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Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the October/November 2014 series

9700 BIOLOGY

9700/31 Paper 3 (Advanced Practical Skills 1), 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)
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

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1 (a) (i) at least four further concentrations of **E +** % **;**

for at least 3 concentrations of **E** correct volumes of **E +** cm^3 **;**

for at least three concentrations final volumes add up to 10 **+** cm^3 **;** [3]

(ii) as concentration of **E** increases the time taken to reach the end-point decreases **;** [1]

(iii) at high enzyme concentration more ESCs / more substrate binds
or
at low enzyme concentration less ESCs / less substrate binds **;** [1]

(iv) replace enzyme / **E** with water / **W** **;** [1]

(v) 1 organised into table with all columns separated by a line **+** all headings underlined **;**

2 headings (top or to left of data) % concentration of **E +** (any column / row headed) time / seconds **;**

3 records lowest concentration first **+** whole seconds **;**

4 highest concentration recorded in shorter time than next concentration **;**

5 results for control as 'more than 300' **;** [5]

(vi) 1 divided by result for 5% **E** to correct number of significant figures **;** [1]

(vii) (dependent variable) colour or end-point **+** idea of judging / determining **;** [1]

(viii) ± **+** half smallest division **+** cm^3 **;** [1]

(b) 1 at least 5 temperatures **;**

2 narrower range of temperatures around optimum / uses optimum temperature **;**

3 use thermostatically-controlled water-bath **;**

4 temperature of milk (**M**) equilibrated (before **E** added) **;** [max 3]

[Total: 17]

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2 (a) (i) at least 4 lines **+** size at least 60 mm across radius **+** no shading **;**

no cells drawn **+** correct sector drawn **;**

shows one outer vascular bundle at least twice the size of other outer vascular bundle **;**

label **+** line to vascular bundle **;** [4]

(ii) 1 at least 3 cells **+** size at least 50 mm across largest cell at widest point **+** sharp continuous lines **;**

2 only 3 cells drawn **+** each of the cells touching each other **;**

3 cells walls drawn as double lines with middle lamella between **;**

4 one complete intercellular space visible between cells **;**

5 label **+** line to cell wall **;** [5]

(b) (i) measures scale bar within range (13 – 15 mm) **+** mm **+** to 0.5 **;**

shows conversion of scale bar measurement to μm × 1000 **;**

measurement of scale bar **÷** scale **+** rounds to whole number **;** [3]

(ii) 1 organise as table with 3 columns headed feature **+ J1 +** Fig. 2.2 **;**

2 only observable differences recorded **;**

max 2 for differences:

mp	point of comparison	J1	Fig 2.2
3	shape of stem	bumps less pronounced	8 pronounced bumps **;**
4	vascular bundles xylem vessels	4 rings xylem vessels larg(er)	1 ring xylem vessels small(er) **;**
5	gaps in stem	present	absent **;**
6	central tissue / pith	spaces present / not filled with cells	no spaces / filled with cells **;**
7	cortex	not thickened	thickened cells **;**

[max 4]

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(c) (i) 1 (*x*-axis sucrose concentration / mol dm^{-3}
+ (*y*-axis) change in distance between cut ends / mm **;**

2 (*x*-axis) 0.2 to 2 cm **+** labelled each 2 cm (except origin and 0.8)
+ (*y*-axis) 2 to 2 cm **+** labelled each 2 cm (except –4 and +4) **+** plus and minus shown **;**

3 correct plotting of five points as small cross or dot in circle or cross **;**

4 five plots **+** ruled lines exactly point to point or line of best fit **+** sharp line **;** [4]

(ii) reference to water movement **;**

at 0.0 mol dm^{-3} water enters **+** at 0.8 mol dm^{-3} water leaves **;**

no net water movement where line intercepts *x*-axis **;** [3]

[Total: 23]

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