Definitions and Concepts for AQA Computer Science GCSE

Topic 3: Fundamentals of data representation

Decimal (Base 10): A number base using ten unique digits (0-9).

Binary (Base 2): A number base using two unique digits (0 and 1), which computers use to represent all data and instructions.

Hexadecimal (Base 16): A number base using sixteen unique symbols (0-9 and A-F), often used by programmers for its compact representation of binary data.

Bit: The fundamental unit of information, representing either a 0 or a 1.

Nibble: A group of 4 bits or half a byte

Byte: A group of 8 bits.

Kilo (kB): A decimal prefix representing 1,000 bytes.

Mega (MB): A decimal prefix representing 1,000 kilobytes (1,000,000 bytes).

Giga (GB): A decimal prefix representing 1,000 megabytes (1,000,000,000 bytes).

Tera (TB): A decimal prefix representing 1,000 gigabytes (1,000,000,000,000 bytes).

Binary Shift (Logical): An operation that moves all bits in a binary number a specified number of positions to the left or right, effectively multiplying or dividing by powers of 2.

Character Set: A defined list of characters that a computer can recognise and use, each mapped to a unique numerical code.

7-bit ASCII: An early character encoding method that uses 7 bits to represent 128 characters, primarily used for English text.

Unicode: A character encoding standard designed to represent text in all of the world's languages, including non-English alphabets.

Pixel: Short for "picture element," a single point in an image.

Image Size: The dimensions of a bitmap image, measured in pixels (width x height).

Colour Depth: The number of bits used to represent the colour of each pixel in an image.

Bitmap: A digital image representation where the image is made up of a grid of individual pixels, each with a specified colour.

Analogue Sound: Sound that is continuous and varying in amplitude and frequency, found in the real world.

Sample (Sound): A measure of the amplitude of an analogue sound wave taken at a specific point in time during the digital conversion process.

Sampling Rate: The number of samples taken per second when converting analogue sound to digital, measured in hertz (Hz).

Sample Resolution: The number of bits used to store the amplitude of each sample when converting analogue sound to digital.

Data Compression: The process of encoding information using fewer bits than the original representation, to save storage space or reduce transmission time.

Huffman Coding: A variable-length encoding data compression algorithm that assigns shorter codes to more frequent characters and longer codes to less frequent ones.

Run Length Encoding (RLE): A form of data compression that reduces the physical size of a repeating string of characters, by storing the character and the number of times it repeats.

Image Representation: Using pixels, resolution, and colour depth to store images.

Sound Representation: Using sample rate and bit depth to digitally store audio.