Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **May/June 2022**

MARK SCHEME

Maximum Mark: 40

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 May/June 2022 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U 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.

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 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

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Question	Answer	Marks	Guidance
1(a)(i)	table drawn with two, columns / rows with line separating headings from body of table **and** with suitable headings **;** recording of blue / no change, in **W**(10) **and** orange in **A**(10) **;**	**2**	
1(a)(ii)	rice contains starch / starch is broken down to form (reducing) sugar / starch is broken down by amylase / (reducing) sugar is produced when amylase is present **ora ;**	**1**	
1(a)(iii)	*any two from:* mass of rice **;** type of rice **;** temperature (of the water-bath) **;** time (in water-bath after adding rice) **;** volume of water **and,** amylase / solution / liquid, added **;** sample size (removed) **;** volume of Benedict's solution (used) **;**	**2**	
1(a)(iv)	as a control (investigation) / for comparison / to show what would happen if no amylase were present / to show the (colour) change was due to amylase / AW **;**	**1**	
1(a)(v)	*any one from:* **W**(10), will change colour / turn, yellow / green / orange / red **;** a positive result in (test-tube) **W**(10) **;** (reducing) sugar present in (test-tube) **W**(10) **;** both test-tubes show a positive result with Benedict's solution **;**	**1**	
1(a)(vi)	*any one from:* thermostatically controlled water-bath **;** thermo-isolated container / insulated jacket / (foam) insulation / AW **;** lid (used on water bath) **;**	**1**	
1(b)	(test rice with) iodine (solution / reagent) / iodine in potassium iodide solution **;** (observe) blue-black colour (if starch present) **;**	**2**	

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Question	Answer	Marks	Guidance
1(c)(i)	(the activity of amylase / mass of (reducing) sugar produced), increased **and** then decreased (as the temperature increased) **;** peak / optimum / AW, temperature is 35°C ± 1°C **;**	**2**	
1(c)(ii)	6 (mg per minute) **;;**	**2**	MP1 correct reading 30 mg from graph MP2 correct answer calculated **ecf** from incorrect MP1 reading divided by five
1(c)(iii)	test at smaller intervals of temperature **;** select a narrower range of temperatures around 35°C **;**	**2**	

Question	Answer	Marks	Guidance
1(d)	***either – reducing sugar method*** 1 *independent variable:* at least two pH values tested / two pH values stated **;** 2 *dependent variable:* time to (first) colour change / colour of Benedict's solution after a set period of time (at 80 °C) of time / mass, of (reducing) sugars **;** 3,4 *variables kept constant, max. two from* **;;** • volume of pH solution • concentration of amylase (solution) • volume / quantity, of amylase (solution) • type of amylase solution • temperature • volume of starch suspension / mass of (starch source) / AW • concentration of starch suspension (if used) • source of starch suspension • volume of Benedict's (solution) 5, 6 *given method, max. two from* **;;** • take (fixed volume of) samples • (testing with) Benedict's (solution) • heat / incubate at 80 °C *7, 8 new method, max. two from* **;;** • use of buffer • use of colorimeter (for Benedict's) / colour chart • use of balance to measure mass (of reducing sugars / precipitate) 9 repeat investigation twice / at least two replicates **;** 10 relevant safety precaution: gloves / goggles / tongs / test-tube holder **;** 11 AVP **;** e. g., equilibration time (in the water bath before mixing)	**6**	

Question	Answer	Marks	Guidance
1(d) (cont./…)	***OR disappearance of starch method*** *independent variable:* 1 at least two pH values tested / two pH values stated **;** *dependent variable:* 2 time for iodine solution to stay yellow-brown / disappearance of starch **;** 3, 4 *variables kept constant, max. two from* **;;** • volume of pH solution • concentration of amylase • volume / quantity, of amylase solution • type of amylase solution • temperature • volume of starch suspension / mass of rice / mass of plant tissue / AW • concentration of starch suspension (if used) • same source of starch 5, 6 *given method* take (fixed volume of) samples **;** samples taken at regular intervals **;** *7, 8 new method, max. two from* **;;** • use of buffer • (testing with), iodine solution • use of spotting / white, tile 9 repeat investigation twice / at least two replicates **;** 10 relevant safety precaution: gloves / goggles **;** 11 AVP ; e.g. equilibration time (in the water bath before mixing)		

Question	Answer	Marks	Guidance
2(a)(i)	outline - single clear unbroken line ; size - greater than 90 mm diagonally (top left to bottom right) ; detail 1: (at least) four projections ; detail 2: either four vascular bundles shown OR presence of hairs on at least two projections ;	**4**	**R** if individual cells drawn **R** shading
2(a)(ii)	measuring line PQ = 112 (mm) ±1 (mm) ; 0.9 (mm) ;;	**3**	MP1 correct measurement MP2 correct answer calculated MP3 correct rounding of answer to one decimal place **ecf** MP2 and MP3 from incorrect measurement / calculation
2(b)(i)	*independent variable:* concentration of sodium chloride solution ; *dependent variable:* length of roots ;	**2**	
2(b)(ii)	*any two from:* (four) repeats ; large number / AW / 15, seeds (grown at each sodium chloride concentration) ; measured, at same time / (after) 20 days (of growth) ; same species / all marram grass seeds / AW ;	**2**	
2(c)(i)	31.6(%) ;;;	**3**	MP1 correct selection of data from Table 2.1, i.e., 19 mm and 13 mm MP2 correct answer calculated MP3 correct rounding of answer to three significant figures **ecf** MP2 and MP3 from incorrect data / calculation
2(c)(ii)	axes labelled with units ; suitable even scale and plotting area occupies at least half the grid in both directions ; six points plotted accurately ± half a small square ; suitable line drawn ;	**4**	

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