Metric Measurements

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1 Powers of Tens

In this course, we will expect you to do simple calculations involving the various units. To do this, you need to commit to memory the first four or five lines of the following table:

Prefix	Negative Exponent	Prefix	Positive Exponent	Popular
milli	10^{-3}	Kilo	10^3	Thousand
micro	10^{-6}	Mega	10^6	Million
nano	10^{-9}	Giga	10^9	Billion
pico	10^{-12}	Tera	10^{12}	Trillion
femto	10^{-15}	Peta	10^{15}	Quadrillion
atto	10^{-18}	Exa	10^{18}	Quintillion
zepto	10^{-21}	Zetta	10^{21}	sextillion
yocto	10^{-24}	Yotta	10^{24}	septillion

Note that the capitalization or non-capitalization of the prefixes is deliberate.

In measuring computer memory capacities, we slightly modify the meaning of the prefixes. Thus 10^{3k} is interpreted as 2^{10k}. Thus, one megabyte (MB) is really 2^{30} and not 10^9 bytes. Obviously, this applies only for Positive Exponents ($k \geq 1$).

To gain an intuitive sense of these scales, consider the following typical examples:

A micron is 10^{-6} meters (one thousandth of millimeter). This is at the level of cells and organelles in biology. Computer circuits have feature sizes at this level.

Current technology in small-scale engineering involves features in the order of 10^{-9} meters or nanometers. Hence "nanotechnology" is the current buzz word.

A special length measurement is **angstroms**. This is 10^{-10} meters, which is the wavelength of X-rays. Visible light has wavelength from 4000 to 8000 angstroms.