Cambridge IGCSE™ (9–1)

BIOLOGY **0970/62**

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.

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.

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.

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

Question	Answer	Marks	Guidance
1(a)(i)	(hot water) 38.5 **and** (cold water) 17(.0) **;** °C **;**	**2**	
1(a)(ii)	(hot test-tube) 6.5 **and** (cold test-tube) 9(.0) **;**	**1**	
1(a)(iii)	table drawn with a minimum of two columns and header line **;** headings including units **;** data recorded as 3.5 and 1(.0) **and** hot / cold or stated temperatures **;**	**3**	**ecf** values from **1(a)(ii)**
1(a)(iv)	*any one from:* (vitamin C) diffuses, more / faster, at high(er) temperature / in hot water **;** greater volume of / greater amount of / more, DCPIP used, at high(er) temperature / in hot water **;**	**1**	
1(a)(v)	to remove vitamin (C) (from the outside of the bag) / *idea that* rinsing prevents contamination (by vitamin C) **;**	**1**	
1(a)(vi)	*error:* volume was not measured **;** *equipment:* use a syringe / measuring cylinder / burette / graduated pipette **;** OR *error:* temperature was not controlled **;** *equipment:* use a thermostatically controlled water-bath **;**	**2**	
1(a)(vii)	*independent variable:* temperature **;** *dependent variable:* volume of DCPIP **;**	**2**	
1(a)(viii)	so that anomalous results can be, identifed / excluded **;**	**1**	

Question	Answer	Marks	Guidance
1(b)	*independent variable:* 1 at least two concentrations of sugar solution **;** *dependent variable:* 2 (measuring) mass / volume, before **and** mass / volume, after or change in, mass / volume (of dialysis tubing or test-tube) **;** *3/4/5 variables kept constant, max. three from:* • volume of water (in dialysis tubing / test-tube) • volume of sugar solution (in dialysis tubing / test-tube) • temperature • (soaking) time • type of dialysis tubing / surface area of tubing • type of sugar *6/7/8 method, max three from description of how to:* • make sugar solution, concentrations / dilutions • maintain the temperature (during the investigation) • make a model cell e.g., knotting dialysis tubing at both ends / other methods of securing dialysis tubing at both ends • remove excess liquid from the tubing (if mass measured) • measure, mass / volume / height, of water / sugar solution e.g., use of a balance / measuring cylinder / syringe / ruler **9** repeat the whole investigation at least twice more (three trials) **;**	**6**	

Question	Answer	Marks	Guidance
2(a)(i)	clear and continuous outline, no shading **;** size greater than half of space provided **;** detail 1: position of stripes drawn **;** detail 2: central hole visible with inner and outer edge of shell joining to enclose the central hole **;**	**4**	
2(a)(ii)	(×)0.62 **/** 0.61 **;;;**	**3**	MP1 correct measurement of line **AB** as 80(mm) ±1 mm MP2 correct answer calculated to any number of significant figures. **R** if incorrect unit given MP3 correct rounding to two significant figures
2(b)	*similarity:* (both have) a spiral / same direction of spiral **;** *difference:* smooth versus rough / fossilised has ridges or bumps or segments / different number of whorls / different construction material (described) / solid versus hollow / non-fossilised shell has stripes / non-fossilised shell has a hole / full spiral versus partial spiral **;**	**2**	
2(c)(i)	axes labelled, unit included **;** linear scale for number of shells **and either** a linear scale **or** categories from the table for width of shell **and** graph to fill half or more of the grid in both dimensions **;** <u>all</u> plotted points accurate to ± half small square **;** bars present **;**	**4**	
2(c)(ii)	*any two from:* as width increases the number of shells (at that width) increases and then decreases **;** the most common shell width is 121–130 (mm) / the least common width is 101–110 (mm) **;** all shells (measured) were between 101–150 (mm wide) **;** fewer nautiluses have smaller shells than larger shells / **ora ;**	**2**	

Question	Answer	Marks	Guidance
2(c)(iii)	to give a representative sample / to avoid bias / AW **;**	**1**	
2(c)(iv)	34.3(%) ;;;	**3**	MP1 selection of correct data from Table 2.1 (98 **and** 22, **or** 120) MP2 correct answer calculated MP3 correct answer rounded to one decimal place
2(c)	biuret **;** lilac / purple / mauve / violet **;**	**2**	