right click to open a **new tab** for *certain words* in red to learn something new!

3.4 Unit Prefixes

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Similar to scientific notation, unit prefixes make very large and very small number easier to manipulate and to understand.Converting numbers from one metric prefix to another is a common task in many areas of science. For example, a lab may stock a 10 gram per liter (g/l) solution of glucose, while a particular procedure may require a 100 µg/l of glucose solution. In order to perform the procedure, a technician needs to know what the concentration* of the stock solution is in µg/l. *If they don't get it right, people die, this is very common actually (especially for heart, insulin, and blood thinners, so watch out)*!

Converting between metric prefixes is also necessary when the information available to solve a problem is not in the units needed for the answer. This is quite common.

Power of 10	Prefix	Symbol
10^{-18}	atto	a
10^{-15}	femto	f
10^{-12}	pico	p
10^{-9}	nano	n
10^{-6}	micro	µ
10^{-3}	milli	m
10^{-2}	centi	c
10^{-1}	deci	d

10^0	(base unit)	
10^1	deka	da
10^2	hecto	h
10^3	kilo	k
10^6	mega	M
10^9	giga	G
10^{12}	tera	T
10^{15}	peta	P
10^{18}	exa	E

For example:

We know that sound travels in air at a speed of 346 m/s, can we figure out how long will it take the sound of an explosion to be heard 1 km away? We can, but to do so we need to be able to convert between meters and kilometers. The following table above shows the relationship between the prefixes. The 10^3 next to the *kilo* prefix means that a number with the kilo prefix is 1000 times greater than the same number in the base unit.

In the case of the speed of sound question, this means that the 1 km needs to be multiplied by 1000 to be converted to m:

$$1 \text{ km} \times (1000 \text{ m} / 1 \text{ km}) = 1000 \text{ m}$$

Now that the distance is in the same units as speed, we can use the fact that time = distance ÷ speed to calculate the answer. So we find that, the sound of an explosion can be heard 1 km away 2.9 seconds after it happens.

$$1000 \text{ m} / 346 \text{ m/s} = 2.9 \text{ s}$$