Cambridge Assessment International Education

Cambridge International AS & A Level

BIOLOGY **9700/52**

Paper 5 Planning, Analysis and Evaluation **May/June 2020**

MARK SCHEME

Maximum Mark: 30

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

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

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & 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 descriptors 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.

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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.

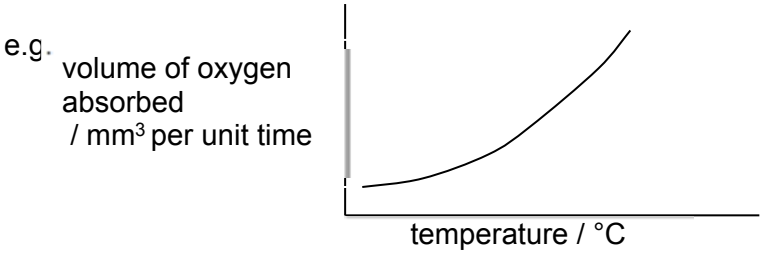
State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

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 usual)
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

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Question	Answer	Marks
1(a)(i)	*independent variable*: temperature **;** *dependent variable*: distance travelled by liquid / volume of oxygen taken up **;**	**2**
1(a)(ii)	1 (because) these are temperatures at which, enzymes are expected to be functioning / woodlice may survive **;** 2 (intervals of) 5 °C / 3 °C / 2 °C **;**	**1**
1(a)(iii)	inert material / glass beads, of same volume (as woodlice) **; A** dead (sterilised) woodlice	**1**
1(a)(iv)	*idea that* absorption of carbon dioxide allows measurement of uptake in oxygen / AW **;**	**1**
1(a)(v)	*any 1 from*: 1 movement of woodlice **;** 2 size / age / sex, of woodlice **;** 3 AVP **;**	**1**
1(b)(i)	*allow in context of using the same respirometer for each temperature, or separate respirometers set up in the same way for each temperature* *any 7 of*: 1 *idea of* adding a fixed volume of carbon dioxide absorbent solution **;** 2 *idea of* adding fixed, number / mass, of woodlice to tube **;** 3 *idea of* method of adding dye solution to capillary tube **;** 4 *idea of* attaching tubes and making airtight **;** 5 *idea of* placing respirometer tube into a water-bath at a stated temperature **;** 6 *idea of* leaving apparatus to equilibrate with tap open **;** 7 *idea of* closing the tap and, marking / recording, position of liquid **;** 8 *idea of* measuring movement of dye on the scale for, 5 minutes / a set time **;** 9 *idea of* re-opening tap / using syringe, to allow liquid to equalise and then closing to take another measurement **;** 10 *idea of* a minimum of three measurements (in sequence) and taking a mean **;** 11 *idea of* repeating experiment at each temperature, e.g. 5 °C, 10 °C, 15 °C, etc **;** 12 low risk experiment *or* medium risk experiment due to (named) carbon dioxide absorbent is harmful and wear gloves **;** 13 AVP **;**	**7**

Question	Answer	Marks
1(b)(ii)	1 *idea of* converting the distance in cm to mm^3 by multiplying by 10 ; 2 volume calculated = volume of oxygen absorbed by woodlice ; 3 divide each of the volumes by time (oxygen uptake per unit time = rate of respiration) ;	**3**
1(b)(iii)	1 axes correctly orientated with labels ; 2 axes have units ; 3 line shows (exponential) increase as temperature increases ; e.g. 	**3**
1(c)	woodlice are using mostly carbohydrate as their energy source ; **A** using a mixed energy source **A** using, protein / lipid, under anaerobic conditions **R** using, protein / fat only	**1**

Question	Answer	Marks
2(a)(i)	*any 2 from:* 1 remove all / add, larvae ; 2 measure larvae and select, medium-sized / 9–16 mm, larvae; 3 *ref. to* way of measuring ; 4 suitable equipment for handling larvae, e.g. paint brush, pooter, (blunt) forceps ; 5 place larvae on plants, randomly / on cotton bolls / on buds / AW ; 6 *idea of* breeding cotton bollworms to use for treatment 2 ; 7 AVP ;	**2**
2(a)(ii)	*any 2 from:* 1 variety / type, of (Bt) cotton ; 2 number of rows of cotton ; 3 (1 m) length of cotton sections per test ; 4 number of plants in each section ; 5 (20 m^2) size of the plot ; 6 size of larvae ; 7 density of larvae in each treatment ; 8 time before spraying with insecticide ; 9 cotton bolls picked at same time when all bolls in each plot were open / AW ;	**2**
2(a)(iii)	(as a control) to compare the, quantity / mass / weight / yield, of cotton (fibres, and /or, seeds) from plots that were not sprayed with insecticide with that from the plots that were sprayed / AW ;	**1**
2(b)(i)	*any 1 from:* 1 compares the means of two sets of data ; 2 the data is continuous ; 3 the populations have a normal distribution ; 4 standard deviations are similar ;	**1**
2(b)(ii)	there is no (significant) difference in the mass of cotton fibre produced when sprayed with insecticide or when not sprayed with insecticide ;	**1**

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Question	Answer	Marks
2(c)	*any 2 from:* 1 (mean) yield of cotton bolls increases when sprayed with insecticide **;** 2 (mean) yield of cotton fibre increases, less / little / unchanged / AW, when sprayed **;** 3 spraying makes little difference to the (mean) yields of bolls and fibres between treatments 1 and 2 **;** 4 standard deviations appear large (e.g. for bolls sprayed in treatment 1 and 2) **;** 5 mean ± SD overlap so no conclusion can be made **;** 6 no results given for, *t*-tests / statistical tests **;** 7 AVP **;**	**2**

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