Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/33**

Paper 3 Advanced Practical Skills **March 2017**

MARK SCHEME

Maximum Mark: 40

Published

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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Question	Answer	Marks
1(a)(i)	(decisions) 1 decides on a least 3 temperatures (other than room temperature and 40) **+** °C at least once **;** 2 suitable even range **;**	**2**
1(a)(ii)	(collects data) 1 colours for each temperature using the letters in the key **;** 2 results, for 15 second intervals, until no colour change **;** 3 letters in correct order **;**	**3**
1(a)(iii)	(recording results) 1 table drawn **+** headings **+** temperature **+** °C **+** time **+** seconds **;** 2 records times for at least four temperatures **;** 3 times the same as recorded for raw results **;** 4 recorded times same as on spotting tile **;**	**4**
1(a)(iv)	(sources of error with reason) 1 appropriate error with reason e.g. colour **+** difficult to judge **;** 2 appropriate error with reason e.g. lowering of temperature when test-tube removed from water-bath **;**	**2**
1(a)(v)	(conclusions) 1 reference to optimum temperature of enzyme **;** 2 reference to optimum temperature higher than human body temperature **;**	**2**

Question	Answer	Marks
1(a)(vi)	(modification to investigate another variable) 1 (to standardise temperature) use of a thermostatically-controlled water-bath **;** 2 (changes the new independent variable – concentration of enzyme solution) makes at least five enzyme concentrations **;** 3 (method) uses proportional or simple or serial dilution **;**	**3**
1(b)(i)	(layout of data) 1 (*x*-axis) temperature / °C **+** (*y*-axis) activity of enzyme / arbitrary units **;** 2 (scale on *x*-axis) 5.00 to 2 cm, labelled at least each 2 cm **+** (scale on *y*-axis) 5.00 to 2 cm, labelled at least each 2 cm **;** 3 correct plotting of five points with a small cross or dot in circle **;** 4 five plots either joined point to point or as a smooth curve, drawn as a thin line **;**	**4**
1(b)(ii)	(interpretation of the effect of temperature on the activity of the enzyme) as temperature rises the activity of the enzyme decreases **;**	**1**
	Total:	**21**

Question	Answer	Marks
2(a)(i)	(plan diagram of **P1**, Ranunculus root) 1 minimum size at least 90 mm **+** no shading **;** 2 no cells drawn **+** correct half of the root drawn **;** 3 stele shown in correct proportion to width of root **;** 4 shape of xylem drawn correctly **;** 5 uses one label line **+** one label to xylem **;**	**5**
2(a)(ii)	(layout of drawing) 1 quality of line for outer wall of each cell, thin and sharp **+** minimum size of cell at least 40 mm **;** 2 only four cells drawn **+** each cell touching at least two other cells **;** 3 cell wall drawn as two lines **;** 4 one cell drawn with at least five sides **;** 5 uses one label line **+** one label to cell wall **;**	**5**
2(b)(i)	(conclusion) Fig. 2.2 identified as a stem **+** appropriate feature e.g. vascular bundles peripheral **;**	**1**

Question	Answer	Marks
2(b)(ii)	(calculation of magnification) 1 measures length of line **Z +** units **;** 2 shows multiplication of length of line **Z** (mm) by 1000 to convert to μm **;** 3 shows division of length of line **Z** by 4500 **;** 4 final answer to appropriate degree of accuracy **;**	**4**
2(b)(iii)	(observable differences between the root on **P1** and the organ in Fig. 2.2) 1 organises comparison into three columns with one column for features, one headed **P1** and one headed Fig. 2.2 **;** 2, 3, 4 any three observable differences of comparison **; ; ;**	**4**
	Total:	**19**