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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Biology 6416

Specification B

BYB5/W Environment

Mark Scheme

2007 examination - January series

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Question 1

(a) Climax community; 1

(b) *One method with explanation e.g.*
Regular grazing / cutting – young shoots eaten / prevents succession;
Herbicides – kills herbaceous plants;
Ploughing / burning - destroys seedlings / plants; 1 max

(c) Rapid process;
Large number produced;
Only one plant required;
No variation linked to advantageous characteristics; 3

Total 5

Question 2

(a) kJ m^{-2} yr^{-1}; 1
(all 3 units needed, accept J, any area, any time)

(b) (i) 0.64 / 0.636 (%); 1

(ii) Heat / respiration; *(Reject respiration uses energy)*
Movement / muscle contraction;
Faeces / indigestible material / food not eaten;
Excretion; 1 max

(c) (i) Some light reflected / not absorbed / refracted;
Some light misses chloroplasts / chlorophyll;
Only certain wavelengths of light used; 1 max

(ii) Excites electrons from chlorophyll;
Electrons passes down carriers;
Energy released during transfer;
ADP + P forms ATP; 3 max

Total 7

Question 3

(a) Decrease in pH linked to decrease in population; 1

(b) Use of pH meter / indicator / pH probe; 1
(Reject litmus)

(c) Quadrats;
Large number / random sampling;
Calculate the mean; 3

(d) (i) Provides oxygen for (aerobic) respiration;
(by) bacteria / microorganisms; 2

(ii) Fewer bacteria / decomposers;
Acid conditions inhibit enzymes / enzymes denatured;
(H^+ ions) affects enzymes active site; 2 max

Total 9

Question 4

(a) More niches / habitats;
Variety of food sources;
Different insects at different times of year; 3

(b) Predators of pests (of crop plants);
Pollination of crops; 1 max

(c) *One mark for each feature <u>and</u> explanation, e.g.*

Small leaves
Reduced surface area (for water loss);

Thick / <u>waterproof</u> cuticle
Increases diffusion distance;

Inrolling of leaf
Reduces water potential gradient / air movement across stomata / traps air which becomes saturated / moist / humid / reduces surface area;

Sunken stomata
Reduces water potential gradient / air movement across stomata / traps air which becomes saturated / moist / humid / reduces surface area / diffusion distance;

Hairs
Traps air which becomes saturated / moist / humid;

No stomata on upper surface
Reduces surface area for evaporation;

Succulent / swollen stem
Water storage;

Deep / long roots
Absorb water deeper in soil;

Shallower roots
Absorb surface water;

Extensive root system
Large surface area for water absorption; 3 max
(Three features without any valid explanation – allow one mark)

(d) (i) (Is the degree) of spread from the mean; 1

(ii) Yarrow has a higher <u>mean</u> survival rate / higher survival rate at more sites;
Buckwheat has a wider variation in survival rate; 2

Total 10

Question 5

(a) Breed (among themselves);
To produce fertile offspring;

OR

Have same niche;
Not shared with any other species; 2 max

(b) High stability with greater number of species / converse;
When number of species is high stability levels out;
More species linked to more food chains / food web;
If one species dies others available as food / converse; 3 max

Total 5

Question 6

(a) Pesticide not biodegradable / broken down;
<u>Stored</u> in tissues / fat;
Animals higher up the food chain eating larger numbers of organisms lower down; 2 max

(b) Acetylcholine is not broken down;
Acetylcholine continues to depolarise the membrane / generates action potentials / more impulses disrupting coordination / muscle action; 2

(c) 2.35 mg dm^{-3} $minute^{-1}$ 1

(d) Higher enzyme concentration / more enzyme and substrate collisions / no time delay for parathion to enter bacterium / time to secrete enzyme; 1

(e) Different <u>shaped</u> molecules;
Do not fit active sites of enzymes (produced by decomposers); 2

Total 8

Question 7

(a) Low nutrient / ion / mineral content of soil;
Deforestation removes nutrients;
Soil erosion more likely; 2 max

(b)
1. Protein into ammonium compounds;
2. Deamination;
3. By saprobionts / decomposers / bacteria / fungi;
4. Ammonium into nitrite;
5. Nitrite into nitrate;
6. By nitrifying bacteria / named example;
7. Nitrogen fixing forms ammonium compounds; 5 max

(c) Active transport;
Uses ATP;
Against a concentration gradient;
Reference to carrier proteins; 3 max

Total 10

Question 8

(a) Interspecific competition; 1

(b) (i) Population declines (as experimental area has higher number than control area / reference to Figure 1); 1

(ii) Population not affected (as number is similar in both areas / in Figure 2); 1

(c) Large population decrease / increase for canyon lizard / in Figure 2; 1

(d) (More) intraspecific competition / high density linked to competition; 1

(e)
1. Hypothalamus (contains the thermoregulatory centre);
2. Receptors which respond to temperature changes of blood;
3. Impulses from receptors in skin;
4. Nerve impulses transmitted (from hypothalamus);
5. Vasoconstriction / constriction of arterioles;
6. Diversion of blood away from surface / to core / appropriate specified organ;
7. Muscular contraction (shivering) generates heat via respiration;
8. Raised hairs providing insulation;
9. Release of thyroxine / adrenaline;
10. Increase in metabolic rate / respiration;
11. Correct behavioural response; 6 max

Total 11

QWC 1