

Biodiversity

Mark Scheme 5

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Biodiversity, classification and conservation
Sub Topic	Biodiversity
Booklet	Theory
Paper Type	Mark Scheme 5

Time Allowed : 70 minutes

Score : / 58

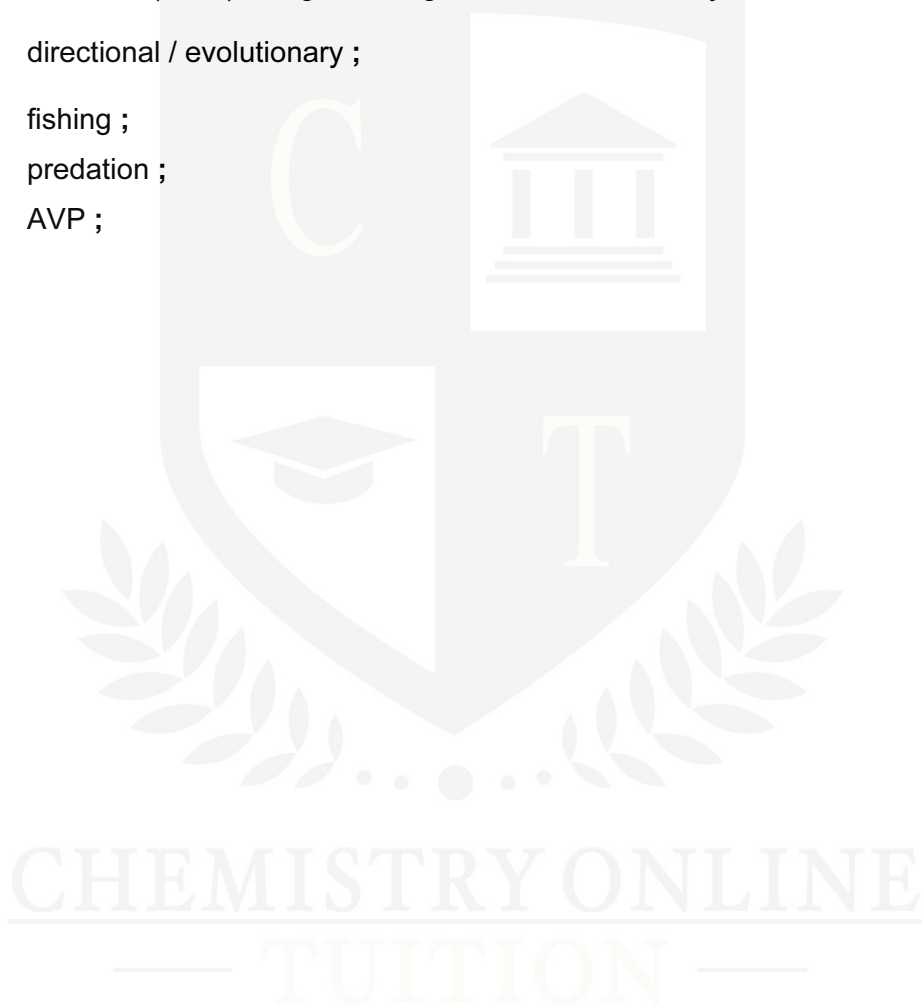
Percentage : /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

- 1 (a) (i) same, mean / mode ;
narrower (5–35) ; *ignore height, curve should be symmetrical* [2]
- (ii) stabilising ; [1]
- (b) mean / mode, to left of 20cm ;
narrower (0–35) ; *ignore height, curve should be symmetrical* [2]
- (ii) directional / evolutionary ; [1]
- (iii) fishing ;
predation ;
AVP ; [2 max]

[Total: 8]



Question	Expected Answers	Marks
2 (a)	<p><u>1 mark for working</u></p> <p>$86.5/809 \times 100 (= 10.69)$; A $42 + 42 + 2.5/400 + 409 \times 100$</p> <p>R $42/400 \times 100 = 10.5 = 11$</p> <p><u>1 mark for correct answer</u></p> <p>11%;</p> <p>R 10.7/other units if specified</p>	[2]
(b)	<p>Energy losses in respiration; R used up in/needed in respiration, energy lost in movement</p> <p>waste/urine/faeces/dead parts/excreta/excretion;</p> <p>primary consumers do not eat all the plant matter; A for secondary consumers</p> <p>not all parts of, plants/primary consumers, are digestible;</p> <p>energy losses as heat qualified e.g. in digestive system (of consumers)/to environment/atmosphere/surroundings;</p> <p>plants/primary consumers, migrate/swept away, by tide/waves AW;</p> <p>energy losses to decomposers;</p>	[max 4]
(c)	<p>proteins → amino acids; A proteins are decayed into amino acids</p> <p>deamination;</p> <p>ammonification/ammonia/ammonium ion;</p> <p>ammonia/ammonium ions, to nitrate; A nitrification</p> <p>oxidation;</p>	[max 2]
		[Total: 8]

- 3 (a) *autotroph to max 3*
carries out photosynthesis/photosynthetic ; **A** acts as a producer
synthesises (complex) organic compounds from inorganic, compounds ;
uses light energy ;

heterotroph

obtains energy from, complex/organic, compounds ; **A** insects/animals
ref. digestion/absorption soluble products ; AW
acts as a consumer/feeds on other organisms ;

[max 4]

- (b) less nitrification/ammonia to nitrite/ammonia to nitrate/nitrite to nitrate ;
limits/AW uptake of ammonia/nitrate, by producers/(aquatic) plants/phytoplankton ;
N becomes/is limiting factor for growth of producers ; **A** decreased growth
less N for synthesis of amino acids/proteins/other named nitrogenous compound(s) ;

less food available for consumers/higher trophic levels ;
reduces production/productivity in these ecosystems ;

[max 3]

[Total: 7]

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- 4 (a) produces/synthesises, (named) organic compounds from inorganic (named) compounds ; **A** substances/materials/molecules using, light/chemical, energy ;
A photosynthesis/converts light energy to chemical energy/chemosynthesis [2]
- (b) primary consumer/feeds on diatoms ;
provides, energy/food/nutrients/biomass, to, secondary consumers/pondskater/next (named) trophic level/next level in food chain ;
A 'pondskater eats it' [2]
- (c) *idea of less energy available to (population of) heron(s) ;*
energy 'lost', between/at, each trophic level ;
any example – respiration/excretion/egestion/movement/to decomposers/heat/not all organisms are eaten/AW ;
ref. to sizes of individuals ; [max 2]
- (d) 1 *pond skater*
can stand on water/use surface for habitat, because of surface tension ;
A strong surface because of, hydrogen bonding/cohesion between water molecules
/ adhesion
- 2 *ref. to its food comprising animals that fall onto water ;*
pike – to max 3
- 3 solvent, provides (dissolved) oxygen ;
- 4 solvent for, carbon dioxide/excreta/ammonia ;
- 5 water, has high density/is a medium that, provides support/buoyancy ;
- 6 liquid so pike can move ;
- 7 transparent, so pike can see ;
- 8 high specific heat capacity (of water), provide stable temperature/environment ;
- 9 ice less dense than water/ice floats, so can survive (when water freezes) ;
A idea of life beneath the ice/insulation
- 10 AVP ; e.g. high latent heat of fusion, water does not freeze easily [max 4]

(e) *ignore nitrogen fixation, formulae must be correct if names are not used*

- 1 decomposers / saprotrophs / bacteria / fungi ;
I microorganisms / microbes
- 2 protein broken down to amino acids ; **A** *ref. to* proteases
- 3 urea / amino acids / protein, converted to, ammonia / ammonium (ions) / NH_3 / NH_4^+ ;
A deamination produces ammonia / ammonification from urea etc.
- 4 ammonia / ammonium ions, to, nitrite / NO_2^- ;
- 5 nitrite / NO_2^- , to, nitrate / NO_3^- ;
- 6 oxidation / nitrification (in correct context) / nitrifying bacteria ;
- 7 *Nitrosomonas* and *Nitrobacter* in correct contexts ;
if ammonia to nitrate or ammonia to nitrite and nitrate = 1 mark
ammonia to nitrite and **then** nitrate = 2 marks

[max 4]

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- 5 (a) *niche*
functional role / function / role / AW, of a species within an ecosystem ;
A population / organism, for species
accept description
- community*
all populations of all species / all organisms / AW, living in a (particular) area / AW, (at the same time) ; [2]
- (b) 1 changing / increasing / decreasing, numbers of sea otters has (large) effect on the rest of the ecosystem ;
- effect on kelp*
2 prey on sea urchins, which, graze / feed on, kelp ;
3 if, no / few, otters numbers of urchins increase, so kelp decreases ; ora
4 sea urchins have no other predator ;
- role of kelp*
5 kelp, is a producer / initial input of energy into ecosystem ;
6 so less kelp means less energy available for the ecosystem ;
7 kelp provides habitats for many other species ;
8 loss of kelp (significantly), changes structure of ecosystem / ref. to 'deforestation' ;
- effect on other organisms*
9 decrease in numbers (of sea otters) leads (initially) to increase in numbers of their prey / named organism from Fig. 6.1; ora
10 for any one example ref. to consequence / knock-on effect ;
11 AVP ; e.g. ref. to effect on, energy flow through ecosystem / regulation of populations within the ecosystem / community structure [max 4]
- (c) 1 (determine) energy content of consumed kelp, absorbed / that can be used, by sea urchins ; AW
2 (determine) energy content of kelp consumed by sea urchins ;
- allow other reasonable suggestions for mps 1 and 2*
- 3 idea of comparing energy contents and expressing as a, percentage / proportion / ratio ;
A equation or worded e.g. mp 1 divided by mp 2
- 4 (calculated as) per unit, area / volume, per unit time ;
A example e.g. (J) m⁻³ year⁻¹ [max 3]

[Total: 9]

6 (a) *max 2 if no examples from passage given population*

- 1 all individuals / all organisms / AW, of,
Trichophilus welckeri
three-toed sloths / *Bradypus variegatus*
one / a, species of roundworm
one / a, species of insect *any one* ;
one / a, species of saprotrophic fungi
one / a, species of algae

A one (particular), species / kind / type

I e.g. the roundworms etc.

treat as neutral same organisms

- 2 *idea of* in, an (specified) area / AW ; e.g. place / habitat e.g. (sloths) in the, forest / trees (at one time) in central / south America
in the sloth's fur / on the sloth

- 3 at the same time ; *allow once only*

- 4 (named organisms) share same gene pool / ref. isolated from other populations (of the same species) ;
community

- 5 all populations of all species / all organisms / AW, living in a (particular) area / AW ;

- 6 examples ; all the organisms living on the sloths fur
or
roundworms, insects, fungi, algae, on sloth's fur/ in same area
in second example do not need ref. to fur or area if mp 5 given

- 7 at, the same / one, time ; *allow once only*

[max 4]

(b) 1 has biotic and abiotic components / biological and physical components ;
A living and non-living components

- 2 described by use of examples from text ; e.g. water and organisms
A fur as an abiotic factor

- 3 ref. energy flow / nutrient cycling ;
A described e.g. food web, algae as producers, fungi as decomposers
A food chains *look for at least one link*

- 4 ref. interactions / functional entity ; AW e.g. self-contained / self-sustaining / inter-relationships

[max 3]

[Total: 7]

7 (a) 7 500 ;;

allow one mark for correct working

allow one mark for 7.5 tonnes

[2]

(b) 1. stop / reduce, fishing ; **A** correct ref. to quotas / moratorium

2. ref. size of nets ;

3. ref. to methods of fishing ;

4. control pollution ;

5. education ;

6. captive breeding and release / restocking from fish farms

7. ref. to marine reserve ;

[max 3]

[Total: 5]

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