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CAMBRIDGE
International Education

Cambridge International AS & A Level

BIOLOGY **9700/53**

Paper 5 Planning, Analysis and Evaluation **May/June 2026**

MARK SCHEME

Maximum Mark: 30

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.

This document consists of **14** printed pages.

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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
	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.
	incorrect point or mark not awarded
	working towards marking point
	information missing or insufficient for credit
	used to highlight part of an extended response
	used to highlight part of an extended response
	allow or accept
	benefit of the doubt given

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Annotation	Meaning
BP	blank page
CON	contradiction in response, mark not awarded
ECF	error carried forward applied
PAG	marking point already given
I	incorrect or insufficient point ignored while marking the rest of the response
IRRL	irrelevant material that does not answer the question
MR	maximum mark reached
O	or reverse argument
R	incorrect point or mark not awarded
SEEN	point has been noted, but no credit has been given or blank page seen

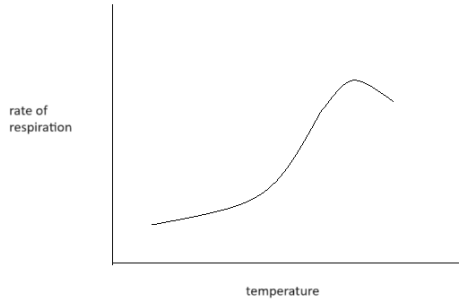
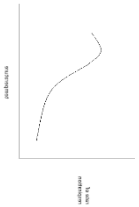
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Mark scheme abbreviations

;	separates marking points
/	alternative answers for the same point
A	accept (for answers correctly cued by the question, or by extra guidance)
R	reject
I	ignore
( )	the word / phrase in brackets is not required, but sets the context
AW	alternative wording (where responses vary more than usual)
underline	actual word given must be used by candidate (grammatical variants accepted)
max	indicates the maximum number of marks that can be given
ora	or reverse argument
mp	marking point (with relevant number)
ecf	error carried forward
AVP	alternative valid point

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Question	Answer	Marks	Guidance
1(a)(i)	1 correct axis labels ; 2 line rises and then falls ; 3 line rising at an increasing rate to the optimum ; e.g. three marks for:  	3	e.g. *x*-axis = temperature *y*-axis = rate of respiration **ignore** anaerobic / aerobic 3 **ignore** absence of fall **accept** any curve with an increasing gradient mp2 and mp3 **ignore** starting point of curve **ecf** for incorrect mp1 with correct axes labels 

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Question	Answer	Marks	Guidance
1(a)(ii)	*any **eight** from:* *any **eight** from:* 1 use a minimum of five stated temperatures **;** 2 suitable method to maintain a constant temperature **;** 3 use, same / stated, number / amount / mass, of seeds **;** 4 use, same / stated, species / type / variety, of seeds **;** 5 use, same / stated, volume / concentration, of sodium hydroxide / NaOH **;** 6 method to, equilibrate / acclimatise, seeds to new temperature **;** 7 at each temperature, measure the distance (moved by the coloured liquid), in a, set / stated, time **or** at each temperature, measure the time, (for the coloured liquid), to travel a, set / stated, distance **;**	**8**	1 temperatures must include 10 ºC **and** 50 ºC must see units at least once **ignore** temperatures outside the range 2 **A** water-bath / incubator **ignore** temperature-controlled room / air conditioning / heater / fridge **A** *ref. to* use thermometer **and** ice **/** warm water 4 **Ignore** age (of seeds) 5 **Ignore** mass / amount mp3, mp4 and mp5 **allow** standardised / fixed / controlled / constant as AW for same **ignore** known 6 **A** leave seeds in respirometer at new temperature / in water-bath / AW, for, set / stated time if stated, minimum time 5 minutes 7 **allow** note / record as AW for measure **ignore** calculate as AW for measure **allow** length / mm as AW for distance **ignore** *ref. to* measuring without sodium hydroxide

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(a)(ii)</td><td>
8 (replace seeds / repeat, with) sterile/ inert / glass / plastic / AW, beads
or
dead / AW, seeds ;

9 at each temperature, take at least three measurements ;

10 safety comment with hazard and risk and precaution ;
<table>
<tr><th>hazard</th><th>risk</th><th>precaution</th></tr>
<tr><td>NaOH / sodium hydroxide</td><td>irritant / corrosive / caustic / damage to eyes</td><td>(wear) gloves / safety glasses / goggles / PPE</td></tr>
<tr><td>seeds</td><td>irritant / allergy</td><td>(wear) gloves / PPE</td></tr>
</table>
11 Idea of: open the tap and use the syringe to reset the coloured liquid ;
</td><td></td><td>
allow how far as AW for distance
allow how long as AW for time
ignore collecting gas in the syringe
ignore ref. to open / close, tap

8 ignore respirometer with no seeds
R if another variable is changed as well as the seeds

9 ignore calculate a mean
A three replicates / repeat 2 times / multiple times, at each temperature

10 ignore burns
ignore biohazard
ignore hot water as a risk
</td></tr>
</table>

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Question	Answer	Marks	Guidance
1(a)(iii)	*any **four** from*: 1 divide diameter by 2 (to give radius) **or** radius = 0.5 mm **;** 2 calculate (cross sectional) area (of the capillary tubing) **or** area = 0.79 mm^2 **;** 3 distance multiplied by (cross sectional) area (to calculate volume of gas) **;** 4 divide by time **;** 5 calculate a mean distance / rate **;** 6 divide by mass of seeds used **;**	**4**	2 **A** πr^2 or $\pi d^2 / 4$ Use calculation guidance $\pi r^2 \times$ distance moved gets mp2 and mp3
1(b)(i)	0.846 **;**	**1**	use calculation guidance **A** 0.85
1(b)(ii)	(species =) **B ;** (evidence =) carbon dioxide (volume) is greater than oxygen (volume) **; ora**	**2**	No **ecf** from **1(b)(i)** **A** RQ is greater than 1 No **ecf** for wrong species
1(b)(iii)	*any **one** from:* *reason why oxygen measurements are too low* 1 (water bath) temperature was too low **;** 2 duration of the test, was too short **/** less than one minute **;** 3 *idea of* gas escaping from, respirometer / apparatus / AW **;**	**1**	**ecf** for species **C** only in **1(b)(ii)** **ignore** human error unqualified **A** temperature was high **and** enzymes denatured **R** gas coming into apparatus

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Question	Answer	Marks	Guidance
2(a)	*independent variable:* number / amount of (daily) garlic capsules **;** *dependent variable:* (resting systolic) blood pressure **;**	**2**	
2(b)	capsule with no garlic **;**	**1**	**ignore** 'placebo' unqualified **A** placebo capsule **allow** tablet / pill, as AW for capsule **A** capsule with, sugar / starch / cellulose / AW, (and no garlic)
2(c)(i)	continuous **;**	**1**	**ignore** quantitative / ordinal / ordered / dependent / interval / normally distributed **R** qualitative / categoric / discrete / discontinuous / nominal

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Question	Answer	Marks	Guidance
2(c)(ii)	*any **three** from*: *comparing start to end of the investigation* 1 (resting systolic) blood pressure decreased in all groups (over the 12 weeks) **;** 2 SE for, start / 0 weeks **and** end / 12 weeks, do not overlap, therefore (mean resting systolic blood pressure may be) significantly different (in all groups) **;** *comparing groups* 3 results / decrease in blood pressure, for 1 garlic capsule were not different to the control **;** 4 SE for one garlic capsule **and** control, overlap (at all times) therefore (mean resting systolic blood pressure) is not significantly different **;** 5 results / decrease in blood pressure, for 2 and 4 garlic capsules were different to the control **or** (taking) 2 garlic capsules gives, greatest / AW, decrease in blood pressure **;** 6 SE for, 2 garlic capsules **and** control, do not overlap (at 8 weeks and 12 weeks) therefore (mean resting systolic blood pressure may be) significantly different **or** SE for, 4 garlic capsules **and** control, do not overlap (at 8 weeks) therefore (mean resting systolic blood pressure may be) significantly different **;**	**3**	**ignore** improved blood pressure as AW for blood pressure decreases 2 a**llow** if only one group is stated **ignore** standard deviation / 95%CI / error bars **allow** significant, decrease / AW (implies a difference) **allow** is significantly different **ignore** 'results are significant' 4 **ignore** standard deviation / 95%CI / error bars **allow** is not significantly different **ignore** no significant decrease **ignore** insignificant 6 **ignore** standard deviation / 95%CI / error bars **allow** significant, decrease / AW (implies a difference) **allow** is significantly different **ignore** 'results are significant'
2(c)(iii)	*any **two** from*: 1 (data) not normally distributed **;** 2 four / more than two, means to compare **;** 3 more than one mean per group / means change over time **;**	**2**	**ignore** *ref. to* standard deviations (because the SDs are approximately the same) **R** standard deviations are different / data is not continuous **ignore** fewer than 30 values

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Question	Answer	Marks	Guidance
2(d)	*any **two** from*: 1 larger sample size / study more than 84 people **;** 2 longer investigation / study for more than 12 weeks **;** 3 standardise, age / sex / diet / smoking status / alcohol consumption / other medication taken / time of day capsule taken / AW **;** 4 measurements of diastolic blood pressure **;** 5 *ref. to* standardise measurement of blood pressure **;**	**2**	**ignore** repeat unqualified 3 **A** exclude those already taking meds for blood pressure **ignore** ref. to take 3 garlic capsules 5 **A** measure blood pressure, at same time of day / at same location / same body position

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