of shoot, elongates / bends / grows, more than, light / right, side ;	4	
5(b)(iii)	**1** better chance of light reaching the plant / AW ; *any one from:* **2** light provides energy ; **3** light is needed for photosynthesis ; **4** able to, produce more glucose / respire ;	2	

Question	Answer	Marks	Guidance
6(a)	<table><tr><th>letter in Fig. 6.1</th><th>name of the structure</th><th>function</th></tr><tr><td>**C**</td><td>scrotum</td><td>contains / protects / holds / AW, testes / **D**</td></tr><tr><td>**F**</td><td>prostate gland</td><td>produces seminal fluid</td></tr><tr><td>**A**</td><td>urethra</td><td>transports urine and sperm</td></tr><tr><td>**E**</td><td>sperm duct</td><td>transport sperm (to urethra)</td></tr></table> ;;;;	4	one mark per correct row

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Question	Answer	Marks	Guidance
6(b)	testosterone **;**	**1**	
6(c)	*any three from:* **1** flagellum / flagella, for, moving / swimming **;** **2** mitochondria to release energy for, moving / swimming **;** **3** acrosome to contain enzymes **;** **4** enzymes to break down the jelly (coat of the egg) **;** **5** haploid nucleus for fusing with the egg nucleus **;** **6** streamlined, shape / head, for swimming / AW **;**	**3**	

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