

4.2 Soil Formation and Erosion

Name: _____ Class: _____ Date: _____

Total: 10 marks

Objective

Build the skills to answer exam questions on **soil formation and erosion**.

You must be able to:

- describe how **weathering** 风化 and decomposition form soil
- identify **soil horizons** 土壤层 (O, A, B, C)
- explain causes and effects of **erosion** 侵蚀

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.

■ How soil forms

Soil forms slowly as rock is broken by **weathering** (physical and chemical) and mixed with **organic matter** from decomposed organisms. It takes hundreds of years to form a few centimeters.

■ Soil horizons

A soil profile has layers (**horizons**):

- **O** —organic litter on top.
- **A** —topsoil, rich in humus (most fertile).
- **B** —subsoil, accumulated minerals.
- **C** —weathered parent rock.

■ Erosion

Erosion is the removal of topsoil by **water and wind**, worsened by removing plant cover (deforestation, overgrazing, plowing). It removes the fertile **A horizon**.

■ Effects

Erosion reduces fertility, lowers crop yields, and washes sediment (and nutrients) into waterways, causing pollution and sedimentation.

2 Practice

Now apply the methods above.

2.1 What two processes form soil from rock? [2]

2.2 Which soil horizon is the fertile topsoil? [1]

2.3 Name one human activity that increases erosion. [1]

3 Exam-style questions

3.1 Soil erosion is most damaging because it removes the [1]

- **A** C horizon (parent rock)
- **B** fertile A horizon (topsoil)
- **C** bedrock
- **D** groundwater

3.2 A farmer plows a sloped field and removes all vegetation.

(a) Explain why this increases erosion. [2]

(b) State one effect of the eroded soil on a nearby river. [1]

3.3 Explain why soil is considered a slowly renewable (nearly non-renewable) resource. [2]

4 Go further

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

- work through the **4.2 Soil Formation and Erosion** lesson on the **Learn** page;
- read the **Soil Formation and Erosion** section of the AP Environmental Science handout on the **Know** page.

Solutions

2.1 Weathering (of rock) and decomposition (of organic matter).

2.2 The A horizon (topsoil).

2.3 Any one: deforestation, overgrazing, plowing.

3.1 B —the fertile A horizon (topsoil).

3.2 (a) Removing plant cover exposes the soil, and roots no longer hold it; on a slope, water washes the loose topsoil away. (b) Sediment (and nutrients) enter the river, causing sedimentation or eutrophication.

3.3 Soil forms extremely slowly (hundreds of years for a few cm), so once eroded it cannot be replaced within a human lifetime.