Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/52**

Paper 5 Planning, Analysis and Evaluation **March 2019**

MARK SCHEME

Maximum Mark: 30

Published

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 International will not enter into discussions about these mark schemes.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

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GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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
AVP	alternative valid point

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Question	Answer	Marks
1(a)	*independent variable:* concentration / molarity, of sucrose solution **;** *dependent variable:* number of, plasmolysed / non-plasmolysed, cells **;**	**2**
1(b)(i)	(weigh / AW) 85.5 g sucrose and make up to 250 cm^3 with, (distilled / deionised), water **;**	**1**
1(b)(ii)	range of at least 5 concentrations from 0 to 1.0 mol dm^{-3} sucrose at (equidistant) intervals **;** shows proportions of (distilled / deionised) water and 1.0 mol dm^{-3} sucrose to make up a volume of 20 cm^3 of at least two different concentrations **;**	**2**
1(b)(iii)	idea that pigment makes it much easier to, see cells / observe changes in vacuole size / judge plasmolysis **;**	**1**

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Question	Answer	Marks
1(b)(iv)	*any **eight** from:* 1 ref. to method of making epidermal strips (from onion leaves) **;** e.g. tweezers / fingers / scalpel / needle 2 ref. to cutting epidermal strips to a standard size / ref. to standardising sample size of epidermal cells **;** 3 ref. to at least one, strip / sample of epidermal cells, into different concentration solutions (in container or on a slide) **;** 4 ref. to making sure, strips / epidermal cells, are completely immersed in the solutions **;** 5 ref. to leaving for same period of time **;** 6 ref. to mounting on a slide in (appropriate) sucrose solution (with coverslip) **;** 7 ref. to using a (light) microscope to count cells **;** 8 ref. to counting, **large** number, of cells / ref. to making two counts from same strip / ref. to counting cells in two fields of view **;** 9 ref. to counting / recording number of plasmolysed cells **and** number of non-plasmolysed / turgid cells AW **;** 10 ref. to minimum of two replicates or counting three different strips from the same solution **and** taking a mean **;** 11 ref. to calculation of percentage by multiplying proportion of plasmolysed cells by 100 **;** 12 ref. to low / medium risk **;**	**8**
1(b)(v)	plot a graph of concentration of sucrose solution against percentage plasmolysis **;** draw a line at 50% plasmolysis and read off the concentration **;** OR find concentration above and below / closest to those that give a percentage plasmolysis of 50% **;** make solutions in this range and repeat experiment to find the concentration giving 50% plasmolysis **;**	**2**

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Question	Answer	Marks
1(c)	1 red onion (epidermis cells) (–0.85) **and** antirrhinum (epidermis cells) (–1.07) cells will both lose water **and** because the water potential / MPa is, less negative / higher/ greater, than the solution **or** the solution water potential, is more negative / lower / less, than the cells **;** 2 rhubarb (epidermis cells) (–1.22) would gain water **and** because the water potential / MPa is, more negative / lower / lesser than the solution **or** the solution water potential is, less negative / higher / greater than the cells **;**	**2**

Question	Answer	Marks
2(a)(i)	(26 ÷ 288) = 0.090 **;**	**1**
2(a)(ii)	the data are, categoric / nominal **;**	**1**
2(b)(i)	number of people with (blood) cancer increases with (mother's) exposure to radiation **;** idea of a linear or proportional relationship **;** no exposure to radiation still shows (blood) cancer developing / AW **;**	**3**
2(b)(ii)	*idea that* radiation exposure is linked to, mutation / DNA damage, of stem cells (in bone marrow) **;**	**1**

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Question	Answer	Marks
2(c)	*any **three** from:* *increases validity:* 1 *idea that* a large number in the study **;** 2 *idea that* data was collected over, a long period of time / 61 years / 56 years **;** 3 *idea that* cohorts, all from / stayed, in the same area (so exposure similar) **;** 4 initial source of radiation the same **;** *decreases validity:* 5 *idea that* group 1 people were born over longer time (40 years) than group 2 (11 years) / exposure of mothers to radiation for different periods of time **;** 6 *idea that* exposure to radioactivity, calculated / measured, differently for the two groups **;** 7 *idea that* types of radiation might be different in the two groups **;** 8 *idea that* records have been lost **;** 9 *idea that* method of record keeping has been changed **;** 10 *idea that*, people who moved away were not followed up / large number of outcomes not known **;** 11 *idea that* there may be other factors contributing to blood cancers that were not taken into account **;**	**3**

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Question	Answer	Marks
2(d)	***three** of:* seeds **;** **;** e.g. same / similar, number of seeds same, species / type / variety, of plant same age of seeds / storage of seeds stated conditions for germination **;** **;** e.g. light water availability temperature oxygen same, source / type, of radiation **;** same background radiation **;**	**3**