CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2014 series

9700 BIOLOGY

9700/32 Paper 32 (Advanced Practical Skills 2), 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) (labels under correct sequence of beakers) **+** 10 **+** 5 **+** 2.5 **+** % **;**
adds previous concentration of **C** to each of the last two beakers **+** 10cm^3 **;**
adds water / **W +** 10 cm^3 to three beakers **;** [3]

(ii) organised into table **+** all columns separated by a line **+** all headings underlined **;**
headings (top or to left of data) percentage concentration **+** (any column/row headed) time (/)s or seconds **;**
whole seconds for at least three concentrations **;**
records highest concentration first **;**
highest concentration recorded in shorter time than next concentration **;** [5]

(iii) (dependent) stage 3 or end-point **+** *idea of* judging / determining **;** [1]

(iv) syringe or thermometer **+** no effect **+** if use same syringe or thermometer **;** [max 1]
or
syringes **+** affect accuracy **+** not true value **;**

(v) replaces calcium chloride / **C** with water **;** [1]

(b) (i) calcium chloride
+ optimum % conc. of calcium chloride from investigation or stated figure % e.g. 20% **;**

type of milk or volume of milk
+ <u>same</u> milk or <u>same</u> volume or stated volume e.g. 2 cm^3 **;**

temperature of water-bath
+ use 70 °C maintained by thermostatically controlled water-bath
or
temperature of milk (reaching desired temperature)
+ check temperature of milk has reached 70 °C
or milk (has reached) 70 °C (before enzyme added) **;**

volume of enzyme
+ use <u>same</u> volume of **E** or stated volume e.g. 1 cm^3 of **E**
or
concentration of enzyme / **E**
+ use <u>same</u> conc. of **E** or 1% **E ;** [max 2]

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(ii) (*x*-axis) time of heating solution **E** / seconds
+ (*y*-axis) time to reach the end-point / seconds **;**

(*x*-axis) 2 cm to 50 seconds, labelled each 2 cm, except origin and 300 seconds
+ (*y*-axis) 2 cm to 50 seconds, labelled each 2 cm, except origin and 250 **;**

correct plotting of five points as small cross or dot in circle or cross **;**

five plots **+** ruled sharp lines exactly point to point
or
ruled line of best fit **+** sharp smooth line **;** [4]

(iii) structure of protein / substrate / enzyme / active site or bonds
+ changed / altered / destroyed / no longer complementary / broken **;**

fewer ESCs / Enzyme Substrate Complexes or less substrate can bind **;**

idea of enzyme denatured **;** [3]

[Total: 20]

2 **(a)** at least 3 lines **+** size at least 40 mm across greatest width of root tip **+** no shading **;**
no cells **+** one closed end with one open end **;**
root cap as separate area or two lines around margin **;**
chooses (correct) area to cells undergoing mitosis **;**
label (e.g. mitosis) to area with cells undergoing mitosis **;** [5]

(b) at least 5 cells **+** size at least 50 mm across largest cell at widest point **+** sharp continuous lines **;**
only 5 whole cells drawn **+** enclosure drawn in cells **Q** and **S** **;**
for cells **P**, **R** and **T** whole nuclei drawn as different shapes **;**
for **Q** chromosomes drawn as a mass **;**
2 labels **+** 2 lines **+** 2 different stages of mitosis identified **;**
one correct annotation of one stage **;** [6]

(c) measures scale bar within range **+** mm **+** to 0.5 ; (range 13–15 mm) **;**

shows conversion of scale bar in mm to μm (× 1000)
or
shows conversion of 31 μm to mm (31 divided by 1000 = 0.031 mm) **;**

show measurement of scale bar in μm divided by 31 μm
or
shows measurement of scale bar in mm divided by 0.031 mm **;**

correct answer 451.61 / correct answer rounded to a whole number (452) **; ecf** [4]

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(d) organise as table with 3 columns headed feature **+** Fig. 2.1 **+** Fig. 2.2 **;** [5]

max 4 for differences

point of comparison	**Fig 2.1**	**Fig 2.2**
cells undergoing mitosis	more	few(er)
visibility of chromosomes	chromosome / chromatids visible	chromosome / chromatids not visible **;**
metaphase or anaphase	present / (one cell in) metaphase / anaphase	absent / no metaphase / anaphase **;**
interphase or telophase	less **or** no telophase	more **or** (one / two cells in) telophase **;**
cell walls **or** cell shape **or** cell arrangement	not visible / absent **or** rectangular / 4 sides **or** scattered / irregular / random	prominent / present **or** 6 sides / 5 sides **or** aligned / regular / ordered **;**
cell packing **or** air spaces **or** cells touching	loosely packed / more spaced out / separated **or** more air spaces **or** have spaces between cells or cells not touching	closely packed / less spaced out; **or** none or few air spaces **or** have no spaces between cells or cells touching **;**
nucleus	present **or** all cells show a nucleus	not all cells show a nucleus or some cells have a nucleus **;**

[max 5]

[Total: 20]

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