

Topic 1: Data Representation

Keyword sheet - Cambridge IGCSE Computer Science 0984. Tick each term once you can define it from memory.

Keyword	Definition	Know it?
Binary	Base-2 number system using only the digits 0 and 1; the form in which all data is stored and processed by a computer.	
Denary	Base-10 number system using the digits 0-9. Also called decimal.	
Hexadecimal	Base-16 number system (0-9, A-F). One hex digit represents four bits, making it a compact, less error-prone way to write binary values such as MAC addresses and colour codes.	
Bit / nibble / byte	A bit is one binary digit; a nibble is 4 bits; a byte is 8 bits.	
Binary addition	Adding binary numbers column by column using the rules $0+0=0$, $0+1=1$, $1+1=10$ (carry 1), $1+1+1=11$.	
Overflow error	Occurs when the result of a calculation is too large to be stored in the available number of bits.	
Logical shift	Moving every bit left or right by a set number of places, filling vacated places with 0. A left shift multiplies by 2 per place; a right shift divides by 2 (bits can be lost).	
Two's complement	Method of representing negative integers in which the most significant bit has a negative place value. Negate by inverting all bits and adding 1.	
Character set	The set of characters a system can represent, each assigned a unique binary code.	
ASCII	Character set using 7 bits (128 characters) or 8 bits in extended form; limited mainly to English characters.	
Unicode	Character set using up to 32 bits per character, covering almost all world languages, symbols and emojis; backwards compatible with ASCII.	
Sample rate	Number of sound samples taken per second (Hz). A higher rate gives a more accurate recording and a larger file.	
Sample resolution	Number of bits used to store each sound sample. A higher resolution gives a more accurate recording and a larger file.	
Pixel	The smallest controllable element of a bitmap image, stored as a binary colour value.	
Resolution (image)	Number of pixels in an image, usually given as width x height. A higher resolution gives greater detail and a larger file.	
Colour depth	Number of bits used to represent the colour of each pixel; n bits gives 2^n possible colours.	
Metadata	Data about data, e.g. image width, height and colour depth, stored with a file so it can be interpreted.	
Image file size	Calculated as width x height x colour depth (in bits); divide by 8 for bytes.	
Sound file size	Calculated as sample rate x sample resolution x length in seconds (in bits).	

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Kibibyte (KiB)	1024 bytes. Larger units: mebibyte (MiB), gibibyte (GiB), tebibyte (TiB), each 1024 times the previous unit.	
Data compression	Reducing the size of a file to save storage space and reduce transmission time.	
Lossy compression	Permanently removes some data to reduce file size, so the original cannot be restored; e.g. JPEG, MP3.	
Lossless compression	Reduces file size without losing any data, so the original can be restored exactly; e.g. run-length encoding, PNG, ZIP.	
Run-length encoding (RLE)	Lossless method that stores consecutive identical values as a count and a value, e.g. AAAABBB becomes 4A3B.	