



General Certificate of Education

Biology 6416

Specification B

BYB5/W Environment

Mark Scheme

2008 examination - June series

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Question 1

- (a) Use a co-ordinate system;
Idea of randomisation/random number tables;
Repeat many times/10 or more times;
(Reject several)
Take a mean;
Use stats to check results; eg Chi², t -test or other suitable method; 4
- (b) Lower light intensity/temperature;
Reduces the rate of growth because less sugars made/other suitable idea;
(Reject food)
Wouldn't reproduce to produce more plants; 2 max
- Total 6**

Question 2

- (a) Population density increases rapidly then levels off/becomes steady/increases more slowly;
Because initially no limiting factors/factors become limiting later on; 2
- (b) Interspecific competition;
B more successful competitor for a named limiting factor e.g. light, minerals, ions/B produces a toxin; 2 max
- Total 4**

Question 3

- (a) Pesticide not biodegradable/broken down/not excreted;
Bioaccumulation/biomagnification;
Consumers higher up the food chain eat large numbers/lots/many organisms from levels below; 3
- (b) (i) Blocks active site;
Prevents substrate binding/enzyme-substrate complex forming;
- OR**
- Binds away from active site;
Changes shape of active site; 2
- (ii) Human enzyme has different tertiary/3D structure/shape;
Prevents pesticide binding/joining/combining;
- OR**
- Pesticides cannot cross plasma membranes/enter cells/not absorbed through gut lining;
Because no complementary carriers; 2
- Total 7**

Question 4

- (a) kJ m^{-2} ;
 y^{-1} ;
(Accept any suitable units of energy, area and time) 2
- (b) Some reflected;
Transmitted through leaf/does not hit chloroplast;
Wrong wavelength; 1 max
- (c) Active transport/ATP needed;
Carrier proteins; 2
- (d) Able to remain active when environmental temperature is low;
Optimum temperature for enzymes/reactions/metabolic processes; 2
- Total 7**

Question 5

- (a) (i) Species of insect/community changes with time; 1
- (ii) Action of species changes conditions/named conditions;
Making habitat suitable for later species; 2
- (b) Break down proteins;
Amino acids to ammonium compounds;
Converted to nitrites and/or nitrates;
By nitrifying bacteria/named examples; 4 max
- (c) Extracellular digestion/enzymes secreted/released;
(Reject excreted)
Insoluble macromolecules broken down by enzymes;
Soluble products absorbed; 3
- Total 10**

Question 6

- (a) Low temperature and low precipitation;
Plants/animals species have adaptations to survive conditions;
Few species present/lower species diversity; 2 max
- (b) Rolled leaves traps humid layer;
Sunken stomata trap humid layer;
Hairy surface traps humid layer;
Fewer leaves/reduced leaves/spines/reduced leaf surface area so fewer stomata;
Thick waxy cuticle so less evaporation/transpiration; 3 max
- (c) Generates heat;
From respiration;
Air trapped/reduces air movement;
Gives insulation/air is a poor conductor of heat/reduces heat loss; 4
- Total 9**

Question 7

- (a) Treatment L; 1
(2 max if they choose the wrong treatment)
- 1 Largest mass of roots to reduce erosion/anchor soil;
2 Leaves/shoots/ reduce wind speed;
3 Large leaf mass allows faster growth/more photosynthesis;
4 Produces seeds which will increase plant density;
5 Produces seeds which reduces cost of reseedling; 3 max
- (b) Phosphate used to produce more chemicals needed for a named process
e.g. cell division/ respiration/photosynthesis/cell membranes; 1
(Reject new cells)
- Named examples e.g.:
ATP;
DNA/RNA/ tRNA/ mRNA/ nucleotides;
phospholipids;
NADP;
RuBP; 2 max
(Accept suitable other phosphate containing products)
- (c) 1 Phosphate ions run off/ leached into rivers/ lakes;
2 Causes increased plant/number of algal bloom;
3 Reduction in light causes plants/algae to die;
4 Increase in number of microorganisms/decomposers;
5 Microbes/decomposers use oxygen for respiration/increased BOD;
6 Fish/animals die due to lack of oxygen; 5 max
(Reject organisms)

Total 12

Question 8

(a) 2 practices (P);; and 2 effects (E);;

P1 Reduction in hedgerows;
P2 Use of pesticides;
P3 Monocultures grown;
P4 Increased area of land used for growing crops; 2 max

E1 Fewer habitats/niches/food sources/nest sites;
E2 Reduces stability of food chains/bioaccumulation; 2

(b) 1 Heat to separate strands/ break hydrogen bonds;
2 Add DNA polymerase/primers;
3 Cooled then heated up;
4 Repeat process; 3 max

5 Name of process - dideoxy sequencing/Sanger method/chain termination;
6 Use restriction/endonucleases to make sections of DNA;
7 Use radioactively labelled bases;
8 DNA replication stopped at base/cytosine/guanine/adenine/thymine;
9 Electrophoresis/description used;
10 Shorter/smaller fragments move faster/further;
11 Autoradiograph made/photographic film used;
12 DNA sequences/bands/ finger prints match; 3 max

Total 10