

**MARK SCHEME for the October/November 2011 question paper
for the guidance of teachers**

0610 BIOLOGY

0610/61

Paper 6 (Alternative to Practical), maximum raw mark 40

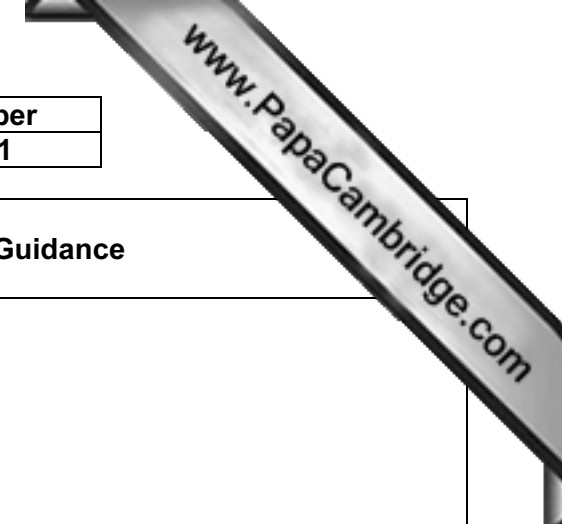
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Mark schemes must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

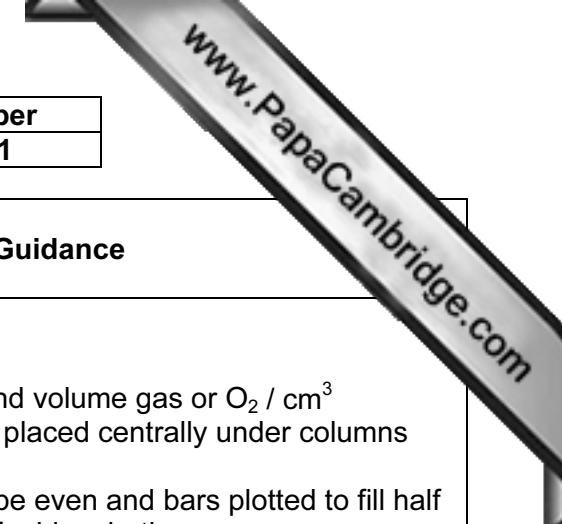
Cambridge is publishing the mark schemes for the October/November 2011 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

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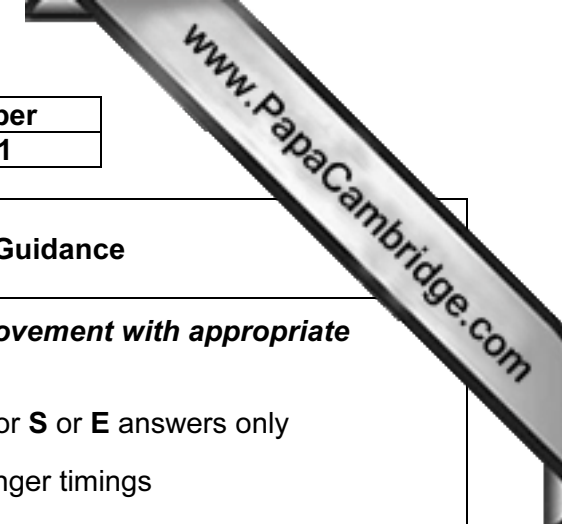
| Question | Mark scheme | Mark allocation | Guidance | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|--|------------------|---|--|--------------|--------------|-----|------|------|-----|------|-----|-----|------|-----|-----|------|------|-------|-------|---------------|------|--------|---------------|-----|--|
| 1 (a) (i) | <table border="1"> <thead> <tr> <th rowspan="2">Mass of tissue g</th> <th colspan="2">Volume of oxygen cm³ per 4 minutes</th> </tr> <tr> <th>Sweet potato</th> <th>Irish potato</th> </tr> </thead> <tbody> <tr> <td>2.0</td> <td>32.0</td> <td>12.5</td> </tr> <tr> <td>2.0</td> <td>20.0</td> <td>9.0</td> </tr> <tr> <td>2.0</td> <td>35.5</td> <td>8.5</td> </tr> <tr> <td>2.0</td> <td>28.0</td> <td>10.0</td> </tr> <tr> <td>total</td> <td>115.5</td> <td>40.0 ;</td> </tr> <tr> <td>mean</td> <td>28.875</td> <td>10.0 ;</td> </tr> </tbody> </table> | Mass of tissue g | Volume of oxygen cm ³ per 4 minutes | | Sweet potato | Irish potato | 2.0 | 32.0 | 12.5 | 2.0 | 20.0 | 9.0 | 2.0 | 35.5 | 8.5 | 2.0 | 28.0 | 10.0 | total | 115.5 | 40.0 ; | mean | 28.875 | 10.0 ; | [2] | |
| Mass of tissue g | Volume of oxygen cm ³ per 4 minutes | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Sweet potato | Irish potato | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.0 | 32.0 | 12.5 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.0 | 20.0 | 9.0 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.0 | 35.5 | 8.5 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.0 | 28.0 | 10.0 | | | | | | | | | | | | | | | | | | | | | | | | |
| total | 115.5 | 40.0 ; | | | | | | | | | | | | | | | | | | | | | | | | |
| mean | 28.875 | 10.0 ; | | | | | | | | | | | | | | | | | | | | | | | | |
| (ii) | Larger surface or area / to release more enzyme / faster reaction; | [1] | <p>Accept enough surface area to react</p> <p>Ignore to make the tissues more uniform in texture / easier to measure / reference to skin of potato</p> <p>Accept more contact</p> <p>Ignore easier reaction</p> | | | | | | | | | | | | | | | | | | | | | | | |

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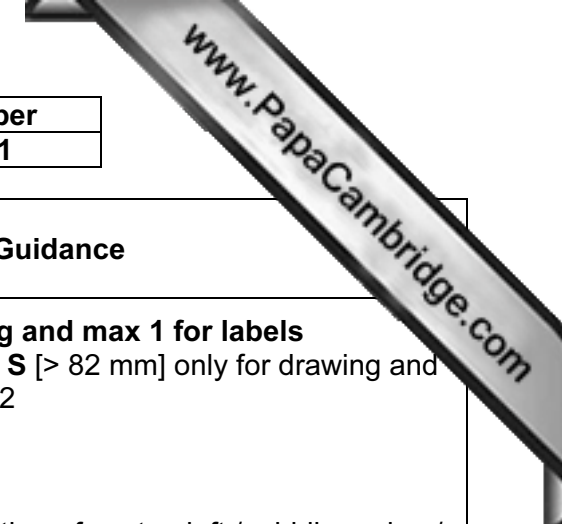
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|----------|---|-----------------|---|
| (b) (i) | <p>Simple column graph to show the range of readings for the sweet potato.</p> <p>A – labelled axes with units;</p> <p>S – scale;</p> <p>P – accurate plot of columns, $\pm \frac{1}{2}$ square;</p> <p>B – neat bars of equal width, not touching and equal interspaces;</p> <p>M – mean line shown $\pm \frac{1}{2}$ square;</p> | [5] | <p>A – accept experiment and volume gas or O_2 / cm^3 – numbers should be placed centrally under columns</p> <p>S – scale on y axis must be even and bars plotted to fill half or greater than half of grid on both axes. Ignore orientation of bars</p> <p>P – deduct mark if any incorrect</p> <p>Accept line columns</p> <p>Mean line does not need to be labelled</p> <p>If line graph allow A, P and M only max 3 If results for Irish potato allow A, B and M only</p> |
| (ii) | <p>two from: reference to temperature; different tubers / part of tuber / amounts catalase; reference to pH; difference in surface area; gas or oxygen escaping or difficulties in accurate measurement of gas volume / AW;</p> | [2] | <p>Ignore 'conditions were not the same' unless qualified Ignore references to activity / concentration of H_2O_2 Accept enzymes for catalase Ignore different amounts of potato Accept correct reference to size or no: pieces for surface area Ignore difficulties in reading measurements</p> |

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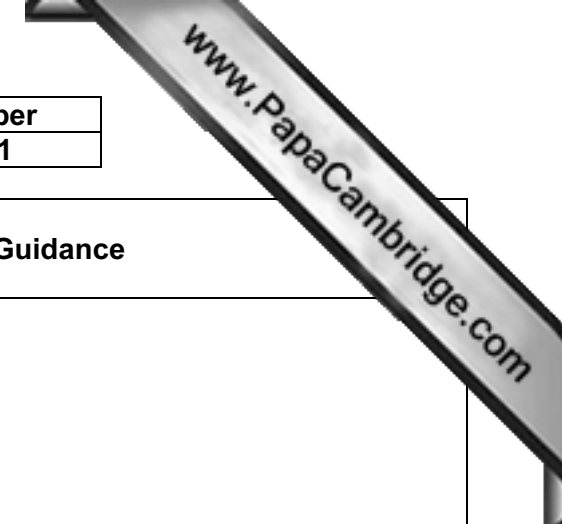
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| (c) | <p>Two from:</p> <p>S: use of water bath / AW; E: correct reference to maintaining temperature / AW;</p> <p>S: use of stopwatch / data logger / computerised or monitoring system / AW; E: correct reference to accurate timing / AW;</p> <p>S: use of stirring device / same agitation or shaking / AW; E: to avoid tissue settling on bottom of flask;</p> <p>S: use the same size / similar apparatus; E: different apparatus or sizes would affect result;</p> <p>S: use burette / syringe / pipette / AW; E: for accurate measurement of volume of hydrogen peroxide;</p> <p>S: cut even size potato pieces / grind potato / AW; E: to keep surface area the same / AW;</p> <p>S: add buffer / pH controller / acid or alkali / AW; E: to maintain constant pH / AW;</p> <p>S: use funnel through bung to add H₂O₂ / AW; E: to save removing bung / prevent gas escape;</p> <p>S: use same concentration H₂O₂; E: to control substrate / make the experiment the same;</p> <p>S: repeat more times; E: to reduce anomalies / AW;</p> <p>AVP;</p> | [max 4] | <p>Mark in couplets – improvement with appropriate explanation</p> <p>If not in couplets, max 2 for S or E answers only</p> <p>Ignore more frequent / longer timings</p> <p>Accept maximising surface area for 'grinding' potato</p> <p>Accept reduce mistakes</p> <p>Ignore use of different tissues / plants</p> |

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| Question | Mark scheme | Mark allocation | Guidance |
|-----------|--|-----------------|---|
| 2 (a) (i) | <p>Drawing:</p> <p>S: size greater than original;</p> <p>O: outline shape to show proportions of feather A;</p> <p>D: one correct detail;</p> <p>Label: one from rachis / calamus / after feathers / vane / shaft / quill / umbilicus / barb;</p> | [4] | <p>Award max 3 for drawing and max 1 for labels If feather B drawn, accept S [> 82 mm] only for drawing and accept correct label, max 2</p> <p>Accept evidence of smooth surface top left / middle region / smoother base / two projections lower right / rachis</p> <p>Accept attachment to body / filaments</p> |
| (ii) | insulation / trap (body) warmth / prevents loss of (body) warmth / traps air / protection against cold / AVP; | [1] | <p>Ignore warm / heat the bird</p> <p>Ignore protect alone</p> <p>Ignore camouflage / attraction / breeding / cover</p> |
| (iii) | flight; blade like / rigid / stiff / wind or air resistance / air will not pass through / aerodynamic / AW; | [2] | <p>Accept glide</p> <p>Ignore feathers packed together</p> <p>Ignore increase surface area</p> <p>Less wind / air resistance loses second marking point.</p> |
| (b) (i) | <p>correct area / $12.5 \text{ cm}^2 (\pm 1 \text{ cm}^2)$; evidence that 1 square = 1 cm^2; marks on feather or grid to show it was used to calculate the area of feather;</p> <p>reference to number of whole and part squares in the working;</p> <p>double calculated area to give total surface area;</p> | [max 3] | <p>Accept $25 \text{ cm}^2 (\pm 1 \text{ cm}^2)$ if they have doubled the area</p> <p>Accept statement or correct use in calculation or on grid</p> |

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| (ii) | Divide feather into (geometric) shapes; measure and add together areas of each shape; OR Cut out shape of feather in paper and weigh mass; cut out known area of paper and weigh mass; calculate area of paper; OR Cut feather into small pieces; fit into 1 cm ² squares; OR Use grid with smaller squares; count squares covered by feather / AW; Double calculated area to give total surface area; | [max 2] [Total: 12] | Ignore smaller grid unqualified This mark can be awarded with any other mark |
| 3 (a) (i) | D (shoot / seedling) curves / bends / grows to one side; light from one / left side; unequal growth / more extension or growth of dark side / phototropism; | [3] | Ignore shorter because F is shorter Ignore reference to roots, D and E are the same grows / bends / curves to the side where light is coming from = 2 Accept reference to auxin / hormone |
| (ii) | E tall(er) (shoot / seedling); uniform light / light above stem / no light at all; competition for light / AW; | [3] | Ignore reference to roots, D and E are the same Accept big / long / grew a lot Ignore direct / plenty / large amounts of light / under the sky Accept etiolation / auxin not destroyed or equally distributed or produced |

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|----------------------|--|-----------------|---|---------------------|--------------------|----------------------|------------------------|-------------|-----------------------|-----|---|
| (iii) | <p>F (shoot / seedling) small(er) / AW;</p> <p>Slow(er) / reduced growth / less well developed;</p> <p>(grown in) colder or lower temperatures / diseased / lacks minerals / AVP;</p> | [3] | <p>Accept short(er) roots</p> <p>Accept no growth / undeveloped</p> <p>Ignore lack of water</p> <p>Accept extreme temperatures</p> <p>Ignore hot temperatures</p> <p>Ignore photosynthesis</p> <p>Accept nutrients / fertilisers</p> | | | | | | | | |
| (b) (i) | <p>two from seeds / remains of stigma or style or pointed (tip) / stalk / seed attachment or seeds arranged at either side / seeds inside the fruit;;</p> | [max 2] | <p>Read through entire answer and award any correct points.</p> <p>e.g. 'Seeds at either side' = 2</p> <p>Accept number / shape / type of seed for 'seeds'</p> <p>Accept (fruit) is smooth</p> | | | | | | | | |
| (ii) | <p>Two rows from</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Fruit G</th> <th style="width: 50%; text-align: center;">Fruit H</th> </tr> </thead> <tbody> <tr> <td>Short(er) / rounded</td> <td>Long(er) / narrow;</td> </tr> <tr> <td>Less seeds / 6 seeds</td> <td>more seeds / 13 seeds;</td> </tr> <tr> <td>Seeds apart</td> <td>seeds close together;</td> </tr> </tbody> </table> | Fruit G | Fruit H | Short(er) / rounded | Long(er) / narrow; | Less seeds / 6 seeds | more seeds / 13 seeds; | Seeds apart | seeds close together; | [2] | <p>Accept comparative answers on one side of the table</p> <p>Accept more fruit mass (grey area) versus less fruit mass</p> <p>Ignore seeds in a ring / AW</p> |
| Fruit G | Fruit H | | | | | | | | | | |
| Short(er) / rounded | Long(er) / narrow; | | | | | | | | | | |
| Less seeds / 6 seeds | more seeds / 13 seeds; | | | | | | | | | | |
| Seeds apart | seeds close together; | | | | | | | | | | |
| (c) | <p>bursts open / explosive / eaten / water / dries out / animals / wind / AW;</p> | [1] | <p>Ignore seeds dispersed when fruit dies / rots</p> | | | | | | | | |
| | | [Total: 14] | | | | | | | | | |