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)	*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;   1   P

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   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)
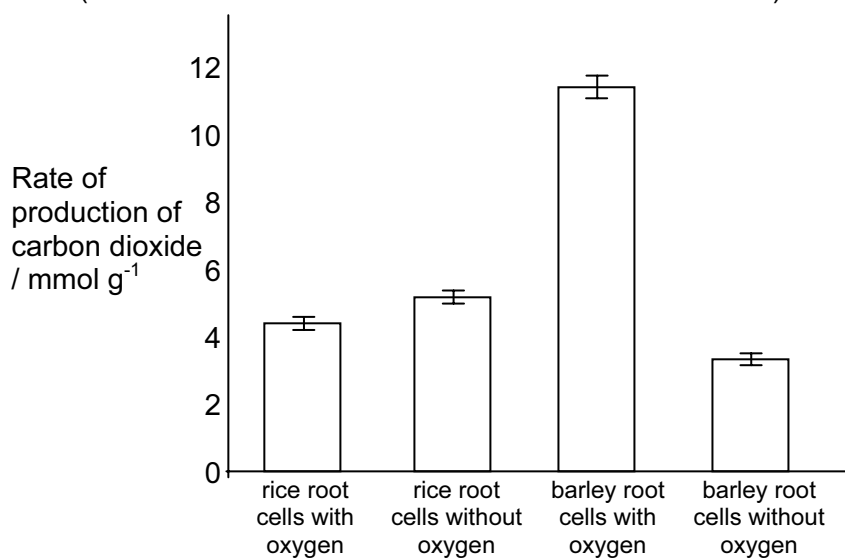
(b) 3 of ref. to:
rice without oxygen grows better than rice with oxygen;

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 3 C
faster/more with oxygen;

7D

Total 10 3C

Question	Expected answer	Mark	AO

3 **(a)** $\dfrac{(7.5-6.2)}{6.2}\times100=\dfrac{1.3}{6.2}\times100=0.21\times100=21\%$;

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]