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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Biology 6416

Specification B

BYB6/A Applied Ecology

Mark Scheme

2007 examination - June series

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Question 1

(a) (Nodules) contain nitrogen fixing bacteria/*Rhizobium*;
Atmospheric nitrogen into ammonia/ammonium ions; 2

(b) Anaerobic conditions;
(Favour growth of) denitrifying bacteria;
(Bacteria) convert nitrates to atmospheric nitrogen; 2 max

Total 4

Question 2

(a) (i) Oil on feathers reduces insulation/water proofing/prevents flight;
(Toxic oil) ingested when feathers preened;
(Oil on water) reduces visibility so cannot fish; 1 max

(ii) (Oil on water) reduces light reaching algae, prevents photosynthesis; 1

(b) (i) Two harmful effects, explained;;

For example, harmful effects due to:
Competition for niche/resources/named resources;
No natural predators, so increase in numbers;
Are new predator species;
Introduce new disease/pathogen; 2 max

(ii) Causes mutation (in DNA);
Prevents synthesis of proteins/non-functional protein produced/reduces production of enzymes/structural proteins;
Stops DNA replication; 2 max

Total 6

Question 3

(a) (a) Migration; 1

(b) Two suitable explanations;;

For example:
Less energy needed to maintain a constant body temperature;
Greater availability of food; 2 max

(c) (i) Detected by receptors/thermoreceptors in brain;
In hypothalamus; 2

(ii) Three suitable responses;;;

For example:
Reduction in sweating;
Hair erection;
Increased metabolism of brown fat;
Rapid contraction of (skeletal) muscles;
Vasoconstriction/shunt vessels/vasodilation in correct location;
Release of named hormones/adrenaline, thyroxine;
Hibernation explained in terms of physiology; 3 max

Total 8

Question 4

(a) Large mesh, so limits capture of small/immature fish;
Small nets limit size of catch (so less effect on population);
Smaller nets gives less by-catch; 1 max

Close season - allows reproduction; 1 max

(b) **A**
Biomass of stock at end of year equals biomass of stock at start of season/ biomass of fish removed equals biomass as a result of growth;
Only the maximum sustainable yield removed; 3
(If incorrect area given, a principle mark can be awarded for the idea of the balance of what goes out to what goes in)

(c) Binding changes tertiary structure of enzyme;
Active site can't bind to substrate/form enzyme-substrate complex;
Non-competitive inhibitor; 2 max

Total 7

Question 5

(a) Suitable method with detail;;

For example:
Kick sampling with net;
Detail, such as time of kicking/area kicked/number of kicks; 2

(b) (i) Breed together organisms (of different colours), if fertile offspring then same species; 1

(ii) 1.068, 1.07;; 2
(62 x 61/(60 +59) + 2 OR 3782/3542 gains 1 mark)

(c) Two suitable advantages

For example:
Takes account of number of individuals and number of species;
Species do not have to be identified;
Do not have to know oxygen requirement of individual species; 2 max

Total 7

Question 6

(a) Suitable advantage

For example:
Long-lasting effect;
Improves soil structure;
Introduces useful bacteria/organisms; 1 max

Suitable disadvantage

For example:
Bulky, so needs a lot of storage space/ difficult to spread;
Nutrient content not known, so difficult to match to crop;
Contains harmful bacteria/spores, pathogens;
Breaks down slowly, so not available immediately; 1 max

(b) (i) The greater the mass/density of oats sown, the more the mass of weed is reduced; 1

(ii)
1 Competition for light;
2 Slows down light-dependent reaction;
3 Chlorophyll molecules/electrons excited;
4 Photolysis;
5 Reduced NADP production;
6 Light-independent reaction;
7 Glycerate 3-phosphate production;
8 Triose phosphate/GALP production; 4 max

(iii) Plant leaf area divided by ground (area) under the leaves. 1

Total 8

Question 7

(a) (i) (Dugongs) large enough to be seen from the air/regularly come to the surface to breathe/found over large areas/planes don't disturb habitat; 1

(ii) Allows comparison between different areas/takes into account different sizes of areas surveyed; 1

(iii) N has smallest population per km^2;

OR

L smallest area/smallest population; 1

(b) (i) Protection of habitat;
Legal measures;
Captive breeding program;
(Captive breeding involving) surrogacy/artificial insemination; 2 max

(ii) Maintaining genetic diversity (for future breeding programmes);
Ethical/aesthetic reasons for conservation/tourism;
Avoid damage to food webs/control local species;
May provide useful genes/chemicals to treat diseases; 2 max

(c) *(i) and (ii) both sections read together, then marks awarded to a max of 3*

(i) Myoglobin has greater affinity for oxygen (than haemoglobin);
So takes up oxygen from (oxygenated) haemoglobin in the blood; 2 max

(ii) At lower partial pressures, small change causes the release of (a lot of) oxygen;
Allows unloading/storage of oxygen at lower partial pressures (of oxygen) during dive; 1 max

Total 10