

Exercise walk-through

4.3

Ecosystems, populations and succession (statements 5.11–5.15, core practical 11)

Pearson Edexcel · International A-Level · Biology

Energy in, energy through, energy lost

Follow the energy: photosynthesis fixes it, food chains lose it, microbes recycle it, and immunity spends it.

- WBI14 is the first IA2 paper.
- 105 minutes, 90 marks, all compulsory.
- Topics 5 and 6 together on one paper.
- Calculation-heavy after Unit 1.

Selection filters, isolation splits

Directional : one extreme favoured,
the mean shifts - resistance alleles spread

Stabilising : the average favoured, both extremes trimmed

Isolation : barrier (**allopatric**) or behaviour (**sympatric**) stops gene flow

Speciation : diverged populations can no longer interbreed

Check yourself

Your turn

Grassland NPP is 40 000 kJ per square metre per year. At 10% per transfer, what reaches second-order consumers?

- A. 400 kJ - two transfers of 10%
- B. 4 000 kJ - one transfer
- C. 40 kJ - three transfers
- D. 400 000 kJ - the food chain multiplies energy

Exercises 2.1·2.3

2.1 Define the terms community and ecosystem. [2]

2.2 Give one biotic and one abiotic factor that could limit a woodlouse population. [2]

2.3 Name the first organisms that colonise bare ground in succession. [1]

Exercises 2.1·2.3

2.1 Define the terms community and ecosystem. [2]

2.1 Community: all the populations of different species living together in one area.
Ecosystem: the community together with the non-living (abiotic) environment it interacts with.

2.2 Give one biotic and one abiotic factor that could limit a woodlouse population. [2]

2.2 Biotic: predation (e.g. by birds) or competition; abiotic: humidity or temperature.

2.3 Name the first organisms that colonise bare ground in succession. [1]

2.3 Pioneer species.

Exercises 3.1·3.2

3.1 A student samples daisies on a school field with twenty 0.25 m^2 quadrats thrown by hand, finding a mean of 8.4 per quadrat. Describe two weaknesses of this method, how each biases the estimate, and how the student should place quadrats instead. [5]

3.2 The graph of a lynx-hare system shows hare numbers peaking about two years before lynx numbers. Explain the lag between the two peaks, referring to reproduction and starvation. [5]

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3.1 Hand-throwing is not random – throwers tend to aim at daisy patches, overestimating; twenty quadrats is a small sample, so chance swings the mean. Correctly: lay a grid, pick coordinates from a random-number table, place quadrat corners at those points.

3.2 The graph of a lynx-hare system shows hare numbers peaking about two years before lynx numbers. Explain the lag between the two peaks, referring to reproduction and starvation. [5]

3.2 Hares rise when vegetation is plentiful; with abundant prey the lynx population grows through reproduction and survival of young – but that takes a breeding season. More lynx then eat hares faster than they breed, so hares decline; lynx numbers fall later by starvation as their food is gone – hence each lynx peak follows its hare peak.

Exercise 3.3

3.3 A retreating glacier leaves bare rock. Describe the expected succession over 200 years to climax forest, naming the type of organism at each stage and one way each stage changes the conditions for the next. [6]

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3.3 Lichens and mosses colonise first – they weather rock and build the first soil from dead matter; grasses and herbs follow on the thin soil, adding organic matter and holding water; shrubs then small trees shade the pioneers and deepen soil; climax forest establishes once soil and microclimate are stable – each stage's remains and shade enable the next.