

EXERCISE - 1 PHYSICAL WORLD

Science: The word Science comes from Latin word "Scientia". The meaning of Scientia is To know or discover of any things. Its Sanskrit equivalent is Vigyan meaning knowledge. Its Arabic equivalent is ilm. Thus science has in fact, gained knowledge of nature by observation and experiments. It has organised the knowledge into various branches, like physics, chemistry, Biology and Zoology etc.

PHYSICS: Physics is the branch of science which deals "Nature" and Natural "phenomena". Nature means Space, Air, water and any objects. Natural phenomena means any event in the Nature. In modern physics, as it is known to many of us, different kinds of interactions are grouped.

Nature of Physical laws: To explain phenomena of nature physicists put forward relationship among certain quantities. These relationship are tested against observed.

Page No.:
Date: / /

Facts by experiment,
Finally they become law
of nature or Physical
law.

Fundamental force in Nature:-

Gravitational force:-

The gravitational force describes action of one body on the other body due to property called masses. we must be knowing Newton's Law of gravitation. It explains motion of satellite, planets, stars and also of small objects like a stone on the basis of force caused gravitational force.

Newton's law of universal gravitation:- According to Newton's law of universal force "the attractive force between two particles is proportional to the product of their masses and inversely proportional to the square of the distance between them."

This law is as known as Newton's law of universal

gravitation.

Let us consider two particles A and B of masses m_1 and m_2 separated by a distance r to each other. Then the force between them is given below

$$F \propto m_1 \cdot m_2 \quad \text{--- (i) } (r \text{ is const)}$$

and

$$F \propto \frac{1}{r^2} \quad \text{--- (ii) } (m_1 \text{ and } m_2 \text{ is const})$$

Then from eqn (i) and (ii) we get that

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

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

This is the fundamental eqn of universal law of gravitation or Newton's law of gravitation.

G is proportionality constant not depends on m_1 and m_2 and r . Its value is found to be the same for all particles and

hence is known as
universal gravitational
constant.

Electromagnetic force:-

We know from universal
law of gravitation ~~at~~ ~~case~~
of force $F = G \cdot \frac{m_1 \cdot m_2}{r^2}$,

the particle may exert upon
each other electromagnetic
force. If two particles
having charges q_1 and q_2
are at rest with respect to
the observer, the force bet-
ween them has a magnitude

$$F = \frac{1}{4\pi\epsilon_0} \frac{q_1 \cdot q_2}{r^2} \text{ where}$$

$$\epsilon = 8.85419 \times 10^{-12} \frac{C^2}{N \cdot m^2} \text{ is}$$

a constant. The quantity $\frac{1}{4\pi\epsilon_0}$ is
 $9.0 \times 10^9 \text{ N} \cdot \text{m}^2 / \text{C}^2$.

This is called Coulomb's
force and it acts along the
line joining the particles.
If q_1 and q_2 are of same
nature (both positive or
both negative), the force
is repulsive other wise
it is attractive.


27.9.21