

VESP Vision

To be the centre of excellence in the field of technical education.

Program Code:- Common to all semesters

Course Name:-Basic Science(physics)

Course Code : - 22102

Course coordinator: Mrs. Deepa Gupte

Date: 12/07/2020

Unit No:1

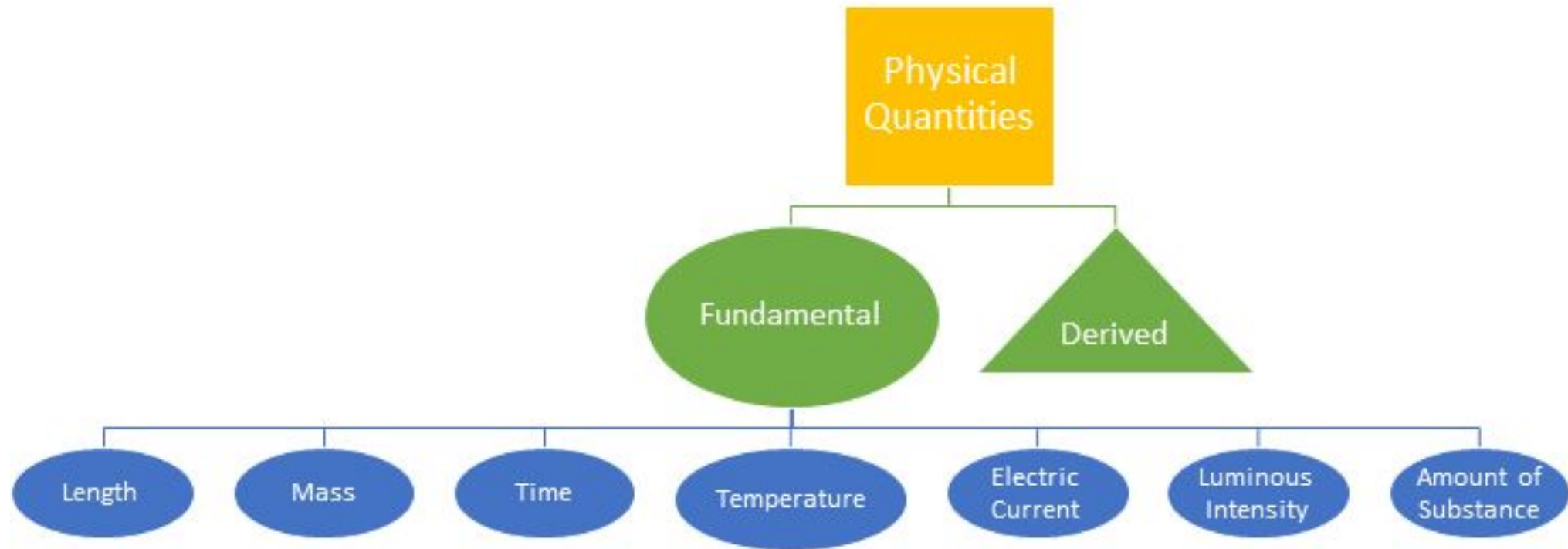
Unit Name: Units and Measurements

Unit Outcomes (UO1a): Describe the given measurement device and its application

Learning Outcome (LO1): Students will be able to explain physical quantities and its types with examples.

Contents: Unit, physical quantities: fundamental and derived quantities and their units

Unit 1: Unit 1



Learning Objective/ Key learning



- ▶ Students will be able to explain physical quantities and its types with examples.
- ▶ Students will be able to state SI units of fundamental and derived Physical quantities

- ▶ Basic physics is a branch of science which deals with the study of matter and its properties.
- ▶ Measurable quantity of matter is called a physical quantity.
- ▶ Measurement of quantities is important and has numerous applications in industry, construction and other field of engineering and technology.
- ▶ For accurate measurements of physical quantities, its value is compared with the standard quantity of same kind.
- ▶ The standard used to measure any physical quantity is called its unit.

MEASUREMENT OF PHYSICAL QUANTITY

- ▶ **What do you see?**
- ▶ **Which Physical Quantity will you measure?**
- ▶ **What are their dimensions?**

A table and a chair

Height, Length and Width

Table dimension is

$H = 75\text{cm}$, $L = 120\text{cm}$, $W = 70\text{cm}$

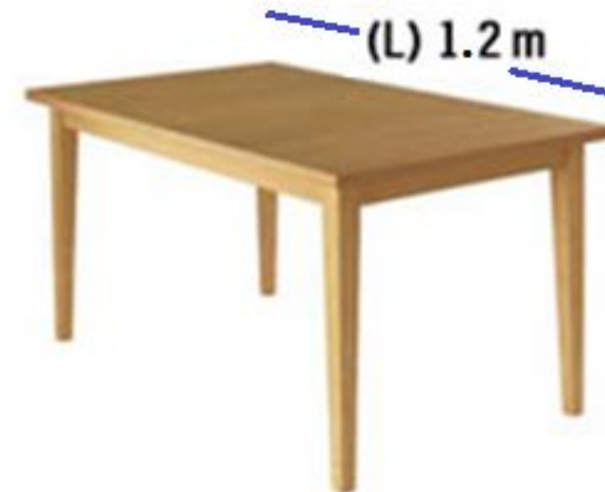
Chair dimension is

$H = 97\text{cm}$, $L = 60\text{cm}$, $W = 44\text{cm}$



UNITS FOR MEASUREMENT

- ▶ Measurement consists of two parts
 - ▶ First is the number which indicates the magnitude of quantity
 - ▶ Second indicates the standard
- ▶ Here the Length of table, $L = 1.2 \text{ m}$
 - ▶ 1.2 is the magnitude of length
 - ▶ metre (m) is the standard or unit of length



- ▶ Requirement of standard unit are as follows:
 - ▶ It should be universally accepted (i.e. accepted by all).
 - ▶ It should be definite and well defined.
 - ▶ It should be invariable (fixed) with time and place.
 - ▶ It should be easily reproducible.
 - ▶ It should be easily comparable with other similar units.
 - ▶ Its size should be such that the quantities measured with it should not be too large or too small.
 - ▶ It should be readily available.

Attempt Set 1 MCQs

Set 1: Question No 1	Set 1: Question No 2	Set 1: Question No 3
The _____ used for the measurement of physical quantity is called unit of that quantity	Physical quantities are _____ property of matter	Which of the following is NOT a characteristic of standard unit
Recall/ Remembering	Understanding	Application
a) quantity	a) immeasurable	a) invariable
b) dimension	b) measurable	b) reproducible
c) standard	c) reliable	c) available
d) none	d) unreliable	d) perishable
Ans: <c>	Ans: 	Ans: <d>



- ▶ Physical quantities can also be classified into -
 1. Fundamental physical quantity and
 2. Derived physical quantity.

- ▶ Fundamental Physical Quantities: Physical quantities which are independent and does not depend on other physical quantities are called *fundamental physical quantities*.
- ▶ Length, Mass and Time are taken as the basic fundamental quantities.
- ▶ Other fundamental physical quantities are electric current, temperature, luminous intensity and amount of substance.
- ▶ The units of Fundamental physical quantities are called *fundamental units*.

Sr. No.	Physical Quantity	S.I unit	Symbol
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(a) Fundamental physical quantities

1.	Length	metre	m
2.	Mass	kilogram	kg
3.	Time	second	s
4.	Electric current	ampere	A
5.	Temperature	kelvin	K
6.	Luminous Intensity	candela	cd
7.	Amount of substance	mole	mol

(b) Supplementary physical quantities

1.	Plane angle	radian	rad
2.	Solid angle	steradian	sr

- ▶ Derived Physical Quantities: Physical quantities which can be expressed in terms of fundamental physical quantities are called *derived physical quantities*.
- ▶ All physical quantities other than fundamental physical quantities can be expressed in terms of fundamental ones.
- ▶ Example $\text{speed} = \frac{\text{distance}}{\text{time}}$
- ▶ Hence speed depends on distance and time. Similarly, area, density, power, force, energy etc. can be expressed in terms of fundamental quantities and so they are derived quantities.
- ▶ Units of derived physical quantities are called *derived units*.

Sr. No.	Physical Quantity	S.I unit	Symbol
(c) Derived physical quantities			
1.	Area	square metre	m^2
2.	Volume	cubic metre	m^3
3.	Density	kg/cubic metre	Kg/m^3
4.	Velocity	meter/sec	m/s
5.	Acceleration	meter/sec ²	m/s^2
6.	Force	newton	N
7.	Work or Energy	joule	J
8.	Power	watt	W
9.	Electric Charge	coulomb	C
10.	Electric Resistance	ohm	Ω
11.	Electric Potential	volt	V
12.	Electric Capacitance	farad	F