

THE BOARD STUDY

Premium Notes - Selected Sample Pages

CLASS 11 PHYSICS

ENGLISH MEDIUM

10-PAGE DEMO

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Units and Measurement

Physical Quantity:-

The quantities which can be measured by an instrument and which describes the law of physical world.

Physical Quantity = numerical value $\times$ unit

$$PQ = n \times u$$

Types of Physical Quantity :-

1. Fundamental Physical Quantity

- Quantity which do not depend on any other PQ
- There are seven base units

Motion in a Straight Line

Motion:- Motion is the change in position of an object with time taking a reference point.

→ Motion in a straight line (1-dimensional) is also called as rectilinear motion.

Distance

* The Actual length of path covered by a body is called distance.

* It is a scalar quantity.

* It can never be zero, or negative.

Displacement

* Displacement is the shortest distance in initial and Final position.

Motion in a Plane

- + Motion in a plane is a 2-dimensional (2-D) motion.

Scalar quantity

- + It is a quantity with magnitude (numerical value) only.
Eg. Distance, mass, temperature, time, etc.
- It can be added, subtracted, multiplied and divided by simple rules of algebra.

vector quantity

- + It has both magnitude as well as direction.
- It obeys the triangle law of addition and parallelogram law of addition.
- e.g. Displacement, velocity, acceleration, force, etc.

Laws of Motion

Force - Agency which changes or tend to change the state of rest or of uniform motion or direction of motion as the shape of object.

Aristotle's Fallacy

He said, an external force is necessary to keep a body moving with uniform velocity.

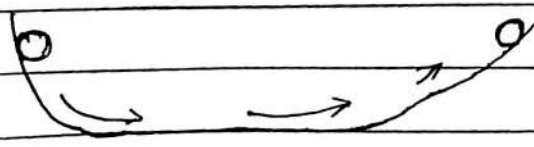
But his idea was proved wrong by Galileo.

Galileo's Observation

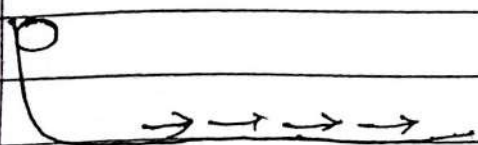
(Absence of friction)



- Ball reaches at same height on the other side.



- Ball reaches at same height but travels longer distance.



- Ball rolls down and continue to move infinite distance.

Work, Energy

& Power

WORK

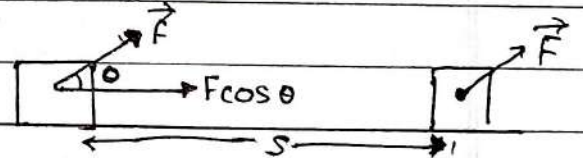
- Work is a scalar product of force and displacement.
- Unit - Nm or Joule named after James Prescott Joule.
- Dimension - ML^2T^{-2}

$$W = \vec{F} \cdot \vec{S} \quad \text{Force is constant.}$$

- Work done = Force x distance moved in direction of force or component of force.

When force and displacement are inclined to each other -

$$W = |F| |S| \cos \theta$$



Work done can be positive or negative.

$\theta \rightarrow$ b/w 0° and $90^\circ \rightarrow W = +FS$ (positive work done)

$\theta \rightarrow$ b/w 90° and $180^\circ \rightarrow W = -FS$ (Negative)

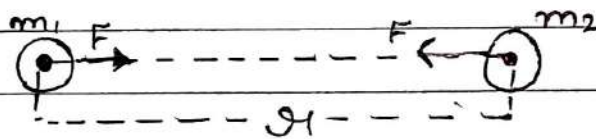
$\theta \rightarrow 90^\circ \rightarrow F \perp S \rightarrow W = 0$ (zero work done)

Gravitation

- Gravitation is the Force of attraction b/w any two bodies in the universe.
- It is the weakest Force in nature.
- Gravity: Force of attraction between earth and any object lying on or near its surface.

Newton's universal law of Gravitation

It states that any particle of matter in the universes attracts any other with a force varying directly as the product of masses and inversely as the square of the distance b/w them.



$$F \propto m_1 m_2$$

$$F \propto \frac{1}{r^2}$$

$$F \propto \frac{m_1 m_2}{r^2}$$

$$F = G \cdot \frac{m_1 m_2}{r^2}$$

G - universal gravitational constant

Thermal Properties of Matter

>> **Temperature** - Relative measure or indication of hotness or coldness.

It is the thermal state of a body which decides the direction of flow of heat energy by virtue of temperature difference.

>> SI unit = Kelvin [K].

>> **Heat** - Energy in transit that flows from one body to another due to temp. difference.

S.I unit = Joule.

CGS unit = Calorie.

Heat	Temperature
Total K.E	Avg. K.E.
It flows from high to low temperature	It decides the direction of flow.

Thermodynamics

- Thermodynamics is the branch of physics that deal with the concepts of heat and temperature and the interconversion of heat and other forms of energy.
- In thermodynamics, we consider that the thermodynamics systems as a whole and learn the interaction of heat and energy during the change of one thermodynamic state to another.
- In this, we study about macroscopic variables like pressure, temperature, volume, internal energy and entropy

* Thermal Equilibrium

- State where all the macroscopic properties of system (P, V, T, M, n) are CONSTANT with time.
- Two systems when in contact with each other are said to be in thermal equilibrium when their temperatures become the same.

WAVES

Wave

A wave is a disturbance that transfers energy from one point to another.

It is the disturbance which travels, not the particles. particles only oscillates.

>> wave is a form of energy transfer and momentum transfer.

>> Disturbance may be in the form of :-

- (i) displacement e.g. - waves on string
- (ii) pressure e.g. sound waves
- (iii) density
- (iv) Electric and magnetic field e.g. - electro magnetic waves (EMW)