3 Hardware – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	**Write it 3 times** (English)		
processor			
primary memory			
secondary storage			
RAM			
volatile			
ROM			
non-volatile			
logic gate			
truth table			

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** (CPU) does the work.

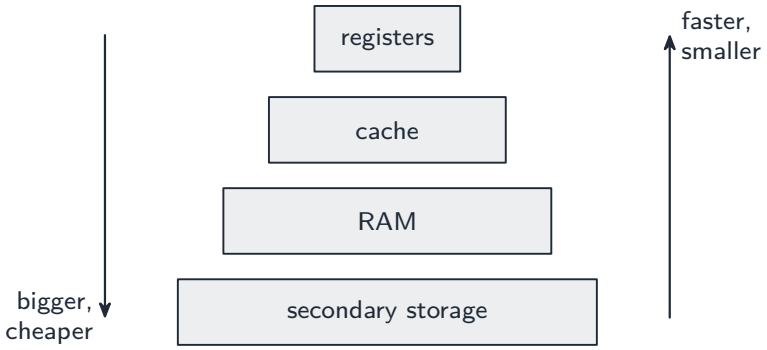
At AS we look more closely at memory and at logic gates – the tiny switches every chip is built from.

New ideas

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

1 Primary and secondary storage

- **primary memory** is the fast memory the processor uses directly while running.
- **secondary storage** (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** holds the programs and data in use; it is **volatile** – its contents are lost when the power goes off.
- **ROM** stores fixed start-up instructions; it is **non-volatile** – kept without power.

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

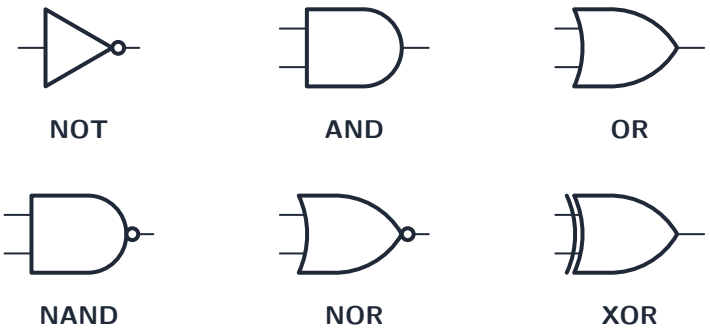
ROM
non-volatile — kept at power off
read-only
holds start-up instructions

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** takes 1s and 0s in and gives a 1 or 0 out. The basic gates are AND, OR and NOT. A **truth table** 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]