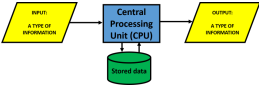





Y7—Hardware

Important ideas

	All computers have the same basic structure. They have a CPU , input and output devices and some kind of storage. This is called the Von Neumann model .
	The Central Processing Unit (CPU) is made up of logic gates that can perform Boolean operations (eg adding). The CPU follows the instructions contained in a program.
	Peripherals that convert information (from the environment) and send it TO a CPU are called INPUT devices.
	Peripherals that convert information (from the CPU) and send it OUT of the computer are called OUTPUT devices.

Important vocabulary

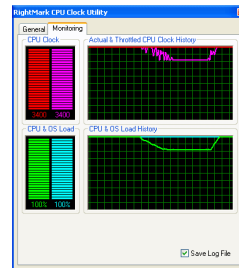
Central Processing Unit (CPU)	Where the processing happens in a computer. This is an Integrated Circuit (IC) that contains logic gates.
ROM	Read Only Memory
RAM	Random Access Memory
HDD	Hard Disc Drive
Bit	Binary Digit (1 piece of data)
Byte	8 bits make a byte

Quick recall facts

There are lots of different types of peripheral devices. They can be **INPUT**, **OUTPUT** or **HYBRID (BOTH)** devices.

INPUT	HYBRID	OUTPUT
mouse	Touch-screen	printer
keyboard	modem	speaker
webcam	controller	screen

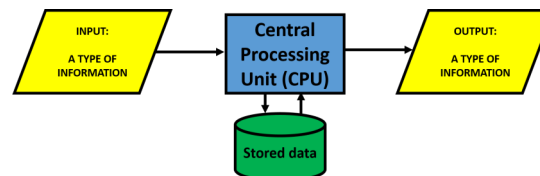
CPUs have different features. You can measure CPU performance by comparing these features.



- **Clock speed.** CPUs do a series of operations every cycle. The more cycles it can do in a certain time (speed) the faster the processing is (in GHz)
- **Bit size.** CPUs will be able to process a certain amount of data every cycle. The higher the bits (it can process in a cycle) the more processing happens eg 16 bit, 32 bit, 64 bit and 128 bit.
- **Cores.** Some ICs are made up of multiple CPUs (4 cores = 4 CPUs)
- **Bus.** This is the number and type of connections in and out of the CPU. The bigger the better.
- **Cache.** This is short term (RAM) memory attached to the CPU. The more the better.

How it connects...

The Von Neumann model of a computer shows how INPUT devices send digital (**binary**) data to the CPU. The CPU processes the data (following the program instructions given to it) and then there is an OUTPUT or STORAGE. The instructions are **algorithms** that use **Boolean Logic**.



Important examples

INPUT and OUTPUT devices in retail



Point of Sale (PoS) systems are used in retail. They consist of a till (a computer) and INPUT and OUTPUT devices. Keyboards, mouse, barcode scanner, debit card reader are INPUT devices. The screen and receipt printer are OUTPUT devices.

Modern CPUs



The best CPU at the moment is the Intel Core-i9 9900K. It has 8 cores, is a 64 bit processor, each core has a clock speed of 3.6GHz which can be raised to 5.0GHz when needed (overclocking). It has a cache of 16Mb. The core i9 has a 16 lane bus. It is a fast processor but it uses a lot of energy. It is not good for battery life!

I must be able to...

Explain the Von Neumann model of a computer

- The CPU is the most important part of a computer. The CPU processes INPUTs and then either stores the result or OUTPUTs it.
- All modern computers fit the Von Neumann model.

Identify INPUT devices

- Keyboard, mouse, camera, optical drive (DVD), microphone, touch pad, motion sensor (accelerometer) and scanner are INPUT devices
- A touchscreen is a HYBRID.

Identify OUTPUT devices

- Printer, speakers, screen, projector and vibration motor are OUTPUT devices.
- **A power supply is not a peripheral. It just supplies electrons for the system.**