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

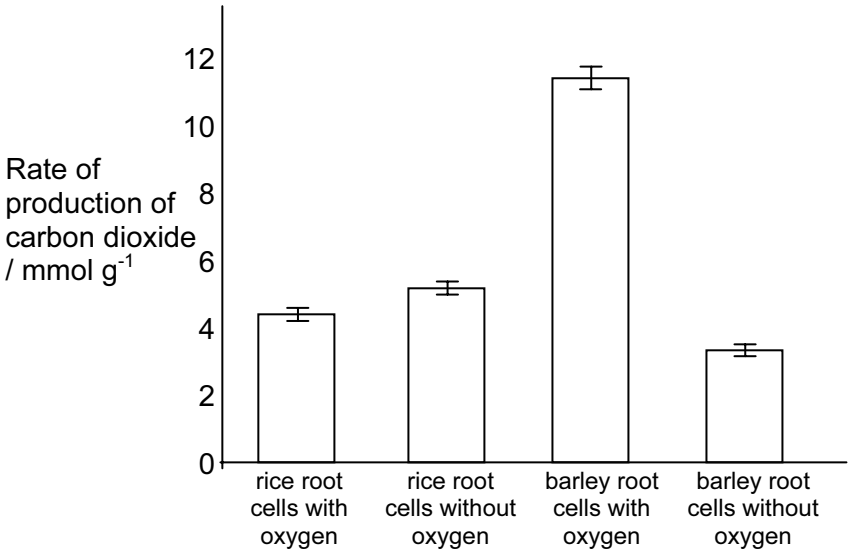
Question	Expected answer		
1 (a) (i)	As the concentration of carbon dioxide increases the rate of photosynthesis increases (until another factor becomes limiting);	1	P
(ii)	*Independent:* concentration of carbon dioxide/hydrogen carbonate solution; *Dependent:* Volume/amount of gas/oxygen collected; *Accept*, rate of photosynthesis	2	P
(b)	any 5 of: ref. to a range of hydrogen carbonate solutions of known concentration; *Accept*, ref. to expose to atmosphere with different known concentrations of CO_2 ref. to gas syringe plunger fully inserted; ref. to inserting stopper **after** 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	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 assocaiated with the source of the pond water; 1

5P

Total 15 10M

Question	Expected answer		
2 (a) (i)	0.14;	1	
(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	

3 (a) $\frac{(7.5-6.2)}{6.2}\times 100 = \frac{1.3}{6.2}\times 100 = 0.21\times 100 = 21\%$;

accept 21.0% or 20.97%
reject 45% as obvious but incorrect [1]

(b) *support*
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;

does not support
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);

ref. to possible anomalies / specific named anomaly from the list experimental samples 4 or 7 / control samples 3 or 5 or 10;

ref. to insufficient replication (for such variable data);

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;

only one concentration tested / ref. limited range / AW; [max 4]