AQA Computer Science A-Level

4.5.3 Units of information

Concise Notes

Specification:

4.5.3.1 Bits and bytes:

Know that:

- the bit is the fundamental unit of information
- a byte is a group of 8 bits

Know that the 2^n different values can be represented with n bits.

4.5.3.2 Units:

Know that quantities of bytes can be described using binary prefixes representing powers of 2 or using decimal prefixes representing powers of 10, eg one kibibyte is written as 1KiB = 2^{10} B and one kilobyte is written as 1kB = 10^3 B.

Know the names, symbols and corresponding powers of 2 for the binary prefixes:

- kibi, Ki - 2^{10}
- mebi, Mi - 2^{20}
- gibi, Gi - 2^{30}
- tebi, Ti - 2^{40}

Know the names, symbols and corresponding powers of 10 for the decimal prefixes:

- kilo, k - 10^3
- mega, M - 10^6
- giga, G - 10^9
- tera, T - 10^{12}

Bits and bytes

- A bit is the fundamental unit of information
- A bit can only take two values, 1 and 0
- The value of a bit can be represented by a computer using high or low current
- 8 bits is called a byte
- 4 bits is called a nybble
- Bits are notated with a lowercase b
- Bytes use an uppercase B
- If more bits are assigned to a number, a greater number of values can be represented
- 2^n different values can be represented with n bits

Units

- Quantities of bytes can be described using binary prefixes or decimal prefixes
- Binary prefixes go up in powers of two
- Decimal prefixes go up in powers of ten
- Binary prefixes and decimal prefixes have similar orders of magnitude

Binary		Decimal	
Prefix	**Value**	**Prefix**	**Value**
Kibi (Ki)	2^{10} $= 1024$	Kilo (K)	10^3 $= 1000$
Mebi (Mi)	2^{20} $= 1048576$	Mega (M)	10^6 $= 1000000$
Gibi (Gi)	2^{30} $= 1073741824$	Giga (G)	10^9 $= 1000000000$
Tebi (Ti)	2^{40} $\approx 1.0995 \times 10^{12}$	Tera (T)	10^{12} $= 1 \times 10^{12}$