Pakistan School
Kingdom of Bahrain

Class 9:Physics

We are going start our online Physics lesson today. I hope you all will enjoy and learn.

- Rules of the Class:
- 1) Be on time for all your classes
- 2)Respect all the participants of the class.
- 3)Do not create any disturbance.
- 4)Raise hand if you have a question or you wish to answer any question.
- 5)Pay attention to your teacher.
- 6)Enter into the class with your actual name and CPR number.
- 7)Follow the Time Table.

Objective

- **Students will be able to:**
- Define Units
- Differentiate different Units
- S I Systems
- Pre Fixes

Unit

- **Defination:**

  Once a standard is set for a quantity then it can be expressed in terms of that standard quantity. This standard quantity is called a unit.

- **Explanation:**

  Measuring is not simply counting, e.g. If we need milk or sugar, we must also understand how much quantity of milk or sugar we are talking about. Thus there is a need of some standard quantities for measuring or comparing unknown quantities

Types of Units

- There are two Types of Units

1. Base Units
2. Derived Units

Base Units

- **Definition:**

  The units that describe base quantities are called base units. Each base quantity has its SI units. There seven Base Units.

Table 1.1: Base quantities, their SI units with symbols

Quantity		Unit	
Name	**Symbol**	**Name**	**Symbol**
Length	*l*	metre	m
Mass	*m*	kilogramme	kg
Time	*t*	second	s
Electric current	*I*	ampere	A
Intensity of light	*L*	candela	cd
Temperature	*T*	kelvin	K
Amount of a substance	*n*	mole	mol

Derived Units

- **Definition:** The units used to measure derived quantities are called derived units. These are derived in terms of base units and are obtained by multiplying or dividing one or more base units with each other.

Table 1.2: Derived quantities and their SI units with symbols

Quantity		Unit	
Name	Symbol	Name	Symbol
Speed	v	metre per second	ms^{-1}
Acceleration	a	metre per second per second	ms^{-2}
Volume	V	cubic metre	m^3
Force	F	newton	N or ($kg\ m\ s^{-2}$)
Pressure	P	pascal	Pa or ($N\ m^{-2}$)
Density	ρ	kilogramme per cubic metre	$kg\ m^{-3}$
Charge	Q	coulomb	C or (As)

Example of Derived Units

- **) Speed:**
- **The formula of speed is**
- **Speed = disance / time**
- **Unit of speed = unit of distance**
  unit of time

Example of Derive Unit

- **Force:**
- **The formula of force is**
- **Force = mass x acceleration**
- **Unit of force = unit of mass x unit of acceleration**
- **= kg x ms^{-2}**
- **= $kgms^{-2}$**
- **= N**

International System of units

- The 11th general conference on weight and measures was held in Paris in 1968 adopted a worldwide system of measurements called International System of units.International System of units is commonly named as SI.
- Some of the advantages are given below:

  i. SI system is in use all over the world.

  ii. Manipulation in the system is quite easy that is the multiple and sub multiple of different units are obtained simply by multiplying or dividing with 10 or powers of 10.

Prefixes

- **The words or letters added before SI units and stands for multiple and sub multiples of that unit are known as prefixes.**

Some Prefixes

Table 1.3: Some Prefixes

Prefix	Symbol	Multiplier
exa	E	10^{18}
peta	P	10^{15}
tera	T	10^{12}
giga	G	10^{9}
mega	M	10^{6}
kilo	k	10^{3}
hecto	h	10^{2}
deca	da	10^{1}
deci	d	10^{-1}
centi	c	10^{-2}
milli	m	10^{-3}
micro	μ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}
femto	f	10^{-15}
atto	a	10^{-18}

Advantages of Prefixes

- **SI have the advantage that their multiples and sub multiples can be expressed in terms of prefixes.**

- **Advantages of prefixes: SI units are useful to express very large or small quantities.**
- **For example: kilo, Mega, giga etc.**

Note:

- **Double prefixes are not used. For example no prefix is used with kilogram it already contains the prefix kilo.**
- **Prefixes are used with both types of units i.e. base and derived units.**

Examples of prefixes:

V=200000 m/s

- $=200x10^{3}$ m/s
- = 200 Km/s

F=0.00003 Hz

- $= 0.02x\ 10^{-3}$ Hz
- $=20\ x10^{-6}$ Hz
- =20 μHz

Closure

- **Units**
- **Types of Units**
- **Base Units**
- **Derived Units**
- **International System of units**
- **Prefixes**