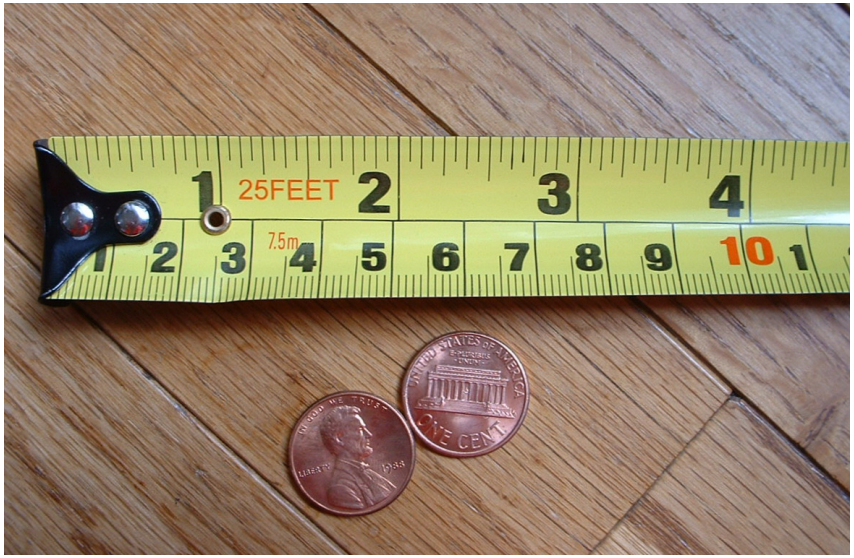
Measurements



- Measurements are information that *represent* quantities. A **quantity** is something that has size, magnitude, or amount.
- Example: 1 teaspoon

The teaspoon is a unit of measurement, the volume is the quantity. The entire statement is the measurement.

Le Systeme International d'Unites (SI)

- Adopted in 1960 by the General Conference on Weights and Measures.
- Now used and agreed upon by scientists around the world.

- This is basically what we call the "metric" system

SI system

- Has 7 “base units”
- Most other units are derived from combinations of 2 or more “base units”
- Not all units in this book are SI units

SI Base Units

Quantity	Quantity symbol	Unit name	Unit abbreviation
Length	*l*	meter	m
Mass	*m*	gram	g
Time	*t*	second	s
Temperature	*T*	kelvin	K
Amount of substance	*n*	mole	mol

You have a handout with this information on it…

Mass ≠ Weight

- Mass is a measure of the amount of matter, weight depends on the local gravitational field.
- We usually measure mass with a balance, weight is usually measured with a spring scale.
- We will talk about MASS only in this class (leave weight for physics…

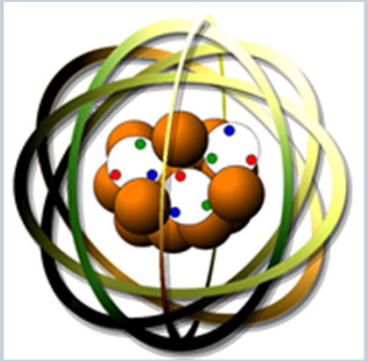
Prefixes –Ally Schwabe what do they MEAN

Prefix	Symbol for Prefix		Scientific Notation
exa	E	1 000 000 000 000 000 000	10^{18}
peta	P	1 000 000 000 000 000	10^{15}
tera	T	1 000 000 000 000	10^{12}
giga	G	1 000 000 000	10^{9}
mega	M	1 000 000	10^{6}
kilo	k	1 000	10^{3}
hecto	h	100	10^{2}
deka	da	10	10^{1}
----	--	1	10^{0}
deci	d	0.1	10^{-1}
centi	c	0.01	10^{-2}
milli	m	0.001	10^{-3}
micro	μ	0.000 001	10^{-6}
nano	n	0.000 000 001	10^{-9}
pico	p	0.000 000 000 001	10^{-12}
femto	f	0.000 000 000 000 001	10^{-15}
atto	a	0.000 000 000 000 000 001	10^{-18}

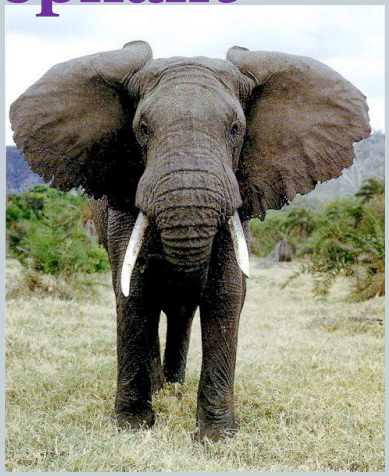
- The handout has the important prefixes you need to know on it.
- Give some examples of what you might measure with these units in **meters.**
- **You should know the prefixes on the handout because you will use them…over and over…and over again.**

Which unit (with appropriate prefix) would you use to measure this stuff?

- **Diameter of an atom**



- **Weight of an elephant**



- **Area of the Tacoma Dome**

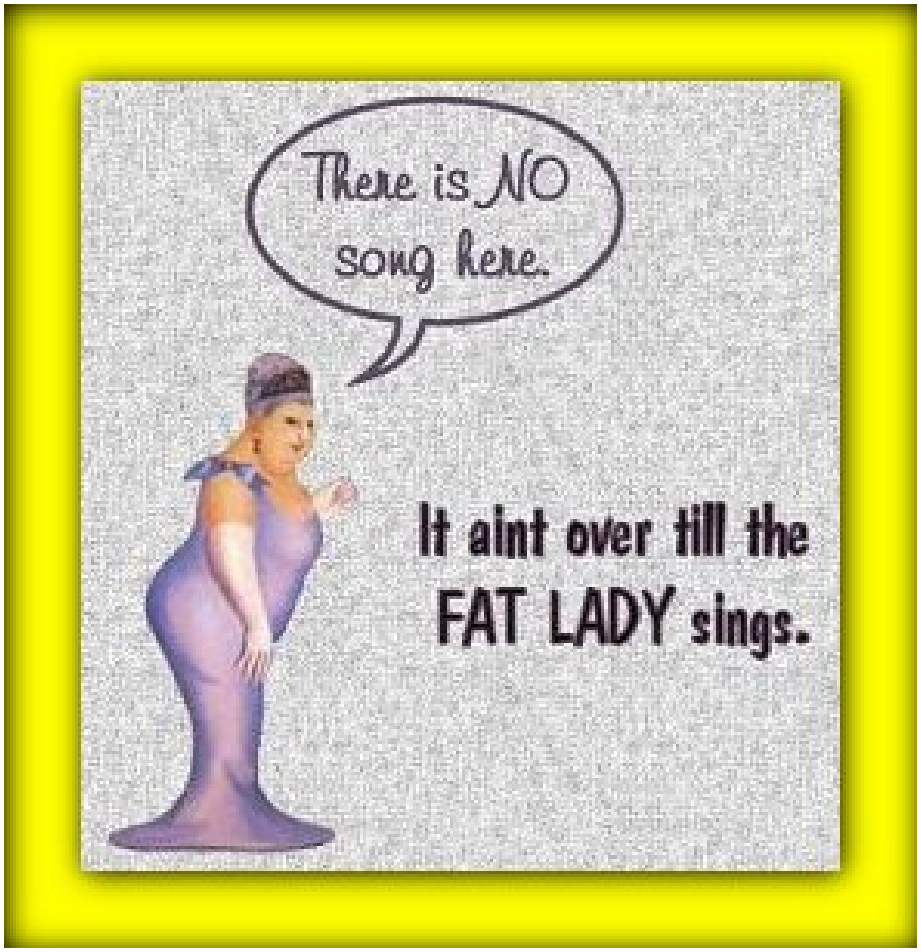
- **Temperature of the summit of Mt. Rainier**

- **Temperature in outer space**

Derived SI Units

- What does the word “derived” mean?
  - What are some examples of things you might derive?
- Are derived units…units that are created by combining 2 or more SI Base Units (usually through multiplying or dividing base units).
- For example:
  - Length (m) x Length (m) = Area (m^2)
  - Mass (kg)/Volume (m^3) = Density (kg/m^3)

Example: Volume



- The amount of space occupied by an object.
- Solids:

  m *x* m *x* m = m^3
- Liquids and gases:
  Liter = 1 dm^3 =

  1000 cm^3

So 1 mL = 1 cm^3

Density

- The ratio of mass to volume, or mass divided by volume
- D = mass/volume or D = m/v
- Often (though not always) expressed in units of g/cm^3.

Now Do the Practice Problems on the Back of Your Notes!

Due tomorrow if you don't finish in class…