CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2012 series

9700 BIOLOGY

9700/33 Paper 3 (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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Mark scheme abbreviations:

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

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1 (a) (i) [1]

MMO decision 1

size or diameter or length or width or surface area (bod) or volume (bod)
or colour
or whole
or same shape;

Do not give mark if
- any other variable than seeds

Ignore
- number
- mass

same type or species or age

(ii) [1]

MMO decision 1

(any one temperature)
°or degree(s) C **AND** any whole number 80 to and including 100 ;

(iii) [3]

MMO decisions 3

mp1 (0).3 **AND** (0).2 **AND** (0).1;

Not required are
- units
- zero

Do not give mark if
- incorrect units e.g. mol dm^{-3}

mp2 cm^3 or ml(s) shown at least once for R **AND** (0.3)7.5 and (0.2) 5 and (0.1)2.5;

Do not give mark if
- on on units e.g. cm or cm^2

mp3 values of (R and W) for ALL tubes must add up to 10 (minimum two tubes);

(iv) [1]

MMO decision 1

cm^3 or ml(s) once **AND**(volume of R) **2** **AND** (one volume of Benedict's)
any one whole number 2 to 10

that is 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10;

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<table>
<tr><td colspan="4">(v) [4]</td></tr>
<tr><td rowspan="4">PDO recording 2</td><td>mp1</td><td>table with all cells drawn</td><td>AND heading
(top row or column to left of recorded data)
percent(age) or % conc(entration) (of)R or reducing sugars ;</td></tr>
<tr><td colspan="3">Do not give mark if
• % in cells of headed column
• other units e.g. mol dm^{-3}
• more than one row in one cell for multiple trials</td></tr>
<tr><td rowspan="2">mp2</td><td colspan="2">(heading for any column/row including mean)
only time (with) s or sec(onds);</td></tr>
<tr><td colspan="2">Do not give mark if
• units in cells of this column/row
• min(utes)
• headings for volumes or method information or in cells e.g. volumes and concentrations in same cell</td></tr>
<tr><td rowspan="4">MMO collection 2</td><td rowspan="2">mp3</td><td colspan="2">(mark first column/row of recorded results)
records at least three results with whole numbers only
that is any whole number less than 180 or records ‘ > or more than 180’;</td></tr>
<tr><td>Must have
• whole numbers between 3 and 180 or ’ > or more than 180’</td><td>Do not give mark if
• ‘< or less than 180’
• e.g. 0:45 or 50:45</td></tr>
<tr><td rowspan="2">mp4</td><td colspan="2">(mark first column/row of recorded time for recording correct pattern)
recorded time for
0.4% is the shorter/lower value than lowest concentration;</td></tr>
<tr><td>Must have
• units for time recorded somewhere e.g. seconds with tenths or min:sec
• minimum two recorded times including ‘more than 180’</td><td>Do not give mark if
• no units for time anywhere</td></tr>
</table>

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<table>
<tr><td colspan="4">(vi) [1]
Do not give mark if no results for R or results all more than 180 or S.</td></tr>
<tr><td rowspan="2">ACE interpretation 1</td><td rowspan="2"></td><td><u>correct estimate</u> with their <u>time</u> results</td><td>AND uses only one of following values
• one value of 0.1, 0.2 , 0.3 ,0.4
• between 0.1 and 0.2
• between 0.2 and 0.3
• between 0.3 and 0.4
• less than 0.1
• more than 0.4
• or their own concentrations;</td></tr>
<tr><td colspan="2">Do not give mark if
• calculate or estimate between two of their concentration values
• description or colour only in results</td></tr>
<tr><td colspan="4">(vii) [2]
Do not give mp 1 if no result for seeds ecf for mp 2</td></tr>
<tr><td rowspan="3">ACE conclusion 2</td><td rowspan="2">mp1</td><td colspan="2">(should be) yes if result is positive for reducing sugar;</td></tr>
<tr><td colspan="2">Can have
• no if their result for S is negative for reducing sugar</td></tr>
<tr><td>mp2</td><td>positive result
described for seed sample either time or colour change</td><td>AND
so <u>reducing sugars</u>
OR
sucrose broken down;</td></tr>
<tr><td></td><td></td><td>OR
negative result
no colour change or stayed blue</td><td>AND
so no <u>reducing sugars</u>
OR
sucrose not broken down;</td></tr>
</table>

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(b) [3]

		MUST mention seeds (in solution/sucrose) in correct context to access marks. **Do not give mark if** • change more than one variable	
ACE improvements 3	mp1	(independent) 5 or more temperatures or described OR gives examples of 5 or more (units NOT required);	
			Do not give mark if • change more than one variable • in context of Benedict's test
	mp2	(how to keep temperature standardised in context of different temperatures only) use thermostat(ically-controlled) water-bath;	
			Do not give mark if • ref. to temperature controlled room e.g. air conditioned or thermostat controlled room
	mp3	(standardisation of variables only in context of changing temperature) same number or example of number or mass or example of mass of seeds **Ignore** amount OR same volume or example of volume with units of sucrose OR concentration or example of concentration of sucrose solution OR (seeds NOT Benedict's) same time in water-bath;	
			Do not give mark if • not idea that changing temperature

(c) (i) [4]

If draw a chart then **max 1** for O

PDO layout 4	O	*x*-axis pH(p.h. PH Ph)	**AND** *y*-axis conc(entration of) reducing sugar(s) (/) mmol(e) hr^{-1};
	S	scale on *x*-axis 1.0 to 2 cm with **4** at origin labelled each 2cm except 8 need not be labelled	**AND** *y*-axis 10 to 2 cm labelled each 2 cm; except origin and 60 need not be labelled
	P	correct plotting of • **five** points **Check** first four points for bark and last point for leaves;	

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	L	plots joined with ruled lines exactly point to point or curve through set of 5 points	**AND** (quality) smooth line for bark less than 1 mm thick use grid	**AND** **for each** line a label leaves and bark or uses key;

Additional guidance:

O	
S	**Must have** label of value of origin if zero not at origin
P	plots (crosses or centre of dot) must be nearer than halfway line – up or down or either side OR if meant to be within two lines then must not be on line above or below or either side

	Can have **ecf** if origin not zero but use scales as given **ecf** if scale correct but not labelled every 2 cm **ecf** if reverse axes and scale is *x*-axis 20 to 2 cm and *y*-axis to 1 to 2 cm **ecf** if scale of pH 2 to 2 cm on *x*-axis or *y*-axis	**Do not give mark if** • any blobs or dots alone • any cross or dot too large
L		**Do not give mark if** • any feathery or gap in line or dashed line • any irregular thickness • any extrapolation

(ii) [1]

ACE interpretation 1		(activity/concentration of reducing sugars) increases/rises to (pH) 5.3	**AND** decreases to (pH) 7.8; or rises by 2.5

(iii) [1]

ACE conclusion 1		In correct context idea of (enzyme) denatured or denaturation;

[Total: 22]

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2 (a) (i) [5]

PDO layout 1	mp1	**Do not give mark if** drawn over the print of question or any shading anywhere or any ruled or compass lines or break in outline which does not have a line to seal open ends	**AND** **Do not give mark if** smaller than *60 mm* across widest point	**AND** (clear, sharp, unbroken lines); **Do not give mark if** • *less than 3 enclosed area* ***the outermost enclosed area has*** • any part of line 1mm or thicker (use grid) • any feathery or dashed or gap in line • *any 'tails' or overlaps*
MMO collection 3	mp2	no cells drawn **AND** *whole section drawn*;		
	mp3	*(epidermal layer and endodermis)* both layers drawn as paired lines with a gap between the layers; **Do not give mark if** • regular enclosed areas e.g. ovals or circles between innermost paired lines		
	mp4	line separating pith from endodermis layer is continuous and wavy OR for epidermis three lines (two layers) for most of layer;		
MMO decision 1	mp5	labels cortex with label line touching;		
		Do not give mark if • any label which is biologically incorrect e.g. animal or cell structure • any label written within drawn area		

(ii) [4]

PDO layout 1	mp1	**Do not give mark if** drawn over the print of question **or** any shading anywhere or any ruled or compass lines	**AND** **Do not give mark if** smaller than 40 mm across widest cell;	**AND** (clear, sharp, unbroken lines) outer boundary lines of any cells **Do not give mark if** • less than 5 cell outlines any of outermost lines have • any line 1 mm or thicker (use grid) • any feathery or dashed or gap in line • *any 'tails' or overlaps*

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MMO collection 2	mp2	only five complete cells drawn	**AND** each cell must touch another cell at least at one point to form one group ;
			Do not give mark if • any ruled or compass lines
	mp3	at least one intercellular space at least 3 mm across at widest point OR at least three cells with rounded shape with no straight sharp corners in correct context;	
		Can have • drawn vacuoles/nucleus	**Do not give mark if** or more cells raw EM organelles e.g. mitochondria raw incorrect cell structure e.g. sieve plates, ll cells drawn separate
PDO recording 1	mp4	all cells with cell walls drawn as double lines all the way round (inner line can touch but not cross outer line-overlap) **AND** (between any two adjacent cells middle lamella drawn) so three lines less than 4 mm across at widest point;	

(b) (i) [3]

MMO decision 1	mp1	**Step 1** **Ignore** first box second box must be whole number 3 to 92	**AND** EITHER answer must be (0).00X(……) where X is a number 1 to 9 OR expressed in standard form e.g. x 10^{-3}; **Do not give mark if** fraction
PDO display 1	mp2	(either box in **Step 2**) 1000 or 10^3	**AND** any answer from step 1 in other box;
		ecf any answer to step 1	
ACE interpretation 1	mp3	μm or mm **AND** answer from step 1 ×1000;	

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(ii)				[2]
MMO collection 1	mp1	measures correctly in eyepiece graticule units; measures total length 57 or 58 or 59 or 60 or 61 or 62 (epg units)		
		Do not give mark if • m or mm or cm or m or stage micrometer units • hoice of measuring e.g. mm and epgu		
PDO display 1	mp2	(shows multiplication by answer from **(b)(i)**) any one value (multiplied by) X by answer from **(b)(i)** step 2;		
		Can have • alternative signs • or * or value **(b)(i)** **Do not give mark if** • division shown		
(c)				[4]
PDO recording 1	mp1	organise as a table with only three columns or rows separated by lines (no cells needed) **Ignore** number column	**AND** headings in any order only K1/slide and Fig 2.4	**AND** third column/row contains list of tissues;
		(features) K1/slide. Fig 2.4 (K1 or Fig 2.4 either way round and other column to left, right or in middle) , | |		

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ACE interpretations 3

max 1 / max 2

	feature	K1	Fig. 2.4
mp2	(vascular bundles or tissue shape)	absent or not visible/seen or cross shape or not in ring or irregular	present or visible/distinct or ring or regular;
	(position)	inner or inside or near endodermis/pericycle	outer or towards outside or near epidermis;
	(quantity of vascular tissue bundles/xylem/ phloem)	Idea of less or small(er) or few(er), narrow(er)	Idea of more or large(r) or wide(r);
	cambium	no(one) or absent or has not	yes or present or has;
mp3	pith or middle or centre	any difference for central area either way round e.g. present vs absent or small(er) vs large(r) or not hollow vs hollow;	
mp4	endodermis or pericycle or stele	yes or present or has	no(one) or absent or has not;
mp5	cortex	large(r) or wider or more	small(er) or narrower;
mp6	epidermis thickened layer/ collenchyma/ sclerenchyma	thin(ner) or narrow(er) or one cell no(one) or absent or has not	thick(er) or wide(r) or large(r) or more than one cell has or present or yes;
mp7	hairs (root) or (trichomes)	yes or present or has or many hairs or rough	no(one) or absent or has not or smooth;

[Total: 18]

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