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.

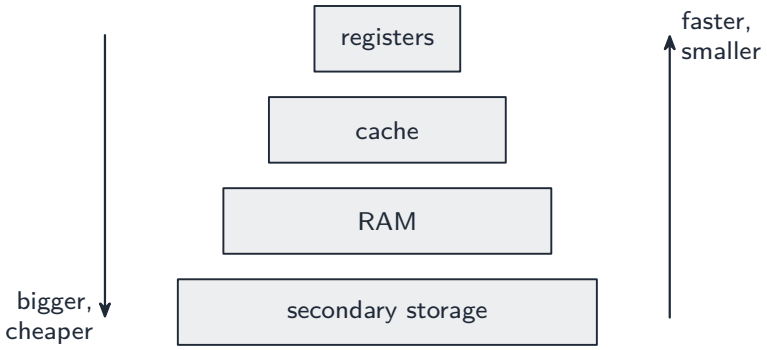
At AS we look more closely at memory and at logic gates — the tiny switches every chip is built from.

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.

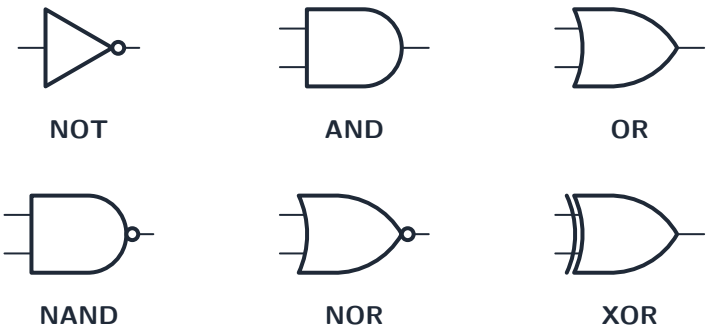
RAM	ROM
volatile — lost at power off	non-volatile — kept at power off
read *and* write	read-only
holds running programs & data	holds start-up instructions

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]