AP PHYSICS 2 • EXERCISE SHEET

11.1 Electric Current

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

KEY WORDS conventional current 常规电流 • electric current 电流 • amperes 安培

Objective

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

You must be able to:

- define **electric current** 电流 as the rate of flow of charge, $I = \dfrac{\Delta q}{\Delta t}$
- describe current as the drift of charge carriers through a conductor
- distinguish **conventional current** 常规电流 from electron flow

1 Worked examples

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

■ Current

$I = \dfrac{\Delta q}{\Delta t}$, measured in amperes (1 A = 1 C s^{-1}).

■ Drift of carriers

In a metal, current is the slow drift of free electrons pushed by the field.

■ Conventional current

Conventional current is the direction **positive** charge would flow — opposite to the actual electron flow.

■ Example

6.0 C passing in 2.0 s: $I = 3.0$ A.

2 Practice

2.1 A charge of 12 C flows past a point in 4.0 s. Find the current. [2]

2.2 State the direction of conventional current relative to the electron flow. [1]

2.3 A current of 0.50 A flows for 10 s. Find the charge that passes. [2]

3 Exam-style questions

3.1 Electric current is the rate of flow of [1]

A B
C D

A energy
B charge
C mass
D voltage

3.2 Conventional current is defined as the direction of flow of [1]

A B
C D

A electrons
B positive charge
C neutrons
D photons

3.3 A wire carries a current of 2.0 A.

(a) Find the charge that passes in 30 s. [2]

(b) Find the number of electrons this represents ($e = 1.6 \times 10^{-19}$ C). [2]