

Exercise walk-through

Soil Composition and Properties ■ 4.3

eXercise

You must be able to

- classify soil by **texture** 质地 (sand, silt, clay) using the soil triangle idea
- link texture to **water-holding** and drainage
- describe **porosity** 孔隙度 and **permeability** 渗透性

Method — Soil particle sizes

Soil texture depends on particle size: **sand** (largest), **silt** (medium), **clay** (smallest).
Loam is a balanced mix and is best for most crops.

Method — Texture and water

- **Sandy** soil — large pores, drains fast, holds little water.
- **Clay** soil — tiny pores, drains slowly, holds much water but can waterlog.
- **Loam** — good balance of drainage and water retention.

Method — Porosity and permeability

- **Porosity** — the fraction of pore (empty) space; how much water it can hold.
- **Permeability** — how easily water flows through; high in sand, low in clay.

Method — A worked reasoning

A sandy soil drains quickly and dries out fast (high permeability, low water retention), so it needs more frequent watering.

Practice 2.1 ■ 1 mark

Which soil particle is the largest?

Solution 2.1

Method: Soil particle sizes

Worked steps

Sand **B1**.

Practice 2.2 ■ 1 mark

Which soil type holds the most water?

Solution 2.2

Method: Texture and water

Worked steps

Clay **B1**.

Practice 2.3 ■ 1 mark

What is porosity?

Solution 2.3

Worked steps

The fraction of empty (pore) space in the soil **B1**.

Exam-style 3.1 ■ 1 mark

Sandy soil drains quickly because it has

- A** small pores and low permeability
- B** large pores and high permeability
- C** no pores
- D** high water retention

Solution 3.1

Method: A worked reasoning

A small pores and low permeability

B large pores and high permeability 

C no pores

D high water retention

Worked steps

B — large pores and high permeability.

Exam-style 3.2 ■ 2 marks

A gardener compares sandy soil and clay soil.

- (a) State which drains faster and which holds more water.
- (b) Explain why loam is often best for crops.

Solution 3.2

Method: Texture and water

Worked steps

(a) Sandy soil drains faster; clay holds more water **B1 B1**. (b) Loam balances drainage and water retention (and holds nutrients), so roots get enough water and air without waterlogging **M1 A1**.

Exam-style 3.3 ■ 2 marks

Explain the difference between porosity and permeability.

Solution 3.3

Method: Porosity and permeability

Worked steps

Porosity is how much empty space (water capacity) the soil has; permeability is how easily water flows through it **M1** **A1**.