

The metric units for all quantities use the same prefixes. One thousandth of a gram is a milligram, and one thousand grams is a kilogram. To use SI units effectively, it is important to know the meanings of the prefixes in Table 2-1.

Table 2-1

Prefixes Used with SI Units			
Prefix	Symbol	Fractions	Example
pico	p	1/1 000 000 000 000 or 10^{-12}	picometer (pm)
nano	n	1/1 000 000 000 or 10^{-9}	nanometer (nm)
micro	μ	1/1 000 000 or 10^{-6}	microgram (μ g)
milli	m	1/1 000 or 10^{-3}	milligram (mg)
centi	c	1/100 or 10^{-2}	centimeter (cm)
deci	d	1/10 or 10^{-1}	decimeter (dm)
Multiples			
tera	T	1 000 000 000 000 or 10^{12}	terameter (Tm)
giga	G	1 000 000 000 or 10^9	gigameter (Gm)
mega	M	1 000 000 or 10^6	megagram (Mg)
kilo	k	1000 or 10^3	kilometer (km)
hecto	h	100 or 10^2	hectometer (hm)
deka	da	10 or 10^1	dekagram (dag)

Example Problem

Conversion Between Units

What is the equivalent of 500 millimeters in meters?

Solution: From Table 2-1, we see the conversion factor is

$$1 \text{ millimeter} = 1 \times 10^{-3} \text{ meter}$$

Therefore,

$$(500 \text{ mm}) \frac{(1 \times 10^{-3} \text{ m})}{1 \text{ mm}} = 500 \times 10^{-3} \text{ m} = 5 \times 10^{-1} \text{ m}$$

Quantities to be added or subtracted must have the same exponents.

Practice Problems

- Convert each of the following length measurements to its equivalent in meters.
 - 1.1 cm
 - 76.2 pm
 - 2.1 km
 - 0.123 Mm
- Convert each of these mass measurements to its equivalent in kilograms.
 - 147 g
 - 11 μ g
 - 7.23 Mg
 - 478 mg

Arithmetic Operations in Scientific Notation

Suppose you need to add or subtract measurements expressed in scientific notation. If the numbers have the same exponent, simply add or subtract the values of M and keep the same n .

POCKET LAB

PAPER BLOCK

Look closely at the markings on a cm scale. Would you guess that a single sheet of paper has a volume of more or less than 1.0 cm^3 ? Estimate the volume of a single sheet of paper to one significant digit. Record your estimate in correct scientific notation. Use the cm scale to measure the volume of a sheet of paper. (Hint: Measure the thickness of 10 or 20 sheets.) Record your measured value. Compare the measured value to your estimate.