

Introduction to Science and Measurement

Science

1. a branch of knowledge or study dealing with a body of facts or truths systematically arranged and showing the operation of general laws: *the mathematical sciences*.
2. systematic knowledge of the physical or material world gained through observation and experimentation.

Resource: <https://www.dictionary.com/browse/science>

Dictionary.com Unabridged Based on the Random House Unabridged Dictionary, © Random House, Inc. 2018

Biology – *bio-* means “life” ... *-ology* means “study of” ...SO, **biology** is the study of life; life science

Tools

(complete this section over the next two weeks)

Microscope –	FOR MEASUREMENT:
Microscope slide –	Ruler –
Cover slip –	Graduated cylinder –
Magnifying glass –	Triple Arm Balance –
Test tube –	Scale –
Test tube holder –	Pipette –
Test tube brush –	Thermometer –
Funnel –	Stop watch –
Petri dish –	Beaker –
Safety goggles –	Erlenmeyer flask –

Scientific Measurement

What **System of Measurement** is being used in Science class? _____

Parameter	Definition	Tools	Units
Linear	Length – Height – Width ...of matter 10 mm = 1 cm and 100 cm = 1 m	ruler	millimeters - mm, centimeters - cm, meters - m, kilometers - km
Mass	The amount of matter in a substance	Triple arm balance	grams – g kilograms - kg
Volume	The space matter occupies	Beaker, pipette, Erlenmeyer flask, graduated cylinder	milliliters – mL liters – L centimeters cubed – cm ³
Temperature	The amount or degree of heat in matter	Thermometer	Celsius – °C or Kelvin - K
Weight	The pull of gravity on matter	Spring scale	Newtons – N or pounds - lb

Accuracy vs. Precision

- **Accuracy** = the closeness of a measured value to a standard or known value.
 - If you take a measurement of 3.2 kg for an object’s mass, but the actual mass is 10 kg – your measurement is not accurate.
- **Precision** = the closeness of two or more measurements to each other.
 - If you take the mass of an object five times and get 3.2 kg each time, your measurement is precise.



Accurate and Precise



Precise... but not Accurate



Accurate, but not Precise



Neither Accurate nor Precise

Sources:

○ <https://labwrite.ncsu.edu/Experimental%20Design/accuracyprecision.htm>

○ <http://blog.minitab.com/blog/real-world-quality-improvement/accuracy-vs-precision-whats-the-difference>