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 **May/June 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 May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U 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.

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

Question	Answer	Marks
1(a)(i)	*independent*: sex / male or female / boy or girl **;** *dependent*: reaction time **;**	**2**
1(a)(ii)	categoric **;**	**1**
1(a)(iii)	*any 6 of*: 1. *ref. to* suitable number of people in total **;** 2. same / similar ages **;** 3. same number boys and girls in each group **;** 4. *ref. to* consent form (e.g. using data / children / AW) **;** 5. *ref. to* standard conditions for the test, e.g. same (type of) computer / tablet / software / same colour change **;** 6. *ref. to* same, stated, **room** conditions **;** 7. *ref. to* avoiding people with conditions affecting reaction time e.g. poor eyesight / colour-blind / neurological disorders **;** 8. no, (named) drugs / medications / caffeine / alcohol **;** 9. *ref. to* testing at same time of day / stated time **;** 10. *ref. to* using same hand to push the button **;** 11. minimum of three tests on each subject **and** taking a mean **OR** minimum of three subjects of each sex **and** taking a mean **;** 12. low / medium risk experiment / parent or guardian present for children / carer for vulnerable adults **;**	**6**
1(a)(iv)	*idea of* processing delay from computer / AW **;**	**1**
1(b)	<table><tr><td>mode</td><td>*0.26*</td><td>**0.25**</td></tr><tr><td>median</td><td>**0.25** **;**</td><td>*0.26*</td></tr></table>	**1**

Question	Answer	Marks
1(c)(i)	comparing (two) <u>means</u> / continuous data / normal distribution ;	1
1(c)(ii)	there is no (significant) difference in the (mean) reaction <u>time</u> (in right handed people) when using the left or right hand ;	1
1(c)(iii)	<u>20</u> ;	1
1(c)(iv)	<u>less than</u> 2.09 / less than the critical value (at $p = 0.05$) ;	1
1(d)(i)	7.9 (trial 11, student 2, before measurement) ;	1
1(d)(ii)	*idea that* affected data should be left out ;	1
1(d)(iii)	student 3 (no mark) (as their) standard deviations / s, are largest ;	1
1(d)(iv)	*supports* *any 1 of:* 1. *Idea that* mean measurement for students was close(r) to, the actual measurement / 7.5, after feedback had been given ; 2. mean +/- *s* before feedback does not overlap with mean +/- *s* after feedback for, students 2 / 3 ; 3. AVP ; *does not support* *any 1 of:* 4. small sample size / only 3 students tested ; 5. mean +/- *s* for student 1 before and after feedback overlap 6. *idea that* improvement in accuracy in student 3 is small / 1.5 to 1.4 (cm) change in closeness to mean ; 7. *idea of* no statistical analysis to determine if difference in results is significant or not ; 8. AVP ;	2

Question	Answer	Marks
2(a)(i)	*any 3 of*: 1. (same) volume / 10 cm^3, of semen ; 2. (same) speed of spinning / spun at 1275 revolutions per minute ; 3. (same) time for spinning / spun for 20 minutes; 4. (same) volume / 15 cm^3, of buffer ;	**3**
2(a)(ii)	*any 1 of*: *idea that:* some sperm cells may get damaged ; separation of X-bearing and Y-bearing sperm is not achieved / all sperm collect at the bottom of the tube ; AVP ;	**1**
2(b)	14 ;	**1**

Question	Answer	Marks
2(c)	*any 5 of*: *estimate of numbers:* 1. idea of find the volume of the sample **or** (volume of sample is) – (for mm^3) $0.25 \times 0.25 \times 0.1$ / 0.00625 / 6.25×10^{-3} (for cm^3) $0.025 \times 0.025 \times 0.01$ / 0.00000625 / 6.25×10^{-6} **;** 2. divide the number of sperm by the volume **or** divide 1 mm^3 by the volume **and** multiply by the number of sperm counted **;** 3. evidence of correct method of converting to cm^3 **;** *deciding which sperm to include:* 4. *idea of:* count those where sperm (fully) inside, the square / 0.0625 (mm^2) / all (small) square**s** / haemocytometer / quadrant / grid / boxes **;** 5. *idea of:* including those in or partially in the inner double lines **;** 6. *idea of:* including those (in edge region) top and left / up and right **or** exclude those in edge region) bottom and right / down and left **;** 7. AVP *detail of method: e.g. ref. to*, dilution / stirring / even spreading / immobilising sperm / use of coverslip / screenshot for counting / *idea of* only counting non- deformed / sperm **;**	**5**