

11.4 Electric Power

Name: _____ Class: _____ Date: _____

Total: 12 marks

Objective

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

You must be able to:

- calculate **electric power** 电功率 delivered to a device, $P = IV$
- rewrite power for a resistor as $P = I^2 R = \frac{V^2}{R}$
- relate power to the **energy** transferred over time, $E = Pt$

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 $V = IR$ gives two more forms:

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

■ Energy

$E = Pt$ —power multiplied by time.

■ Example

A device drawing 2.0 A at 12 V: $P = 24$ W.

2 Practice

2.1 A device draws 3.0 A at 12 V. Find the power. [2]

2.2 A $6.0\ \Omega$ resistor carries 2.0 A. Find the power dissipated. [2]

2.3 A 60 W bulb runs for 120 s. Find the energy transferred. [2]

3 Exam-style questions

3.1 Electric power is [1]

- **A** IV
 - **B** I/V
 - **C** V/I
 - **D** IR
-

3.2 The power dissipated in a resistor can be written as [1]

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

3.3 A 240 V heater has a resistance of $60\ \Omega$.

(a) Find the current it draws. [2]

(b) Find the power it dissipates. [2]

4 Go further

- work through the **11.4 Electric Power** lesson on the **Learn** page;
- read the **Electric Circuits** section of the AP Physics 2 handout on the **Know** page.

Solutions

2.1 $P = IV = 3.0 \times 12 = 36 \text{ W}.$

2.2 $P = I^2 R = (2.0)^2 \times 6.0 = 24 \text{ W}.$

2.3 $E = Pt = 60 \times 120 = 7200 \text{ J}.$

3.1 A.

3.2 B.

3.3 (a) $I = \frac{V}{R} = \frac{240}{60} = 4.0 \text{ A}.$ (b) $P = IV = 4.0 \times 240 = 960 \text{ W}.$