GCSE COMPUTING MEMORY AND STORAGE **KNOWLEDGE ORGANISER** -PRIMARY STORAGE is used to store programs 1.2.1 PRIMARY STORAGE (MEMORY) and data currently used by the computer. When a user needs to run a program, it is loaded from disk to

primary storage.

available memory.

The need for primary storage The difference between RAM and ROM The purpose of RAM in a computer system The purpose of ROM in a computer system Virtual memory



1.2.2 SECONDARY STORAGE)

This shows speed vs capacity of

primary/secondary storage

The need for secondary storage Common types of storage:

- Optical
- Magnetic
- Solid state

Optical Storage includes CD, DVD and Blu-ray. Data is written to optical storage media using a laser. The capacity of this type of media ranges from 640

megabytes (CD) to 50 gigabytes (Blu-ray)

Since it involves the use of moving parts, access/data transfer speeds are slower than for other types of media.

Examples - CD, DVD, Blu-ray

- Solid state media is also known as electrical or flash storage.
- Solid state has the fastest transfer speed out of all the three types of media, since it features no moving parts
 - This also makes it more robust than other forms of storage and in addition they consume less power However this form of storage offers lower capacity

ิก Ci Micro 6468 than other forms of media and is still comparatively

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when the device is powered off) -ROM or Read Only Memory is non-volatile (i.e. any data stored in RAM is not lost when the device is powered off) - it is stored permanently. -ROM can be used to store the BIOS (i.e. the program that boots up and loads the Operating System when the computer turned on)

-Another term for primary storage is RAM or Random Access Memory. It is given this name

because data can be stored anywhere within the

-RAM is volatile (i.e. any data stored in RAM is lost

- VIRTUAL MEMORY is used when the computer is short of RAM. This involves the hard disk being used as memory instead of RAM.
- This is not ideal as the speed of a hard disk is MUCH slower then RAM.





This means that they have comparatively slow data read and write speeds and can be prone to damage.

Examples – hard drive, magnetic tape, external hard drive

Criteria for choosing secondary storage	Criteria	Meaning
	Cost	How much does it cost per GB of storage?
	Capacity	How much space is there to store files?
	Speed	How fast can it read / write data?
	Portability	Can it be carried easily or is it a device that is hard or impractical to carry/move?
	Durability	How robust is it? Will it break or damage easily?
	Reliability	How likely to fail is it? How long will it

last?

Examples – Solid State Drive, flash drive, SD Card _____

1.2.3 UNITS

expensive.

The units of data storage:

- Bit
- Nibble (4 bits)
- Byte (8 bits)
- Kilobyte (1,000 bytes or 1KB)
- Megabyte (1,000 KB)
- Gigabyte (1,000 MB)
- Terabyte (1,000 GB)
- Petabyte (1,000 TB)

How data needs to be converted into a binary format to be processed by a computer Data capacity and calculation of data capacity requirements

Computers are electrical devices; their components are made up of millions of circuits. Each circuit contains switches which can be Either 'on' or 'off'. These can be represented by the values 1 and 0. This is called binary.

REVISION NOTE

When recommending a method of secondary storage, always consider the context in which the data will be used

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ALL data is stored and processed in binary form - this includes text, images, sound and video.



1.2.4 DATA STORAGE

Numbers

- How to convert positive denary whole numbers to binary numbers (up to and including 8 bits) and vice -versa
- How to add two binary integers together (up to and including 8 buts) and explain overflow errors which may occur
- How to convert positive denary whole numbers into 2digit hexadecimal numbers and vice versa
- How to convert binary integers to their hexadecimal equivalents and vice versa
- Binary shifts

Characters

- □ The use of binary codes to represent characters
- □ The term 'character set'
- The relationship between the number of bits per character in a character set, and the number of characters which can be represented, e.g.:
 - ASCII
 - Unicode

Every character (letters, numbers, symbols) sent to the computer or typed in, is stored as 7-bit binary code. For example, if the user types in the message below, **H** is represented by the number '072'. This character set is called **ASCII**



UNICODE uses 16 bits to allow an even wider range of characters to be stored, including one used for foreign languages:

Images

- How an image is represented as a series of pixels, is represented in binary
- Metadata
- □ The effect of colour depth and resolution on:
 - The quality of the image
 - The size of a sound file

Sound

- □ How sound can be sampled and stored in binary form
- □ The effect of sample rate, duration and bit depth on;
 - The playback quality
 - The size of a sound file

Sound waves are **ANALOGUE** and must be converted in to **DIGITAL** (0's and 1's) in order to be stored/ processed by computer. This is called **SAMPLING**.

-The height of a sound wave is its **AMPLITUDE**.

-The SAMPLE RATE is the number of

- samples captured per second.
- -SAMPLE RESOLUTION is the number of bits used to capture the sound

1.2.5 COMPRESSION

The need for compression

- The need for compression
- Types of compression;
 - Lossy
 - Lossless



expense of quality

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no loss of quality

(.BMP)

(FLAC)