Cambridge Assessment International Education

# Cambridge IGCSE™

**BIOLOGY** **0610/51**

Paper 5 Practical Test **October/November 2023**

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 October/November 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.



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**[Turn over**

**PUBLISHED**

## 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:<br><br>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:<br><br>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**

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|---|---|
| 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<br><br>For questions that require ***n*** responses (e.g. State **two** reasons …):<br><br>• The response should be read as continuous prose, even when numbered answer spaces are provided.<br>• Any response marked *ignore* in the mark scheme should not count towards ***n***.<br>• Incorrect responses should not be awarded credit but will still count towards ***n***.<br>• 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.<br>• 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<br><br>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'.<br><br>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.<br><br>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.<br><br>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<br><br>Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.<br><br>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) | **1** table drawn with at least three**,** columns with a line separating the headings from the body of the table **;**<br><br>**2** suitable headings with units for temperature (in) °C **and** time (in) minutes / s **;**<br><br>**3** **six** times and temperatures recorded for both **A** and **B** **;**<br><br>**4** values show a suitable trend, i.e. temperature decreases with time **;** | **4** | |
| 1(a)(ii) | rate of heat loss for **A** = value correctly calculated from candidate's data **;**<br>rate of heat loss for **B** = value correctly calculated from candidate's data **;**<br>correct unit stated i.e. °C per minute **;** | **3** | |
| 1(a)(iii) | *any one from:*<br>the larger the penguin, the lower the rate of heat loss **;**<br>large penguins lose heat more slowly (than small penguins) **;** | **1** | ora throughout |
| 1(b)(i) | the size of the container / AW **;** | **1** | |
| 1(b)(ii) | *any one from:*<br>starting temperature of the water **;**<br>temperature of, environment / surroundings / room **;**<br>material the containers are made from **;**<br>total time / 5 minutes **;**<br>sampling time / measure every minute **;**<br>height of water / 5 cm height on each container **;**<br>AVP **;** | **1** | |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1(c)(i) | *independent variable:*<br>**1** at least two different temperatures **;**<br><br>*detail of method:*<br>**2** method of maintaining different temperatures **;**<br>**3** method of cutting agar cubes **;**<br>**4** enough acid to cover cubes / AW **;**<br><br>**5 & 6 & 7** *variables kept constant – max three from:* **;;;**<br>• same, size agar cubes / shape of agar (cubes)<br>• type of agar<br>• concentration / pH, of acid<br>• volume of acid<br>• type of acid / named acid<br>• same type of indicator / named indicator<br><br>*dependent variable:*<br>**8** time taken for cube to become (completely) colourless<br>**or**<br>idea of after a set period of time how much of the cube has become colourless **;**<br><br>**9** ref. to at least two further replications / repeat investigation two more times **;**<br>**10** relevant safety precaution e.g. goggles / gloves / cut agar on a solid surface / cut away from hands / AW **;** | **6** | |
| 1(c)(ii) | (surface area) 6 **;** (: volume) 1 **;** | **2** | |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 2(a) | length of line **CD** = 100 ±1(mm) **;**<br>167 **;;** | **3** | MP1 correct measurement<br>MP2 correct calculation<br>MP3 correct rounding to three significant figures<br><br>line **CD** of 99 mm = 165<br>line **CD** of 101 mm = 168<br><br>ecf from previous step |
| 2(b)(i) | *any two from:*<br>(lizard red blood cells are) bigger **;**<br>(lizard has) no white blood cells **;**<br>(lizard red blood cells have) oval shape / AW **;**<br>(lizard red blood cells) have a nucleus **/ are** darker in the middle / are lighter on the outside **;** | **2** | ora if clear that human blood is described |
| 2(b)(ii) | outline is a single clear line with no shading **;**<br>size at least 41 mm in diameter **;**<br>detail 1: small lobe to the bottom right of the upper section drawn **;**<br>detail 2: thin line joining lobes on both sides **;** | **4** | |
| 2(c)(i) | (mean) mass of haemoglobin (per athlete) **;** | **1** | |
| 2(c)(ii) | axes labelled with units – i.e. number of days (after returning to low altitude) **and** (mean) mass of haemoglobin (per athlete) / g **;**<br>suitable linear scale and plotting area occupies at least half of the grid in both directions **;**<br>seven points plotted ± half small square **;**<br>suitable line drawn **;** | **4** | |
| 2(c)(iii) | any indication on the candidate's graph of a reading taken **;**<br>correct reading **at 17 days** from candidate's graph ± half a small square **;** | **2** | |
| 2(d)(i) | the more carbohydrate in the diet, the more exercise they can do / the longer the exercise time / the slower they get exhausted **;** | **1** | |

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| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 2(d)(ii) | *any two from:*<br>sex **;**<br>age **;**<br>mass / weight / BMI / fat to muscle ratio / height **;**<br>ref. to diet **;**<br>sport discipline / fitness / exercise regime **;**<br>medical history **or** (named) health conditions / illness **;**<br>lifestyle qualified (e.g. smoking / alcohol consumption / drugs) **;** | **2** | |
| 2(e)(i) | (add) Benedict's (solution to the sample) **;**<br>heat (and observe the colour) **;** | **2** | |
| 2(e)(ii) | iodine (solution) **;** | **1** | |

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