

# 3 Hardware – Part 1

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

## Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

| English           | 中文      | Write it 3 times (English) |
|-------------------|---------|----------------------------|
| processor         | 处理器     | _____                      |
| primary memory    | 主存储器    | _____                      |
| secondary storage | 辅助存储器   | _____                      |
| RAM               | 随机存取存储器 | _____                      |
| volatile          | 易失性     | _____                      |
| ROM               | 只读存储器   | _____                      |
| non-volatile      | 非易失性    | _____                      |
| logic gate        | 逻辑门     | _____                      |
| truth table       | 真值表     | _____                      |

## Recall

At IGCSE you named the parts of a computer. Bring this with you:

- A computer has input devices, output devices and storage.
- The **processor** 处理器 (CPU) does the work.

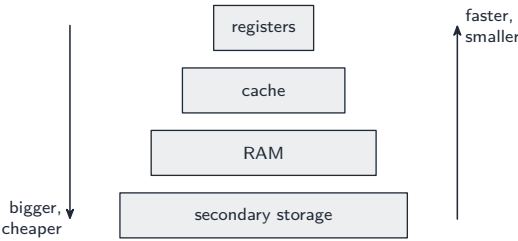
At AS we look more closely at memory and at logic gates — the tiny switches every chip is built from.

## New ideas

Read these first. Each idea has a short worked example. Then do the Practice.

### ■ 1 Primary and secondary storage

- **primary memory** 主存储器 is the fast memory the processor uses directly while running.
- **secondary storage** 辅助存储器 (hard disk, solid-state drive) keeps data long-term, even when the power is off.



*Worked example.* When you open a game it is copied from the SSD (secondary) into RAM (primary) so the processor can reach it quickly; closing it frees the RAM, but the game still sits on the SSD.

### ■ 2 RAM and ROM

- **RAM** 随机存取存储器 holds the programs and data in use; it is **volatile** 易失性 — its contents are lost when the power goes off.
- **ROM** 只读存储器 stores fixed start-up instructions; it is **non-volatile** 非易失性 — kept without power.

**RAM**  
volatile — lost at power off  
read *and* write  
holds running programs & data

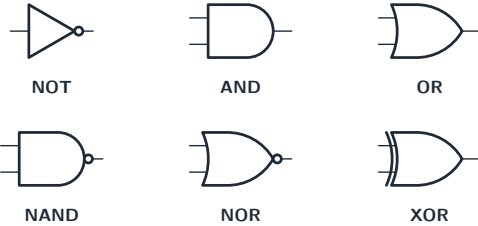
**ROM**  
non-volatile — kept at power off  
read-only  
holds start-up instructions

*Worked example.* Switching the computer off erases whatever was in RAM (so unsaved work is lost), but the start-up code in ROM is still there next time you turn it on.

**Watch out:** “memory” usually means RAM (primary), *not* the hard disk. A file “in memory” is being used now; a file “in storage” is saved for later.

### ■ 3 Logic gates

A **logic gate** 逻辑门 takes 1s and 0s in and gives a 1 or 0 out. The basic gates are AND, OR and NOT. A **truth table** 真值表 lists the output for every input.



For a 2-input AND gate, the output is 1 only when both inputs are 1:

| A | B | A AND B |
|---|---|---------|
| 0 | 0 | 0       |
| 0 | 1 | 0       |
| 1 | 0 | 0       |
| 1 | 1 | 1       |

*Worked example.* For this AND gate with  $A = 1$  and  $B = 0$ : the inputs are not *both* 1, so the output is 0.

### Practice

**3.1** Give one example of a secondary storage device. [1]

**3.2** A NOT gate has input 1. State its output. [1]

**3.3** State one difference between primary memory and secondary storage. [2]

**3.4** State whether RAM or ROM is volatile, and what “volatile” means. [2]

**3.5** Write the truth table for a 2-input **OR** gate. [2]

**3.6** Explain *why* a computer needs both RAM and a hard disk, rather than just one of them. [2]

**3.7 Challenge.** Write the truth table for the expression NOT (A AND B). [3]