

Past-paper walk-through

Energy Flow Through Ecosystems ■ 8.2

eXercise

Questions in this set

- 2017 Q4

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 4

2017 ■ Q4

DIETARY COMPOSITION OF ORGANISMS IN AN AQUATIC ECOSYSTEM

Organism	Food Source (% of diet) — Algae	Food Source (% of diet) — Stoneflies	Food Source (% of diet) — Midges	Food Source (% of diet) — Hellgrammites	Food Source (% of diet) — Caddisflies
Algae					
Stoneflies			90		10
Midges	100				
Hellgrammites		20	10		70
Caddisflies	70		30		

Question 4

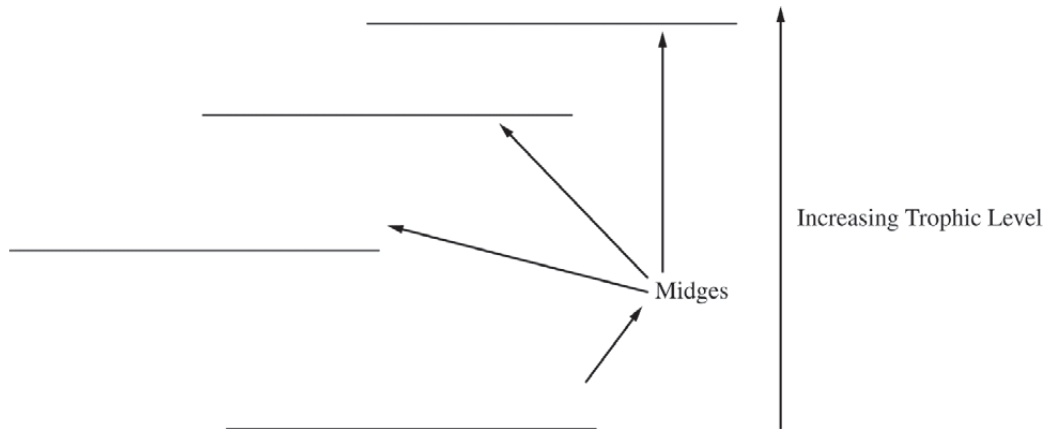
The table above shows how much each organism in an aquatic ecosystem relies on various food sources. The rows represent the organisms in the ecosystem, and the columns represent the food source. The percentages indicate the proportional dietary composition of each organism. High percentages indicate strong dependence of an organism on a food source.

[Figure: A food-web template with blank horizontal lines to be labeled with organism names by the student, arrows already drawn between the (student-labeled) boxes toward a box labeled “Midges,” and a vertical double-headed arrow labeled “Increasing Trophic Level” alongside the template. Three arrows point into “Midges” from three blank labeled lines above/below it, indicating energy flow directions the student must complete by naming the organisms at each blank line.]

Question 4

- (a) Based on the food sources indicated in the data table, **construct** a food web in the template below. Write the organism names on the appropriate lines AND draw the arrows necessary to indicate the energy flow between organisms in the ecosystem.
- (b) In an effort to control the number of midges, an area within the ecosystem was sprayed with the fungus *Metarhizium anisopliae*, which significantly decreased the midge population. Based on the data in the table, **predict** whether the spraying of the fungus will have the greatest short-term impact on the population of the stoneflies, the caddisflies, or the hellgrammites. **Justify** your prediction.

Question 4



Question 4

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Solution 4

(a) Mark scheme

- Food web constructed from the dietary table, with Algae as the producer base and increasing trophic level toward Hellgrammites. Arrows (food source → consumer): Algae → Midges (100% of Midges' diet) and Algae → Caddisflies (70%); Midges → Stoneflies (90%) and Midges → Caddisflies (30%) and Midges → Hellgrammites (10%); Stoneflies → Hellgrammites (20%) and Stoneflies → Caddisflies (10%); Caddisflies → Hellgrammites (70%). Points: (1) all four consumer organisms (Stoneflies, Midges, Hellgrammites, Caddisflies) plus Algae correctly placed on the template; (2) all arrows correctly drawn matching the percentages in the data table.

Solution 4

(b)

Mark scheme

- Prediction (1 point): stoneflies will show the greatest short-term impact.
Justification (1 point): stoneflies have a higher dependence on midges than do hellgrammites and caddisflies — midges make up 90% of the stonefly diet, versus only 30% of the caddisfly diet and 10% of the hellgrammite diet, so a midge population crash from the fungal spray affects stoneflies most.