



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**BIOLOGY**

**0610/53**

Paper 5 Practical Test

**October/November 2016**

MARK SCHEME

Maximum Mark: 40

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**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.

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**Abbreviations used in the Mark Scheme:**

- ; separates marking points
- / alternatives
- I ignore
- R reject
- A accept (for answers correctly cued by the question, or guidance for examiners)
- AW alternative wording
- AVP any valid point
- ecf credit a correct statement / calculation that follows a previous wrong response
- ora or reverse argument
- ( ) the word / phrase in brackets is not required, but sets the context
- underline actual words given must be used by the candidate (or grammatical variants of them)

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| Question  | Answer                                                                                                                                                                                                                                                                                                                                           | Marks | Guidance |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|
| 1(a)      | <p>table with two / three columns and two / three rows and result recorded in each cell of the table;</p> <p>headings for dependant variable<br/>volume of oxygen / gas produced with unit in the header only (cm<sup>3</sup>);</p> <p>headings for the independent variable;</p> <p>correct trend in values (cut potato higher than uncut);</p> | 4     |          |
| 1(b)(i)   | <p>calculates rate by dividing by 3;</p> <p>two correct answers to 1 d.p.;</p>                                                                                                                                                                                                                                                                   | 2     |          |
| 1(b)(ii)  | increased / AW;                                                                                                                                                                                                                                                                                                                                  | 1     |          |
| 1(b)(iii) | <p><i>description</i><br/>greater oxygen production with cut potato / larger surface area;<br/>use of data;</p> <p><i>explanation</i><br/>a greater surface area / more catalase, in contact with the hydrogen peroxide / substrate;</p>                                                                                                         | 3     |          |

|               |                                                |                 |              |
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| <b>Question</b> | <b>Answer</b>                                                                                                                                                                                                                                                                                                                | <b>Marks</b> | <b>Guidance</b> |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|
| 1(c)            | <i>either</i><br>(25 cm <sup>3</sup> ) the volume of gas produced was greater than 10 cm <sup>3</sup> / the 10 cm <sup>3</sup> measuring cylinder did not hold all of the gas produced;<br><br><i>or</i><br>(10 cm <sup>3</sup> ) the 10 cm <sup>3</sup> measuring cylinder could be read with greater accuracy / precision; | <b>1</b>     |                 |
| 1(d)            | total length / diameter / width / volume of potato cylinder;<br>concentration / volume of hydrogen peroxide;<br>time;                                                                                                                                                                                                        | <b>2</b>     |                 |

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| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Marks | Guidance                     |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------|
| 1(e)     | <p><i>error</i> – loss of gas while connecting the bung;<br/><i>improvement</i> – idea of closed system / three-way tap / doing quickly;</p> <p><i>error</i> – pieces sticking together reduces surface area;<br/><i>improvement</i> – shake continuously;</p> <p><i>error</i> – (inconsistent) shaking;<br/><i>improvement</i> – sensible suggestion for regular shaking;</p> <p><i>error</i> – potato not measured so not cut into equal sized pieces;<br/><i>improvement</i> – measure 5 mm slices;</p> <p><i>error</i> – dilution of peroxide due to washing;<br/><i>improvement</i> – use a new large test tube each time;</p> <p><i>error</i> -sticks not from same potato / same variety of potato / different mass / density;<br/><i>improvement</i> – use sticks from the same potato / variety of potato / age of potato / measure mass;</p> <p><i>error</i> – temperature fluctuation;<br/><i>improvement</i> – water bath;</p> <p><i>error</i> – only one trial ;<br/><i>improvement</i> – repeat at least 2 more time ;</p> <p>AVP;</p> | 4     | error must match improvement |

|               |                                                |                 |              |
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| <b>Question</b> | <b>Answer</b>                                                                                                                                                                                                                                                                                                                                                                        | <b>Marks</b> | <b>Guidance</b>                                                                                                                                                                          |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1(f)            | <p>keep (all) variables the same / AW;</p> <p>substitute plant material for inert material e.g. glass beads / leave out potato;</p> <p>idea of collecting gas produced solely by decomposition <u>and</u> subtracting this value / AW;</p>                                                                                                                                           | <b>2</b>     | <p><b>A</b> at least 2 named variables</p> <p><b>A</b> boiled or dead plant material</p> <p><b>I</b> no catalase / enzyme unqualified</p> <p><b>R</b> adding water instead of potato</p> |
| 1(g)            | <p>1 use the same size (surface area) of plant;</p> <p>2 carry out experiment at the same temperature / pH;</p> <p>3 other variable from previous method;</p> <p>4 measure volume of oxygen produced;</p> <p>5 plans to repeat experiment;</p> <p>6 calculate the mean;</p> <p>7 comparison of volumes for different food plants;</p> <p>8 reference to relevant safety feature;</p> | <b>5</b>     | <p><b>A</b> mass</p> <p><b>A</b> counting bubbles</p> <p><b>A</b> comparative statement</p> <p>e.g. goggles, gloves, lab coat</p> <p><b>I</b> general lab safety</p>                     |

|               |                                                |                 |              |
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| Question | Answer                                                                                                                                                                                                                                                                                 | Marks            | Guidance                 |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------|
| 1(h)     | <b>A</b> (xes) – labelled with units, y-axis even scale;<br><b>S</b> (ize) – occupies at least half the grid;<br><b>P</b> (lot) – all bars plotted accurately $\pm \frac{1}{2}$ square;<br><b>B</b> (ars) – ruled lines, have an equal gap between each component and are equal width; | <b>4</b>         |                          |
| 1(i)     | add Benedict's solution;<br>heat;<br>red / brown / green / yellow precipitate indicates reducing sugars present;                                                                                                                                                                       | <b>3</b>         | I unqualified water-bath |
|          |                                                                                                                                                                                                                                                                                        | <b>Total: 31</b> |                          |

| Question | Answer                                                                                                                                                                                                                                                                                                  | Marks    | Guidance |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|
| 2(a)(i)  | outline – single clear lines with no shading;<br><br>size – <u>three</u> cells (whole or part) larger than image cells;<br><br>detail –<br>slight gap between cell wall and vacuole (at least once) / presence of small nucleus;<br><br>correct proportion, vacuole longer than wide;<br>label vacuole; | <b>5</b> |          |
| 2(a)(ii) | <b>MN</b> $35 \pm 1$ (mm);<br><br><b>PQ</b> $70 \pm 1$ (mm);<br><br>100%;                                                                                                                                                                                                                               | <b>3</b> |          |

|               |                                                |                 |              |
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| <b>Question</b> | <b>Answer</b>                                                                                                                            | <b>Marks</b>    | <b>Guidance</b> |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|
| 2(b)            | same shape / longer than wide;<br>all contain a vacuole;<br>all have cell walls;<br>all have dark pigmentation / AW;<br>all have nuclei; | <b>1</b>        |                 |
|                 |                                                                                                                                          | <b>Total: 9</b> |                 |