

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

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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) |
| <u>underline</u> | 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 |
| AVP | Alternative valid point (examples given as guidance) |

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- 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 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]

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- 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 μm) 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 + μm ; [2]