Exercise walk-through

Soil Formation and Erosion ▪ 4.2

eXercise

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**

Method — 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.

Method — 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.

Method — 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**.

Method — Effects

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

Practice 2.1 ▪ 2 marks

What two processes form soil from rock?

Solution 2.1

Method: How soil forms

Worked steps

Weathering (of rock) and decomposition (of organic matter) B1 B1.

Practice 2.2 ▪ 1 mark

Which soil horizon is the fertile topsoil?

Solution 2.2

Worked steps

The A horizon (topsoil) B1.

Practice 2.3 ▪ 1 mark

Name one human activity that increases erosion.

Solution 2.3

Worked steps

Any one: deforestation, overgrazing, plowing B1.

Exam-style 3.1 ▪ 1 mark

Soil erosion is most damaging because it removes the

A C horizon (parent rock)

B fertile A horizon (topsoil)

C bedrock

D groundwater

Solution 3.1

A C horizon (parent rock)

B fertile A horizon (topsoil) ✓

C bedrock

D groundwater

Worked steps

B — the fertile A horizon (topsoil).

Exam-style 3.2 ▪ 2 marks

A farmer plows a sloped field and removes all vegetation.
(a) Explain why this increases erosion.
(b) State one effect of the eroded soil on a nearby river.

Solution 3.2

Method: Erosion

Worked steps

(a) Removing plant cover exposes the soil, and roots no longer hold it; on a slope, water washes the loose topsoil away M1 A1. (b) Sediment (and nutrients) enter the river, causing sedimentation or eutrophication B1.

Exam-style 3.3 ▪ 2 marks

Explain why soil is considered a slowly renewable (nearly non-renewable) resource.

Solution 3.3

Method: How soil forms

Worked steps

Soil forms extremely slowly (hundreds of years for a few cm), so once eroded it cannot be replaced within a human lifetime M1 A1.