

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
International General Certificate of Secondary Education

**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

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 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.

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Page 2	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2011	0610	61

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 cm<sup>3</sup> 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><b>40.0 ;</b></td> </tr> <tr> <td>mean</td> <td>28.875</td> <td><b>10.0 ;</b></td> </tr> </tbody> </table>	Mass of tissue g	Volume of oxygen cm <sup>3</sup> 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	<b>40.0 ;</b>	mean	28.875	<b>10.0 ;</b>	[2]	
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(ii)	Larger surface or area / to release more enzyme / <b>faster</b> reaction;	[1]	<p><b>Accept</b> enough surface area to react</p> <p><b>Ignore</b> to make the tissues more uniform in texture / easier to measure / reference to skin of potato</p> <p><b>Accept</b> more contact</p> <p><b>Ignore</b> easier reaction</p>																							

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	IGCSE – October/November 2011	0610	61

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

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2011	0610	61

Question	Mark scheme	Mark allocation	Guidance
(c)	<p><b>Two from:</b></p> <p><b>S:</b> use of water bath / AW;  <b>E:</b> correct reference to maintaining temperature / AW;</p> <p><b>S:</b> use of stopwatch / data logger / computerised or monitoring system / AW;  <b>E:</b> correct reference to accurate timing / AW;</p> <p><b>S:</b> use of stirring device / same agitation or shaking / AW;  <b>E:</b> to avoid tissue settling on bottom of flask;</p> <p><b>S:</b> use the same size / similar apparatus;  <b>E:</b> different apparatus or sizes would affect result;</p> <p><b>S:</b> use burette / syringe / pipette / AW;  <b>E:</b> for accurate measurement of volume of hydrogen peroxide;</p> <p><b>S:</b> cut even size potato pieces / grind potato / AW;  <b>E:</b> to keep surface area the same / AW;</p> <p><b>S:</b> add buffer / pH controller / acid or alkali / AW;  <b>E:</b> to maintain constant pH / AW;</p> <p><b>S:</b> use funnel through bung to add H<sub>2</sub>O<sub>2</sub> / AW;  <b>E:</b> to save removing bung / prevent gas escape;</p> <p><b>S:</b> use same concentration H<sub>2</sub>O<sub>2</sub>;  <b>E:</b> to control substrate / make the experiment the same;</p> <p><b>S:</b> repeat <b>more</b> times;  <b>E:</b> to reduce anomalies / AW;</p> <p>AVP;</p>	<p>[max 4]  [Total:14]</p>	<p><b>Mark in couplets – improvement with appropriate explanation</b></p> <p>If not in couplets, <b>max 2</b> for <b>S</b> or <b>E</b> answers only</p> <p><b>Ignore</b> more frequent / longer timings</p> <p><b>Accept</b> maximising surface area for 'grinding' potato</p> <p><b>Accept</b> reduce mistakes</p> <p><b>Ignore</b> use of different tissues / plants</p>

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	IGCSE – October/November 2011	0610	61

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

Page 6	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2011	0610	61

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

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	IGCSE – October/November 2011	0610	61

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(iii)	<p><b>F</b> (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><b>Accept</b> short(er) roots</p> <p><b>Accept</b> no growth / undeveloped</p> <p><b>Ignore</b> lack of water</p> <p><b>Accept</b> extreme temperatures</p> <p><b>Ignore</b> hot temperatures</p> <p><b>Ignore</b> photosynthesis</p> <p><b>Accept</b> nutrients / fertilisers</p>								
(b) (i)	<p><b>two from</b> 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><b>Read through entire answer and award any correct points.</b></p> <p>e.g. 'Seeds at either side' = 2</p> <p><b>Accept</b> number / shape / type of seed for 'seeds'</p> <p><b>Accept</b> (fruit) is smooth</p>								
(ii)	<p><b>Two</b> rows from</p> <table border="1" data-bbox="347 874 1108 1141"> <thead> <tr> <th>Fruit G</th> <th>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><b>Accept</b> comparative answers on one side of the table</p> <p><b>Accept</b> more fruit mass (grey area) versus less fruit mass</p> <p><b>Ignore</b> 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><b>Ignore</b> seeds dispersed when fruit dies / rots</p>								
		[Total: 14]									