Cambridge International AS & A Level

Cambridge Assessment International Education
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BIOLOGY **9700/52**

Paper 5 Planning, Analysis and Evaluation **March 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.

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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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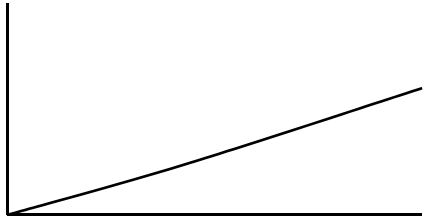
Mark scheme abbreviations:

;	separates marking points
/	alternative answers for the same marking point
R	reject
A	accept (for answers correctly cued by the question, or by additional 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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Question	Answer	Marks	Guidance
1(a)	$\left\{\begin{array}{c}85\ (\text{mg cm}^{-3}) \\ \dfrac{85\ (\text{mg cm}^{-3}) \times 35\ (\text{cm}^3)}{10\,000\ (\text{cm}^3)}\end{array}\right\}$ = 0.30 (mg cm^{-3}) **;**	**1**	**A** 0.298 / 0.297
1(b)	ref. to a named method of dilution or a description in words or a diagram **;** ref. to using correct proportions of stock solution and water to make 100 cm^3 **;** 700 μg cm^{-3} **and** 200 μg cm^{-3} plus sensible choice of at least three other intermediate concentrations described **;** e.g. (700) 575, 450, 325 (200) μg cm^{-3} (700) 600, 500, 400 300 (200) μg cm^{-3}	**3**	**A** all marks on a fully labelled table
1(c)	*independent*: enzyme / lipase, <u>concentration</u> **;** *dependent:* time (for pH) to reach 6.5 **;**	**2**	
1(d)	*any **six** from:* 1 ref. to using same volume of each concentration of lipase (in boiling tube) **;** 2 ref. to method of measuring volume **;** 3 add, acid / alkali, to give pH 7.9 **;**	**7**	2 e.g. graduated pipette / measuring cylinder / syringe / burette 3 **R** if buffer used

Question	Answer	Marks	Guidance
1(d)	4 *idea of* incubating enzyme (so it reaches the test temperature) before adding cotton fabric **;** 5 ref. to suitable incubation temperature **;** 6 ref. to timing until <u>pH reaches 6.5</u> **;** 7 ref. to a suitable control **;** e.g. boiled enzyme / water with alkali 8 ref. to suitable method of keeping same incubation temperature for all concentrations **;** 9 ref. to using same, size / area, of stained fabric **;** 10 ref. to, agitation / mixing / stirring **;** 11 ref. to low / medium risk **or** hazard **and** suitable safety precaution **;** 12 ref. to minimum of 3 replicates / replicating the whole experiment at least 3 times **and** finding a <u>mean</u> / to identify (and remove) anomalies *plus **one** required marking point:* 13 ref. to immersing the cloth **<u>and</u>** starting a, stop-clock / timer, simultaneously **;**		5 **A** a single temp range 20–60 °C 8 e.g. incubator, water-bath, temperature-controlled room **I** air conditioning 9 **A** 20 mm × 20 mm pieces 11 e.g. allergy / sensitivity, to enzymes **and** wearing, gloves / eye protection 13 **A** starting, stop-clock / timer, immediately after immersing the cloth **A** ref. to pH meter instead of cloth since both will be immersed at the same time according to Fig. 1.1
1(e)(i)	$\frac{1}{\text{time (for pH to fall to 6.5)}}$ **;**	**1**	

Question	Answer	Marks	Guidance
1(e)(ii)	1 axes correctly orientated with labels **;** *x*-axis: concentration of lipase *y*-axis: rate of, release of fatty acids / digestion of fats 2 axes have units **;** *x*-axis unit: $\mu g\ cm^{-3}$ *y*-axis unit: s^{-1} or min^{-1} 3 line shows increase as lipase concentration increases **;** e.g. rate of release of fatty acids / s^{-1} or min^{-1}  concentration of lipase / $\mu g\ cm^{-3}$	**3**	2 **A** arbitrary units **or** 1 / t(ime) on *y*-axis 3 **A** linear curve or plateau
1(e)(iii)	*idea of* rates calculated from times for pH to reach 6.5 for washing liquids (from Table 1.1) **;** use of intercepts / described **;**	**2**	
1(f)	*any **one** from:* *idea that* the lipase in **A** has a higher activity than that of **B** **;** *idea that* lipases are of, different types / different origin **;** *idea that* washing liquids and test solution are different (from each other) **;** e.g. washing liquids contain other chemicals to remove fat	**1**	**I** ref. to optimum temperature

Question	Answer	Marks	Guidance
2(a)	*any **two** from:* 1 volume of, liquid / (orange) juice, consumed **;** 2 idea of*:* time between drinking liquid and time of test **;** e.g. left for 40 minutes before testing 3 sex / gender / all females **;** 4 colour of light / flickering increases in even steps / time intervals of increase are always the same / AW **;** 5 (16) mg of alcohol in, drink / (orange) juice **;** 6 time allowed for drinking (5 mins) **;**	**2**	5 **A** concentration of alcohol
2(b)	*any **two** from*: *idea of* shows the spread about the mean / AW **;** indicates the reliability of the data **;** to put <u>error bars</u> on the graph / see if the standard deviations overlap / see if the differences are significant **;**	**2**	**R** accuracy

Question	Answer	Marks	Guidance
2(c)	*any **three** from:* 1 the frequency at which flicker fusion occurs varies greatly between individuals (with or without alcohol) **;** 2 the frequency at which flicker fusion occurs is greater after alcohol consumption / on day 2 (in, most of the women / 9 out of 13 women) 3 there is little variation in the repeated measurements on day 1 or day 2 / result for individuals on day 1 or day 2 are consistent **;** 4 it takes longer to notice the change from flickering to fused stimulus after alcohol consumption **;** 5 (women) 4, 6 and 13, show little change / have lower CFFT, after alcohol **;** 7 ref. to overlapping error bars for, some women / 4, 5, 6, 7, 8, 11, 12, 13, suggests the effect of alcohol is not significant **or** ref. to women with the highest flicker fusion (2 and 3) / 1, 2, 3, 9, do not have overlapping error bars so effect of alcohol is significant **;** 8 ref. to a range of values from lowest to highest **;** no alcohol: 17.3± 0.1 and 12.7± 0.1 alcohol: 18.5± 0.1 and 12.7± 0.1	**3**	

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Question	Answer	Marks	Guidance
2(d)	*any **three** from:* very small sample / only 13 subjects **;** all test subjects are female **;** *idea of* habituation (as 10 tests carried out) **;** not all age ranges included **;** no indication of body mass **;**	**3**	