

Answers to exam-style questions

Option C

1 Any three of:

- temperature: suitable temperature is essential for enzyme activity;
- light: essential for photosynthesis;
- water: essential for photosynthesis and transport of dissolved substances;
- breeding sites: essential for animals, must be safe and within reach of food;
- food supply: animals need a source of food to survive

[4]

2 a less successful for unattractive organisms;
but preserving the habitat of high-profile species means conserving habitat;
which will benefit all species [3 max]

b a large reserve contains more habitats than a small one;
a large reserve contains more species than a small one;
a large reserve has less edge effect;
large reserves have more populations of individual species than small ones so genetic diversity is greater;
a rounded shape is better than a long thin shape of the same area because it has less edge effect

[4 max]

c allow gene flow between two protected areas;
allow seasonal movements to take place;
reduce accidents on roads which separate protected areas

[2 max]

[total 9 marks]

3 a $D = 2.88$ [2]

b a higher diversity index indicates that the second sand dune has a greater evenness with no one individual dominating the environment / the dune with the lower diversity index has one dominant organism, which might indicate a poorer ecosystem

[1]

[total 3 marks]

4 a

Time/mins	Population / 1000s
0	1
20	2
40	4
60	8
80	16
100	32
120	64
140	128
160	256

[4]

b Graph with axes correctly labelled: Time/mins;
Population number; [1]

graph shows an exponential increase in the population [1]

c the curve would level off;
enter the lag phase and then the plateau phase;
as nutrients ran out / waste accumulated;
the population would stop increasing;
eventually bacteria would die. [3 max]

[total 9 marks]

5 a both species are limited at the top of the shore by the temperature fluctuations and the lack of moisture
C. stellatus is able to tolerate the conditions at the top of the shore better than *B. balanoides* and occurs in greater numbers there
at the lower end of their ranges both are eaten by predators (particularly whelks) – *B. balanoides* is limited by these predators
barnacles must compete for space with algae, which grow in wetter conditions at the lower end of their ranges [4]

b the two barnacles compete with each other for resources;
lower down the shore *B. balanoides* out competes *C. stellatus*;
this may be because it is more resistant to predatory whelks or because it grows more quickly and occupies space before *C. stellatus* [1]

[total 5 marks]

6 43%

[2]

- 7 animals mistake plastic waste for food and eat it, leading to physical damage to the digestive system or infections;
or the feeling of fullness so they stop feeding;
birds such as the albatross may feed plastic to their young who starve as a result – adults regurgitate the plastic and are less likely to be harmed but chicks cannot;
plastic bags can entangle species such as turtles and prevent them swimming and hunting successfully;
plastic debris can block gills of fish so that their ability to obtain oxygen is restricted [4 max]
- 8 *Cane toad introduced to Queensland, Australia:*
competes with endemic amphibian species by breeding faster and earlier;
has occupied the habitat of endemic amphibians, severely reducing their numbers;
the toad's poisonous skin deters or kills potential predators;
the toad feeds on rodents and insects, upsetting natural food chains [3 max]
- 9 indicator species are very sensitive to changes in their environment and can give information about the condition of an ecosystem by their presence or absence;
used to monitor water quality / some species are very sensitive to organic pollution and die if water is contaminated
biotic indices either sample organisms whose sensitivity is known to build up a picture of pollution;
or measure species diversity to measure pollution stress [4]
- 10 *ex situ* conservation involves captive breeding;
uses animal breeding in zoos to increase species numbers;
artificial insemination or embryo transfer may be used;
genetic diversity can be monitored;
plants can be bred in greenhouses, which provide the correct environmental conditions;
selected seed from seed banks may be used [5 max]
- 11 a a sample of organisms is captured, marked and released;
later a second sample is taken and the proportion of marked individuals in the sample noted;
the proportion marked in the second sample is assumed to be the same as the proportion of the total population that was originally marked [3]
b only useful for mobile small animals with limited territories;
assumes there is no immigration or emigration;
not useful for very small populations [3]