

Year 9 Understanding Computers Knowledge Organiser

Binary Addition

The Rules of Binary Addition

Work Right to Left and apply these simple rules:

1. $0 + 0 = 0$
2. $0 + 1 = 1$
3. $1 + 0 = 1$
4. $1 + 1 = 0$ Carry 1
5. $1 + 1 + 1 = 1$ Carry 1

$$\begin{array}{r}
 1110 \\
 + 1100 \\
 \hline
 = 11010
 \end{array}
 \begin{array}{l}
 14 \\
 12 \\
 26
 \end{array}$$

Carry Bit
Rule 5
Rule 4
Rule 2 or 3
Rule 1

Hardware

Computer hardware refers to the **physical parts of a computer and related devices.**

Internal hardware devices include motherboards, hard drives, and RAM.

Computer Components

Motherboard



Hard Disk Drive

CPU (Central Processing Unit)



Fan



PSU (Power Supply Unit)



RAM (Random Access Memory)



Types of Computer Storage

Storage is a **mechanism that enables a computer to retain data**, either temporarily or permanently. **Storage** is among the key components of a computer system and can be classified into several forms, although the types we cover are:

Internal Storage:

Most often refers to a **computer's internal** hard drive. This is the primary storage device used to store a user's files and applications. The computer's internal memory, **RAM (Random Access Memory)** and **ROM (Read Only Memory)** is also classed as internal storage.



External Storage:

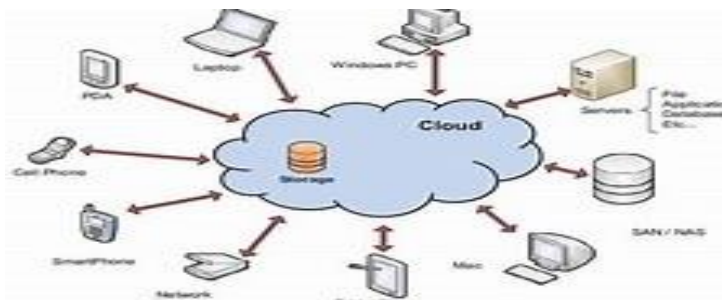
Commonly referred to as an external drive, external storage is storage that's not part of the internal parts of a computer. These drives often connect to the computer using a connection, such as USB (Universal Serial Bus).



Common types of external storage are **Flash Drives (USB Sticks)** and **DVDs**.

Cloud Storage

Cloud storage is a cloud computing model in which data is stored on remote servers accessed from the internet, or "cloud".



Software

Computer software refers to the programs and other operating information used by a computer.

The main piece of software on a computer is the

Operating System

The part of the operating system we see on screen is known as the User Interface.

- Graphical User Interface (GUI).
The most popular type of system. They combine menu driven interfaces with icons.
- Command Line Interface (CLI).
Users need to learn the commands to make it work.
- Menu Driven Interface.
A list of options organised under various headings or menus

Most used Operating Systems (OS)

- Microsoft – Windows
- Apple – iOS
- Google - Android



Windows



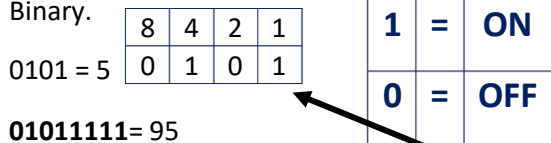
Apple™



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Binary (Base 2)

The only thing that computers understand is Binary.



128	64	32	16	8	4	2	1	Odd numbers
0	1	0	1	1	1	1	1	

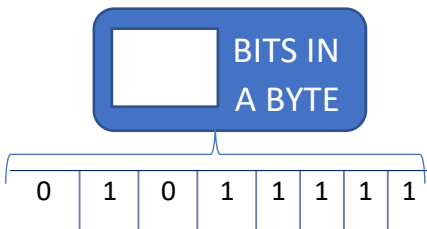
Convert these binary numbers into denary:

1) 1010		6) 1011	
2) 1010		7) 0001	
3) 0110		8) 1011	
4) 0111		9) 1001	
5) 0100		10) 0011	

Convert these denary numbers into binary (4 bits):

11) 14		16) 6	
12) 2		17) 11	
13) 10		18) 15	
14) 4		19) 2	
15) 3		20) 12	

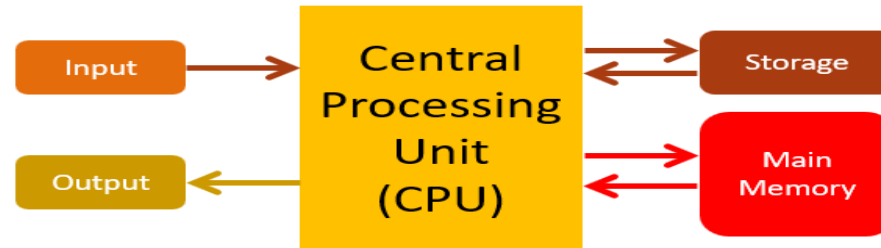
The ones and zeros in binary represent 'bits'. Each '1' or '0' is one 'bit'.



Computer System

A basic, **complete**, and **functional** computer. It will include all the **hardware** and **software** required to make it functional.

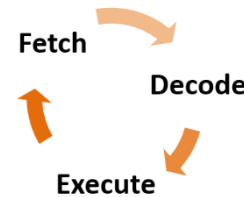
Components of a Computer



Fetch – Decode – Execute Cycle

Computer has a list of instructions in memory to carry out.

- CPU **Fetches** top instruction from the list
- Instructions is passed to **Decoder** to **interpret**
- **Decoder** passes on the instruction
- Instruction is **Executed** or carried out
- CPU **Fetches** top instruction from the list...



Processor Speed

The most common measure of **CPU** speed is the **clock speed**, which is measured in **MHz** or **GHz**. The higher the **clock speed**, the more operations the **CPU** can **execute per second**.

- One cycle per second = **1 Hertz (Hz)** = 1 instruction carried out each second
- **1 KiloHertz (KHz)** = **1024** cycles per second
- **1 Megahertz (MHz)** = **1,048,576** cycles per second
- **1 Gigahertz (GHz)** = **1,073,741,824** cycles per second (Approximately 1 Billion!)

How fast is your computer's processor?

RAM vs ROM

RAM is alternatively referred to as main memory, **RAM** is **volatile** and allows information to be stored and retrieved on a computer. When opened programs are stored in **RAM**.

ROM is a type of **non-volatile** memory. **ROM** contains **BIOS**, which allows the computer system to start-up.

ASCII

The **ASCII** character set is a **7-bit** set of codes that allows 128 different characters. That is enough for every upper-case letter, lower-case letter, digit, and punctuation mark on most keyboards. **ASCII** is only used for the English language.

Extended ASCII

Extended ASCII code is an **8-bit** character set that represents **256** different characters, making it possible to use characters such as é or ©. Extended ASCII is useful for European languages.

Decimal	Binary	Character
96	01000000	'
97	01000001	a
98	01000010	b