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# MARK SCHEME for the October/November 2014 series

# 9700 BIOLOGY

**9700/36** Paper 3 (Advanced Practical Skills 2), maximum raw mark 40

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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)** at least 4 further concentrations of **E** + % ;

at least 3 correct volumes for **E** + $cm^3$ ;

for at least three concentrations of **E** final volumes add up to 20 + $cm^3$ ; [3]

**(ii)** 1 organised into table
all columns separated by a line + all headings underlined ;

2 headings (top or to left of data) percentage concentration of **E** +
(any column / row headed) time (/)s or seconds ;

3 whole seconds for at least three concentrations of **E** ;

4 highest concentration of **E** recorded in shorter time than next concentration ;

5 records in multiples of 30 seconds ; [5]

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

**(iv)** replicates or put **E** / **M** in water-bath (to reach temperature) ; [1]

**(b) (i)** 1 selects temperature + pH ;

2 temperature + use thermostatically controlled water-bath ;

3 pH + use buffers ; [3]

**(ii)** 0.250 ;

0.019 ; [2]

**(iii)** 1 (*x*-axis time / min(utes) + (*y*-axis) mass of glucose / mg ;

2 (*x*-axis) 2 cm to 5 minutes labelled each 2 cm except origin and 20 minutes
+ (*y*-axis) 2 cm to 1 mg each 2 cm except origin and 5 ;

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

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

**(iv)** (between 0 and 12 minutes)
many enzyme substrate complexes / ESCs / binding / fitting of substrate / enzyme ;

(between 12 and 20 minutes) fewer ESCs or less substrate can bind ; [2]

**[Total: 21]**

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**2 (a) (i)** central stele / vascular tissue ; [1]

**(ii)** 1 at least 2 lines + size at least 100 mm across diameter + no shading ;

2 no cells + half drawn ;

3 endodermis shown by 2 lines ;

4 correct proportion stele compared to cortex ;

5 label + line to xylem ; [5]

**(ii)** 1 at least 6 cells + size at least 40mm across largest cell at widest point + sharp continuous lines ;

2 only 6 whole cells drawn + as two groups of touching cells ;

3 cell wall of xylem cells drawn correctly (angular) ;

4 cell walls as double lines with middle lamella between ;

5 label + line to lumen ; [5]

**(b)** measures line **Y** within range + mm + to 0.5 ; *(range 86–88 mm)*

measures line **Z** within range + mm + to 0.5 ; *(range 14–16 mm)*

answer as larger whole number to smaller whole number to simplest ratio ; [3]

**(c)** 1 organise as table with 3 columns headed feature + **M1** + **Fig. 2.2** ;

2 only observable differences recorded ;

*max 3 for differences – see table below:*

| mp | point of comparison | Fig 2.1 | Fig 2.2 |
|---|---|---|---|
| 3 | *stele shape*<br>vascular bundle / vascular tissue / xylem / phloem | cross<br>(do not accept irregular / central) | round / circular / scattered ; |
| 4 | *stele*<br>layers around stele endodermis | 1 or 2 layers / fewer layers / thin | 2 or 3 layers / more layers / thick ; |
| 5 | *stele*<br>size <u>in relation to diameter</u> of root / size of specimen | small(er) | larg(er) ; |

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| mp | point of comparison | Fig 2.1 | Fig 2.2 |
|---|---|---|---|
| 6 | *cortex*<br>air spaces<br><br>shape of cells<br><br>length of cells | <br>air spaces absent<br><br>round / circular / oval<br><br>small / short(er) | <br>air spaces present<br><br>elongated / long / rectangular<br><br>large / long(er) ; |
| 7 | *cortex*<br>number of cells in cortex<br>*(must refer to cortex)*<br><br>packing | <br>filled with cells / more / many cells<br><br>more packed | <br>not filled with cells / less / few(er)<br><br>less packed ; |
| 8 | *epidermal layer*<br>red stained cells (near epidermis) | <br>one layer / thin(ner) absent | <br>several layers / thick(er) present ; |
| 9 | total number of layers | less / few(er) layers or expressed as a number of layers, e.g. 5 | more layers or expressed as a number of layers, e.g. 8 ; |

[max 5]

**[Total: 19]**

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