



General Certificate of Education

Biology 6416

Specification B

BYB678/B Biological Principles

Mark Scheme

2008 examination - June series

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Question 1

- (a) Each section grows by very small amount/produces little force;
Combined growth easier to see/measure/ together produce enough force;
Reduces error factor/improves accuracy (qualified); 2max
- (b) Two suitable reasons;;

e.g.
Metal applies constant force (for coleoptiles to act against);
Metal does not transmit light/ casts shadow on film;
Stops coleoptile sections from floating up/apart/metal doesn't float; 2max
- (c) Coleoptiles grow/in length (and push weight up);
So shadow on film rises/more light blocked; 2
- (d) IAA causes increase in growth (rate) of coleoptiles;
Time delay in effect;

(Softening of cell wall allows) expansion of cells/vacuoles;
Due to uptake of water/fluid;

(Soft cell walls allow) mitosis/cell division;
Adding to length of coleoptile; 3max
- (e) Two suitable factors with explanation;

e.g.
Temperature, because affects rate of enzyme action/metabolism;
Strain/age/growth conditions before experiment of coleoptiles, so cells in similar
stage of expansion/growth;
Where sections taken from in coleoptiles, so similar stages of differentiation/
hardening of cell walls;
Mass of metal, to provide constant force; 2 Max
- (f) Small movements of weight lead to much larger movement of shadow on the
film/ to put scale on axis/to convert beam movement to mm of growth/give
quantitative result; 1

Total 12

Question 2

- (a) Y is a shore crab (*No mark*),
Has (reasonable amounts of) endopeptidase for (digestion of) animal/mollusc tissue/only one that eats seaweed;
Has laminarinase for (digestion of) seaweed; 2
- Z is a speedy crab (*No mark*),
Which is a carnivore/only eats barnacles/doesn't eat any 'plants';
Food (high in) protein, produces a lot of endopeptidase/doesn't produce (much) cellulase; 2
- (b) Method to maintain range of temperatures;
Method to measure activity – e.g. time taken for indicator to turn yellow;
Other condition kept constant/named example;
Method of refining optimum; 3 Max
- Total 7**

Question 3

- (a) Suitable suggestion; and reason;

e.g.
Ketamine binds specifically to one kind of receptor/enzyme as inhibitor (in synapse);
Only some synapses have these receptors/enzymes;

Ketamine similar shape to a neurotransmitter (found in certain synapses);
Neurotransmitter only found in certain synapses; 2
- (b) Affects muscles in/contraction of walls of arterioles;
Vasoconstriction/vasodilation/described;
- OR**
- Affected parts of brain become more/less active, so have higher/lower rate of respiration;
Leads to greater/lower blood flow to area; 2
- (c) One appropriate suggestion, with reason;;

e.g.
Inability to make decisions/make voluntary movements;
Because frontal lobe affected;

Difficulty seeing/visual hallucinations;
Because visual sensory/association areas affected;

Problems hearing/hearing hallucinations;
Because temporal lobe/hearing association area affected; 2 Max
(Accept converse reasoning)

Total 6

Question 4

- (a) The part played by the movement of substances across cell membranes in the functioning of different organs and organ systems.

Topic areas for assessment of scientific content:

1	Plasma membranes and movement across	(P)
2	Gaseous exchange system/ lungs	(G)
3	Digestive system/small intestine	(D)
4	Blood vascular system	(B)
5	Transpiration/root/stem	(T)
6	Mass flow/leaf/stem	(Mf)
7	Nervous system/eye	(N)
8	Excretory system/ kidney	(K)
9	Muscle systems	(M)
12	Liver, blood glucose	(L)
11	Root mineral ions	(U)
10	Lungs cystic fibrosis	(Cf)

Any other sensible example of the movement of substances across cell membranes in the functioning of different organs and organ systems should be credited. In a good essay, the emphasis should be on movement across membranes involving organ function.

Assessment of breadth of knowledge

3 marks	Coverage of 4 examples with sufficient detail to illustrate relation of content to movement across membranes. Including at least one non-animal example.
2 marks	3 examples described in some detail.
1 mark	Reference to 2 examples.

- (b) The part played by enzymes in the functioning of different cells, tissues and organs.

Topic areas for assessment of scientific content:

1	Action of enzymes	(AE)
2	Enzyme properties	(EP)
3	Extracellular digestion	(ED)
4	Nutrient cycles	(N)
5	Digestion in humans	(D)
6	Replication of DNA	(R)
7	Protein and enzyme synthesis	(TT)
8	Metabolic pathways	(Met)
9	Mutations	(M)
10	Coenzymes and enzyme action	(Co)
11	Homeostasis	(H)
12	Neurone/synapse	(S)
13	Muscle contraction	(C)
14	Pesticide toxicity	(P)

Any other sensible example of the part played by enzymes in the functioning of different cells, tissues and organs should be credited. In a good essay, the emphasis should be on the part played by enzymes.

Assessment of breadth of knowledge

3 marks	Coverage of 4 examples with sufficient detail to illustrate relation of content to role of enzymes in context of cells.
2 marks	3 examples described in some detail.
1 mark	Reference to 2 examples.