Tiverton High School Year 8 **Computing** **Autumn Term** Knowledge Organiser

Parts of a Computer System (Unit 8-1)

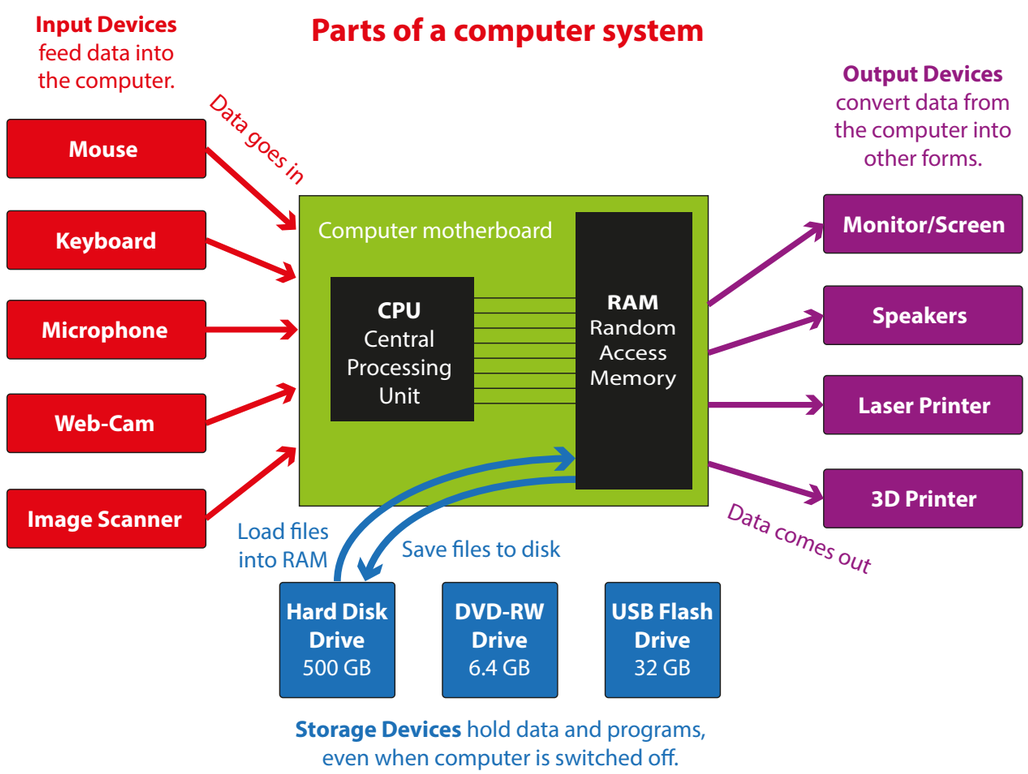
A **computer** is an **electronic device** that follows a **stored program of instructions**.
The **program** of instructions tell it **how** to process data and how to make things happen e.g. activate outputs.
A **computer system** is a **collection** of parts that **work together** to perform a task – comprised of **hardware** and **software**.

Input Devices transfer data **into** the computer processor.
Examples: **QWERTY keyboard**, **mouse**, **microphone**, **web-cam**, **image scanner**, **accelerometer**, **fingerprint sensor**.

Output Devices transfer data **out** of the computer for people to use.
Examples: **Screen/monitor**, **laser printer**, **audio speakers**, **3D printer**, **robot-arm**, **LED display**, **laser cutter**.

Storage Devices store data for **long term** or **while the computer is switched off**.
Examples: **Hard-disk drive**, **solid-state drive**, **optical drive**, **USB Flash-drive**, **magnetic tape drive**.

Parts of a computer system



Computers in Control (Unit 8-2)

An **embedded system** is a dedicated single-purpose computer that is **built into some other electronic device**.
The embedded computer **controls** the operation of that device.

Examples of embedded systems include **microwave ovens**, **burglar alarms**, **digital TV receiver boxes**, **GPS sat-nav systems**.

Embedded systems usually contain a cheap, simple **microcontroller** chip. They have less RAM and a simpler CPU than a PC.

File Types and Compression (Unit 8-4)

A **file** is a **persistant** store of data that is held on a **secondary storage device** e.g. on a hard-disk drive.

Data and files can be **compressed** (to **reduce** the amount of data held) so they can be sent and received faster over networks.

mp3, **mp4**, **jpg** use **LOSSY compression** because **some of the original data is lost when compressing - it cannot be retrieved**.

A **character** is a **symbol** that can be stored inside the computer system using a special number called a **character code**.
The full collection of ALL of the characters that a computer can represent/store is called a **character set**.

ASCII is the **American Standard Code for Information Interchange**. It can be used for writing in the English language.
Plain ASCII text is often stored using **7 bits per character.**

A better version of ASCII is **Extended ASCII**. This can be used for writing in English, French, German, Spanish or Italian.
Extended ASCII contains more characters than original ASCII, but uses **8 bits** (1 byte) to store each different character code.

Unicode is a better character set. It can represent **any** language in the world, including Russian and Chinese, not just English.
Unicode can use up to **32 bits** for each character code. This means the text takes up more storage space in the computer.
Emoji pictures are character symbols from the Unicode character set. ASCII and Extended-ASCII do not contain any emojis.

1 bit (a **binary digit**, this can be either **0** or **1** value).

A bit is the smallest amount that a computer can store.
It uses an **ON** or **OFF** voltage in a circuit.

8-bit binary means a pattern of **8 binary-digits**.

8-bits allow **256 possible combinations** between **00000000** and **11111111**.

This is why 8 bits can represent between **0** and **255** in base ten.

1 byte	=	**8 bits** (an ASCII character takes 1 byte)
1 kilobyte	=	**1000 bytes**
1 megabyte	=	**1000 kilobytes** (or 1000 x 1000 bytes)
1 gigabyte	=	**1000 megabytes** (or 1000 x 1000 x 1000 bytes)
1 terabyte	=	**1000 gigabytes** (or 1000 x 1000 x 1000 x 1000 bytes)

Binary means base-2
Computers use binary to store all data.

Denary means base-10
People usually use denary in everyday life.

Converting Binary (base two) to Denary (base ten)

128	64	32	16	8	4	2	1
0	**1**	**0**	**0**	**1**	**0**	**1**	**0**

(**1** x 64) + (**1** x 8) + (**1** x 2) = **74** in base ten

Parts Inside a Computer (Unit 8-1)

Hardware means the **physical components, devices and circuitry** of the computer system.

A computer has a **processor** inside it.
Another name for it is the **Central Processing Unit** (**CPU**).
The processor **executes** each instruction to carry out a program.

Processor speed is measured in **Hertz** (**Hz**)... cycles per second.

1 Hz (**Hertz**)	=	1 clock cycle per second (very slow!)
1 MHz (**Mega-Hertz**)	=	1 **million** clock cycles per second.
1 GHz (**Giga-Hertz**)	=	1 **billion** clock cycles per second.

RAM stands for **Random Access Memory**.
RAM is a kind of memory storage inside the computer.

RAM is used to hold the program of instructions that the CPU needs to carry out. It also holds data that the program is using.
RAM is **volatile - all data is lost when the power is turned off**.
We "load" programs and data from disk into RAM, ready to use them.

Software (Unit 8-3)

Software means the **programs** that it uses.

Without software, the hardware would be useless, it would not have any instructions to follow.

A **program** is **a set of instructions that tells the computer what to do**.

Operating systems and **utilities** are examples of **systems software**.

Without an operating system, a modern computer would be too difficult to use.

General purpose **applications** include **Word Processors**, **Spreadsheets**, **Graphics Packages**.

Software uilities include **anti-virus** tools, **firewalls**, **file compression** utilities and **disk management** tools.