Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/53**

Paper 5 Planning, Analysis and Evaluation **October/November 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.

Cambridge International is publishing the mark schemes for the October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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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.

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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
AVP	alternative valid point

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Question	Answer	Marks
1(a)(i)	*independent:* mass / biomass, of yeast **;** **or** concentration of, yeast / suspension / culture **;** *dependent:* absorbance / colour (change / of indicator) **;**	**2**
1(a)(ii)	*any two of:* volume of water (added) / volume of yeast suspension **;** (same) indicator / TTC **;** (same) temperature **;** (same) time / period, of incubation **;** colorimeter zeroed **;**	**2**
1(a)(iii)	*one of:* *replace (live) yeast by:* boiled / dead / inactivated / AW, yeast (of the same mass) **;** sterile / inert / glass beads / AW, material (of same mass) **;**	**1**
1(a)(iv)	axes labelled *x* =, time / t, *y* =, absorbance / Ab **;** line to show absorbance shows an increase **;** **ecf** if axes inverted but shape (related to axes) correct = 1 **ecf** if axes wrong but shape correct (related to those axes) = 1	**2**

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Question	Answer	Marks
1(b)	*any seven of:* 1 same / stated / known, mass / volume (suspension), of each yeast (added to separate flasks) **;** 2 same / stated / known, concentration of, nutrient solution / glucose **;** 3 same / stated / known, volume of, nutrient solution / glucose **;** 4 *ref. to* method to maintain temperature **;** 5 suitable temperature in range 15 °C–80 °C **;** 6 *idea of* equilibration / bringing yeast suspension **and** nutrient solution, to temperature, before mixing **;** 7 add TTC / redox indicator, to yeast / yeast and nutrient mixture **;** 8 *time for recording absorbance* **either** record (absorbance) at, regular / stated, time intervals **or** leave for set time (if stated max = 1 hour) **and** record (absorbance) **;** 9 *ref. to* method of maintaining homogeneity (of yeast) **;** 10 *ref. to* method of maintaining oxygen concentration **;** 11 use (at least) 3 replicates / repeats **and** find mean **or** identify / eliminate / remove, anomalies **;** 12 *ref. to* low risk **;** **or** **A** named hazard and risk and precaution e.g. yeast **and** allergy **and** wear gloves / mask / goggles e.g. TTC **and** irritant **and** wear gloves / mask / goggles	**7**
1(c)(i)	i*dea of* how close the (sample) mean, is to the, true / population, mean **;**	**1**
1(c)(ii)	**either** 95% of, the / all / repeated, data, would be expected to lie within this range **;** **or** At 1 / 3 / 4, hours, the (sample) mean, was reliable / AW, because the, confidence intervals / CI, do not overlap **;**	**1**

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Question	Answer	Marks
1(c)(iii)i	*from the graph* / *Fig. 1.3* / *experiment 1* pH 6.0 gives the highest absorbance at 4 hours incubation **;** **or** *from the table* / *Table 1.1* / *experiment 2* at 30°C at pH 6 absorbance is highest **;** *from the graph* / *Fig. 1.3* / *experiment 1* the CI / (standard) error bars, (for pH 6), do not overlap (at 4 hours) **;** **or** *from the table* / *Table 1.1* / *experiment 2* standard errors / S_M, do not overlap (with other, temperatures / pHs) **;**	**2**

Question	Answer	Marks
2(a)(i)	plant nurseries = (–) 69 (%) **; ;**	**2**
2(a)(ii)	*descriptions of:* woodland **and** roadside, increase in number of cases, (over 2013–2015) ***or*** nurseries (**and** gardens) **and** farmland, decrease in number of cases (over 2013–2015) **;** *explanations as ideas of:* 1 (more) difficult to manage, 'wild' environments / woodland / roadside, **ora** ***or*** 2 as woodland and roadside, cover a large area / far from centres of habitation, so, many trees to get infected / hard to get access for management difficult to access, **ora** ***or*** 3 disease spreads (more) easily, in, dense woodland, **ora** **or** 4 ref to burying diseased trees could provide a reservoir of infection ***or*** 5 *idea of* number of reported findings have increased as awareness of ash dieback has spread / AW **;**	**2**

Question	Answer	Marks
2(b)(i)	complementary base pairing **;**	**1**
2(b)(ii)	*idea of* intensity / brightness, of, fluorescence / fluorescent dye / colour **or** difference in intensity of, fluorescence / fluorescent dye / colour, (between healthy and diseased samples) **;**	**1**
2(c)(i)	(these trees) are (likely to be) tolerant / resistant **or** (these trees could be) a source of, tolerance / resistance, genes / alleles / mRNA / DNA **or** *idea of* comparing non-diseased and diseased trees **;**	**1**
2(c)(ii)	*any two of:* multiple / several / many / 4, locations **;** varying ages **;** from differently sized populations **;** from, different countries / from across Europe **;** varying degree of damage / healthy and non-healthy, sampled **;** **A** description of a suitable, random / systematic, sampling technique for 1 mark *if no other mp awarded.*	**2**
2(c)(iii)	*any one of:* to allow (easier) comparison of data (from different sites) **;** to allow (easier) analysis (of results) **;** (easier) to plot, as graph / bar chart **;** *idea of* (bioinformatic) analysis will be carried out by a computer **;**	**1**
2(d)(i)	guanine / G **;**	**1**
2(d)(ii)	*idea of* (mutation causes) a change in, protein / polypeptide / enzyme, which changes, function / tolerance / resistance **or** (mutation causes) a change in, protein / polypeptide / enzyme, that allows the plant to, respond to infection / repair damage **or** (mutation causes) a change in, protein / polypeptide / enzyme, that prevents the pathogen from, entering / spreading in, the ash plants **;**	**1**

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