CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2013 series

9700 BIOLOGY

9700/51 Paper 5 (Planning, Analysis and Evaluation), maximum raw mark 30

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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

Mark scheme abbreviations:

;	separates marking points
/	alternatives answers for the same point
R	reject
A	accept (for answers correctly cued by the question, or extra guidance)
AW	alternative wording (where responses vary more than usual)
underline	actual word given must be used by candidate (grammatical variants excepted)
max	indicates the maximum number of marks that can be given
ora	or reverse argument
ecf	error carried forward
I	ignore
mp	marking point (with relevant number)

© Cambridge International Examinations 2013

Question	Expected answer	Extra guidance	Mark
1 (a) (i)	*idea that oxygen uptake or respiration is different or the same* 1 of: respiration (rates) / oxygen uptake of the organisms will be different from **or** same as each other ; one organism / named organism will be faster **or** the same as any other (named); **ora**	allow any testable hypothesis but it must be in the context of all three organisms. e.g. the rate depends on the organism used / all the organisms have the same rate e.g. the insect larvae will have the fastest respiration	[max 1]
(ii)	*independent* : (different / named) organisms ; *dependent* : distance moved by the water / air (along capillary in a specific time);	**A** list of all names **A** distance moved **I** uptake of oxygen per unit time / rate of respiration / volume	[2]

© Cambridge International Examinations 2013

Questions	Expected answers	Extra guidance	Mark
(iii)	8 of: *independent variable:* 1. ref. to using, same mass of (each) organism / all named ; 2. ref. to keeping container with the organisms in the dark ; *dependent variables:* 3. (using the scale) to find the distance moved **or** take readings at start and end ; 4. ref. to (measure distance) at specific / known **time** interval ; 5. ref. to a method of holding the algae / organisms ; *Controlled variables (max* 3) 6. ref. to ensuring apparatus is airtight ; 7. ref. to keeping (appropriate) constant temperature (in the water bath) ; 8. *idea of* equilibration / acclimatisation of respirometer (containing organisms before measuring) ; 9. *idea of* replacing air / oxygen between measurements ; 10. ref. to a control with inert material (of the same mass) ;	1. **I** amount / number **A** known / fixed / similar / stated mass 2. **A** if only kept the algae in the dark 3. looking for use of the scale **A** using a ruler **R** metre ruler **I** volume 4. **A** any specified time mp3 and mp4 can be stated as same distance and measure time **or** same time and measure distance 5. e.g. inside a small container **A** on a diagram 6. **A** description of a method to make airtight **I** watertight 7. **I** method of maintaining temperature . **A** temperatures in the range 15–45 °C 8. **I** any stated times *looking for* acclimatisation AW e.g. leave for a time before starting experiment 10. e.g. glass beads / dead organisms **A** description of a control e.g. tube with beads for comparison	

© Cambridge International Examinations 2013

Questions	Expected answers	Extra guidance	Mark
	11. ref. to using same mass of absorbent / replacing each time the respirometer is re-used ; *safety*: 12. ref. to suitable hazard and precaution ; *reliability* 13. ref. to replicate / repeat (experiment) and mean / to identify or eliminate anomalies ;	11. **A** *idea of* 'enough' absorbent to ensure all CO_2 absorbed. **A** volume / amount / quantity of absorbent 12. ref. to broken glass <u>tube</u> cuts hand and hold bung while attaching to container **or** ref. to carbon dioxide absorbent as corrosive / caustic / harmful / irritant and gloves / eye protection. **or** ref. to allergic risk to any organism / absorbent and gloves / mask **R**. ref. to hot water **I** low risk 13. must be a minimum total of 3. **A** as original and 2 more **or** several / many **A** for single organism **A** outliers for anomalies **R** mean of readings along the capillary at timed intervals i.e. mean of distances measured 1–2 min, 2–3 min, 3–4 min	[max 8]

© Cambridge International Examinations 2013

Questions	Expected answers	Extra guidance	MarkII
(b)	*allow answers that describe the main stages of the calculation in words or as a formula* *elements of this calculation may be shown separately* 3 of: 1. ref. to valid <u>method</u> calculating volume of oxygen ; 2. ref. to <u>dividing</u> (volume of oxygen) by the mass ; 3. ref. to <u>dividing</u> (volume of oxygen) by time ; 4. ref. to correct units either <u>$cm^3 g^{-1}$ s^{-1}</u> or <u>$cm^3 g^{-1}$ min^{-1}</u> ; OR <u>volume of oxygen</u> (cm^3) (= y) time (s) x mass (g) ; ; (y)= <u>$cm^3 s^{-1} g^{-1}$</u> ;	**A** any valid method: e.g. distance (d) / length (l) / height (h) × π r^2 / π $(D \div 2)^2$ / π $D^2 \div 4$, pre-calibrated tube **A** min as time unit if volume is not calculated, but the oxygen is shown or described as distance moved in the tube or oxygen uptake, allow mp2 and / or mp3 e.g. divide the distance by mass and / or time **A** rate of oxygen uptake divided by mass for mp2 value of y – ignore actual value if an example is used **A** cm^3 / g / s	[max 3]
(c)	1. remove the carbon dioxide absorbent / weigh the absorbent at start and end of the experiment; 1 of: 2. difference in the measurement (between distance moved or mass) gives the carbon dioxide ; **or** 3. divide the difference in distance / volume by time ;	carbon dioxide absorbent must either be removed or weighed. **A** measure the volume	[max 2]

© Cambridge International Examinations 2013

Question	Expected answers	Extra guidance	Mark
(d) (i)	insect larvae = 0.8(0) and green algae = 0.97 / 1.00 ;	**A** 0.98 ÷ 1.23 **R** 0.79 **A** 0.34 ÷ 0.35	[1]
(ii)	3 of : 1. *algae* RQ suggests mainly CHO / named being metabolised ; 2. *insect larvae* RQ suggests mainly protein / amino acids being metabolised ; 3. *seeds* RQ suggests mainly fat / fatty acid / lipid / oil being metabolised ; 4. fat uses proportionally more oxygen than CHO for respiration ;	1. if value is stated should be RQ1 2. if value is stated should be around RQ8–9 **A** a mixture of lipid and protein 3. if value is stated should be around RQ7	[max 3]
			[Total: 20]

© Cambridge International Examinations 2013

Question	Expected answers	Extra guidance	Mark
2 (a)	*ignore all references to data quotes* 3 of: 1. there is more auxin on shaded side / side A of test 3 ; 2. (auxin) redistributes because the total 3A and 3B is approx. same as in 4 where redistribution prevented ; 3. there is no difference in the total auxin in light and dark ; 4. (so) auxin not broken down by light ; 5 the total auxin in all tests is approximately the same ;	3. **A** ref. to treatment 2 and total auxin of any other treatment being the same 5. **A** any comparison between treatment 3 and all the other treatments	[max 3]
(b) (i)	ref. to (standard deviation) shows (all) these data / results (in the table) are reliable; ref. to data / results (in the table) describing degree of reliability; **or** because the standard deviations (in the table) are all less than 1;	**I** definition of standard deviation / standard error (S_M) e.g. treatments 2 and / or 4 most reliable as values are the smallest / treatment 1 is the least reliable as the value is the largest	[max 2]
(ii)	increase the total number of shoot tips used (in each group) ; **or** replicate / repeat the investigation / experiment several times minimum of 2 more ;		[1]

© Cambridge International Examinations 2013

Question	Expected answers	Extra guidance	Mark
(c)	diagram of shoot with <u>flat</u> top bending to right (of page) ; marks on the left (outside) of the curve only are further apart than those on the inside of the curve ;	**R** if no top is drawn **R** if curves at both ends **I** agar block **R** if 2 diagrams drawn which are inconsistent there needs to be a clear difference in spacing on the two sides of the curve and should not be a difference anywhere else **A** if curves wrong way	[2]
(d) (i)	there is no <u>significant</u> difference in the movement (of auxin) in light compared to that in the dark ;	the difference in the movement (in auxin) in light and in the dark is <u>not significant</u> **R** insignificant	[1]
(ii)	38 ;		[1]
			[Total: 10]

© Cambridge International Examinations 2013