1. Physical World.

Curosity of human being have opened the doors for science and technology. The modern era is nothing but reflection of intelligence of human brain. The rapid growth of science began from 16th century and till date it has become international enterprise.

What is science?

Science is nothing but systematic study, analysis of natural phenomena. Science based on exploring the things and apply it for the betterment of our society with experimental ways. Following are some important theories which helped for many more further discoveries.

1) Johannes Kepler (1571-1630) - examined data on planetary motion & proposed laws for it.
2) Nicolas Copernicus (1473-1543) - theory related to sun and planets i.e. heliocentric theory.
3) Galileo Galilei - Laws of inertia.
4) Christian Huygen's - Theory of light (wave theory)
5) Isaac Newton - Universal law of gravitation, Laws of motion, Calceulus mathematics etc.
6) Ernest Rutherford (1871-1937) - Nuclear model of an atom
7) Paul Dirac (1902-1984) - Concept of antiparticle.

From all above theories it is easy to understand that 'Physics is the basic branch of natural science'. Along with physics, chemistry and Biology are also important branches of Natural science.

Physics; a Greek word meaning 'Nature'. So we can define physics as the 'study of physical properties of substances in nature'.

Scope and excitement of physics :-

In modern science the basic scope of physics is lies in studies of mainly macroscopic and microscopic things in nature.

In macroscopic studies involved the experimental analysis in laboratory, terrestrial and astronomical observations etc. Whereas microscopic studies includes atomic, molecular and nuclear phenomena.

* Classical Physics :-

It is branch of physics which mainly deals with the subjects (parts) like Mechanics, electrodynamics, optics and thermodynamics.

1) Mechanics can be studied in details from Newton's laws of motion; which can explain terms like displacement, velocity, acceleration, force, pressure etc.

2) Electrodynamics includes studies of electric field and magnetic field and phenomena that depends on it. Using Coulomb's laws, Ampere's law, and Faraday's law one can study charges, current, electric circuit, working of transformer, electric motor, electric generator etc.

3) Optics includes study of properties of light and instrument that worked on it eg. telescope, microscope, mirrors etc.

4) Thermodynamics helps us to understand the terms like heat (thermal) energy, temperature, working of engines in vehicles, refrigerator etc.

In physics we study microscopic things (like 10^{-14} m) to macroscopic things (like 10^{55} kg).

The study process of physics involves,

1) Hypothesis: theoretical explanation (assumptions)
2) Axiom: the mathematical argument with proof.
3) Model: The theory proposed for explanation of certain thing with some detailed studies.

Eg. Newton's law of gravitation, Einstein's special theory of relativity, Euclid's statement are some important physics and mathematical concepts which involves hypothesis, axiom and model.

* Physics, technology and society :-

All the discoveries in the field of physics and technology are always benefical for society and human being. Sir Thomas Alva Edison discoved the bulb which had enlighten the world. Discoveries like steam engine, communication, semiconducting materials had changed the forms of developement. Following are some important discoveries with the name of scientists and their country of origin.

Name	Discovery	Country
1. Archimedes	Buoyancy, principle of lever	Greece.
2. Galileo	Law of inertia, study of gravity	Italy
3. Newton	Gravitational force, laws of motion; Reflecting telescopes	U.K.
4. Faraday	Laws of electro - magnetic induction.	U.K.
5. Maxwell.	Electromagnetic theory	U.K.
6. Hertz	Production of EM waves	Germany

* Force and Fundamental forces in nature :-

We know that the push or pull acts on the object is called as force. or an external agent which can change the state of object from rest to motion or vice-versa. Scientists like Aristotle and Newton have tried to explain it. Sir Isaac Newton had given correct formula for force in his famous laws of motion as,

Force = mass x acceleration.

In practice there are several types of forces are used like muscular force, frictional force, buoyant force, gravitational force. etc.

Fundamental forces in nature are —

1) Gravitational force :

The force of attraction between any two objects present in universe by virtue of their masses. Newton proposed a law to explain gravitational force as,

$F = G \cdot \frac{m_1 m_2}{r^2}$; where m_1 & m_2 are masses of objects & r is distance.

G = Universal gravitational constant

$= 6.67 \times 10^{-11}\ Nm^2/kg^2$

Studies of gravitational force helps to explain concepts structure of galaxy, solar system etc.

It is attractive force only. It is weakest force.

2) Electromagnetic force :-

The force between charged bodies (particles) is known as electromagnetic force. The electrostatic force between charges at rest is given by Coulomb's law as,

$F = k \cdot \frac{q_1 q_2}{r^2}$ where q_1 & q_2 are charges and r is distance between them.

It can be attractive or repulsive in nature. It is stronger in nature.

3) Strong Nuclear force :-

The force which binds nucleons ie. protons and neutrons inside nucleus is called as Nuclear force. It is strongest force and about 100 times the electromagnetic force. It ranges upto 10^{-15} m. This force helps to provide stability for the nucleus.

4) Weak nuclear force :-

The force that appears in nuclear process like beta decay (β-decay) is termed as weak nuclear force. It is weaker than electromagnetic force but stronger than gravitational force. It's a small range force having order upto 10^{-16} m.

* Nature of physical laws :-

The quantities that are studied in physics may ~~are~~ changes with respect to time or remains constant. The laws discovered by physicist had explored all the possibilities including magnitude and direction ie. scalar and vectors.

Following are some important laws which are used for illustration of physical quantities.

1) Law of conservation of energy : The sum of kinetic energy and potential energy in a system is constant.

2) Law of conservation of linear momentum : The total momentum of two colliding bodies before and after collision remains same.

3) Law of conservation of charges : Total charge in universe is always constant. It can be transfered from one system to another.

4) Law of conservation of angular momentum : The momentum of rotating bodies remains conserved.