



## **General Certificate of Education**

# **Biology 6416**

## *Specification B*

**BYB5/W Environment**

# **Mark Scheme**

*2007 examination - June series*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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**Question 1**

- (a) Mud crabs; 1
- (b) (i) Pyramid shape with four trophic levels; 1  
(ii) Kg per m<sup>2</sup>; 1  
(Accept any other suitable units showing mass per area)
- (c) ATP – energy source; 2 max  
Phospholipids – membranes;  
DNA /RNA / nucleic acids – e.g. protein synthesis;  
NADP – photosynthesis;  
(One mark if only two named molecules)
- (d) Creates lower water potential in cells / water potential gradient; 2  
Allows water uptake / prevents water loss by osmosis;

**Total 7****Question 2**

- (a) (i) Respiration / decomposition; 1  
(ii) Nitrogen fixation / death of animals / organisms / excretion; 1
- (b) Increase in photosynthesis; 2  
As enzyme activity increased;
- (c) Secretion / release of enzymes; 3  
Extracellular digestion;  
Absorb soluble products / named product e.g. glucose, amino acids

**Total 7****Question 3**

- (a) Quadrat placed (along line) at 1 metre / regular intervals; 2  
Count number / calculate per m<sup>2</sup>;
- (b) pH; 2 max  
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;  
(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 <i>Ranunculus bulbosus</i> B <i>Ranunculus acris</i> C <i>Ranunculus repens</i>	1
	(iii)	Breed together; Production of fertile offspring (if same species);  OR  Use of DNA; Similar base sequence / 'fingerprint';	2
			<b>Total 9</b>

**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
			<b>Total 8</b>

**Question 5**

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

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**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**