



4.5.3 Units of Information

Bits and Bytes

A **bit** is a binary digit, either the value 0 or 1.

It is the fundamental building block for computers, which can only understand states such as on or off, true or false, and a charge or no charge.

Bits are often organised into groups of 8 bits called a **byte**, and less often into groups of 4 bits called a **nibble**.

Byte	Nibble
01101001	0110

Combinations of bits can be used to represent many things, such as characters and numbers.

Given **n** bits, the number of possible values they can represent is 2^n .

3 bits can be arranged in $2^3 = 8$ different ways:

000	010	100	110
001	011	101	111





Quantities of Bytes

A quantity of bytes can be described using prefixes.

There are two common ways to describe quantities of bytes: **base 2** and **base 10**.

Base 2 uses powers of 2 and is preferred in computer science because it reflects binary multiples used in computer memory.

Base 10 uses powers of 10 and is commonly used in storage device marketing and everyday file size descriptions.

Base 2

Name	Symbol	Power	No. of Bytes
Kibibyte	Ki	2^{10}	1,024
Mebibyte	Mi	2^{20}	1,048,576
Gibibyte	Gi	2^{30}	1,073,741,824
Tebibyte	Ti	2^{40}	1,099,511,627,776

Base 10

Name	Symbol	Power	No. of Bytes
Kilobyte	K or k	10^3	1,000
Megabyte	M	10^6	1,000,000
Gigabyte	G	10^9	1,000,000,000
Terabyte	T	10^{12}	1,000,000,000,000

