

# Exercise walk-through

Eutrophication ■ 8.5

eXercise

## You must be able to

- explain the **eutrophication** 富营养化 sequence
- link nutrients to algal blooms and oxygen loss
- describe **hypoxia** 缺氧 / dead zones

## Method — The eutrophication sequence

- 1 **Excess nutrients** (nitrogen, phosphorus) enter water — usually from fertilizer runoff or sewage.
- 2 **Algal bloom** — algae grow explosively, covering the surface.
- 3 Algae **die** and **decompose**.
- 4 **Decomposers use up oxygen**, causing **hypoxia** (low oxygen).
- 5 Fish and other organisms **suffocate** — a **dead zone**.

## Method — The key cause

The nutrients that normally **limit** algal growth (especially phosphorus) become abundant, so algae grow out of control.

## Method — A worked link

Fertilizer runs off a farm into a lake → algal bloom → algae die → decomposers deplete oxygen → fish die.

## Method — Dead zones

Large **dead zones** (e.g. the Gulf of Mexico) form where big rivers deliver farm nutrients to the sea.

## Practice 2.1 ■ 1 mark

What nutrients cause eutrophication?

## Solution 2.1

### Worked steps

Nitrogen and phosphorus **B1**.

## Practice 2.2 ■ 1 mark

What happens to oxygen levels during eutrophication?

## Solution 2.2

Method: The eutrophication sequence

### Worked steps

Oxygen is depleted (hypoxia) **B1**.

## Practice 2.3 ■ 1 mark

What is a dead zone?

## Solution 2.3

Method: The eutrophication sequence

### Worked steps

An area of water with too little oxygen to support most life **B1**.

## Exam-style 3.1 ■ 1 mark

Fish die during eutrophication because decomposition of algae

- A** adds oxygen
- B** uses up the oxygen (causing hypoxia)
- C** removes nutrients
- D** cools the water

## Solution 3.1

Method: The eutrophication sequence

- A adds oxygen
- B uses up the oxygen (causing hypoxia)**
- C removes nutrients
- D cools the water



### Worked steps

**B** — uses up the oxygen (causing hypoxia).

## Exam-style 3.2 ■ 3 marks

Fertilizer runs off farmland into a lake.

- (a) Describe the sequence that leads to fish deaths.
- (b) State one way to prevent this.

## Solution 3.2

Method: A worked link

### Worked steps

(a) Excess nutrients cause an algal bloom; the algae die and decompose; decomposers use up the oxygen, so fish suffocate **M1 M1 A1**. (b) Any one: buffer strips, reduced fertilizer, better sewage treatment **B1**.

## Exam-style 3.3 ■ 2 marks

Explain why adding phosphorus in particular can trigger a bloom.

## Solution 3.3

Method: The eutrophication sequence

### Worked steps

Phosphorus is usually the limiting nutrient, so adding it removes the limit and lets algae grow explosively **M1** **A1**.