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Measurement Device and System.

System of Measurement:

System of measurement refers to the process of associating numbers with physical quantities and phenomena. It is more like a collection of units of measurement and rules relating them to each other. The whole world revolves around measuring things! Everything is measured: the milk you buy, the gas you fill for the vehicle, the steps you walk. Even our productivity is measured in terms of productivity indexes on how productively we work. System of measurement is very important and define and express the different quantities of length, area, volume, weight, in our day-to-day communications. The system of measurement is based on two important foundation pillars of defining the basic unit of measurement, and the measure of conversion from the basic unit to other related units.

Further, the other related units of measurement can be in the same system of measurement or a different system of measurement. Let us learn about systems of measurement on this page.

What is System of Measurement?

Measurement systems are a collection of units of measurement and rules relating them to each other. The word “measurement” is derived from the Greek word "metron," which means a limited proportion. This word also finds its roots in the words "moon" and "month", possibly because astronomical objects were among the first methods to measure time. In the old days, we used body parts for informal measurement systems like foot length, cubit, handspan, etc. which were not so accurate and vary from person to person.

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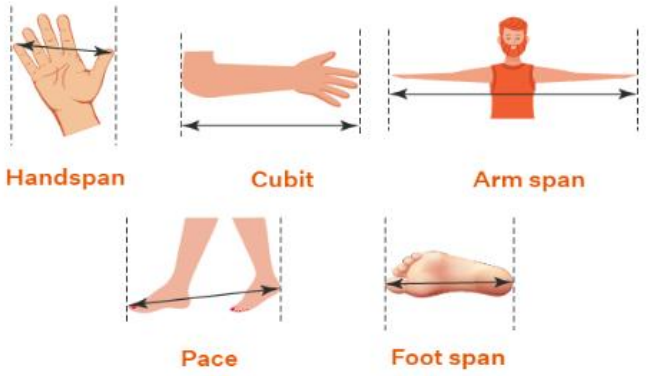
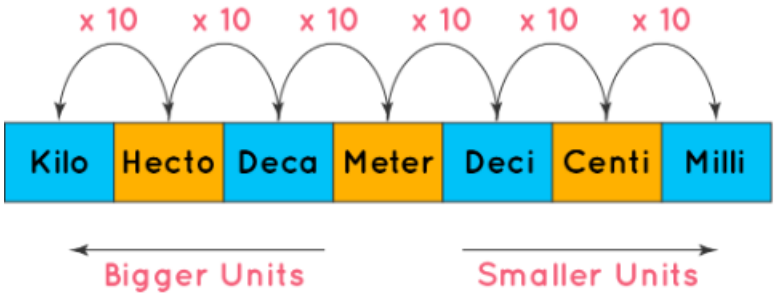


So, there was a need to regularize the measurements. A system of measurement like the International System of Units called the SI units (the modern form of the **metric system**), Imperial system, and US customary units were standardized across the world.

- **Metric System:** The units of the metric system, originally taken from observable features of nature (basically what we normally measure like the time, length, mass, etc. are defined by seven physical constants with numerical values in terms of the units. Metrics systems evolved and over time are universally accepted as the International System of Units called the SI System. Many countries follow this system.

- **US Standard Units:** United States, Liberia, and Myanmar have not adopted the metric system as their official system of weights and measures. U.S. customary units are used across the states for measurements.



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Conversions from One System of Measurement to Another

The conversion of length, mass, area, volume from one system of measurement to another system of measurement is very helpful to identify the units. In the below set of tables, we have listed the different units of length, area, volume, mass from US standard measurement to the metric measurement system. Please find below the different units of conversion of length from US standard measurement to the metric measurement system.

Table1: Length

Length Conversions	
US standard meaurement	Metric Measurement
1 inch	2.54 cm
1 ft	0.3048 m
1 yard	0.914 m
1 mile	1.609 km

Table2: Mass

Mass Conversions	
US Standard Measurement	Metric Measurement
1 ounce	28.34g
1 pound	0.453 kg
1 ton	907.184 kg

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Table 3: Volume

Volume(capacity) Conversions	
US standard measurement	Metric measurement
1 fluid ounce	29.573 ml
1 fluid pint	0.473 l
1 fluid quart	0.946 l
1 gallon	3.785 l

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- **Example 2: Emy measured 3 inches in her inch scale. How many centimeters will it be approximately equal to?**

  Solution:

  Using system of measurement, we have 1 in = 2.54 cm. Thus, 3 in = 3 × 2.54 = 7.62 cm. Therefore, 3 inches = 7.62 cm.

- **Example 3: Water boils at 100 degrees Celsius. What is the temperature in degrees Fahrenheit?**

  The formula Fahrenheit = 9/5 × Celcius + 32

  Solution:

  As per the measurement system, Fahrenheit = 9/5 × C +32. Substituting C = 100, we get, F = 9/5 ×100 +32. Simplifying it further, we get, F = 9 × 20 +32 = 180 + 32 = 212.F. Therefore, 100 Celsius is equal to 212 Fahrenheit.

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Measurement Devices: Equipment & Accessories:

- **Electricity & Multimeter**

H / temperature / conductivity meter, pen-type, pH = 0.00 … 14.00, T = 0 … 50°C, EC = 0 ... 19990 µS/cm

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- **Length, Distance & Volume**

Article no:03010-00

Vernier calliper stainless steel 0-160 mm, 1/20

Article no:03011-00

Vernier calliper, plastic

Article no:03118-00

Measuring tape, linen, l 20 m

Article no:09937-01

Ruler, plastic, 200 mm

Article no:EAK-P-2801

Laser-Distance-Meter up to 60 m with calculation of area and

Article no:EAK-P-2802

Laser-Distance-Meter up to 80 m with calculation of area and

- **Temperature Meters & Thermometers**

Article no:12910-00

Cobra SMARTsense Wide-Range Temperature - Sensor for measuring temperature -20 ... 330°C (Bluetooth)

Article no:12903-00

Cobra SMARTsense Temperature - Sensor for measuring temperature -40 ... 120 °C (Bluetooth)

Article no:12938-01

Cobra SMARTsense Thermocouple - Sensor for measuring temperature -200 ... +1200 °C (Bluetooth + USB)

Article no:12917-01

Cobra SMARTsense Surface Temperature - Sensor for measuring surface temperature -25 ... 125 °C (Bluetooth + USB)

Article no:04168-00

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- **Melting & Boiling Point Determination**

Article no:35910-15

Apparatus for determination of melting point (Thiele)

Article no:39052-00

Melting point determination tubes, 100 pcs.

- **Sound Level Meters**

Article no:EAK-P-8010

Sound Level Calibrator ~ 94 dB (1 Pa) / 114 dB (10 Pa)

Article no:EAK-P-5055

Sound Level Meter ~ 2.000 Counts ~ 25 ... 130 dB A/C

Article no:EAK-P-8005

Sound Level Meter ~ 30 ... 130 dB A/C ~ with 32000 Points Datalogger and USB

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- **Measuring Amplifier**

Article no:11074-93

Power supply 12V AC/500 mA

Article no:11444-93

PHYWE Difference amplifier

Article no:13621-00

PHYWE Electrometer amplifier

Article no:13625-93

PHYWE LF amplifier, 220 V

Article no:13626-93

PHYWE Universal measuring amplifier

Standard of Measurements

A standard of measurement is a physical representation of a unit of measurement. A unit is realized by reference to an arbitrary material standard or to natural phenomena including physical and atomic constants.

Standard of measurement classified by their function and application in the following categories:

1. International standards
2. Primary standards
3. Secondary standards
4. Working standards

The international standards are defined by international agreement. They represent certain units of measurements to the closest possible accuracy that production and measurement technology allow. These standards are maintained at the International Bureau of Weights and Measures in America and not available to the ordinary user of measuring instruments.

The primary (basic) standards are maintained by national standards laboratories in different parts of the world. The National Bureau of standards (NBS) in America, National Physical Laboratory (NPL) in Britain, and Physikalisch Technische in Germany. The primary standards represent the fundamental units and some of the derived mechanical and electrical units. Primary standards are not available for use outside the national laboratories. One of the main functions of primary standards is the verification and calibration of secondary standards.

Secondary standards are the basic reference standards used in industrial measurement laboratories. These standards are maintained by the particular involved industry and are generally sent to the national standards laboratories (primary) on a periodic basis for calibration and comparison.

Working standards are the principal tools of a measurement laboratory. They are used to check and calibrate general laboratory instrument for accuracy and performance or to perform comparison measurements in industrial applications. A manufacturer of precision resistances, for example, may use a standard resistor (a working standard) in the quality control department of his plant to check his testing equipment.