GCE 2004
June Series

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark Scheme

Biology B
BYB6/A

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BYB6/A

Question 1

(a)	(i)	the non-living / physical part (of an ecosystem/environment);	1
	(ii)	density-independent, with named abiotic factor and a specific effect;	1
(b)		capture, count and release; carefully mark to avoid detection; recapture, count marked and unmarked; *(information from an equation is valid)*	3
		Total	5

Question 2

(a)	(i)	presence of grass causes less nutrients/minerals/nitrates/ ammonium ions to be leached; *(do not allow references to less nitrogen)*	1
	(ii)	clover contains <u>nitrogen-fixing</u> bacteria; *(do not allow references to nitrifying bacteria)* decomposition (of ploughed clover) introduces nitrates/ ammonium ions into soil;	2
(b)	(i)	minimal effect/no significant effect on yield/<u>small</u> increase up to 25 kg ha^{-1}; increase in protein content of grain with all fertiliser applications;	2
	(ii)	(37 ÷ 44 =) 0.84 : 1.0 (*allow 0.8 : 1)*;	1
		Total	6

Question 3

(a) same intensity/duration of kicking / net held at same depth/distance from bank; 1

(b) hoglice, shrimp, mayfly larvae; 1

(c) sewage contains urea/protein/nitrogen-containing waste;
decomposed by/action of bacteria/saprophytes; 2
(do not allow nitrifying bacteria, detritivores)

(d) levels of food/organic material/urea decrease;
fewer microbes/bacteria/saprophytes;
(do not allow no bacteria)
less oxygen used in respiration/decomposition/lower BOD;
aquatic plants photosynthesise releasing oxygen; 3 max
(do not allow splashing introduces oxygen)

Total 7

Question 4

(a) limited genetic diversity in modern varieties / greater genetic diversity in old varieties / older varieties contain other (useful) alleles/genes;
old varieties useful for future breeding programmes; 2

(b) (i) seeds lose viability / will not germinate/develop after long storage; 1

(ii) preserve variety of alleles / different genotypes;
maintain <u>genetic</u> variation;
prevent inbreeding / reduces the chance of homozygosity; 2 max

Total 5

Question 5

(a) controlled supply of specific fish / to satisfy demand for particular types of fish;
select and breed fish with desired qualities;
allows wild stocks to recover / increase;
maximises productivity / reduced cost *if qualified*; 2 max

(b) fish are ectothermic / mammals are endothermic;
(accept reference to cold blooded / warm blooded)
less energy is wasted by fish through heat loss;
(do not allow to keep the animal warm)

OR

cattle diet mainly cellulose / fish fed protein-rich pellets;
more energy lost by cattle assimilating products of cellulose digestion; 2

(c) (i) easily transmitted between fish as close together / more likely to be in contact / densely populated; 1
(do not allow reference to a large population, unless the proximity idea is qualified)

(ii) water potential of freshwater is higher/less negative than inside the lice;
water enters lice by osmosis causing cells to burst; 2

Total 7

Question 6

(a) carbon dioxide fixed into 4-carbon compound/ PEP;
carbon dioxide fixed (at high rate) when at low concentration;
fixation of carbon dioxide and the Calvin cycle occur in two separate kinds of cell;
carbon dioxide released inside / RuBP / rubisco / light-independent reactions in bundle sheath cells;
C4 uses more ATP than C3; 3 max

(b) (i) high light intensity, high temperature and low levels of intercellular carbon dioxide;
(*must comment on two or more factors for this mark*)

(maximum of 1 mark for a quantitative comparison)
light intensities above 0.04 to 0.06 (Watts m^{-2});
temperatures greater than 11 to 15^{o}C;
levels of (intercellular) carbon dioxide below 4.5; 2 max
(must take figures accurately)

(ii) can photosynthesise (at high rate) when carbon dioxide low and light intensity high;
allows efficient use of high light intensity;
carbon dioxide concentrations less likely to be a limiting factor;
photorespiration / description of photorespiration less likely to/ does not occur;
because rubisco kept well away from a source of oxygen; 3 max

(c) oxygen fits into/competes for the active site of enzyme;
prevents carbon dioxide entering / no/less product formed from carbon dioxide; 2

Total 10

Question 7

(a) *for biological control organisms*

target the pest more effectively;
will not select for resistance in pests;
will not bioaccumulate (through a food chain poisoning other species);
reproduce / do not need reapplying / persist;
cause no toxic/harmful side effects affecting other organisms;
an organic method of pest control; 3 max

(b) (i) for correct use of sigma;
numerator = 380 and denominator = 132; 2

2.87 to 2.9 gains 2 marks

(do not allow 2.8 or denominator = 135)

(ii) more types of prey found on strawberries; 1

(c) *for the principle that*

acetylcholine accumulates/stays/continues to have effects in the synaptic cleft/synapse;
because it is not broken down (by the enzyme);
stimulating the postsynaptic membrane / binding to receptors;
opens sodium channels / generating action potentials / causes depolarisation in the postsynaptic membranes;
stores of ATP are exhausted; 4 max

Total 10