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**BIOLOGY**

**9700/03**

Paper 3 Advanced Practical Skills

**For Examination from 2016**

SPECIMEN MARK SCHEME

**2 hours**

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**MAXIMUM MARK: 40**

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This document consists of **4** printed pages

**Mark scheme abbreviations:**

<b>;</b>	separates marking points
<b>/</b>	alternative answers for the same point
<b>R</b>	reject
<b>A</b>	accept (for answers correctly cued by the question, or by extra guidance)
<b>AW</b>	alternative wording (where responses vary more than usual)
<b><u>underline</u></b>	actual word given must be used by candidate (grammatical variants excepted)
<b>max</b>	maximum number of marks that can be given
<b>ora</b>	or reverse argument
<b>mp</b>	marking point (with relevant number)
<b>ecf</b>	error carried forward
<b>I</b>	ignore
<b>AVP</b>	alternative valid point (examples given as guidance)

Numbers against mark points are for examiner reference only; they do not reflect relative importance of answers or a required sequence of answers.

- 1 (a) (i) level of water in large beaker shown equal to or above level of yeast suspension in small beaker + below level of top of small beaker ; [1]
- (ii) at least three other temperatures over a range between 15 °C and 65 °C ; [1]
- (iii) mark (test-tube or delivery tube) ; [1]
- (iv) °C + any whole number or to 0.5 50 to 55 ; [1]
- (v) table with all cells drawn ; + heading (top or to left of data) temperature °C ;  
(any column / row headed) number of bubbles ;  
records readings for at least four temperatures as whole numbers of bubbles ;  
records temperatures with highest value first ;  
(records processed results) number of bubbles per minute recorded as whole numbers ; [5]
- (vi) *cause of error + idea of error:*  
(counting) bubbles + too fast / very fast / too many / rate varies ;  
(size) of bubbles + varies ; [max 1]
- (vii) *(error) + reason*  
random + difficulty of variable foam / bubbles in yeast or reading meniscus on scale or any other valid reason ; [1]  
**R** systematic as only one syringe provided so systematic error in scale is same for all measurements of **Y**
- (viii) mp1 (dependent variable)  
video / film  
or gas syringe  
or idea of downward displacement of water and measure volume of gas  
or less / lower volume (not amount) of yeast suspension ;  
mp2 (standardised variables)  
put Vaseline / grease around bung (in **A**)  
or replace with better-fitting bung ;  
mp3 (independent variable)  
maintained in thermostatically controlled water-bath  
or idea of more temperatures / bigger range of temperatures ;  
mp4 replicatesu to obtain mean ; [max 3]
- (b) (i) *circles 6% trial 3 / 20 + circles 12% trial 4 / 9* ; [1]
- (ii) 13 ; [1]
- (iii) x-axis: percentage or % concentration of glucose + y-axis: (mean) time taken to collect 10 cm<sup>3</sup> of carbon dioxide or CO<sub>2</sub> ( / ) sec(onds) or s ;  
scale on x-axis: 5 to 2 cm, labelled each 2 cm + scale on y-axis: 10 to 2 cm, labelled each 2 cm ;  
correct plotting of **five** points (from means given in Table 1.1) ;  
**six** plots with either ruled lines exactly point to points **or** hand-drawn smooth curve for whole graph, starts and ends exactly at end points and passes through at least two other points with smooth thin line ; [4]

- (iv) *at high / increasing concentrations ora*  
 more / many active sites occupied / bind / join / used  
**or**  
 more / many enzyme-substrate complexes / E-S complexes ;  
*idea of why reaches maximum rate (limiting factor)*  
 not enough enzyme / active sites **or** limiting factor is enzyme / yeast concentration **or** all  
 active sites occupied **or** active sites saturated ; [2]

[Total: 22]

- 2 (a) (i) quality of drawing ; *lines should be continuous, thin and sharp (but not ruled), at least four lines shown and no shading*  
 no cells + bottom sector drawn ;  
 draws endodermis as two lines ;  
 length between epidermis and endodermis is at least twice the diameter of the stele ;  
 uses label line + correct label of xylem region with letter **T** ; [5]
- (ii) *idea of hollow or no cell contents or large lumen* ; [1]
- (b) quality of drawing ; *lines should be continuous, thin and sharp (but not ruled), with no shading*  
 only six complete cells drawn + each cell touches at least two other cells ;  
 all cells must be drawn with double lines all the way round + where two pairs of cells touch there must be three lines (representing the middle lamella) ;  
 cells different sizes + at least one air space drawn ;  
one correct label "cell wall", with one label line which must touch outermost line of a cell or finish between the two cell wall lines ; [5]
- (c) shows measurements for both types of cells + as whole numbers or to 0.5 only + units as "eyepiece", (e)gu or epu ;  
 shows division by number of cells (5 or more), for both cell types ;  
 larger whole number to smaller whole number + to the lowest common denominator ; [3]
- (d) organised as table with three columns or rows separated by lines + two columns headed J1 / slide and Fig. 2.2 in any order + third column headed feature(s) ; (1)

feature(s) / AW	J1 / slide	Fig. 2.2
vascular tissue	star-shape / one bundle	oval shape / divided into bundles ;
epidermis	rough / uneven <b>or</b> no stomata	smooth <b>or</b> has stomata ;
cortex / (layer) under epidermis	more / large(r)	less / small(er) ;
endodermis	present	absent ;

(max 3)

[4]

[Total: 18]