

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS****Specimen for 2007 (version 2)****GCE A LEVEL****MARK SCHEME****MAXIMUM MARK: 30****SYLLABUS/COMPONENT: 9700/05****BIOLOGY  
PLANNING, ANALYSIS AND EVALUATION**

Question	Expected answer	Mark	AO
1 (a) (i)	As the concentration of carbon dioxide increases the rate of photosynthesis increases (until another factor becomes limiting);	1	P
	(ii) <i>Independent:</i> concentration of carbon dioxide/hydrogen carbonate solution;		
	<i>Dependent:</i> Volume/amount of gas/oxygen collected; <i>Accept</i> , rate of photosynthesis	2	P
(b)	any 5 of:  ref. to a range of hydrogen carbonate solutions of known concentration; <i>Accept</i> , ref. to expose to atmosphere with different known concentrations of CO <sub>2</sub>  ref. to gas syringe plunger fully inserted;  ref. to inserting stopper <b>after</b> attaching syringe;  ref. to equilibration time before measuring any gas produced;  ref. to reading volume after specific time;  time to collect stated volume;  ref. to repeating each measurement;  AVP (e.g. detail of means of ensuring that gas syringe is read accurately/consistently);	5	M
(c)	identification of 4 appropriate variables;  quantity of aquatic plant – same mass/number of leaves/same plant;  volume of test solution – same volume of each concentration;  temperature – immerse the test solution in water bath at same temperature/use an air conditioned room;  light intensity – use same light source at same distance from plant/means of controlling and measuring light intensity (in dark room/enclosed box); wave length – use same light source with same voltage/current/power/light temperature	1	P
		4	M
(d)	1 of: gases dissolved in the pond water are removed/only gases from the plant are collected; microscopic plants that may use carbon dioxide are killed;	1	M

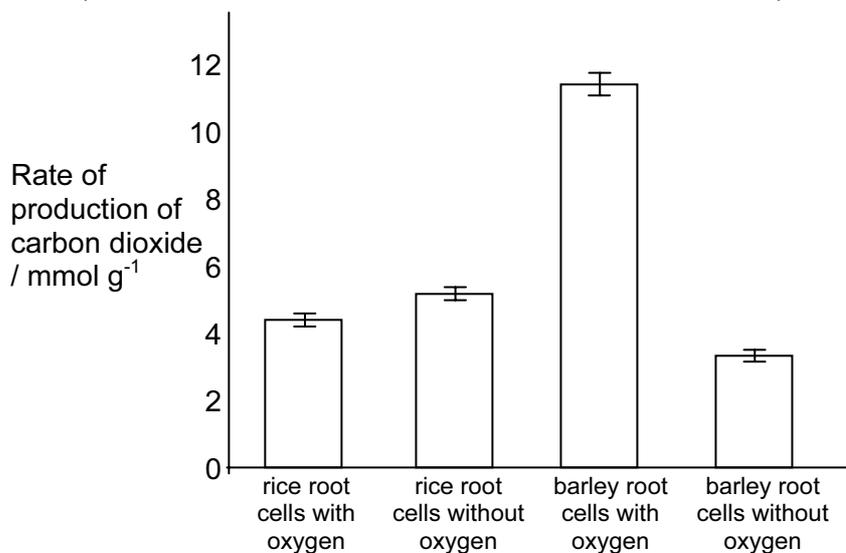
- (e) 1 of:
  - hazard associated with hydrogen carbonate solution;
  - hazard associated with the source of the pond water;

1 P

5P

Total 15 10M

Question	Expected answer	Mark	AO
2 (a) (i)	0.14;	1	D
(ii)	barley root cells with oxygen is less reliable than the others; spread of data /standard deviation/standard error is greater;	2	D
	OR		
	significant difference between (all of/any of) treatments; error bars do not overlap;		
(iii)	axes correct orientation and labelled;	1	D
	all plots correct (means 4.5,5.5,11.4,3.3);	1	D
	error bars plotted from standard error;	1	D
	error bars correctly placed and plotted;	1	D
	(allow error carried forward if standard deviation used)		



- (b) 3 of ref. to:  
rice without oxygen grows better than rice with oxygen;  
rice is adapted to grow in anaerobic/water logged conditions,  
grows better than barley without oxygen;  
rice can tolerate the ethanol produced by anaerobic respiration/barley seeds killed by ethanol  
produced by anaerobic respiration;
- aerobic respiration releases more energy than anaerobic, barley grows  
faster/more with oxygen;

3 C

7D

Total 10 3C

Question	Expected answer	Mark AO
3	<p>(a) <math>\frac{(7.5 - 6.2)}{6.2} \times 100 = \frac{1.3}{6.2} \times 100 = 0.21 \times 100 = 21\%</math>;</p> <p>accept 21.0% or 20.97% reject 45% as obvious but incorrect</p>	[1]
	<p>(b) <i>support</i> mean value of experimental cell culture is higher (than control); bottom or range higher / top of range higher, in experimental cell culture (than control) / AW;</p> <p><i>does not support</i> range overlaps / ref. to specific examples of control and experimental samples which are the same (e.g. control 6 and experimental 8 which are both 6.5);</p> <p>ref. to possible anomalies / specific named anomaly from the list experimental samples 4 or 7 / control samples 3 or 5 or 10;</p> <p>ref. to insufficient replication (for such variable data);</p> <p>no statistical test of difference carried out / do not know if the difference is significant / no chi squared test / no t-test / no standard error bars plotted;</p> <p>only one concentration tested / ref. limited range / AW;</p>	[max 4]