AP ENVIRONMENTAL SCIENCE • EXERCISE SHEET

8.11 Sewage Treatment

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

Objective

Build the skills to answer exam questions on **sewage treatment**.

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

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

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).

Why treat sewage

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

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.

Sludge

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

2 Practice

Now apply the methods above.

2.1 What does primary treatment remove? [1]

2.2 What does secondary treatment use to break down organic matter? [1]

2.3 What does tertiary treatment remove? [1]

3 Exam-style questions

3.1 Bacteria are used to break down dissolved organic matter in [1]

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

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

(a) Name the three treatment stages in order. [3]

(b) Explain why releasing untreated sewage would harm the river. [2]

3.3 Explain why tertiary treatment is important for preventing eutrophication. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **8.11 Sewage Treatment** lesson on the **Learn** page;
- read the **Sewage Treatment** section of the AP Environmental Science handout on the **Know** page.

Solutions

2.1 Solids (by settling/screening).

2.2 Bacteria (biological breakdown).

2.3 Nutrients (nitrogen, phosphorus) and pathogens (disinfection).

3.1 B —secondary treatment.

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

3.3 Tertiary treatment removes the nitrogen and phosphorus that would otherwise fertilize algae, preventing algal blooms and eutrophication downstream.