

11.7 Kirchhoff’s Junction Rule

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

KEY WORDS kirchhoff’s junction rule 基尔霍夫电流定律 • conservation of charge 电荷守恒

Objective

Build the skills to answer exam questions on **Kirchhoff’s junction rule**.

You must be able to:

- state **Kirchhoff’s junction rule** 基尔霍夫电流定律: the current into a junction equals the current out
- explain the junction rule as a statement of **conservation of charge** 电荷守恒
- apply it with the loop rule to find unknown currents

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ The junction rule

At any junction, $\sum I_{in} = \sum I_{out}$: charge is not created or destroyed, so what flows in must flow out.

■ Why it holds

Charge is conserved, and it cannot pile up at a point, so the currents must balance.

■ Example

If 5.0 A enters a junction and splits into two branches carrying 2.0 A and I , then $I = 3.0$ A.

2 Practice

2.1 State Kirchhoff’s junction rule. [1]

2.2 State the conservation law that the junction rule expresses. [1]

2.3 At a junction, 4.0 A enters and one branch carries 1.5 A out. Find the current in the other branch. [2]

3 Exam-style questions

3.1 Kirchhoff’s junction rule states that the current into a junction equals the current [1]

- | | |
|---|---|
| A | B |
| C | D |
- A stored there
 - B out of it
 - C squared
 - D halved

3.2 The junction rule is a statement of conservation of [1]

- | | |
|---|---|
| A | B |
| C | D |
- A energy
 - B charge
 - C momentum
 - D power

3.3 At a node, 6.0 A enters and two branches leave; one carries 2.5 A.

(a) Find the current in the other branch. [2]

(b) State the conservation law you used. [1]