
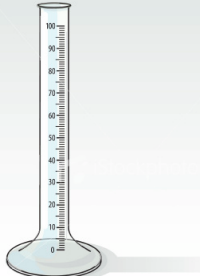











Lab Equipment and Uses


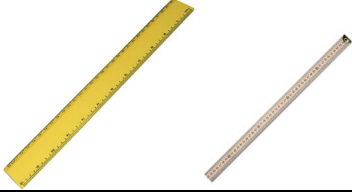

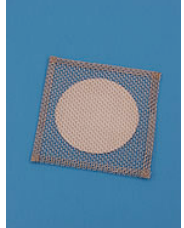

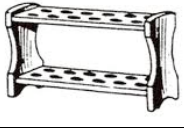

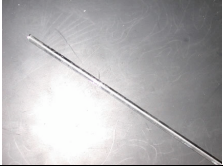

Measurement Using Lab Equipment

Notes:

- International System of Units, SI
- Base 10
- 6 General Types of Measurement:
Length, Volume, Mass, Temperature, Weight, Time

| Name | Image | Use(s) |
|--------------------|---|---|
| Spring Scale |  | Measuring Weight or Force in Newtons. Weight is the measure of the pull of gravity on something. |
| Graduated Cylinder |  | Measure precise volumes. Volume is a measure of how much space something occupies. Can be measured LxWxH or by displacement method for irregularly shaped objects. Units are usually liters(L), milliliters(mL) or cm ³ or m ³ . $1\text{mL} = 1\text{cm}^3$ |
| Erlenmeyer Flask |  | Hold Liquid, Approximate volume but not for precise measuring |
| Beaker |  | Hold Liquid, Approximate volume but not for precise measuring |
| Stopwatch |  | Measures time in seconds. Time is a measure of how long. |

| Name | Image | Use(s) |
|---------------------------|---|---|
| Triple Beam Balance |  | To measure mass. Mass is the amount of matter in something. The base unit of mass is the gram. Kilograms are commonly used. |
| Ring Stand and Ring Clamp |  | Support |
| Bunsen Burner |  | Heat source |
| Crucible |  | To heat small amounts of chemical |
| Dropper Pipet |  | To transfer small droplets of liquid |
| Funnels |  | To pour or transfer liquid |

| Name | Image | Use(s) |
|--------------------------------|---|--|
| Scoopula |  | To scoop chemicals |
| Meter Stick and Metric ruler |  | To measure distance. Metric system base unit of distance is the meter. Centimeters, millimeters, kilometers also commonly used. |
| Test tube and test tube holder |  | Test tube used to hold liquids or solids. Holder used to hold the test tube. |
| Wire Gauze |  | Support of glassware when heating over a flame. |
| Watch Glasses |  | Used to hold chemicals. Multifunctional |
| Test tube rack |  | Holds test tubes. |
| Thermometer |  | Measure temperature. Temperature is the measure of the average kinetic energy in something. We use Celsius or Kelvin. No prefixes with temperature measurements. |
| Stir Rod |  | Stir liquids |
| Forceps |  | Picking up small objects |

Prefixes for Powers of Ten

| Prefix | Symbol | Notation | Meaning |
|-----------|--------------------|------------|-------------------|
| tera | T | 10^{12} | 1,000,000,000,000 |
| giga | G | 10^9 | 1,000,000,000 |
| mega | M | 10^6 | 1,000,000 |
| kilo | K | 10^3 | 1,000 |
| hecto | H | 10^2 | 100 |
| deca | da | 10^1 | 10 |
| Base Unit | liter, meter, gram | 10^0 | 1 |
| deci | d | 10^{-1} | 0.1 |
| centi | c | 10^{-2} | 0.01 |
| milli | m | 10^{-3} | 0.001 |
| micro | μ | 10^{-6} | 0.000001 |
| nano | n | 10^{-9} | 0.000000001 |
| pico | p | 10^{-12} | 0.000000000001 |

Which is larger??

- a. kilometer or centimeter?
- b. decameter or decimeter?
- c. micrometer or centimeter?
- d. millisecond or gigasecond?
- e. picoliter or nanoliter?
- f. hectometer or kilometer?
- g. meter or millimeter?

Answers a. kilometer b. decameter c. centimeter d. gigasecond e. nanoliter

f. kilometer g. meter

Scientific notation is a way of writing numbers that accommodates values too large or small to be conveniently written in standard decimal notation.

In scientific notation all numbers are written like this:

$$a \times 10^b$$

Where a represents the significant figures in the value (a is always a number less than 10) and b represents the power of 10.

$$300 \qquad 3 \times 10^2$$

$$200000 \qquad 2 \times 10^5$$

$$0.0000004 \qquad 4 \times 10^{-7}$$

$$0.00005099 \qquad 5.099 \times 10^{-5}$$

$$50.04000 \qquad 5.004 \times 10^1$$

$$23.0 \qquad 2.3 \times 10^1$$

$$30 \qquad 3 \times 10^1$$

Convert the following values out of scientific notation:

$$1.009 \times 10^3 \qquad 1009$$

$$5.7 \times 10^{-5} \qquad 0.000057$$

$$3.8777 \times 10^3 \qquad 3877.7$$

$$6.000 \times 10^{-9} \qquad 0.000000006$$

$$1.0 \times 10^3 \qquad 1000$$

$$1.00006 \times 10^4 \qquad 10000.6$$

$$9.9998 \times 10^0 \qquad 9.9998$$