

5.13 Methods to Reduce Urban Runoff

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

KEY WORDS permeable pavement 透水路面 • green roofs 绿色屋顶 • rain gardens 雨水花园
• impervious surfaces 不透水面

Objective

Build the skills to answer exam questions on **methods to reduce urban runoff**.

You must be able to:

- describe green infrastructure (**permeable pavement** 透水路面, **rain gardens** 雨水花园, green roofs)
- explain how each reduces runoff and pollution
- link solutions to the problem of impervious surfaces

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 problem

Cities' **impervious surfaces** cause heavy runoff that floods and carries pollutants to waterways. Solutions let water **soak in** instead.

■ Green infrastructure

- **Permeable pavement** — lets water pass through into the ground.
- **Rain gardens** — planted depressions that collect and absorb runoff.
- **Green roofs** — vegetation on roofs that absorbs rain and cools buildings.
- **Retention/detention ponds** — hold runoff and release it slowly.

■ How they help

They increase **infiltration**, reduce peak runoff (less flooding), and filter pollutants before water reaches rivers.

■ A worked link

A rain garden collects roof runoff, letting it soak into the soil where plants and soil filter out pollutants — reducing both flooding and water pollution.

2 Practice

Now apply the methods above.

2.1 How does permeable pavement reduce runoff? [1]

2.2 What is a rain garden? [1]

2.3 State one benefit of a green roof. [1]

3 Exam-style questions

3.1 Permeable pavement reduces flooding by allowing water to [1]

- | | |
|---|---|
| A | B |
| C | D |
- A run off faster
B soak into the ground
C evaporate instantly
D freeze

3.2 A city installs rain gardens and permeable pavement.

(a) Explain how these reduce runoff and pollution. [3]

(b) State the underlying problem they address. [1]

3.3 Explain how green roofs reduce both runoff and the urban heat island effect. [2]