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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Biology 6416

Specification B

BYB5/W Environment

Mark Scheme

2007 examination - June series

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Question 1

(a) Mud crabs; 1

(b) (i) Pyramid shape with four trophic levels; 1

(ii) Kg per m^2; 1
(Accept any other suitable units showing mass per area)

(c) ATP – energy source;
Phospholipids – membranes;
DNA /RNA / nucleic acids – e.g. protein synthesis;
NADP – photosynthesis; 2 max
(One mark if only two named molecules)

(d) Creates lower water potential in cells / water potential gradient;
Allows water uptake / prevents water loss by osmosis; 2

Total 7

Question 2

(a) (i) Respiration / decomposition; 1

(ii) Nitrogen fixation / death of animals / organisms / excretion; 1

(b) Increase in photosynthesis;
As enzyme activity increased; 2

(c) Secretion / release of <u>enzymes</u>;
Extracellular digestion;
Absorb soluble products / named product e.g. glucose, amino acids 3

Total 7

Question 3

(a) Quadrat placed (along line) at 1 metre / regular intervals;
Count number / calculate per m^2; 2

(b) pH;
Linked to nutrient availability / enzyme activity;
Nutrient;
Effect of named nutrient on growth;
Light;
Adapted to lower light availability for photosynthesis;
Air movement;
Notadapted to water loss; 2 max
(Allow other abiotic factors with explanation e.g. temperature and enzyme activity)

(c) (i) Number of seeds;
Amount of nutrients;
pH;
Temp;
Light;
Carbon dioxide;
Size of pots;
Spacing of seeds; 2 max

(ii) A *Ranunculus bulbosus*
B *Ranunculus acris*
C *Ranunculus repens* 1

(iii) Breed together;
Production of fertile offspring (if same species);

OR

Use of DNA;
Similar base sequence / 'fingerprint'; 2

Total 9

Question 4

(a) Populations of different species in the same place; 1

(b) Chalkland has more species / diversity / taxa;
Loss of a species has less effect as larger food webs / more food sources / more niches; 2

(c) (i) Amylase (breaks down starch);
Produces maltose; 2

(ii) Sucrose transported;
In phloem by mass flow / or description in terms of turgor pressure / water potential difference;
Glucose respired / converted to cellulose; 3

Total 8

Question 5

(a) Broken down;
By microorganisms / decomposers / saprobionts; 2
(Accept saprophytes)

(b) (i) Sodium ions move inwards / can't be removed;
Impulses / action potentials continually produced / inhibited;
Muscle spasms / paralysis; 3

(ii) ATP production decreased;
Linked to effect e.g. on muscle contraction / nerve impulses; 2

Total 7

Question 6

(a) Same crop grown in large numbers / over large area; 1

(b) Reduction in diversity;
Since smaller variety of niches / habitats / food sources;
Reduction in soil fertility / more fertilisers required;
Same nutrients continually removed;
Increased risk of disease / large scale crop failure / more pesticide;
As numbers of crop specific pathogens / pests increase;
Hedgerows removed;
Linked to specific effect e.g. soil erosion / loss of diversity; 4 max
(One mark for effect and one mark for explanation)

Total 5

Question 7

(a) (i) To reject / support the null hypothesis / hypothesis;
Difference is not due to chance / there is a significant difference; 2

(ii) Chi-squared test; 1

(b) (i) 12, 60, 8; 1

(ii) 2; 1

(c) Population reduced / reference to selection pressure;
Inbreeding / increased homozygosity / reduced gene pool; 2

(d) (Fovea) contains cones;
High discrimination / visual acuity / one cone linked to one neurone;
Larger / wider area of clear vision; 3
(References to colour vision are neutral)

Total 10

Question 8

(a) Sewage contains organic content;
Bacteria / microorganisms break down (organic matter);
Using oxygen during respiration; 3

(b) Ammonium ions produced from breakdown of protein / amino acids;
By deamination;
Ammonium ions converted to nitrite;
Nitrite converted to nitrate;
By nitrifying bacteria; 4 max

(c) Restriction enzyme / endonuclease (cuts out gene);
Produces 'sticky ends';
Use of plasmid;
Cut plasmid with endonuclease;
Use ligase (to join gene and plasmid); 5

Total 12