

4.3 Soil Composition and Properties

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

KEY WORDS permeability 渗透性 • porosity 孔隙度 • texture 质地 • soil 土壤

Objective

Build the skills to answer exam questions on **soil composition and properties**.

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

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.

■ 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.

■ 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.

■ 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.

■ A worked reasoning

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

2 Practice

Now apply the methods above.

2.1 Which soil particle is the largest? [1]

2.2 Which soil type holds the most water? [1]

2.3 What is porosity? [1]

3 Exam-style questions

3.1 Sandy soil drains quickly because it has [1]

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

3.2 A gardener compares sandy soil and clay soil.

(a) State which drains faster and which holds more water. [2]

(b) Explain why loam is often best for crops. [2]

3.3 Explain the difference between porosity and permeability. [2]