# Tools, Measurement, and Safety

**Tool – Anything that helps you to do a task.**

- **One way to collect _____ is to take measurements (quantitative observations).**
- **To get the best measurements, you need to use the proper _____.**

**Making Measurements:**

- **Many years ago, different countries used different _____ of measurement.**
- **Many units of measurement were based on objects that were not _____.**
  **EX: an inch was three _____ _____**
  **a foot was based on the body's foot**
- **These units made _____ measurements difficult because they meant different things for different people.**

- **In the late 1700s, the French Academy of Sciences developed a system of**

**measurements called the International System of Units (_____). It is also referred to as the _____ system.**

- **This system makes communicating measurements easy because it uses _____ units.**

**<u>Standard</u> – The _____ for everyone.**

## Properties that can be Measured

| Property | Basic SI Unit |
|---|---|
| length | |
| mass | |
| volume (solid) | |
| volume (liquid) | |
| temperature | |

## Length:

- **Length is usually expressed in meters (m) or centimeters (cm).**
- **A _____ or meter stick is used to measure length.**

## Mass:

**<u>Mass</u> – The amount of _____ in an object.**

- **Usually measured in _____ or _____.**
- **A _____ or _____ is used to measure the mass of an object.**

## Volume:

**Volume – The amount of _____ that an object takes up.**

- **The volume of solid objects is usually expressed in _____ _____ ($m^3$) or cubic centimeters ($cm^3$).**
- **To find the volume of an object with a rectangular shape, multiply the _____ times the _____ times the _____.**

$$V = l \times w \times h$$

- **The volume of a _____ is usually expressed in liters (L) or milliliters (mL).**
- **A milliliter of liquid will fit into a box that is $1cm^3$, so 1mL = 1_____.**
- **The volume of liquids is usually measured with a _____ _____.**

## Temperature:

**Temperature** – A measure of how hot (or cold) something is.

- The SI unit for temperature is _____ (K), though scientists usually use degrees _____ (°C).
- A _____ is used to measure temperature.

### Common SI Prefixes

| Prefix | Meaning | Example |
|---|---|---|
| kilo- (k) | _____ x | 1 km = 1000 m |
| hecto- (h) | 100 x | 1 hm = _____ m |
| deca- (da) | 10x | 1 dam = _____ m |
| deci- (d) | 1/10 or .1 | 1 _____ = 0.1 m |
| centi- (c) | _____ or .01 | 1 cm = 0.01 m |
| milli- (m) | 1/1000 or .001 | 1 _____ = 0.001m |

## Metric Conversions:

- To convert between SI units, use the chart below on the next page.
- Determine how many spaces you are moving (from the measurement you know, to the measurement you don't) to the left or right on the chart.

- **Move the _____ in your number the same number of spaces in the *opposite* direction. (i.e. if you move left on the chart, move your decimal to the right)**

## Metric Conversion Chart

| m | c | d | Base | da | h | k |
|---|---|---|---|---|---|---|
| | | | | | | |

**Examples:**

**8 km = 8000 m**

**17 daL = 170,000 mL**

**94.302 cg = 9.4302 dg**