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CAMBRIDGE
International Education

Cambridge International AS & A Level

BIOLOGY **9700/52**

Paper 5 Planning, Analysis and Evaluation **February/March 2025**

MARK SCHEME

Maximum Mark: 30

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 February/March 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.

Mark scheme abbreviations:

;	separates marking points
/	alternative answers for the same marking point
R	reject
A	accept
I	ignore
AVP	any valid point
AW	alternative wording (where responses vary more than normal)
ecf	error carried forward
underline	actual word underlined 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
( )	the word / phrase in brackets is not required, but sets the context

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Question	Answer	Marks
1(a)	*any* ***three*** *from*: 1 catch (a sample of grey bush) crickets (within habitat) **and** count total captured **and** mark **and** release them **;** 2 detail **;** e.g*. idea of* suitable marking **so** not harmful / too obvious / not removed e.g. *idea of* leaving for a few days (to give time for populations to mix before second sample taken) 3 catch second sample **and** count total number of crickets **and** number of marked crickets **;** 4 reference to Lincoln index **;**	**3**
1(b)	Table 1.1 completed correctly **and** $\Sigma(n / N)^2 = 0.21 / 0.22$ when answer rounded to 2 significant figures **;** $D = 0.78 / 0.79$ when rounded to 2 significant figures **;** $D = 0.783$ **;** must be to 3 significant figures **;**	**3**

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Question	Answer	Marks
1(c)(i)	*any **two** from:* 1 wind, speed / direction **;** 2 (atmospheric) humidity **;** 3 rainfall / soil water content **;** 4 soil type **;** 5 soil pH **;** 6 salinity (of soil) **;** 7 mineral / ion, concentration (of soil) **;** 8 (atmospheric) carbon dioxide concentration **;**	**2**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(c)(ii)</td><td>
any seven from:

1 use quadrats ;

2 method of, random / systematic, placement of quadrats ;

3 use, same / stated, size (frame / point), quadrat ;

4 method of identifying (plant) species ;

5 count the number of individuals of each (plant) species ;

6 idea of taking care to note, low growing / small / easy to miss, species ;

7 idea of sampling, 10 or more / AW, separate points / quadrats (in the grey dune habitat) ;

8 (measure biodiversity of plant species) at regular intervals (over the 10-year period) and at the same time of the year ;

9 repeat (whole investigation over 10 years) at different, times of year / seasons ;

10 named hazard and risk and precaution ;

<table>
<tr><th>hazard</th><th>risk</th><th>precaution</th></tr>
<tr><td>plants / pollen</td><td>allergy / irritation / injury</td><td>gloves / eye protection / mask / PPE / protective clothing</td></tr>
<tr><td>animals</td><td>allergy / irritation / injury</td><td>gloves / eye protection / mask / PPE / protective clothing</td></tr>
<tr><td>grey dunes / ecosystem</td><td>getting lost / trip hazard / injury</td><td>wear suitable shoes / clothes / gloves / PPE

stay, in a group / with expert / ranger</td></tr>
</table>
</td><td>7</td></tr>
</table>

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)</td><td>any two from:

1 data, are ordinal / can be ranked ;

2 data points within samples are independent of each other ;

3 there are 20 paired observations ;

4 coffee farms / sampling points, were selected at random ;

5 AVP ;</td><td>2</td></tr>
<tr><td>2(b)</td><td>(there is) no correlation between the water availability and the number of months that elephants entered each (coffee) farm per year ;</td><td>1</td></tr>
<tr><td>2(c)(i)</td><td>all correct ;

<table><tr><th>r_s value</th><th>significance</th></tr><tr><td>0.63</td><td>yes</td></tr><tr><td>–0.30</td><td>no</td></tr><tr><td>0.02</td><td>no</td></tr><tr><td>0.38</td><td>no</td></tr></table></td><td>1</td></tr>
</table>

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Question	Answer	Marks
2(c)(ii)	*any **one** from:* negative correlation / the greater the density of December trees, the fewer the number of months that elephants entered each (coffee) farm / **ora** **and** (correlation) is weak / is not significant **;** there is no correlation (between the density of December trees and the number of months that elephants entered each farm) **;**	**1**
2(d)	*any **three** from:* *support:* 1 *idea that* reducing water availability is (significantly) correlated with a reduced number of times that elephants enter the (coffee) farm **;** 2 *idea that* water availability was the only variable found to be significant (so reducing the number of water bodies might be the most effective action) **; ora** *does not support (**max 2**):* 3 water bodies only counted, once / in March / in 2008 **;** 4 investigation only, in one geographical area (of India) / at Nagarahole National Park **;** 5 *idea that* size of, ponds / lakes / water holes, might also be important **;** 6 *idea that* (questionnaire) does not record actual, number of times elephants entered the farms / number of elephants (per month) **;** 7 *idea that* correlation does not indicate causation (so reducing the availability of water may not affect the number of elephant visits) **;**	**3**

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Question	Answer	Marks
3(a)	*independent variable:* vaccinated or not vaccinated (against *Rotavirus*) **;** *dependent variable:* number of children with (type 1) diabetes (per 100 000 population in Australia) **;**	**2**
3(b)(i)	1 number of children (aged from 0 to 4 years) with (type 1) diabetes decreased, after the introduction of the vaccine (against rotavirus) **;** 2 number of children (aged from 0 to 4 years) with (type 1) diabetes increased (slowly) from, 2000 to 2007 / 2008 to 2015 **;**	**2**
3(b)(ii)	*any **three** from:* 1 *idea that* (mean) number of children aged from 0 to 4 years with (type 1) diabetes (per 100 000 population) is lower after introduction of vaccine **;** 2 *idea that*, (95%) confidence intervals / (95%) CI / error bars (for before and after introduction of vaccine), in children aged from 0 to 4 years (before and after introduction of vaccine) do not overlap therefore number of children with (type 1) diabetes is significantly different (before and after introduction of vaccine) **;** 3 10 to 14 year olds act as a control group (because they are not vaccinated against *Rotavirus*) **or** 10 to 14 year olds are unvaccinated (before and after introduction of vaccine) **;** 4 *idea that*, (95%) confidence intervals / (95%) CI / error bars (for before and after introduction of vaccine), in children aged from 10 to 14 years (before and after introduction of vaccine) overlap, therefore number of (unvaccinated) children with (type 1) diabetes is not significantly different (before and after introduction of vaccine) **;**	**3**

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