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A2 Biology OCR

Unit F215: Control, genomes and environment

Module 3.1 Ecosystems

Answers

5.3.1

1. (a) (i) *award both marks for correct answer*
 10 000 / 800 000 ($\times 100$);
 1.25 / 1.3 / 1(%); 2
- (ii) **R** *any reference to energy / light missing the plant*
 reflected (off plant) / only certain wavelengths of light can be, absorbed /
 used; ora
 absorbed by / hits, non-photosynthetic parts; e.g. bark
 passes through leaf / misses chlorophyll / misses chloroplasts;
 some is heat that is used in evaporation / respiration; max 2
- (iii) bacteria / named bacterium decomposer; (*Nitrobacter, Nitrosomonas*) 1
- (iv) *take the first 2 answers:*
 death / dead remains;
 excretion; **R** *waste products*
 egestion;
 other suitable method; e.g. insects moulting
 hatched eggs
 moulting (fur / feathers)
 R *leaves* 2
- (b) *Primary consumers are eating and...*
 producers have, cell walls / cellulose; ora
 difficult to digest / much material, wasted / egested;
 energy used by gut microorganisms; ora
 much material cannot be eaten (by primary consumer); ora 3
- [10]
2. (a) starts with previously uncolonised area / bare ground / bare rock / AW;
 ref to pioneer species / named pioneer;
 series of recognisable, seres / stages;
 progresses to, climax / final equilibrium stage; max 2
- (b) stabilise environment;
 soil development / increase humus / organic material;
 change soil pH;
 hold more water;
 release more minerals or nutrients / increase N content or fix N / hold
 ions;
 form microhabitat / reduce exposure / provide shelter / reduce erosion; max 3

5.3.1

(c) *any two from following:*

grazing;

burning;

mowing / application of fertilizer / application of selective herbicide;

exposure to wind;

grass able to continue to grow (linked to a statement above);

2

(d) increases;

plants at later stages are large / plants in early stages are small;

trees / shrubs. are woody, appear later in succession;

2

[9]

3

(a) (i) denitrification;

1

(ii) Rhizobium;

1

(iii) active transport / diffusion;

1

(iv) nitrification;

1

(b) *max 3 for each method*

ploughing-in

- 1 legumes / named e.g., possess, (root) nodules / nitrogen fixing bacteria;
- 2 *Rhizobium*, performs nitrogen fixation / described;
- 3 nitrogenous compounds are present in, roots / nodules / legumes / plants;
- 4 made available to soil if, ploughed in / not removed;
- 5 roots / AW, decomposed / acted on by decomposers / rot / decay;
- 6 nitrogenous compounds released (by decomposers);
- 7 formation of nitrate; *3 max*

crop rotation

- 8 different, crops / plants, have different (nutrient / nitrate) requirements;
- 9 each year, different demands made on the soil / nutrients not being removed at the same rate;
- 10 in, 4th / fallow, year, no (little) nutrients removed / used for grazing animals;
- 11 nutrient levels allowed to build up;
- 12 use legume in rotation;
- 13 tuber / root, crop to improve soil structure; *3 max*

4 max

[8]

4

idea of soil development; **A** ref to depth or fertility of soil (increase), organic material / humus; (increase) in availability of water; minerals available; **A** nutrients (some pioneer species) carry out nitrogen fixation; photosynthesis (fixing carbon); create habitats / provide shelter; AVP; e.g. increase weathering, stabilise sand / soil

2 max

[2]

5.3.1

5

- (i) final stage in succession / AW;
(community) in equilibrium with environment; 1 max
- (ii) eat / trample, seedlings (of shrubs / trees) / AW; **R** eat grass
prevents, succession / establishment of next sere; 1 max

[2]

6

- (a) *award two marks if correct answer (18.4) is given
incorrect answer (or no answer) but correct working = 1 mark*
44 / 239 (× 100)
18.4%;
ecf applied for minor addition errors +/- 2 2

- (b) 1 lay, tape / string, across path; **R** along the path
2 include trampled and non trampled areas in same transect;
3 use of quadrat;
4 ref to how quadrat is placed; **R** random
5 count number of plants / percentage cover of plants;
6 plot a graph;
7 repeat the transect;
8 carry out statistical test (Mann-Whitney / Spearman's rank);
9 AVP; e.g. detail of sampling technique 5 max

[7]

7

- (a) *do not credit if any incorrect answer included*
- (i) fox; 1
- (ii) grass / clover / legume; 1
- (b) (i) nitrogen fixation / Haber (process); **A** reduction 1
- (ii) lightning; **A** oxidation / combines with oxygen
A 'lightening'
R thunderstorm / lightning 1
- (iii) denitrifying; **A** correct e.g. (Pseudomonas)
R Nitrobacter / Nitrosomonas / Rhizobium 1
- (iv) fixes nitrogen / provides fixed nitrogen *or* $\text{NH}_4^{(+)}$; **R** ammonia
ref to, clover / legume / named legume, making, amino acids /
polypeptides / protein;
(plant has) no need to rely on (fixed) nitrogen compounds in soil;
R *ref to fertilisers*
free-living species provide, ammonium (ions) / fixed nitrogen,
for nitrifying bacteria / nitrification; 2 max

[7]

8

- 1 sun is the energy source (for the system);
- 2 producers / (green) plants, trap / use / absorb (sun's energy);
- 3 photosynthesis;
- 4 not all energy trapped and reason;
- 5 energy used for, plant metabolism / plant processes / e.g.; **A** respiration
- 6 so this energy not, passed on / available, to consumer;
- 7 (some energy) used for, growth / storage;
- 8 so this energy is, passed on / available, to consumer;
- 9 1^o consumer / herbivore, eats, producer / plant;
- 10 some producer, not edible / not accessible / e.g.;
- 11 some, not digested / egested / lost as faeces;
- 12 2^o consumer / carnivore / omnivore, eats, 1^o consumer / herbivore;
- 13 some parts of animal not edible / e.g.;
- 14 energy used by animal in moving (to feed);
- 15 energy, used / lost, in, digestion / excretion / sweating / e.g.; **A** respiration
- 16 transfer / loss, to, decomposers / bacteria / fungi / saprotrophs;
- 17 energy lost as heat from respiration;
- 18 net productivity = gross productivity – respiration;
- 19 some ref to estimate of efficiency of transfer (a general statement);
- 20 quote of (comparative) figures from diagram;
- 21 manipulation of figures to illustrate a point; **NOT** 6612 and 14198
- 22 AVP;
- 23 AVP; e.g. loss out of ecosystem
 another manipulation of figures
 available energy limiting length of chain
- QWC – legible text with accurate spelling, punctuation and grammar;**

max 9

1

[10]