CAMBRIDGE
International Education

# Cambridge IGCSE™

**BIOLOGY** **0610/52**

Paper 5 Practical Test **February/March 2024**

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 February/March 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

**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 descriptions 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. |

**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 | <u>'List rule' guidance</u><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

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1(a)(i) | table drawn with minimum two columns and a header line ;<br>appropriate, column / row headings and correct units ;<br>recording of three concentrations and three times ;<br>correct trend ; | 4 | |
| 1(a)(ii) | a greater rate of respiration at a higher glucose concentration / AW / ora ; | 1 | ecf from their data – answer must be consistent with the data in the table in **(a)(i)** |
| 1(a)(iii) | concentration of glucose ; | 1 | |
| 1(a)(iv) | *any one from:*<br>temperature ;<br>volume / population / type, of yeast ;<br>total volume of, solution / glucose and water / AW ;<br>time for equilibration / AW ;<br>volume / concentration / number of drops, of methylene blue ;<br>height / type, of oil ; | 1 | **A** concentration of yeast |
| 1(a)(v) | *any one from:*<br>*idea of* uniform distribution (of yeast cells) / dispersing foam / AW ;<br>*idea of* ensuring each volume (in step 6) of yeast suspension has the same, number of cells / AW ; | 1 | |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1(b)(i) | *any two from*<br>repeat at each concentration / AW ;<br>method to identify end point e.g. colour, chart / standard / use of reference tube ;<br>keep timing beyond 600 s for first tube / no 10-minute cut-off / AW ;<br>measure the volume of methylene blue with more precision (than one drop) / AW ;<br>use, clean / different, glass rods for each test-tube / clean the glass rod between use (in different test-tubes) / AW ;<br>measure the time for different concentrations at different times / individually / AW ;<br>use a thermostatically controlled water bath ;<br>AVP ; | 2 | e.g. negative control / boiled yeast / use of pH buffer |
| 1(b)(ii) | put the same volumes of (0.5%) glucose and (distilled) water (in a test-tube) ;<br>final volume of glucose and water adds up to a total of 5 $cm^3$ (in a test-tube) ; | 2 | |
| 1(b)(iii) | add Benedict's (solution) ;<br>heat ; | 2 | |
| 1(c)(i) | *any one from:*<br>upturned measuring cylinder with delivery tube ;<br>collect it over water with a measuring cylinder ;<br>gas syringe ; | 1 | **A** labelled diagram |
| 1(c)(ii) | result that does not fit the pattern / does not fit with the other results / not concordant / AW ; | 1 | |
| 1(c)(iii) | did not include, sample 2 / anomalous value OR used only samples 1 and 3 / AW (in the calculation of the mean) ; | 1 | **A** (1.8 + 2.0) / 2 = 1.9 |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1(c)(iv) | *any two from:*<br>(volume of carbon dioxide) at both temperatures increases (overall) ;<br>(volume of carbon dioxide) is (always) higher at 35 (°C) / ora ;<br>at 35 (°C volume of carbon dioxide) levels off / becomes constant / AW, at the end (and continues to increase at 25 °C) / ora ;<br>at 25 (°C) no (carbon dioxide) produced at the start (and carbon dioxide is produced during this time at 35 °C) / AW ;<br>manipulated comparative data quote ; | 2 | |
| 1(c)(v) | axes labelled with units ;<br>suitable size with a linear scale and data occupies at least half of the grid in both directions ;<br>all points plotted accurately ± half a small square ;<br>two suitable lines drawn ;<br>key that clearly and correctly identifies each line plotted ; | **5** | |
| 1(c)(vi) | answer consistent with line on graph ;<br>indication on graph ; | 2 | |
| 1(d) | (red to) orange / yellow ; | 1 | |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 2(a)(i) | outline – single clear line no shading ;<br>size – equal to or greater than 80 mm long ;<br>detail 1: bumps drawn directly below nucleus ;<br>detail 2: two projections on right drawn, with lower projection at least twice as long and pointy (compared with upper projection) and cell wall drawn ; | 4 | |
| 2(a)(ii) | 0.226 / 0.229 / 0.232 ;;; | **3** | MP1 correct measurement<br>MP2 correct calculation of actual size<br>MP3 correct rounding to 3 significant figures<br>ecf MP2 / MP3 from error in previous step |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 2(b) | *independent variable:*<br>**1** **(**at least) two different concentrations of sodium chloride solution / sodium chloride solution and distilled water **;**<br><br>*detail of measuring dependent variable:*<br>**2** cutting cylinders / pieces, of plant tissue **;**<br>**3** leave cylinders / pieces, into sodium chloride (solution) for suitable length of time (for osmosis to occur) **;**<br>**4** measuring length / mass / angle, before and after immersion **;**<br>**5** extra detail of method e.g. surface dry the tissue before weighing / method to keep the (floating) tissue pieces submerged **;**<br><br>**6 & 7** *variables kept constant* **;;**<br>*max two from:*<br>• variety of plant or type of tissue<br>• immersion time<br>• temperature<br>• use of stoppers / AW, to prevent evaporation<br>• initial, surface area / length / mass<br>• volume of (immersion) solution<br><br>**8** two or more (additional) repeats (at each concentration) **;**<br><br>**9** relevant safety precaution e.g. *ref to* cutting on a flat surface / cutting away from hand **;** | **6** | |