Cambridge International AS & A Level

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BIOLOGY **9700/31**

Paper 3 Advanced Practical Skills 1 **May/June 2016**

MARK SCHEME

Maximum Mark: 40

Published

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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) *(decides level of water)*
two levels of water drawn **+** labelled 'before' **+** 'after' **;**
bottom level drawn still above / covering the level of reducing sugar Visking tubing **;** [2]

(ii) *(decisions on completion of table)*
correct volumes of **G** for four further dilutions **;**
correct total volumes of 10 for each concentration **;** [2]

(iii) *(recording results)*
1. heading (top left of data), % / percentage concentration of reducing sugar solution **;**
2. heading (any column / row), time **+** seconds **;**
3. *collects* readings of reducing sugar solutions as whole seconds **;**
4. concentration at top **+** other concentrations in decreasing order **;** [4]

(iv) *(decision about variable to standardise)*
volume / 3 cm^3, of Benedict's (solution) **or** volume / 2 cm^3, of **U** / sample **or** temperature (of water-bath) **;** [1]

(v) *(interprets results)*
time recorded in whole seconds **+** correct units **;** [1]

(vi) estimate for **U** matches results in **(a)(iii)** **;** [1]

(b) (i) *(line graph)*
1. (*x*-axis) percentage concentration of sucrose solution **+** (*y*-axis) time (to) decolourise potassium manganate(VII) solution / s **;**
2. (scale on *x*-axis) 0.5 to 2 cm **+** labelled at least every 2 cm **+** (scale on *y*-axis) 40.0 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 **+** thin line drawn **;** [4]

(ii) *(interpretation)*
correctly reads from graph time to decolourise at 1.75% **;**
correctly reads from graph time to decolourise **+** units **;** [2]

(iii) *(conclusion)*
more substrate / higher enzyme activity **;**
more active sites occupied / bind / join **or** more enzyme-substrate complexes / ESCs **;** [2]

(iv) *(modifications)*
1. (standardise sucrose concentration) using same (sucrose) concentration **or** named sucrose concentration **;**
2. (independent variable pH) at least five pH **or** five examples **;**
3. (method) use of buffers (to make pH at regular intervals) **;** [3]

[Total: 22]

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2 (a) (i) *(plan diagram)*

1. plan diagram of appropriate size **+** no shading **;**
2. no cells **+** correct section drawn **;**
3. endodermis shown by two lines in the correct proportions **;**
4. uses one label line **+** one label to xylem **;** [4]

(ii) *(drawing)*

1. quality of line for outer wall of cells **+** size at least 40 mm across largest cell **;**
2. only four cells drawn, each cell touching at least one other cell **;**
3. cell walls drawn as two lines close together **;**
4. cells drawn with correct proportion of length to width **;**
5. uses one label line **+** one label to cell wall **;** [5]

(b) (i) *(calculation)*

collects correct measurements of lines **K**, **L**, **M**, **N**, **O +** correct units for each measurement **;**
shows division by the magnification (25) **;** [2]

(ii) *(displays and division)*

shows addition of 5 measurements **+** shows division by 5 **;**
correct answer **+** correct units **;** [2]

(iii) *(conclusion)*

aquatic **+** air cavities for buoyancy **or** support **or** providing / storing oxygen **;** [1]

(c) *(observable difference between root on **J1** and stem in **Fig. 2.2**)*

organises comparison into three columns with one column for features, one headed **J1** and one headed **Fig. 2.2 ;**
any three observable differences of comparison **;;;**
e.g. **J1** has smaller air cavities than **Fig 2.2** [4]

[Total: 18]

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