

## Bits

**Definition:** 1 bit is the smallest divisible amount of digital data. One bit will be either represented by a 0 or 1 in binary: on or off.

**Abbreviation:** b

## Bytes

**Definition:** 8 bits of data form one byte. Bytes are the most commonly referred to unit in digital storage.

**Abbreviation:** B

## SI Prefixes

**Definition:** The SI (from the French **S**tandard **I**nternational) units are prefixes which multiply the value of bits or bytes. It is a base 10 system.

**Abbreviations:**

Kilo	K	$10^3$	Thousand	1,000
Mega	M	$10^6$	Million	1,000,000
Giga	G	$10^9$	Billion	1,000,000,000
Tera	T	$10^{12}$	Trillion	1,000,000,000,000
Peta	P	$10^{15}$	Quadrillion	1,000,000,000,000,000
Exa	E	$10^{18}$	Quintillion	1,000,000,000,000,000,000

## Base 2 Prefixes

**Definition:** These prefixes are used almost exclusively in computer science to account for the fact that computers inherently work on a base 2 system rather than a base 10 system.

**Abbreviations:**

Kibi	Ki	$2^{10}$	1024
Mebi	Mi	$2^{20}$	1,048,576
Gibi	Gi	$2^{30}$	1,073,741,824
Tebi	Ti	$2^{40}$	1,099,511,627,776
Pebi	Pi	$2^{50}$	1,125,899,906,842,624
Exbi	Exi	$2^{60}$	1,152,921,504,606,846,976

## Working with Units

It is relatively simple to combine the prefixes with bits or bytes if you remember the scales. Let's consider a few examples:

1KB = 1 kilobyte

1Kb = 1 kilobit

1Mb = 1 megabit

1KiB = 1 Kibibyte

1Tib = 1 Tebibit

When working with the commonly used SI prefixes, each "step up" is 1000 times larger than the previous one:

1000B = 1KB

1000KB = 1MB

1000MB = 1GB...

It is common to use **bits** when referring to networking applications, while most other uses will normally be presented in **bytes**. For example:

Network adapters are commonly 100 Mb/s (100 megab**its** per second)

Hard drive capacities now reach up to 2 TB (2 terab**ytes**)

Converting from bits to bytes is equally simple; all you need to know is how to divide by 8:

Uncapped, ADSL can reach up to 8 Mb/s (8 megab**its** per second)

This is equivalent to 1 MB/s (1 megab**yte** per second as there are 8 bits per byte)

Another case where proper usage of terms can be confusing is with HDD capacities; the reason that your 1 terabyte hard drive does not format to a full 1000 gigabytes is because they are rated using the SI base 10 system, while computers actually work on a base 2 system. For example, see the conversion done in [Wolfram|Alpha](#).

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