BIOLOGY	**9700/03**
Paper 3 Advanced Practical Skills	**For Examination from 2016**
SPECIMEN MARK SCHEME	
	2 hours

MAXIMUM MARK: 40

CAMBRIDGE
International Examinations

[Turn over

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)
<u>**underline**</u>	actual word given must be used by candidate (grammatical variants excepted)
max	maximum number of marks that can be given
ora	or reverse argument
mp	marking point (with relevant number)
ecf	error carried forward
I	ignore
AVP	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) <u>mark</u> (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) <u>temperature °C</u> ;
(any column / row headed) <u>number of bubbles</u> ;
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 <u>gas</u> syringe
or idea of downward displacement of water and measure <u>volume</u> 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 replicate<u>s</u> to obtain mean ; [max 3]

(b) **(i)** *circles 6% trial 3 I* <u>20</u> *+ circles 12% trial 4 I* <u>9</u> ; [1]

(ii) <u>13</u> ; [1]

(iii) *x*-axis: <u>percentage</u> **or** <u>% concentration</u> of <u>glucose</u> + *y*-axis: (mean) <u>time taken to collect 10 cm³ of carbon dioxide</u> **or** <u>CO₂</u> (/) <u>sec</u>(onds) **or** <u>s</u> ;
scale on *x*-axis: <u>5 to 2 cm</u>, <u>labelled</u> each 2 cm + scale on *y*-axis: <u>10 to 2 cm</u>, <u>labelled</u> each 2 cm ;
correct plotting of **five** points (from means given in Table 1.1) ;
six plots with **either** <u>ruled</u> lines exactly point to points **or** hand-drawn smooth curve for <u>whole</u> 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 <u>active sites</u> occupied / bind / join / used
or
more / many <u>enzyme-substrate complexes / E-S complexes</u> **;**
idea of why reaches maximum rate (limiting factor)
not enough enzyme / active sites **or** limiting factor is enzyme / yeast concentration **or** <u>all</u>
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 **;**
<u>one</u> correct label "cell wall", with <u>one</u> label line which must touch outermost line of a cell or
finish between the two cell wall lines **;** [5]

(c) shows measurements for <u>both</u> types of cells + as whole numbers or to 0.5 only + units as
"<u>eyepiece</u>", <u>(e)gu</u> or <u>epu</u> **;**
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 <u>three</u> columns or rows separated by lines + two columns headed
<u>J1 / slide</u> and <u>Fig. 2.2</u> 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 **or** no stomata	smooth **or** has stomata **;**
cortex / (layer) under epidermis	more / large(r)	less / small(er) **;**
endodermis	present	absent **;**

(max 3) [4]

[Total: 18]