Cambridge International AS & A Level

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BIOLOGY **9700/52**

Paper 5 Planning, Analysis and Evaluation **May/June 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.

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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 guidance for examiners)
I	ignore (for answers that include irrelevant information that does not contradict the expected answer)
AW	alternative wording (where responses vary more than usual)
ora	or reverse argument (for answers which are written as the opposite to the expected answer)
underline	actual word given must be used by candidate (grammatical variants accepted)
max	indicates the maximum number of marks that can be given
ecf	error carried forward
mp	marking point (with relevant number)

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Question	Answer	Marks	Guidance
1(a)(i)	*idea that* not measured / AW **;**	**1**	e.g. results show colours / no numbers / subjective / observations / description not numbers **I** categoric
1(b)	*2 of:* *idea that:* they are **all** acting as controls **;** *idea that*: they show that colour change **or** <u>the effect</u> occurs, if DCPIP chloroplast and light are present **;** *tube 2:* shows that chloroplast suspension does not change colour on its own ***or*** without DCPIP there is no colour change ***or*** DCPIP is needed for the colour change **;** *tube 3:* shows that DCPIP does not change colour on its own ***or*** without chloroplast suspension there is no colour change ***or*** chloroplast suspension is needed for the colour change **;** *tube 4:* shows that DCPIP **and** chloroplast suspension together do not change colour on their own ***or*** without light there is no colour change ***or*** light is needed for the colour change **;**	**2**	**R** controlled variable / controlled experiment *tube 2:* **A** *idea that:* acts as a colour comparison for the end point / tube 1
1(c)	*idea that*: reducing heat (from lamp) passing through / AW **;**	**1**	

Question	Answer	Marks	Guidance
1(d)(i)	*independent*: light intensity / distance of tube from light source / lamp **;** *dependent*: time taken for DCPIP to decolourise / time for green colour to appear **;**	**2**	**I** ref. to rate of light dependent reaction **I** ref to solution / tube, decolourising / going colourless

Question	Answer	Marks	Guidance
1(d)(ii)	*7 of:* 1. method to vary light intensity **;**	**7**	1. e.g. distances between tube and lamp or different strengths of neutral density filters or wattages of bulbs / variable resistor / dimmer switch / number of lamps
	2. five values of stated distances in the range 10 to 200 cm **;**		2. for other stated methods, must have 5 stated values, e.g. wattages/ etc.
	critical step 3. start timer straight away when exposed to light **;**		
	4. record time, (at each intensity) until DCPIP decolourises / chloroplast suspension is green **;**		4. **A** record time, until blue colour disappears / colour changes **R** tube goes colourless without ref. to DCPIP
	5. use a colour comparator / tube 2, to decide when to stop timing **;**		**if using colorimeter:** mp 4 –removes samples at intervals until absorbance becomes zero or constant mp 5 – calibrating / zeroing with chloroplast suspension
	6. same volume of (same) chloroplast suspension **;**		mp6 & mp7: if volumes are stated, total volume must be minimum 10 cm^3 and maximum 50 cm^3 (so it fits in the tube) if outside this range award mp 6 or mp 7 but **not** both **I** 'same volume' of tube contents
	7. same volume of DCPIP **;**		
	8. same concentration of DCPIP **;**		

Question	Answer	Marks	Guidance
1(d)(ii)	9. water tank at same distance from test tube / light source **;** 10. ref. to a minimum of **two** replicates and calculate a mean **or** identify / eliminate/ remove anomalies **;** 11. medium risk **or** hazard and suitable safety **;**		
1(e)	2.5×10^{-3} / 0.0025 **;**	**1**	**A** 25 if converted distance to metres **I** ignore any units
1(f)(i)	*idea that*: no intermediate data for reaction between 7 and 8 minutes **;**	**1**	**A** water
1(f)(ii)	tangent drawn at 6 min **;** correct number in range 0.2 to 0.4 **;**	**2**	**ecf** correct calculation from incorrect tangent **I** any sign **A** rate calculated from time in seconds
1(f)(iii)	curve should be to the right of original curve **and** must be drawn from 1–12 min **;**	**1**	**A** if merges with the original after 8 min

Question	Answer	Marks	Guidance
1(g)(i)	there is no significant difference between the (mean) absorption values for, tubes 1 and 2 / no weed killer and weed killer **X** **or** the difference between the (mean) absorption values for, tubes 1 and 2 / no weed killer and weed killer **X**, is not significant **;**	**1**	
1(g)(ii)	*1 of:* continuous **;** normally distributed / normal distribution **;** standard deviations are approximately the same **;** size of the two samples is less than 30 **;**	**1**	**I** 'compare the means'
1(g)(iii)	(n =) 12 **;**	**1**	
1(g)(iv)	greater than (>) 2.07 / critical value **or** 2.07 / critical value is less than (<) calculated value / *t* value **;**	**1**	

Question	Answer	Marks	Guidance
2(a)	any suitable method of generating random numbers / co-ordinates / positions **;** use the numbers generated, as co-ordinates / grid reference, to locate or create a (10 m) plot **;**	**2**	
2(b)	*idea that:* one animal may produce carrying numbers of dung piles **or** difficulty in identifying the source of the dung **or** dropping may be hidden / washed away / decomposes / eaten **;**	**1**	**A** dung may belong to a different species of animal
2(c)	*2 of:* time when sampling was carried out **;** area of survey sites (0.25 × 0.25 km) **;** number of types of survey sites (8 of each) **;** area of study plots (10 × 10 m) **;** number of study plots per site (3) **;** dimensions (size or area) of dung collecting strips **;**	**2**	**A** stated times**,** first week in April and first week in July / the time of year sampled **A** same size survey site **A** same size study plot / quadrats

Question	Answer	Marks	Guidance
2(d)	*3 of:* 1. increased, number of plant species / plant species richness, does not necessarily mean increased plant species diversity **;** 2. *idea that:* no data for number of individuals of each species / abundance **;** *idea that:* 3. variation / range in dung count is large **;** 4. no statistical analysis **;** 5. correlation of dung data with number of species does not mean one causes the other **;** 6. no evidence for effect of sheep alone on plant species number **;**	**3**	

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