Cambridge Assessment International Education

Cambridge International AS & A Level

BIOLOGY **9700/53**

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)	(approximately) 1 ; **A** value in 0.94 to 1 range to allow for mixed CHO and protein	**1**
1(a)(ii)	*any 7 from*: 1 *idea of* adding a fixed, number / mass, of peas to respirometer (below the shelf with soda lime) ; 2 *idea of* a control containing dead (sterilised) peas / glass beads of same mass ; 3 *idea of* inserting bung with tubing with clip and glass tubing with scale so that the apparatus is airtight / AW ; 4 *idea of* dipping glass tube into coloured liquid ; 5 *idea of* placing respirometer tube into a water-bath at a stated temperature in range 13°C to18°C ; 6 *idea of* (opening clip and) leaving to equilibrate ; 7 *idea of* closing the clip and marking the position of dye and *idea of* starting stop-clock immediately ; 8 *idea of* measuring movement of dye on the scale, for 5 minutes / at timed intervals ; 9 *idea of* opening clip and resetting the coloured liquid ; 10 *idea of* doing minimum of three measurements in sequence and taking a mean ; 11 *idea of* removing carbon dioxide absorbent ; 12 *idea of* again measuring movement of dye on the scale, for 5 minutes / at timed intervals ; *must be linked to mp11* 13 low risk experiment *or* 14 medium risk experiment and carbon dioxide absorbent is harmful and wear gloves ; 15 AVP ;	**7**
1(b)	*any 3 from:* 1 find radius of glass tubing and use πr^2 (to find surface area) ; 2 multiply πr^2 by distance moved by liquid with carbon dioxide absorbent to find volume of oxygen used ; 3 multiply πr^2 by distance moved by liquid without carbon dioxide absorbent ; 4 add together the volume with carbon dioxide absorbent and volume without carbon dioxide absorbent (to find volume of carbon dioxide released) ; **A** marks on a correct formula e.g. oxygen consumed = πr^2 × distance moved with carbon dioxide absorbent = 2	**3**
1(c)(i)	1 *idea of* replacing the sodium hydroxide by (a named) oxygen absorbent / replacing air with nitrogen ; 2 *idea of* setting dye position, close to the tube containing peas / half way along the tube ; 3 look for liquid moving away from the peas (showing that carbon dioxide is produced in anaerobic conditions) ;	**3**
1(c)(ii)	trial 2 and the result, is anomalous / does not fit the pattern ;	**1**

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Question	Answer	Marks
2(a)(i)	*any 3 from:* 1 percentage of Bt cotton has increased (by 72.9 / 73%) **;** 2 (since 2007) the percentage of 1 gene Bt has decreased and 2 or more gene increased **;** 3 number of hectares of cotton grown has increased (by 0.7 million hectares) **;** 4 the use of pesticide has decreased as Bt cotton has increased **;** 5 AVP **;**	**3**
2(a)(ii)	*idea of* (less insecticide used) as more of the crop is protected from bollworm by the toxic proteins / Cry1Ac / Cry2Ab / AW **;**	**1**
2(b)(i)	*idea of* the yield will decrease as the population of resistant bollworms will increase **;** **A** in terms of greater selection pressure so only resistant insects survive	**1**
2(b)(ii)	*any 2 from:* 1 *idea of* non-Bt cotton enables non-resistant bollworms to survive **;** 2 *idea of* breeding between susceptible and resistant bollworms keeps frequency of resistance genes lower (in the gene pool) **;** **A** in terms of less selection pressure so more susceptible survive to breed 3 AVP **;**	**2**
2(c)(i)	*independent variable:* the type of cotton plant / transgenic v*ip3AcAa* / whether the cotton produces Vip3AcAa **;** *dependent variable:* the number of dead larvae **;**	**2**
2(c)(ii)	*any 1 from:* 1 number of larvae on each leaf ; 2 age of larvae ; 3 time (after adding larvae / for feeding) before counting dead larvae; 4 AVP ;	**1**

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Question	Answer	Marks
2(c)(iii)	*any 2 from:* 1 *idea of* control using non-Bt plant gives a baseline of larval death caused by factors other than toxic proteins in leaves **;** 2 *idea of* control using Bt *cry1Ac* plants for comparison with non-Bt to show, the larvae are Cry1Ac resistant / no difference in the number that die **;** 3 AVP **;**	**2**
2(c)(iv)	1 difference between the number killed with Bt cry1Ac + vip3AcAa cotton (containing the toxic protein Vip3AcAa) is significant for both types of larvae *and* (as) standard deviations do not overlap with Bt cry1Ac cotton (which does not contain the toxic protein Vip3AcAa) **;** 2 the difference between the increase in deaths of type **A** larvae and type **B** larvae killed on Bt cry1Ac + vip3AcAa (compared to those killed on Bt cry1Ac) is not significant *and* (as) standard deviations overlap **;**	**2**
2(d)	*any 1 from:* 1 *idea of* carrying out same investigation using susceptible strains of bollworm (as well as resistant types) **;** 2 AVP **;**	**1**

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