Cambridge International AS & A Level

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BIOLOGY **9700/34**

Paper 3 Advanced Practical Skills 2 **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 sampling times)*
(0) 5 **+** 10 **+** 15 **+** or every 5 **+** minutes **;** [1]

(ii) *(decides on reagent and method to test for starch)*
iodine solution or **I** **+** add to sample **+** orange / yellow / brown if starch absent **or** (blue-)black if starch present **;** [1]

(b) *(risk assessment)*
(acid / amylase / potassium manganate(VII)) harmful **or** irritant **+** medium **or** high **;** [1]

(c) (i) *(collects room temperature)*
records whole number **or** to 1 decimal place **+** °C **;** [1]

(ii) *(recording results)*
1. table drawn **+** heading (sample time) **+** minutes **;**
2. appropriate heading for raw results **;**
3. appropriate colours recorded for starch test for at least four times including 20 minutes **;**
4. correct pattern of results **;**
5. processed times recorded as whole seconds **;** [5]

(iii) *(interpretation of significant error)*
correct calculation of difference **+** not significant **;**
A significant *if difference 5 °C or more* [1]

(iv) *(conclusions)*
1. (more heat energy / higher temperature*) idea of* (more / increase in) kinetic / movement energy **;**
2. (more heat energy / higher temperature) *idea of* more successful collisions between **S** and **E** **or** more active sites bind / join with substrate **or** more enzyme substrate complexes / ESCs **;**
3. (at high temperature **or** increasing by 30 °C **or** above the optimum) *idea of* denatured or active site changes shape (so fewer ESCs) **;** [3]

(v) *(modifications)*
1. at least five pH **or** five examples **;**
2. use of <u>buffer</u>s **;**
3. remove sample after set time / example of time **or** test with iodine and *idea of* looking for a colour change **or** test with potassium manganate(VII) and time taken to decolourise **;** [3]

(d) (i) *(line graph)*
1. (*x*-axis) percentage concentration of starch **+** (*y*-axis) initial rate of reaction of amylase / arbitrary units **;**
2. (scale on *x*-axis) 1.0 to 2 cm **+** labelled at least every 2 cm **+** (scale on *y*-axis) 100.0 to 2 cm **+** labelled at least each 2 cm **;**
3. correct plotting of six points with a small cross **or** dot in circle **;**
4. six plots **+** thin line drawn **;** [4]

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(ii) *(display of calculations)*
1. shows on the graph V_{max} line at top of curve to the *y*-axis from the maximum rate of reaction **;**
2. shows on the graph how K_m is read off at half V_{max} **;**
3. correct answer for K_m from candidate's graph **;** [3]

[Total: 23]

2 (a) (i) *(plan diagram)*
1. plan diagram of appropriate size **+** no shading **;**
2. no cells **+** only two whole vascular bundles **+** epidermis drawn **;**
3. epidermis shown by two lines in the correct proportions **;**
4. all vascular bundles divided into at least three regions **;**
5. uses one label line + one label to xylem in any on vascular bundle **;** [5]

(ii) *(drawing)*
1. quality of line for outer wall of cells **+** size at least 40 mm across largest cell **;**
2. draws **only** four whole cells **+** each cell of the group must touch at least two other cells **;**
3. at least one intercellular space **;**
4. cell walls drawn as two lines close together **;**
5. uses one label line **+** one label to cell wall **;** [5]

(b) (i) *(calculation)*
1. collects correct measurement of length of scale bar **+** length of line drawn across cell **X +** correct units **;**
2. displays correct method for calculation **;**
3. correct answer to calculation **;** [3]

(ii) *(observable difference between stem on **N1** and root in **Fig. 2.1**)*
organises comparison into three columns with one column for features, one headed **N1** and one headed **Fig. 2.1** **;**
any three observable differences of comparison **;;;**
e.g. **N1** has smaller xylem vessels than **Fig 2.1** [4]

[Total: 17]

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