

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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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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) |
| <u>underline</u> | 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 + 10cm³ ;
 adds water/**W** + 10 cm³ 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
 + same milk or same volume or stated volume e.g. 2 cm³ ;
 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 same volume of **E** or stated volume e.g. 1 cm³ of **E**
or
 concentration of enzyme/**E**
 + use same 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 ($\times 1000$)

or

shows conversion of $31 \mu\text{m}$ to mm ($31 \text{ divided by } 1000 = 0.031 \text{ mm}$) ;

show measurement of scale bar in μm divided by $31 \mu\text{m}$

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]