8 Natural selection and biodiversity

Answers to Exam practice questions

1 B [1]

2 A [1]

3 **a)** A description that includes any three of the following:

- Seeds dried;
- Sealed in moisture-proof packaging;
- Kept at −18 °C;
- Tested for germination at intervals;

b) An explanation that includes any three of the following:

- Preserve seeds of endangered plant species;
- Can be used to create new (or maintain) habitats;
- Small numbers of preserved seeds can be planted to produce large numbers of new seeds;
- An efficient way to preserve a large number of samples;

4 **a)**
- Correct substitution for N as 95 × 94;
- Correct substitutions for n: (44 × 45, 40 × 39, 10 × 9);
- Correct final calculation: 8930 ÷ 3630 = 2.46
- Correct answer = 3 marks

e.c.f. [3]

b)
- Species richness is a simple count of how many different species are present;
- The diversity index takes account of the numbers of individuals of each species present;
- Therefore gives a better description of the diversity/a better comparison to other habitats;

Credit comparison of richness (3) with index for m.p. 3. [3]

5 **a)**
- The sanctuary is crossed by rivers, which the orang-utans do not cross;
- This creates small populations with a smaller gene pool/less variation;
- Small populations with small gene pools are unlikely to be able to adapt to future environmental change;
- Therefore more likely to become extinct than larger populations; [4]

b) A discussion which includes the following points.

Ethical:

- The need to respect the rights of orang-utans as intelligent apes (our close relatives);
- The need to conserve biodiversity for future generations;

- The need to respect the rights of other forest dwellers/reference to role of orang-utans in the forest ecosystem.

Economic:

- Orang-utans are part of an important genetic resource;
- Extinction would cause the permanent loss of unique genes;
- Global genetic resources have potential value to genetic engineers/breeding programmes in the future;

Max 3 marks for either ethical or economic, with an overall max of 5 marks [5]

6 a) An explanation that includes any four of the following:

- Nocturnal habit allows it to avoid its main predator;
- Large size allows it to compete successfully with other ground species;
- Varied vegetarian diet takes advantage of the full range of plant food available;
- Ability to climb and walk distances makes wide range of plant food accessible;
- Booming mating call allows it to attract females even in the dark;
- Standing at the sign of danger makes it difficult for any possible predator to find it;

For each mark expect an explanation not just naming the adaptation. [4]

b)

- (Being flightless) they were easily hunted by humans for meat;
- Nests on the ground so cats and rats eat the eggs and chicks;
- Farming destroys available habitats; [3]

c) An explanation that includes any two from the following advantages and drawbacks.

Advantages:

- Removes all major predators therefore allows more successful breeding;
- Increases numbers in one area so increases chances of mating;
- Allows for active conservation/protection over a smaller area;

Drawbacks:

- There is a very small population and a limited gene pool;
- Therefore there is a high chance of inbreeding leading to less variation;
- The small island could lead to increased competition for resources (food, space, nest sites);
- Therefore limiting population growth;

A maximum of 2 marks for each section [4]

Stretch and challenge questions

7 The following is a list of indicative points which may be credited. Not all of the points would be expected but where points are awarded it must be in the context of a sound biological argument, which follows a logical sequence and displays a good understanding of the material.

Agree:

- Advanced agriculture means that large populations can be supplied with food.
- Reference to mechanisation of farming.
- Plant breeding has produced many high yielding crops, e.g. rice, wheat, soya, increasing productivity of limited arable space.
- Modern fertilisers have the same effect.
- Plant breeding and agrochemicals developed to limit crop destruction by pests.
- Advances in medical science combat major selection by diseases, e.g. eradication of major killers such as smallpox, vaccination programmes.
- Building of shelters, homes, heating and other technology to limit selection by environmental factors.
- Medical advances resulting in longer life-span, low infant mortality and increasing population.
- Continuing development of new technologies.

Disagree:

- Large populations still have very limited food supply and famine.
- Advances in farming are slowing.
- GM foods may create new selection pressures.
- Success in dealing with major disease has also revealed new threats, e.g. longer life = higher risk of cancer.
- Advances such as antibiotics now being undermined by resistance, and medical science finding it difficult to keep up.
- Examples such as new viruses (AIDS and Ebola) are very difficult to treat and there is no cure.
- Some viruses, such as common cold, still have no cure.
- Malaria is still a major killer.
- Many advances lead to rapidly increasing populations, which creates increased pressures.
- Large parts of the human population do not have access to new developments, especially medical treatment.

A good answer will consider some pros and cons and will come to a reasoned conclusion.

8 The answer here will very much depend upon the research undertaken. Look for examples of conservation of habitats and species contrasted with demands of leisure and industry – a biological not geographical answer.

Indicative content:

Awareness of the habitats in the National Parks, e.g.

- chalk grassland – South Downs
- peat uplands – NorthYorks, Brecon Beacons, etc.
- limestone flora – Yorkshire Dales
- rocky shores – Pembrokeshire coast

Pressures – industrial:

- limestone quarrying – Peak District
- potash mining – North Yorkshire

Pressures – environmental:

- power lines
- wind farms
- access roads and car parks

Pressures – recreational:

- roads and car parks
- physical damage (e.g. erosion of Pennine Way)
- overcrowding (e.g. tourist spots Lake District)

A discussion of striking a balance between conservation and leisure is best illustrated by some case study. These can be examples of management schemes or even protests and challenges to planning decisions, showing a need for skilful compromises between conflicting demands. For some extended answers a level-based mark scheme could be used to introduce this idea, which is used in some papers. In this case it would take the indicative content and how it has been used as follows.

Level 1 (1–3): Provides little or no reference to a range of ideas relevant to the question. Some argument may be attempted, but fails to link ideas in a sequence in order to support any conclusion.

Level 2 (4–6): Scientific reasoning occasionally supported through the linkage of a range of scientific ideas or argument. The argument is partially developed. Attempts to link together some scientific ideas and shows an understanding of the conflicts.

Level 3 (7–9): Argument is well-developed and logical. Links together information in a logical way to form a clear argument with a conclusion.