CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the May/June 2015 series

9700 BIOLOGY

9700/31 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

CAMBRIDGE
International Examinations

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 accepted)
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

© Cambridge International Examinations 2015

1 (a) (i) (heading) solution(s) **or** sample **+** (heading) observation(s) **or** colour (with iodine) ;

(**S**) blue-black / black **+** (**S** and **E)** any acceptable colour (orange / brown / yellow) ;

repeats the experiment ; [3]

(ii) records time as a whole number only **+** seconds / s / sec(s) ; [1]

(iii) ref. to hydrolysis / digestion of starch ; [1]

(iv) glucose / maltose ; [1]

(v) (level of risk) medium or high ; [1]

(b) (i) (labels under correct sequence of beakers) 0.5 **+** 0.25 **+** 0.125 **+** 0.0625 **+** % ;

shows transfer of 10 cm^3 of solution from previous beaker to 3 beakers ;

adds 10 cm^3 water / **W** to 4 beakers ; [3]

(ii) 1 (heading) percentage concentration of starch solution ;

2 (heading for any column/row) time **+** s / second(s) / sec(s) ;

3 records at least 5 results for 5 different concentrations as whole numbers ;

4 records 1% as faster than lowest concentration ; [4]

(iii) correct answer calculated from students results ; [1]

(iv) reject ;

colour change fastest at 1% ; [2]

(c) (i) colour change / endpoint is difficult to judge ; [1]

(ii) systematic error **+** same syringe **or** random error **+** appropriate problem ; [1]

(iii) same concentration of starch ;

at least 5 different concentrations of **X** or fruit juice **+** serial or simple dilution ;

add Benedict's **+** heat to 80 °C / boil **+** record the time for first appearance of any colour change ; [3]

[Total : 22]

© Cambridge International Examinations 2015

2 (a) (i) 1 at least 3 lines **+** size at least 70 mm **+** no shading ;

2 no cells **+** correct quarter drawn ;

3 at least 5 lines drawn **+** one complete bulge ;

4 at least 3 layers **+** epidermis drawn as double lines **or** trichomes drawn ;

5 label **T** with label line ; [5]

(ii) 1 quality of outer line sharp and continuous **+** largest cell size at least 40 mm in length **+** at least 4 cells ;

2 only 4 complete cells drawn **+** each cell must touch another cell at least at one point to form one group ;

3 correct proportion of cell wall to cytoplasm (thin cell walls) ;

4 labels one cell wall ; [4]

(b) records correct number of eyepiece graticule units ;

shows multiplication by 11 ;

correct answer **+** units ; [3]

(c) (i) *orientation*
(*x*-axis) biological molecule found in fruit **+** (*y*-axis) mass (of) biological molecule in the 35 g fruit (/) g ;

scale
(*x*-axis) bars of equal width **+** equal distance apart) **+** using more than half the grid **+** (*y*-axis) even scale ;

plotting
correct plotting of each bar in the order in the table ;

line
sharp ruled lines **+** labels for **C**, **S, U**, **F**, **P** directly below bar or inside bar ; [4]

(ii) shows addition of 0.2 and 0.4 **+** division by 35 **+** multiplication by 100 ;

1.7(%) ; [2]

[Total: 18]

© Cambridge International Examinations 2015

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the May/June 2015 series

9700 BIOLOGY

9700/32 Paper 3 (Advanced Practical Skills 2), 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

CAMBRIDGE
International Examinations

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 accepted)
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

© Cambridge International Examinations 2015

1 (a) (i) starch test **+** iodine solution ; [1]

(ii) completed table with tick for **D1 +** cross for each of **D2**, **D3**, **D4** ; [1]

(iii) (reducing sugar test) add Benedict's **+** heat (80 °C - 100 °C) ;

(non-reducing sugar test) add acid **+** heat ;

(non-reducing sugar test) neutralise ; [3]

(iv) (level of risk) medium or high ; [1]

(v) **1** table with heading **+** drinks ;

2 table with heading **+** time **+** seconds ;

3 records results for 4 reducing sugar tests **+** 4 non-reducing sugar tests ;

4 for **D2** records time for reducing sugar test as longer than for non-reducing sugar test ;

5 records time in whole seconds ; [5]

(vi) **D1** or **D2** (breaks down to glucose) or **D3** shortest time to show colour change ; [1]

(vii) at least 5 known glucose concentrations ;

made by simple or serial dilution ;

carry out Benedict's test with known glucose concentrations and **D5 +** compare result for **D5** with results for known glucose concentrations ; [3]

(b) (i) *orientation*
(*x*-axis) $\log_{10}$ distance (/) m **+** (*y*-axis) average speed (/) m s^{-1} ;

scale
(*x*-axis) 2 cm to 0.5 labelled each 2 cm **+** must have 2 at the origin **+** (*y*-axis) 2 cm to 1 labelled each 2 cm **+** must have 5 at origin ;

plotting
correct plotting of 5 points as small cross or dot in circle ± half a square ;

line
5 plots with ruled lines exactly point to point **+** quality smooth line less than 1 mm thick ; [4]

(ii) correct estimate from candidate's graph ; [1]

(iii) as distance increases the average speed decreases ; [1]

(iv) increased number of red blood cells ; [1]

[Total: 22]

© Cambridge International Examinations 2015

2 (a) (i) draws at least 2 layers of tissue **+** size at least 70 mm **+** no shading ;

no cells drawn **+** correct quarter drawn ;

epidermis drawn as 2 lines close together ;

draws at least one vascular bundle subdivided into tissue layers ;

correct label with label line to vascular bundle ; [5]

(ii) thin and continuous lines **+** size at least 40 mm for at least one cell ;

draws only 4 whole cells **+** each cell touching at least 2 other cells ;

intercellular space present for 4 cells;

cell walls drawn as double lines ;

correct label with label line to cell wall ; [5]

(b) organizes table with 3 columns or rows **+** with appropriate headings **+** one column or row for features ;

records only differences ;

at least one observable difference for the vascular tissue ;

at least one observable difference for one other tissue ; [4]

(c) (i) shows measurement of line **Y** within range **+** mm ;

shows length of **Y** divided by 250 **+** multiplied by 1000 ; [2]

(ii) lumen / space / no (cell) contents **+** transport / *idea of* less resistance [1]
or
wall **+** support to prevent collapse ;

(iii) shows the simplest ratio of the diameter of cell **Q** to the diameter of cell **R** ; [1]

[Total: 18]

© Cambridge International Examinations 2015

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the May/June 2015 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

CAMBRIDGE
International Examinations

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 accepted)
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

© Cambridge International Examinations 2015

1 (a) (i) starch test **+** iodine solution ; [1]

(ii) reducing sugar test **+** add Benedict's solution **+** heat (80 °C – 100 °C) ; [1]

(iii) table with heading **+** solutions **+** (any column / row headed) **+** observations ;

records results for reducing sugar test and starch test for **S1**, **S2** and **S3** ;

for starch test on **S3** records colour change to blue-black
+ for reducing sugar test on **S2** records colour change from blue to yellow, green, red ; [3]

(iv) completed table identifying mixture of sucrose and glucose as **S2**
+ sodium chloride as **S1 +** starch as **S3** ; [1]

(v) (level of risk) medium or high ; [1]

(b) (i) completed sentence, inserting leaves **+** plasmolysed ; [1]

(ii) table with heading **+** solutions **+** (any column / row headed) **+** number **+** cells ;

records repeats ;

for **W** records number as 0 or 1 **+** for **S1** records number as 6 or above ; [3]

(iii) *idea of* difficulty judging which cells are plasmolysed ; [1]

(iv) **1** thin and continuous lines **+** size at least 70 mm for at least one cell ;

2 draws one cell for **W** and one cell for **S1 +** cell walls drawn as double lines ;

3 for **S1**, draws cell membrane coming away from cell wall ;

4 correct label with label line to cytoplasm for **W** and **S1** ; [4]

(v) for **S1** or **S3**, osmosis **+** correct direction of water movement ;

for **S1**, water moving out of cell **+** correct reference to water potential ;

for **S3**, *idea of* no net movement of water **or** correct ref. to water potential ; [3]

[Total: 19]

© Cambridge International Examinations 2015

2 (a) (i) using syringe to fill **or** empty tubes to lines marked on tube ; [1]

(ii) 1 table with heading **+** tubes **+** (any column / row headed) **+** volume **+** cm^3 ;

2 for 4 tubes, volumes for $\mathbf{V_0}$ and volumes for $\mathbf{V_9}$;

3 records number as whole numbers **or** to correct precision ;

4 for processed results ($\mathbf{V_0} - \mathbf{V_9}$), correct calculation of volume of water evaporated ; [4]

(iii) completed table according to candidate's results ; [1]

(iv) using lid without holes **or** no lid ; [1]

(v) increase temperature **+** thermostatically-controlled water-bath
or
increase wind speed **+** fan
or
lower humidity **+** fan **or** use of named water absorber ; ; [2]

(b) *orientation*
(*x*-axis) total circumference of holes (/) mm **+** (*y*-axis) rate of evaporation of water (/) $cm^3\ day^{-1}$;

scale
(*x*-axis) 2 cm to 5 labelled each 2 cm **+** (*y*-axis) 2 cm to 0.2 labelled each 2 cm ;

plotting
correct plotting of 5 points as small cross **or** dot in circle to ± half a square ;

line
5 plots with ruled lines as line of best fit **or** exactly point to point **+** quality smooth line less than 1 mm thick ; [4]

(c) 1 draws at least 3 layers of tissue **+** size at least 70 mm **+** no shading ;

2 no cells drawn **+** correct quarter drawn ;

3 draws at least 4 layers of tissue ;

4 vascular bundle drawn to correct proportions ; [4]

(d) (i) shows 0.024 multiplied by 1000 ;

shows answer as 24 μm ; [2]

(ii) shows length of **Y** as eyepiece graticule divisions within range ;

shows length of **Y** multiplied by 24 **+** μm ; [2]

[Total: 21]

© Cambridge International Examinations 2015

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the May/June 2015 series

9700 BIOLOGY

9700/34 Paper 3 (Advanced Practical Skills 2), 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

CAMBRIDGE
International Examinations

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 accepted)
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

© Cambridge International Examinations 2015

1 **(a)** level of risk) medium or high ; [1]

(b) **(i)** (labels under correct sequence of beakers) 0.03 + 0.003 + 0.0003 + % ;

shows transfer of 1 cm^3 of solution from previous beaker to 2 beakers ;

adds 9 cm^3 water / **W** to three beakers ; [3]

(ii) **1** table with heading **+** <u>percentage concentration of **X**</u> ;

2 table with heading **+** <u>number</u> **or** <u>no. of bubbles</u> ;

3 records results for **W or** 0% and 4 concentrations ;

4 records lowest concentration of **X** with a higher number of bubbles than highest concentration of **X** ;

5 repeats at least one concentration ; [5]

(iii) whole seconds recorded and shows 2 divided by this value ;

correct answer calculated to correct number of significant figures ; [2]

(iv) *idea of* inhibits activity ;

idea of preventing substrate binding to the enzyme / active site **or** fewer enzyme-substrate complexes formed ; [2]

(v) (counting bubbles) different sizes **or** too fast **or** bubbles group together ;

(displacement of water) gas escapes from delivery tube **or** not all bubbles go into syringe **or** parallax error ; [2]

(vi) (independent variable) use the same concentration of **X** ;

5 or more temperatures ;

use thermostatically-controlled water-bath ; [3]

[Total: 18]

© Cambridge International Examinations 2015

2 (a) (i) *orientation*
(*x*-axis) length of neck / cm **+** (*y*-axis) thickness of muscle wall in left ventricle / mm ;

scale
(*x*-axis) 2 cm to 10 labelled each 2 cm **+** must have 50 at the origin **+** (*y*-axis) 2cm to 5 labelled each 2 cm, **+** must have 20 at origin ;

plotting correct plotting of 5 points ;

line
5 plots with ruled lines exactly point to point **or** line of best fit **+** quality smooth line less than 1 mm thick ; [4]

(ii) correct estimate from candidate graph; [1]

(iii) *idea of* thicker / stronger / wall or muscle to push blood up longer neck **or** to push the blood further; [1]

(b) (i) 1 correct selection of vessel **Q** or **T** ;

2 size at least 100 mm **+** no shading ;

3 length of drawing is at least twice the size of the narrowest width ;

4 draws at least three lines across wall **+** inner line crinkled ;

5 proportions of vessel walls correct with one selected ; [5]

(ii) 1 shows on Fig. 2.1 where measured **S** ;

2 shows at least 5 of measurements of the diameter **+** 5 measurements of the thickness of the wall ;

3 measures at least 3 for each in whole mm or to ±0.5 mm ;

4 answer shown as larger number to smaller number to lowest common denominator ; [4]

(c) (i) 1 sharp continuous lines **+** size at least 40 mm for at least one cell ;

2 draws only 4 xylem vessels **+** at least 2 touching ;

3 for at least 2 cells, walls drawn as double lines, with middle lamella ;

4 straight line where 2 cells meet **or** at least one cell with at least one angle present ;

5 correct label with label line ending in the lumen ; [5]

(ii) *idea that* Fig. 2.1 has thicker walls than the xylem **or** Fig. 2.1 has more than one layer xylem has only one ; [1]

(iii) lumen **+** space / no (cell) contents **or** lumen **+** idea of less resistance ; [1]

[Total: 22]

© Cambridge International Examinations 2015

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the May/June 2015 series

9700 BIOLOGY

9700/35 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

CAMBRIDGE
International Examinations

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 accepted)
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

© Cambridge International Examinations 2015

1 **(a)** (level of risk) medium or high ; [1]

(b) **(i)** (labels under correct sequence of beakers) 2.5 **+** 1.25 **+** 0.625 **+** % ;

shows transfer of 20 cm^3 of solution from previous beaker to 2 beakers ;

adds water / **W +** 20 cm^3 to three beakers ; [3]

(ii) **1** table with heading underlined (top or to left of data) **+** percentage concentration of urea / **U** ;

2 table with heading (any column / row headed) **+** time **+** seconds ;

3 records time for at least 4 concentrations **+** lowest concentration of **U** recorded first ;

4 records repeats ;

5 records time in whole seconds ; [5]

(iii) difficult to judge end-point ;

mixing of **U** and **E** not standardized or size of litmus not the same for each test-tube ; [2]

(iv) use of mechanical stirrer **or** use of ruler to measure accurately the size of litmus paper ; [1]

(v) syringe ; [1]

(vi) decrease the temperature **+** use of thermostatically-controlled water-bath ;

decrease concentration of **E +** dilution of **E** ;

decrease volume of **E +** stated volume of **E** (less than 0.5 cm^3) ; [max 2]

(c) **(i)** *orientation*
(*x*-axis) time of sampling (/) minutes **+** (*y*-axis) $^{13}CO_2$ in the breath (/) arbitrary units ;

scale
(*x*-axis) 2 cm to 20 labelled each 2 cm **+** must have 30 at the origin
+ (*y*-axis) 2 cm to 2 labelled each 2 cm **+** must have 10 at the origin ;

plotting
correct plotting of 5 points as small cross / dot in circle ± half a square ;

line
5 plots with ruled lines exactly point to point **+** quality smooth line less than 1 mm thick ; [4]

© Cambridge International Examinations 2015

(ii) less urea / substrate **+** as urea is broken down ;

fewer enzyme-substrate complexes **+** slower rate of reaction ; [2]

[Total: 21]

2 (a) (i) 1 drawn at least 2 layers of tissue **+** size at least 100 mm **+** no shading ;

2 no cells **+** correct half drawn ;

3 epidermis of bulges drawn as two lines ;

4 draws angular inner region ;

5 correct label with label line ending in the pith ; [5]

(ii) 1 thin and continuous lines **+** size at least 40 mm for at least one cell ;

2 draws only 4 cells **+** 2 cells from epidermis touching **+** 2 cells from cortex touching ;

3 4 cells with walls drawn as double lines ;

4 for at least 2 cells, walls drawn with middle lamella between the cells ;

5 correct label with label line ending at the cell wall ; [5]

(b) (i) shows 0.028 multiplied by 1000 ;

shows answer as 28 μm ; [2]

(ii) shows length of line **X** as eyepiece graticule units within range ;

shows length of **X** multiplied by 28 μm ; [2]

(iii) air spaces **+** *idea of* buoyancy or relatively small amount of xylem as water diffusing through epidermis ; [1]

(c) 1 organises table with 3 columns or rows **+** with appropriate headings **+** one column or row for features ;

2 observable difference between **K1** and Fig. 2.2, e.g. position of vascular tissue ;

3 observable difference between **K1** and Fig. 2.2, e.g. presence of air spaces ;

4 observable difference between **K1** and Fig. 2.2, e.g. presence of pith ; [4]

[Total: 19]

© Cambridge International Examinations 2015