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Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/33**

Paper 3 Advanced Practical Skills **March 2017**

MARK SCHEME

Maximum Mark: 40

Published

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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**

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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**

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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**

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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**