

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.

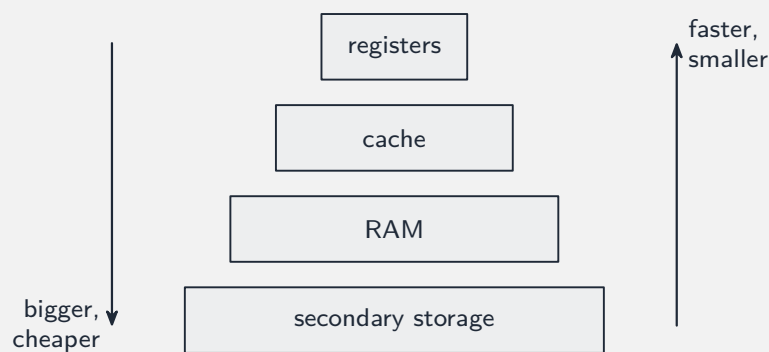
At AS we look more closely at memory and at logic gates —the tiny switches every chip is built from.

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.



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.



NOT



AND



OR



NAND



NOR



XOR

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]