



# Cambridge IGCSE™

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## BIOLOGY

0610/06

Paper 6 Alternative to Practical

For examination from 2023

MARK SCHEME

Maximum Mark: 40

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Specimen

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This document has 8 pages.

**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.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| <p>GENERIC MARKING PRINCIPLE 1:</p> <p>Marks must be awarded in line with:</p> <ul style="list-style-type: none"> <li>the specific content of the mark scheme or the generic level descriptors for the question</li> <li>the specific skills defined in the mark scheme or in the generic level descriptors for the question</li> <li>the standard of response required by a candidate as exemplified by the standardisation scripts.</li> </ul>                                                                                                                                                                                                                                                                                                                                              |
| <p>GENERIC MARKING PRINCIPLE 2:</p> <p>Marks awarded are always <b>whole marks</b> (not half marks, or other fractions).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p>GENERIC MARKING PRINCIPLE 3:</p> <p>Marks must be awarded <b>positively</b>:</p> <ul style="list-style-type: none"> <li>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</li> <li>marks are awarded when candidates clearly demonstrate what they know and can do</li> <li>marks are not deducted for errors</li> <li>marks are not deducted for omissions</li> <li>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.</li> </ul> |
| <p>GENERIC MARKING PRINCIPLE 4:</p> <p>Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p>GENERIC MARKING PRINCIPLE 5:</p> <p>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).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

**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 | <p><u>'List rule' guidance</u></p> <p>For questions that require <b><i>n</i></b> responses (e.g. State <b>two</b> reasons ...):</p> <ul style="list-style-type: none"> <li>• The response should be read as continuous prose, even when numbered answer spaces are provided.</li> <li>• Any response marked <i>ignore</i> in the mark scheme should not count towards <b><i>n</i></b>.</li> <li>• Incorrect responses should not be awarded credit but will still count towards <b><i>n</i></b>.</li> <li>• Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should <b>not</b> 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.</li> <li>• Non-contradictory responses after the first <b><i>n</i></b> responses may be ignored even if they include incorrect science.</li> </ul> |

**SPECIMEN****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 schemes will use these abbreviations:

; separates making points  
 / alternatives  
 () the word / phrase in brackets is not required but sets the context  
**A** accept (for answers correctly cued by the question, or guidance for examiners)  
**and** both responses required for the mark  
 any [number] from: accept the [number] of valid responses  
 A/VP alternative valid point  
 AW alternative wording (where responses vary more than usual)  
 ecf error carried forward  
**I** ignore as irrelevant  
 MP mark point  
 note: additional marking guidance  
 ora or reverse argument  
**R** reject  
underline actual word given must be used by candidate (grammatical variants accepted)

| Question  | Answer                                                                                                                                                                                                                                                                                         | Marks | Guidance                                                                                                       |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------|
| 1(a)(i)   | table drawn with header lines and at least two columns ;<br>headings with units ;<br>height of the foam for both cooked and uncooked potato recorded ;                                                                                                                                         | 3     | expected range for foam height in cooked is 0.8–1.1 cm and for uncooked is 2.9–3.3 cm, check the printed paper |
| 1(a)(ii)  | 2.2 ± 0.2 cm ;                                                                                                                                                                                                                                                                                 | 1     | ecf measurements in <b>1(a)(i)</b>                                                                             |
| 1(a)(iii) | <i>any one from:</i><br>uncooked potato produces more, foam / oxygen ; ora<br>catalase / enzyme, more active in uncooked potato / AW ; ora                                                                                                                                                     | 1     |                                                                                                                |
| 1(b)(i)   | treatment of potato / AW ;                                                                                                                                                                                                                                                                     | 1     |                                                                                                                |
| 1(b)(ii)  | same surface area ;                                                                                                                                                                                                                                                                            | 1     |                                                                                                                |
| 1(b)(iii) | <i>any two from:</i><br>volume of hydrogen peroxide solution ;<br>concentration of hydrogen peroxide solution ;<br>time potato is in hydrogen peroxide solution ;                                                                                                                              | 2     |                                                                                                                |
| 1(c)      | <i>any one from:</i><br>cooked potato was not dried before adding to hydrogen peroxide solution ;<br>cooked potato was not cooled before adding to hydrogen peroxide solution ;<br>uncooked potato was not soaked in (cold) water ;<br>uneven surface of the foam ;<br>foam is unstable / AW ; | 1     |                                                                                                                |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Marks | Guidance |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|
| 1(d)     | <p><i>independent variable</i><br/>at least two different species of plant ;</p> <p><i>variables that are kept constant (max. two from:)</i> ;<br/>same, size / mass, plant<br/>same volume of hydrogen peroxide solution<br/>same concentration of hydrogen peroxide solution<br/>same temperature<br/>same pH<br/>same time<br/>tissue from the same part of the plant, e.g. roots or leaves<br/>same, size / diameter, test-tube</p> <p><i>dependent variable</i><br/>measure height of foam / measure volume of oxygen produced / count bubbles ;</p> <p><i>detail of given method</i><br/>adding hydrogen peroxide solution to plant tissue ;<br/>preparation of plant material / method used to achieve the same surface area ;</p> <p><i>novel method</i><br/>collecting volume of gas with, gas syringe / upturned measuring cylinder ;</p> <p><i>control</i><br/>test hydrogen peroxide solution with, no plants / boiled plants ;<br/>two or more replicates ;<br/>relevant safety precaution ;</p> | 6     |          |

| Question | Answer                                                                                                                                                                                           | Marks | Guidance |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|
| 1(e)     | <i>starch</i><br>add iodine solution ;<br>blue-black ;<br><br><i>reducing sugars</i><br>add Benedict's solution ;<br>heat (to 80 °C) ;<br>(brick-)red / yellow / orange / green, (precipitate) ; | 5     |          |

  

| Question  | Answer                                                                                                                                                                                                                                                                                                | Marks | Guidance                                                                                                                             |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------|
| 2(a)(i)   | <i>start</i><br>44 / 45 / 46 (mm)<br><b>and</b><br><i>after 30 minutes</i><br>4 / 5 / 6 (mm) ;                                                                                                                                                                                                        | 1     |                                                                                                                                      |
| 2(a)(ii)  | 40 (mm) ;                                                                                                                                                                                                                                                                                             | 1     | ecf readings from <b>2(a)(i)</b>                                                                                                     |
| 2(a)(iii) | 1.3 ; ;                                                                                                                                                                                                                                                                                               | 2     | ecf answer to <b>2(a)(ii)</b> correctly divided by 30 and rounded to 1 d.p.<br>1 mark for correct value, 1 mark for correct rounding |
| 2(b)(i)   | 1.5 ;                                                                                                                                                                                                                                                                                                 | 1     |                                                                                                                                      |
| 2(b)(ii)  | axes labelled as animal species <b>and</b> mean rate of movement (of the drop of coloured liquid) / mm per minute ;<br><br>suitable scale and occupies at least half the grid on both axes ;<br><br>all bars plotted accurately $\pm$ half a small square, bars do not touch and are the same width ; | 3     | ecf their plot for A from <b>2(b)(i)</b>                                                                                             |
| 2(b)(iii) | <b>C</b> ;                                                                                                                                                                                                                                                                                            | 1     |                                                                                                                                      |
| 2(b)(iv)  | replace woodlice with inert material (in the respirometer) / AW ;                                                                                                                                                                                                                                     | 1     |                                                                                                                                      |

| Question | Answer                                                                                                                                                                                                                                                 | Marks    | Guidance                                                                                                                                                                                  |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2(b)(v)  | measure the mass of the animal ;<br>divide rate of, respiration / movement of bubble, by mass (in grams) ;                                                                                                                                             | <b>2</b> |                                                                                                                                                                                           |
| 2(c)(i)  | <i>outline</i> : single clear line and no shading ;<br><br><i>size</i> : equal to / larger than, original ;<br><br><i>detail 1</i> : at least eight distinct segments ;<br><i>detail 2</i> : two projections at the front <b>and</b> two at the back ; | <b>4</b> |                                                                                                                                                                                           |
| 2(c)(ii) | length of <b>PQ</b> 48 (mm) $\pm$ 1 mm ;<br><br>5.22–5.44 (mm) ;;                                                                                                                                                                                      | <b>3</b> | check measurement on printed paper<br><br>MP1 correct measurement<br>MP2 correct calculation<br>MP3 correct rounding to three significant figures<br><br>ecf MP2 and MP3 if MP1 incorrect |