Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/51**

Paper 5 Planning, Analysis and Evaluation **October/November 2018**

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 2018 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* light intensity ; *dependent* distance moved by bubble (in a set time) **or** time taken for the bubble to move (a set distance) ;	**2**
1(a)(ii)	*any three variables for one mark* *two correct methods for one mark each* **1** temperature – temperature-controlled room / heat shield / environmental chamber / incubator / cold light source / LED light ; **2** background light – dark room (with fixed light) / closed blinds / AW ; **3** same wavelength / type / colour of light – use the same bulb / lamp / AW ; **4** *idea of* air flow / wind – e.g. windows closed / doors closed / fans off or on throughout / limit movement / AW ; **5** plant / (leafy) shoot – use same, type / species / plant / shoot / age / number of leaves / area of leaves ; **6** humidity – any valid way it might be controlled ; **7** CO_2 levels – any valid way it might be controlled ; **8** time – measure for same time / time over same distance ;	**3**

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Question	Answer	Marks
1(b)	*any six from* **1** *ref. to* cutting / inserting, stem under water **;** **2** use, petroleum jelly / silicone gel / silicone tape / AW (to make joints air tight) **;** **3** *idea of* removing tube from water to introduce an air bubble **;** **4** *ref. to* method of obtaining a minimum of 5 different light intensities **;** **5** *ref. to* method of controlling one variable **;** **6** allow (apparatus / plant) to, equilibrate / AW, before starting measurements **;** **7** *idea of* setting / resetting / returning, air bubble (to start position / between measurements) **;** **8** *ref. to* measuring distance moved by bubble over a set time **or** *ref. to* measuring time for bubble to move a set distance **;** **9** take a minimum of 2 repeats at each light intensity **+** take a mean / identify anomalies **;** 10 low / medium, risk investigation **or** cutting stem **+** cut away from your hand (with scalpel) / cut with secateurs or scissors **;**	**6**
1(c)(i)	30.0 (%) **;** (3.03 – 2.12) / 3.03 or (1 – 2.12 / 3.03) × 100	**2**

Question	Answer	Marks
1(c)(ii)	*any two from* **1** *idea of* only two, concentrations of CO_2 / light intensities, measured **;** **2** *idea of* only 1, type / species, of plant tested **;** **3** not replicated / repeated **;** ***4*** *idea that* laboratory conditions may not be replicated in the field **;** **5** no statistical analysis **;** **6** *idea of* other (stated) variable(s), not controlled / can affect transpiration **;**	**2**

Question	Answer	Marks
2(a)(i)	*any two from* **1** volume of urine **;** **2** volume / concentration / composition / pH, of agar **;** **3** concentration / volume, of antibiotics **;** **4** (incubation) temperature **;** **5** incubation time **;** **6** size / diameter / area / spacing / type / source, of discs **;**	**2**
2(a)(ii)	**1** measure the, diameter / radius / area, of clear zone around the antibiotic disc (with a ruler / callipers / grid) **;** **2** *idea of* the, larger / wider / bigger / AW ,the clear zone is, the, more sensitive / less resistant, the bacteria are to the given antibiotic / **ora or** *idea of* no clear zone means bacteria are, resistant to / not affected by / not killed by / not sensitive to, (given) antibiotic **;**	**2**

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Question	Answer	Marks
2(b)(i)	*any two from* **1** *idea that* it shows a large, spread of data (around the mean) / difference in data / deviation from the mean / variation with the mean **;** **2** data is not (very) reliable / trustworthy / consistent / AW **;** **3** standard deviation increases as mean increases / positive correlation between standard deviation and mean **;**	**2**
2(b)(ii)	*any two from* *idea that* **1** patients may not take the antibiotics prescribed **;** **2** patients may not complete the course of antibiotics **;** **3** dose (per prescription) may differ **;** **4** antibiotics are also prescribed by dentists / hospitals / other practitioners **;** **5** patients may buy antibiotics (without a prescription) **;** **6** data only taken from large clinics **; ora** **7** patients may be prescribed, antibiotics other than those stated in table / more than one antibiotic **;**	**2**
2(c)(i)	*any one from* **1** data, may be / is, non-linear / skewed **;** **2** data, not / may not be, normally distributed **;** **3** data is ordinal / discontinuous / not continuous / discrete **;** **4** scatter, graph / diagram, shows / may show, that there is a relationship **;** **5** data samples are independent **;** **6** *ref. to* random selection **;**	**1**

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Question	Answer	Marks
2(c)(ii)	there is no (significant) correlation between antibiotic use / (number of) prescriptions and**,** the percentage of urine samples containing resistant *E. coli* / the presence of resistant strains of *E. coli* in the urine (of patients) **;**	**1**
2(c)(iii)	**1** *two from* ampicillin, trimethoprim**,** quinolone **;** **2** calculated value / r_s, is higher than the, critical / table value (of r_s at, $p = 0.05$ / 0.362) **or** critical value is, at $p = 0.05$ / 5% significance / 0.362 **;**	**2**
2(d)	*description max 2* *percentage of (ampicillin-)resistance / (ampicillin-)resistant E. coli* **1** is higher in males than females (of the same age / at all ages) **; ora** **2** is initially high in, (very) young / 3-year olds / up to 15 **;** **3** decreases (steeply), in young / up to (around) 20 **;** **4** resistance, more or less plateaus / fluctuates / changes little / goes up and down, between ages 20 / 30 and 60 / 80 **;** **5** increases steeply from (around) 80 **or** increases from around, 60–80 / old age **;** **6** is highest at 100 years (in both) **;** *explanation (must be linked to antibiotic use) max 2* **7** antibiotic / ampicillin, use is higher in the, young / old **; ora** **8** *idea of* people between 20 and 60 / 80 are prescribed, different antibiotics / antibiotics other than ampicillin **;** **9** males, may be less likely to complete the full course of antibiotics / may take more antibiotics **; ora** **10** *idea of* young / old, have greater contact with, hospital / health care centres, and therefore greater exposure to, ampicillin / antibiotic-resistant *E. coli* **;**	**3**

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