

Exercise walk-through

Sewage Treatment ■ 8.11

eXercise

You must be able to

- describe **primary** 一级, **secondary** 二级, and **tertiary** 三级 treatment
- state what each stage removes
- explain why treatment protects water

Method — The stages

- **Primary — physical** removal: screening and settling out solids (sludge).
- **Secondary — biological**: bacteria break down dissolved organic matter (reducing oxygen demand).
- **Tertiary — advanced**: removes remaining nutrients (nitrogen, phosphorus) and disinfects (often with chlorine or UV).

Method — Why treat sewage

Untreated sewage adds **nutrients** (eutrophication), **pathogens** (disease), and **oxygen-demanding** organic matter to water. Treatment removes these before release.

Method — A worked order

Sewage first settles (primary), then bacteria digest the organics (secondary), then nutrients are removed and the water is disinfected (tertiary) before discharge.

Method — Sludge

The settled **sludge** is treated separately (digested), and can be used as fertilizer or disposed of.

Practice 2.1 ■ 1 mark

What does primary treatment remove?

Solution 2.1

Worked steps

Solids (by settling/screening) **B1**.

Practice 2.2 ■ 1 mark

What does secondary treatment use to break down organic matter?

Solution 2.2

Method: The stages

Worked steps

Bacteria (biological breakdown) **B1**.

Practice 2.3 ■ 1 mark

What does tertiary treatment remove?

Solution 2.3

Worked steps

Nutrients (nitrogen, phosphorus) and pathogens (disinfection) **B1**.

Exam-style 3.1 ■ 1 mark

Bacteria are used to break down dissolved organic matter in

- A** primary treatment
- B** secondary treatment
- C** tertiary treatment
- D** no treatment

Solution 3.1

Method: The stages

- A primary treatment
- B secondary treatment**
- C tertiary treatment
- D no treatment



Worked steps

B — secondary treatment.

Exam-style 3.2 ■ 3 marks

A treatment plant processes sewage before releasing water to a river.

- (a) Name the three treatment stages in order.
- (b) Explain why releasing untreated sewage would harm the river.

Solution 3.2

Method: Why treat sewage

Worked steps

(a) Primary, secondary, tertiary **B1 B1 B1**. (b) Untreated sewage adds nutrients (eutrophication), pathogens (disease), and oxygen-demanding matter, harming aquatic life and human health **M1 A1**.

Exam-style 3.3 ■ 2 marks

Explain why tertiary treatment is important for preventing eutrophication.

Solution 3.3

Method: Why treat sewage

Worked steps

Tertiary treatment removes the nitrogen and phosphorus that would otherwise fertilize algae, preventing algal blooms and eutrophication downstream [M1](#) [A1](#).