

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
**GCE Advanced Subsidiary Level and GCE Advanced Level**

**MARK SCHEME for the May/June 2011 question paper**  
**for the guidance of teachers**

**9700 BIOLOGY**

**9700/35**

Paper 31 (Advanced Practical Skills 1),  
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.

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



<b>Page 2</b>	<b>Mark Scheme: Teachers' version</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE AS/A LEVEL – May/June 2011</b>	<b>9700</b>	<b>35</b>

Mark scheme abbreviations:

<b>;</b>	separates marking points
<b>/</b>	alternative answers for the same point
<b>R</b>	reject
<b>A</b>	accept (for answers correctly cued by the question, or by extra guidance)
<b>AW</b>	alternative wording (where responses vary more than usual)
<b><u>underline</u></b>	actual word given must be used by candidate (grammatical variants excepted)
<b>max</b>	indicates the maximum number of marks that can be given
<b>ora</b>	or reverse argument
<b>mp</b>	marking point (with relevant number)
<b>ecf</b>	error carried forward
<b>I</b>	ignore
<b>ACE</b>	Analysis, Conclusions and Evaluation (skills)
<b>PDO</b>	Presentation of Data and Observations (skills)
<b>MMO</b>	Manipulations, Measurement and Observation (skills)

<b>Page 3</b>	<b>Mark Scheme: Teachers' version</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE AS/A LEVEL – May/June 2011</b>	<b>9700</b>	<b>35</b>

<b>1 (a) (i) Complete Fig. 1.1 to show how you will make three further concentrations of ethanol, E solution. [3]</b>	
MMO decisions 3	<p>(labels under correct sequence of beakers)</p> <p style="text-align: center;">2.5 AND 1.25 AND 0.6(25);</p> <p><b>Additional guidance</b></p> <p><b>Must have</b></p> <ul style="list-style-type: none"> <li>• % once</li> <li>• Concentrations at least 1 decimal place</li> </ul>
	<p>(uses serial dilution to complete three unlabelled beakers) (adds previous concentration of E to each of three beakers)</p> <p><u>5</u> (%) with volume Or shown by arrow from <u>5</u>(%) with volume</p> <p><b>Additional guidance</b></p> <p><b>Must have</b></p> <ul style="list-style-type: none"> <li>• AND the <u>same</u> volume transferred from first beaker to second and from second beaker to third;</li> <li>• cm<sup>3</sup> once</li> <li>ecf</li> <li>• if mp 1 incorrect</li> </ul>
MMO decision 2	<p>(adds (distilled) water/W to <b>each</b> of three beakers)</p> <p>10 cm<sup>3</sup> (W/water);</p> <p><b>Additional guidance</b></p> <p><b>Must have</b></p> <ul style="list-style-type: none"> <li>• cm<sup>3</sup> once</li> <li>ecf</li> <li>• if mp1 incorrect</li> <li>• if mp2 incorrect BUT <b>MUST</b> add previous concentration to second and third beakers</li> </ul>
<b>(ii) Describe how you will set up this control using the apparatus provided. [1]</b>	
ACE improvement 1	<p>(test-tube) replace E/ethanol with equal or same or 10 cm<sup>3</sup> volume of water OR (beaker) 20 cm<sup>3</sup> or only water;</p> <p><b>Additional guidance</b></p> <p><b>Do not give mark if</b></p> <ul style="list-style-type: none"> <li>• 10% ethanol/E</li> </ul> <p><b>Ignore</b></p> <ul style="list-style-type: none"> <li>• 0% must have what this is i.e. water</li> </ul>

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE AS/A LEVEL – May/June 2011	9700	35

<b>(iii) Prepare the space below and record your observations.</b>		<b>[4]</b>
PDO recording 2	[1] table with all cells drawn	<b>AND</b> heading (top or left) percent(age) conc(entrati on) ;
	Additional guidance <b>Can have</b>	
	<ul style="list-style-type: none"> <li>• %</li> </ul> <b>Do not give mark if</b> <ul style="list-style-type: none"> <li>• % in cells of the headed column/row</li> <li>• other units e.g. mol dm<sup>3</sup></li> </ul>	
	[1] (heading) colour or observations or description or result(s) AW;	
MMO collection 2	Additional guidance <b>Do not give mark if</b>	
	<ul style="list-style-type: none"> <li>• additional columns/rows for method/volumes of E /lengths</li> </ul>	
MMO collection 1	[1] records colour /no change for 5 concentrations <b>AND</b> control/0 (6);	
	[1] records highest concentration with deeper blue than next concentration;	
Additional guidance		<b>Can have</b>
		<ul style="list-style-type: none"> <li>• minimum two recorded colours</li> </ul>
<b>(iv) State the volume of the smallest division on syringe. State degree of uncertainty.</b>		
ACE interpretation 1	[1] +/-	<b>AND</b> half smallest division <b>AND</b> cm <sup>3</sup> /ml;
	Additional guidance	
		<b>Can have</b>
		<ul style="list-style-type: none"> <li>• rounding up or down</li> <li>• percentage error if shows calculation as half division /10 or any volume X 100</li> </ul>
		<b>Must have</b> percentage or %

Page 5	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE AS/A LEVEL – May/June 2011	9700	35

<b>(v) Explain the effect of the ethanol on the plant tissue.</b>		<b>[3]</b>
max 3	<p>1. (ethanol) Idea of breaks down / destroys/damages cell or cell surface/plasma membrane;</p> <p>2. Idea of decreases <u>selective</u> permeability or increases permeability;</p> <p>3. <u>Idea of</u> effect on protein (in cell membrane) <u>denatures</u> or opens channels;</p> <p>4. Idea of effect on phospholipid(s);</p>	
ACE conclusion max 3		
<b>(vi) If the ends had not been cut off how would the results have been affected?</b>		<b>[1]</b>
max 1	<p>1. lengths not same;</p> <p>2. more colour from ends;</p> <p>3. colour not same;</p>	
ACE interpretation max 1		

<b>Page 6</b>	<b>Mark Scheme: Teachers' version</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE AS/A LEVEL – May/June 2011</b>	<b>9700</b>	<b>35</b>

<b>(b) (i) Plot a graph of the data shown in Table 1.1.</b>		<b>[4]</b>
[1]	<p>x-axis pH of buffer solutions</p> <p>Additional guidance <b>Must have</b></p> <ul style="list-style-type: none"> <li>• units</li> </ul> <p><b>Do not give mark if</b></p> <ul style="list-style-type: none"> <li>• any units for pH e.g. arbitrary units</li> </ul> <p><b>AND</b> y-axis absorbance / %;</p>	
[1]	<p>(scale on x-axis) 4.0 at 0 <b>AND</b> one pH to 2 cm <b>must</b> label each 2 cm</p> <p>Additional guidance ecf if no labels for O if reverse O scale must have still have 20 to 2 cm</p> <p><b>Do not give mark if</b></p> <ul style="list-style-type: none"> <li>• awkward scale e.g. 25 to 2 cm, 40 to 2 cm</li> </ul> <p><b>AND</b> (scale on y-axis) <u>20 to 2 cm</u> <b>must</b> label each 2 cm;</p>	
[1]	<p>correct plotting of each point;</p> <p>Additional guidance <b>Can have</b></p> <ul style="list-style-type: none"> <li>• small cross or dot in circle</li> </ul> <p><b>Do not give mark if</b></p> <ul style="list-style-type: none"> <li>• awkward y-axis scale</li> <li>• blobs or dots alone</li> <li>• cross too large with any part of line touching 4 mm by 4 mm square –</li> </ul> <p>4.0      83 6.0      39 7.3      10 7.8      38 8.5      78</p>	
[1]	<p>lines point to point</p> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>• ruled, clear sharp and</li> <li>• quality ruled lines, thinner than half square;</li> </ul> <p>Additional guidance <b>Do not give mark if</b></p> <ul style="list-style-type: none"> <li>• any feathery line</li> <li>• irregular thickness</li> <li>• extrapolation at either end</li> </ul>	

PDO layout 4

Page 7	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE AS/A LEVEL – May/June 2011	9700	35

(ii) ... the absorbance was 46%. Use your graph to estimate the pH of the buffer solution at this absorbance. [2]	
ACE decision 1 [1]	one correct reading from graph;
MMO decision 1 [1]	readings of any TWO values from graph;
(iii) State two variables that need to be kept the same in this investigation. Describe how to keep each of these variables the same. [3]	
MMO decision 1 [1]	(selects <b>TWO</b> variables for one mark) 1. Idea of size of plant material 2. type or part of plant or condition
ACE improvements max 2	1. volume of buffer 2. temperature; 3. time
	(Suitable method to keep the same ) using ruler/use cork borer/Vernier callipers; use <u>same</u> type or <u>same</u> part or fresh; use syringe / measuring cylinder / graduated pipette burette; use thermostatically-controlled water-bath; staggered start or separate experiments;
[Total: 22]	

Page 8	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE AS/A LEVEL – May/June 2011	9700	35

2 (a) Draw a large plan diagram of the quarter shown in Fig. 2.1. Label the xylem. [5]	
PDO layout 1	[1] clear, sharp, unbroken lines AND no shading AND larger than 60 mm by 60 mm; Additional guidance <b>Must have</b>
	<ul style="list-style-type: none"> <li>• four or more lines</li> </ul> <b>Do not give mark if</b> <ul style="list-style-type: none"> <li>• drawn over the print of question</li> <li>• any line thicker – than 1mm</li> <li>• any feathery line</li> <li>• 1 'tail' or overlap or gap</li> </ul>
	[1] no cells drawn <b>AND</b> correct quarter drawn;
	[1] (outer layer(s)/outside stele) drawn as two/three lines wider than 5mm for most of layer; [1] (central vascular tissue) drawn with two lines for endodermis <b>AND</b> triangular regions/extra layer adjacent; correct label with label line to xylem;
MMO decision 1	[1] Additional guidance <b>Do not give mark if</b> <ul style="list-style-type: none"> <li>• any label which is biologically incorrect e.g. from incorrect organ or animal</li> <li>• label within drawn area</li> </ul>



<b>Page 9</b>	<b>Mark Scheme: Teachers' version</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE AS/A LEVEL – May/June 2011</b>	<b>9700</b>	<b>35</b>

<b>(b) (i) Prepare the space below so that it is suitable for you to record the observable differences between the specimens on Fig. 2.1 and that in Fig. 2.2.</b>							
PDO recording	[1]	organise as a table/ruled boxes	<b>AND</b> headed Fig. 2.1 and Fig. 2.2	<b>AND</b> first difference opposite each other;			
		Additional guidance	Fig. 2.1	Fig. 2.2 OR Fig. 2.2	Fig. 2.1		
ACE interpretation max 3	[max 3]	<b>feature</b>	<b>Fig. 2.1</b>	<b>Fig. 2.2</b>			
		1	vascular tissue/ xylem	small(er)/only one;	large(r) or seven or more;		
		2		round/circular or middle/in centre	star-shape/(seven) different area/not circular or more spread;		
		3	endodermis	present/around stele	absent/none;		
		4	cortex or parenchyma cells	large(r)/wid-er circular/round/more even sizes	small(er)/narrow(er) irregular/different sizes;		
		5	thickened/layer under or epidermis	thick(er)/wide(r)/large(r)	curled/bent;		
		6	epidermis or hairs/ trichomes	present/has hairs/trichomes/many	absent/no/few hairs/trichomes or rough;		
		7	radius/size	1.25mm/smaller	1.7 mm/larger;		
		8	AVP;				

Page 10	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE AS/A LEVEL – May/June 2011	9700	35

<b>(ii) Use the scale bar to calculate the magnification of Fig. 2.2.</b>		<b>[4]</b>
MMO collection 1	[1] measures scale bar in mm; 14 or 14.5 or 15 or 15.5 or 16 mm	
MMO decision 1	[1] (converts to same units) (mm to $\mu\text{m}$ ) X 1000 14 000 or 14 500 or 15 000 or 15 500 or 16 000 ecf if mp1 incorrect OR (converts $\mu\text{m}$ to mm) 620/1000	Additional guidance Do not give mark if • metres
PDO display 2	[1] shows division of converted scale bar measurement by 620; OR scale bar measurement in mm/0.620;	Additional guidance ecf if no units or incorrect measurement or no or incorrect conversion
	[1] whole number only; 22 or 23 or 24 or 25 or 26	

Page 11	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE AS/A LEVEL – May/June 2011	9700	35

<b>(c) ... find three cells with different shapes. Make a large drawing of these cells. Label the cell wall and any observable internal structures of these cells. [5]</b>			
PDO layout 1	[1]	clear, sharp, unbroken lines  Additional guidance	<b>AND</b> no shading  <b>AND</b> largest cell 50 mm at widest point;
			<b>Must have</b> <ul style="list-style-type: none"> <li>three or more enclosed areas</li> </ul> <b>Do not give mark if</b> <ul style="list-style-type: none"> <li>drawn over the print of question</li> <li>any line thicker – than 1 mm</li> <li>any feathery line</li> <li>0 'tails' or overlaps or gaps if one line for cell walls check cell walls only.</li> </ul>
MMO collection 2	[1]	only three cells drawn <b>AND</b> all different shapes;	
	[1]	three cells with cell walls drawn as double lines;	
PDO recording 1	[1]	at least one cell contains three or more substantial inclusions drawn;	
MMO decision 1	[1]	correct label with label lines to cell wall <b>AND</b> starch (grain) or nucleus;  Additional guidance	<b>Do not give mark if</b> <ul style="list-style-type: none"> <li>any label which is biologically incorrect e.g. from incorrect organ or animal</li> <li>label within drawn area</li> </ul>
			<b>[Total: 18]</b>