CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2014 series

9700 BIOLOGY

9700/31 Paper 3 (Paper 31 – Advanced Practical Skills 1), maximum raw mark 40

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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) volume given the same or more than **G** (4–10 inclusive) **;** [1]

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

headings temp(erature) / °C **+** time / s or sec(onds) **;** [2]

(iii) answer according to candidates results + further qualification **;**

use of data (at least two temperatures AND two references to time)
or
idea of an increase in kinetic energy increases the rate of reaction **;** [2]

(iv) statement of temperature with units °C + valid reason **;** [1]

(v) shows transfer of 15 cm^3 (of 2% to the next dilution)
+ adds 15 cm^3 of (distilled) water / **W ;**

1(.0)% AND 0.5% **;** [2]

(vi) all four volumes correct **;**

solution	**volume/cm^3**
Benedict's	same volumes as stated in **(a) (i)**
glucose	4
S1	4
S2	4

[1]

(vii) records 6 times (for 4 concentrations of glucose + **S1** + **S2**) **;**

records whole seconds only **;**

highest concentration of glucose is shortest time **;** [3]

(viii) shows position of 0.5, 1(.0) and 2(.0), scale – one space = 0.5 **;**

shows position of **S1 + S2** correctly according to their results **;** [2]

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(ix) more / wider / narrower range of glucose concentrations ;

do individually / each test-tube separately to prevent timing error
or
replicate / repeat ;

idea of thermostatically-controlled water-bath ;

use of white card / tile to observe colour change ; [max 3]

(x) syringe or thermometer or stopwatch **+** no effect **+** if use same syringe or thermometer or stopwatch
or
idea of different syringe used **+** systematic error **+** not true value ; [1]

[Total: 18]

2 (a) (i) at least 2 lines for upper epidermis **+** 2 lines for lower epidermis **+** vascular bundle **+** size at least 60mm across midrib **+** no shading ;

no cells **+** one complete vascular bundle in the midrib **+** vascular bundle subdivided ;

one concave surface and one convex surface **+** enclosed area beneath or above (or around) the vascular bundle ;

uses label line **+** label to xylem ; [4]

(ii) at least 6 cells **+** size at least 20 mm across largest cell at narrowest **+** sharp continuous lines ;

only 2 groups of 3 cells drawn, each cell touching at least one other cell ;

one cell has at least 3 corners ;

cell walls drawn as double lines **+** middle lamella between ;

use label line(s) + label to <u>one</u> lumen ; [5]

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(b) (i) correct measurement of line **X** (18–20 mm or 1.8–2(.0) cm) **;**

uses mm and converts to μm by multiplying by 1000 **;**

shows division by 230 **;**

rounds answer to appropriate number of significant figures **;** [4]

(ii) idea of stomata / guard cell(s) **+** closed
+ reduces transpiration or evaporation or diffusion of water **;** [1]

(c) mp1 organise as table with 3 columns headed feature **+** Fig. 2.2 **+** Fig. 2.3 **;**

max 3 for differences

mp	feature	Fig. 2.2	Fig 2.3
2	guard cells **size**	(some) large(r) / thicker	(some) small(er) / thinner **;**
3	nucleus of the guard cells	rounder or small(er) / short(er)	more elongated or large(r) / long(er) **;**
4	stomata **shape or length**	narrow / elongated / slits or long(er)	oval or short(er) **;**
5	stomata / guard cell **number**	few(er)	more **;**
6	(epidermal) cells **shape** or **size**	narrow / elongated / rectangular / oblong or longer / narrower	irregular / star-shaped / convoluted or shorter / wider **;**
7	(epidermal) cells **wall**	small indentations wavy	large indentations smooth **;**
8	number of types of cells	more	less **;**
9	arrangement of any cells	in rows / lines / linear / parallel	scattered / random **;**
10	line or strip	present	absent **;**

[max 4]

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(d) (x-axis) concentration of CO_2 μmol mol^{-1}
+ label on blocks upper epidermis / U, lower epidermis / L, 380 **+** 560**+** 800
+ (y-axis) mean number of stomata / mm^2 **;**

(x-axis) even width of blocks and even distance between blocks **+**,
+ (y-axis) 20 to 2 cm labelled every 2 cm, except 0 **;**

correct plotting of each bar in the same order as the table
+ ruled sharp line **;**

all vertical lines drawn as ruled sharp lines + all lines meeting exactly
+ labels for upper and lower must either be directly below the correct bar or inside the bar or shaded with a key **;** [4]

[Total: 22]

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