

GCE 2004

June Series



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;
<i>(information from an equation is valid)</i> | 3 |
| | | | Total 5 |
-

Question 2

- | | | | |
|-----|------|--|---------|
| (a) | (i) | presence of grass causes less nutrients/minerals/nitrates/
ammonium ions to be leached;
<i>(do not allow references to less nitrogen)</i> | 1 |
| | (ii) | clover contains <u>nitrogen-fixing</u> bacteria;
<i>(do not allow references to nitrifying bacteria)</i>
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) | $(37 \div 44 =) 0.84 : 1.0$ <i>(allow 0.8 : 1)</i> ; | 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; (do not allow nitrifying bacteria, detritivores) 2
- (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; (do not allow splashing introduces oxygen) 3 max
- 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 genetic 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°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
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