

11.4 Electric Power

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

KEY WORDS joule heating 焦耳热 • electric power 电功率 • resistance 电阻

Objective

Build the skills to answer exam questions on **electric power**.

You must be able to:

- define **electric power** 电功率 as $P = IV$
- express the power in a resistor as $P = I^2 R = \frac{V^2}{R}$
- describe **Joule heating** 焦耳热 (electrical energy to thermal energy)
- find the total energy delivered, $E = Pt$

1 Worked examples

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

■ Power

$P = IV$, in watts. For a resistor, using $V = IR$:

$$P = I^2 R = \frac{V^2}{R}.$$

■ Joule heating

A resistor turns electrical energy into **thermal energy** at rate $I^2 R$.

■ Energy

$E = Pt$ over a time interval.

2 Practice

2.1 A device draws 2.5 A at 12 V. Find the power. [2]

2.2 A $10\ \Omega$ resistor carries 3.0 A. Find the power dissipated. [2]

2.3 A 100 W device runs for 5.0 minutes. Find the energy it uses. [2]

3 Exam-style questions

3.1 The power dissipated in a resistor is [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** $I^2 R$
B IR^2
C I/R
D I^2/R

3.2 Joule heating converts electrical energy into [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** light
B thermal energy
C sound
D chemical energy

3.3 A resistor dissipates 48 W while carrying 4.0 A.

(a) Find its resistance. [2]

(b) Find the voltage across it. [1]