



Adaptation to environment: practice questions

7 questions • 22 marks • mark scheme at the back

For IB Diploma Biology, Standard Level and Higher Level (first assessment 2025). **HL only** is additional higher level content, for HL students only.

Name

Total / 22

1 PAPER 1A STYLE [1 mark]

Which statement correctly describes a habitat?

- A. ☐ The role of a species in an ecosystem, including how it obtains food
- B. ☐ The place in which a community, species, population or organism lives
- C. ☐ All the populations of different species living and interacting in an area
- D. ☐ The range of an abiotic factor within which a species can survive

2 PAPER 1A STYLE [1 mark]

Why do coral reefs form mainly in shallow water, usually less than about 30 m deep?

- A. ☐ The water pressure dissolves calcium carbonate skeletons
- B. ☐ The salinity of deep water is too high for coral polyps
- C. ☐ Too little light reaches the zooxanthellae for photosynthesis
- D. ☐ The water is too warm for coral polyps to survive

3 PAPER 1A STYLE [1 mark]

Cacti in American deserts and spurges in African deserts are not closely related, but both have succulent stems, spines and reduced leaves. What explains this similarity?

- A. ☐ Convergent evolution under similar selection pressures
- B. ☐ Inheritance of the features from a recent common ancestor
- C. ☐ Competitive exclusion between the two groups
- D. ☐ Adaptive radiation from a single desert species

4 PAPER 2A STYLE [4 marks]

Explain how a named tree species is adapted to the abiotic conditions of a mangrove swamp.

5 PAPER 1B STYLE

[5 marks]

Students used a belt transect from the edge of a woodland into its interior. At each point they measured light intensity with a sensor and estimated the percentage cover of a moss species in three quadrats. The data are for practice. (a) Describe the relationship between light intensity and moss cover. [2] (b) Suggest one abiotic variable other than light that could have changed along the transect and affected moss cover. [1] (c) Evaluate the conclusion that low light intensity causes the moss to grow. [2]

Light intensity and moss cover along a woodland transect (practice data)

Distance from edge / m	Light intensity / lux	Mean moss cover / %
0	12000	2
5	6500	8
10	3000	21
15	1400	34
20	900	38

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6 PAPER 2A STYLE

[3 marks]

Outline how temperature and rainfall determine the distribution of terrestrial biomes, using two named biomes.

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Explain how named species of plants and animals are adapted to life in hot deserts and in tropical rainforest.

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Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B (A describes a niche, C a community, D a range of tolerance) [1]

2. [1]

C C [1]

3. [1]

A A [1]

4. [4]

- named species, e.g. red mangrove / *Rhizophora mangle* [1]
- stilt / prop roots anchor tree in soft mud [1]
- lenticels in aerial roots allow oxygen uptake / gas exchange [1]
- because waterlogged mud is anoxic / low in oxygen [1]
- roots exclude salt during water uptake [1]
- salt accumulated in older leaves that are shed [1]
- viviparous seeds / propagules germinate on parent and float to establish in mud [1]
- thick waxy leaves reduce water loss OWTTE [1]
- max 4

5. [5]

- (a) negative correlation / moss cover increases as light intensity decreases [1]
- (a) use of data, e.g. 2% at 12000 lux rising to 38% at 900 lux / change levels off at low light [1]
- (b) soil / air humidity OR soil moisture OR temperature OR soil pH [1]
- (c) correlation does not prove causation [1]
- (c) other variables such as humidity also change with distance / were not controlled [1]
- (c) only one transect / three quadrats per point, so limited replication [1]
- (c) moss may tolerate shade rather than need it / may be outcompeted in bright light OWTTE [1]
- max 5

6. [3]

- for a given temperature and rainfall pattern one natural ecosystem type / biome is likely to develop [1]
- tropical forest where temperature is high all year and rainfall very high [1]
- hot desert where rainfall is very low and daytime temperatures are high [1]
- tundra where temperatures are very low / below 0 °C most of the year and precipitation is low [1]
- accept other correct biome-climate pairs: taiga, temperate forest, grassland [1]
- max 3

7. [7]

- desert plant named, e.g. saguaro cactus / *Carnegiea gigantea* [1]
- leaves reduced to spines reduce surface area for water loss / deter herbivores [1]
- stem stores water / pleated stem swells after rain [1]
- shallow, widespread roots absorb rain quickly [1]
- CAM photosynthesis / stomata open at night, reducing water loss [1]
- desert animal named, e.g. dromedary camel [1]
- body temperature allowed to rise during day, so less water used for sweating [1]
- concentrated urine / dry faeces reduce water loss [1]
- rainforest plant named, e.g. kapok / *Ceiba pentandra* [1]
- tall / emergent trunk reaches light above canopy OR buttress roots support tree in shallow soil [1]
- leaves with drip tips shed rainwater quickly [1]
- rainforest animal named, e.g. spider monkey with prehensile tail for moving in canopy / poison frog with toxins and warning colours [1]
- Note: credit adaptations only when linked to a named species; accept common or scientific names
- max 7