RAM	ROM
1. Temporary Storage.	1. Permanent storage.
2. Store data in MBs.	2. Store data in GBs.
3. Volatile.	3. Non-volatile.
4. Used in normal operations.	4. Used for startup process of computer.
5. Writing data is faster.	5. Writing data is slower.

RAM

Program data & instructions

Secondary Storage e.g. HDD SDD

Virtual memory
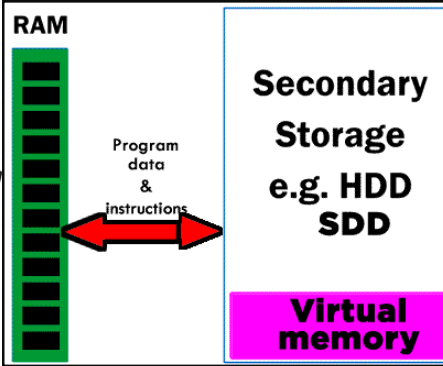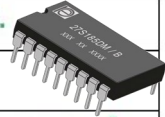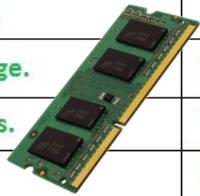
OPTICAL	A laser light creates marks in a pattern on the disk. A laser light detects where the marks are and translates this into a readable format.
SOLID STATE	This is made of microchips (switches) The state of the switches determine if a 1, or 0 is stored.
MAGNETIC	Read/write move across the medium and change how magnetised that part of the medium is. E.g. one level of magnetism will be a 1, a second will be a 0

Lossless Compression

Original — Compressed — Original

Lossy Compression

Original — Compressed — Original

Characteristics of secondary storage
- Cost
- Durability
- Capacity
- Physical Size
- Reliability
- Portability
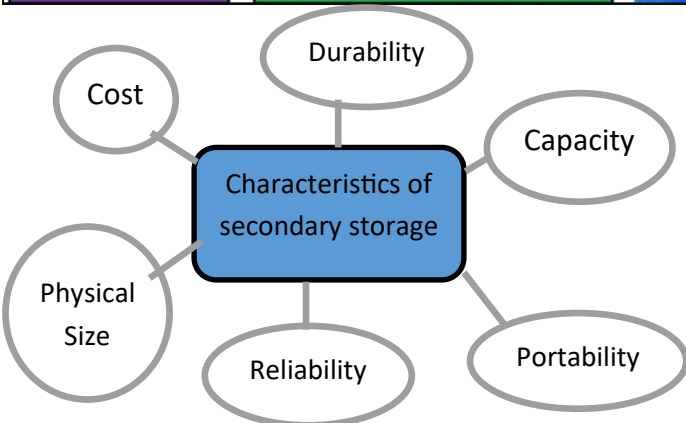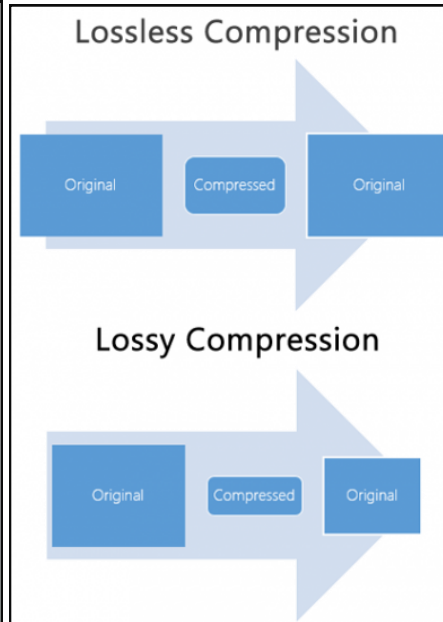
Primary memory	**Secondary Storage**
Directly accessed by the CPU with fast access speeds	Does not work directly with the CPU with slower access speeds.
Small in capacity and used for processing data	Large in capacity and used for storing data permanently.

Primary Storage	Volatile memory used to store currently used data and instructions.
RAM - Random access memory.	This is volatile memory that is constantly being written to and read from. It does not retain its contents without a constant supply of power. When a computer is turned off, everything stored in its RAM is lost.
ROM - Read only memory.	This is non-volatile memory or storage containing data that cannot be changed.
Virtual Memory	A section of a secondary storage which is temporarily used as RAM, when RAM is full.
Secondary Storage	Non-volatile memory used for long-term storage of programs and data.
Optical Storage	Storing and reading data from a disc using a laser. Examples include CD, DVD, Blu-ray.
Magnetic Storage	Storing and reading data from a hard drive disc using magnetism.
Solid State Storage	Storing and reading data using electricity
Capacity	The maximum amount of data that a device can contain.
Compression	A method of reducing file sizes, particularly in digital media such as photos, audio and video.
Lossy Compression	A form of compression that reduces digital file sizes by removing data.
Lossless Compression	A form of compression that encodes digital files without losing detail. Files can also be restored to their uncompressed quality.

Computer Systems | Data and Maths

Binary Conversion

The number 42 in binary:

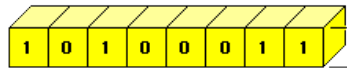| 128	64	32	16	8	4	2	1
0	0	1	0	1	0	1	0

Place a 1 in the columns that's are needed in order to make the number you are wanting.

E.g. 32 + 8 + 2 = 42

8-bit or 256 color displays

Pixels on the computer screen

Each screen pixel is represented by eight bits of memory.

| 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |

256 colors (Color Look Up Table)
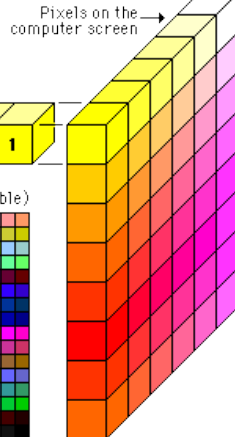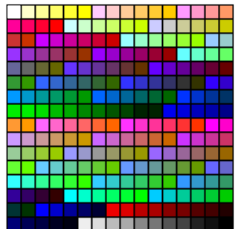
Binary Addition

Start at the right hand side of any addition and follow the rules. Here is 7+6 in binary. Note the carries go above the column to the left.

+	=
0+0	0
0+1	1
1+1	0 carry 1
1+1+1	1 carry 1

	1	1		
0	1	1	1	
0	1	1	0	
1	1	0	1	

Hexadecimal conversion

The hexadecimal number system is 0-9 then A-F (A represents 10)
Carry out a binary conversion then split the number into 2 nibbles. Then convert the two separate values into hexadecimal.
The denary number 42 in Hexadecimal is 2A

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

8	4	2	1	8	4	2	1
0	0	1	0	1	0	1	0
In hex 2 is 2				In hex 10 is A			

Increasing Sample Rates

Analog Wave / Digital Result

Samples taken at these points

Samples

A. =

Time →

B. =

C. =

Binary shift to multiply

128	64	32	16	8	4	2	1

Binary digit removed

| 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |

Denary value before shift = 20

| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |

Denary value after shift = 40

Add a 0 to the empty place value holder
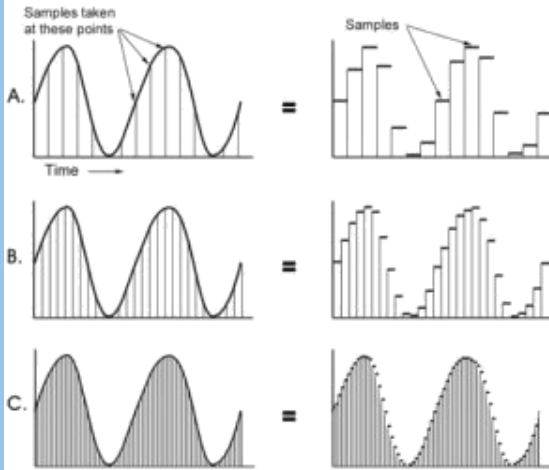
ASCII - 128 characters represented—everything on the keyboard. English characters (upper and lower case), numbers and symbols

Unicode - Represents all the characters used in all languages—lot more space needed to store each individual character with a unique binary value

Denary/ Decimal	The number system most commonly used by people. It contains 10 unique digits 0 to 9. Also known as decimal or base 10.
Binary	A number system that contains two symbols, 0 and 1. Also known as base 2.
Hexadecimal	A number system using 16 symbols from 0-9 and A-F, also known as base 16 and hex.
Binary Shift	Multiply a binary number by shifting digits to left. Divide by shifting to the right. Fill gaps with zeros.
Character set	A table of data that links a character to a number. This allows the computer system to convert text into binary. Examples are ASCII and Unicode.
Pixel	Picture element - a single dot of colour in a digital bitmap image or on a computer screen.
Metadata	Data about data, e g photo image files have data about where the photo was taken and which camera took the picture.
Colour Depth	The amount of bits available for colours in an image.
Resolution	The fineness of detail that can be seen in an image - the higher the resolution of an image, the more detail it holds. In computing terms, resolution is measured in dots per inch (dpi).
Sample rate	How many samples of data are taken per second. This is normally measured in hertz, eg an audio file usually uses samples of 44.1 kHz (44,100 audio samples per second).
Bit depth	The number of bits available to store an audio sample.
Duration	Length of a file in terms of time. (minutes and seconds)