

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International Advanced Subsidiary and Advanced Level

## **MARK SCHEME for the March 2016 series**

### **9700 BIOLOGY**

**9700/33**

Paper 3 (Advanced Practical Skills), 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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<b>Page 2</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge International AS/A Level – March 2016</b>	<b>9700</b>	<b>33</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 accepted)
<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>AVP</b>	Alternative valid point (examples given as guidance)

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge International AS/A Level – March 2016	9700	33

- 1 (a) (hazard and level of risk)  
corrosive + medium or high ; [1]
- (b) (i) 1 at least four percentage concentrations of protein ;  
2 volumes of **P** for three percentage concentrations of protein ;  
3 volumes of **P** and **W** for three percentage concentrations of protein make  $5\text{ cm}^3$  ; [3]
- (ii) volume of, sample / protein solution, to test  
or  
volume of reagents (potassium hydroxide solution / **K** and copper sulfate solution / **C**) ; [1]
- (iii) 1 table drawn + heading for percentage concentration of protein ;  
2 headings for colour / observation + (scale) number ;  
3 records results for at least four concentrations of protein ;  
4 appropriate result for 1% protein solution ;  
5 appropriate result for solution with lowest concentration of protein ; [5]
- (iv) stated protein concentration of **U** matched to number and results in (b)(iii) ; [1]
- (v) appropriate error identified ; e.g. difficulty of judging colour [1]
- (c) (i) 1 two correct variables ; ; e.g. volume of urine sample  
+ volume of reagents (**K** and **C**)  
2 shaking or mixing of solutions  
3 correct description of any one method ;  
e.g. using syringe to standardise volume  
stated method to standardise mixing [3]
- (ii) 1 (x-axis label) protein concentration /  $\mu\text{g cm}^{-3}$  +  
(y-axis label) absorbance ;  
2 (scale on x-axis) 200 to 2 cm, labelled at least each 2 cm +  
(scale on y-axis) 0.2 to 2 cm, labelled at least each 2 cm ;  
3 correct plotting of six points as small crosses or dots in circles ;  
4 six plots + thin smooth line of best fit to zero or ruled lines exactly point  
to point ; (not including anomalous result) [4]
- (iii) circle around plotted point on graph at 200, 0.36 ; [1]
- (iv) 1 shows how to read off concentration of protein from graph at 0.49 ;  
2 correctly estimates concentration of protein +  $\mu\text{g cm}^{-3}$  ; [2]

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge International AS/A Level – March 2016	9700	33

- 2 (a) (i) 1 sharp and continuous line for outer walls of cells ;
- 2 size at least 50 mm across largest cell + no shading ;
- 3 two touching cells drawn for each slide ;
- 4 both cells in **S1** drawn with cell surface membrane pulled away from cell wall ;
- 5 label line + label to cell wall of one of the cells ; [5]
- (ii) 1 (solution) **S1** ;
- 2 correct explanation in terms of water potential ;
- 3 direction of water movement + cell (surface) membrane away from cell wall / plasmolysis ; [3]
- (b) (i) 1 cell **D**: wavy outline ;
- 2 cell **D**: 9–11 folds ;
- 3 cell **Z**: smooth outline with sharp, continuous line ; [3]
- (ii) cell **D** annotation: wavy / folded, cell (surface) membrane  
or  
cell **Z** annotation: cell (surface) membrane, smooth / not folded ; [1]
- (iii) (cell **D** and cell **Z**) have different water potentials  
or  
cell **D** has higher water potential than (surrounding) solution  
or  
cell **Z** has same water potential as (surrounding) solution ; [1]
- (c) (i) 1 correct measurements for all cells + recorded as whole numbers (or to 0.5) + units in mm ;
- 2 (for all five cells) shows division by 1430 ;
- 3 (for all five cells decides on correct conversion of mm to  $\mu\text{m}$ ) multiplies by 1000 ; [3]
- (ii) 1 shows addition of measurements from (c)(i) + division by 5 ;
- 2 answer shown to whole number or to appropriate accuracy +  $\mu\text{m}$  ; [2]