SCIENCE:

The word science comes from the Latin word scientia which implies knowledge . The science as subject has come to mean the systematic, consistent and excellent study of the physical world including everything than can be seen, observed or detected in nature by the man and society and the knowledge that grows out of such study. usually the science is characterized by the methodologies and approaches of the hypothesises, postulates, assumptions, theories and laws based experimental observations and mathematical conclusions.

The science is broadly categorized into two groups- Natural science and Social science .natural science deals with the nature or physical world .

Natural science is broadly divided into:

1.Physical science(studies concerned with non-living matter)

2.Life science or Biological science(studies concerned with living matter)

General Science :

1. The temperature at which all substances have zero thermal energy - **273 degree celcious.**
2. Any substance which when added to a reaction, alters the rate of the reaction but remains chemically unchanged at the end of the process is called - **Catalyst.**
3. The study of the inter-relations of animals and plants with their environment is called-**Ecology.**
4. Study of insects is called-**Entomology.**
5. A unit used to express the focal power of optical lenses-**Dioptre.**
6. The velocity that a body with less mass must achieve in order to escape from the gravitational attraction of a more massive body is called-**Escape Velocity.**
7. Laughing gas is chemically known as**- Nitrous Oxide.**
8. The blood vessels carrying blood from the heart to various parts of the body is called-**Artery.**
9. The distance travelled by light in one year is called **- Light year.**
10. An organism which derives its nourishment from another living organism is called-**Parasite.**
11. Newton's which law states that the rate of change of momentum of a body is directly proportional to the force applied and takes place in the direction in which the force act **-Newton's second law of motion.**
12. Which is the world's first man-made satellite- **Sputnik-I.(4 Oct. 1957)**
13. Which planet is the brightest of all the planets-**Venus.**
14. Small pieces of solid matter which are found scattered in the inter-planetary space of the solar system are known as-**Meteoroids.**
15. The largest gland in the body which is dark red in colour is- **Liver.**
16. Inadequate secretion of Insulin hormone causes which disease -**Diabetes.**
17. Common cold, Influenza, Chickenpox and Measles are caused due to the attack of Virus or Bacteria - **Virus.**
18. In which atmospheric layer are the communication satellite located- **Ionosphere.**
19. The scientific principle behind 'Fibre Optics' is – **Total internal reflection of light.**
20. Ginger is a stem and not a root, True or False - **True (because it has nodes and Internodes).**
21. When we wind a watch which energy is stored - **Potential Energy.**

22. On which phenomena the process of Dialysis used on patient with affected kidneys is Based - **Osmosis.**

23. When a piece of ice floating in a beaker of water melts, the level of water will rise or fall-**Remains the same.**

24. Energy stored in a dry cell is - **Chemical energy.**

25. When a cricketer lowers his hand while catching the ball, it saves him from injury due to - **Conservation of momentum.**

26. Full form of AIDS is - **Acquired Immune Deficiency Syndrome.**

27. Chemical technology dealing with the conversion of base metals into gold is - **Alchemy.**

28. Subtances produced by micro-organism that kill or prevent growth of other micro-organism is called - **Antibiotics.**

29. Substances which react with acids to form salts is called - **Base.**

30. The ancient oriental art of growing trees in dwarf form is called - **Bonsai.**

31. What is the unit of heat - **Calorie.**

32. The ability of a body to resist tension or compression and to recover its original shape and size when the stress is removed is called - **Elasticity.**

33. The negatively charged particles which revolve around the nucleus of the atom in certain orbits is called - **Electron.**

34. The branch of biology dealing with study of Heredity is - **Genetics.**

35. Kwashiorkor is caused due to the deficiency of - **Protein.**

36. Optical illusion often witnessed in deserts when the objects on the surface of the earth at

37. The branch of science which deals with study of nature and properties of light is called- **Optics.**

38. The scale used to measure the magnitudes of earthquakes is called - **Richter scale.**

39. The heat required to raise the temperature of 1 kg of a substance through one degree celcius is called - **Specific heat.**

40. The speed greater than the speed of sound is called- **Supersonic speed.**

41. Volatile substance that incapacitates for a time by powerfully irritating the eyes, provoking tears is called - **Tear gas.**

42. Who is the inventor of Dynamite - **Alfred B. Nobel**.

43. Who discovered life in plants - **Jagadish Chandra Bose.**

44. The unit used to measure loudness of sound is - **Decibel.**

45. The smallest part of an element that can take part in a chemical reaction is called - **Atom.**

46. Substances used for destroying or stopping growth of micro-organisms in living tissue is Called -**Antiseptic.**

47. Water that does not form lather with soap easily is called - **Hard water.**

48. The lines drawn on maps joining the places having same barometric pressure is called -**Isobars.**

49. Lymph differs from blood in not having - **Red Blood Corpuscles.**

50. Universal receivers can receive blood from - **Groups O, A, B and AB**

51. Study of Grass is called - **Agrostology.**

52. Study of Tumor is called - **Oncology.**

53. Which physical property will be unaffected with increase in quantity - **Density.**

54. Oil spreads over the surface of water because - **Oil has less surface tension than water.**

55. In high mountaneous regions bleeding through nose occurs because - **The pressure of the blood in the capillaries is higher than the outside air pressure.**

56. Why does a man weigh more at the poles than at the equator - **Gravitational pull is more at the poles.**

57. A gas will behave as an ideal gas at - **At very low pressure and high temperature.**

58. Oology is the branch of science dealing with the study of -**Birds egg.**

59. Why does a drop of liquid assume a spherical shape - **Because a sphere has the least surface tension**

60. When cream is separated from milk the density of milk increases or decreases-**Increases**

61. Diamond is harder than Graphite due to difference of - **Crystalline structure.**

62. Which combination of colours is the most convenient during day and night time-**- Red and Green**

63. An element which does not react with oxygen is - **Helium**

64. An instrument that measures and records the relative humidity of air is - **Hygrometer**

65. The different colours of different stars are due to the variation of- **Temperature**

66. Which is left when an hydrogen atom loses its electron - **A proton**

67. The fundamental scientific principle in the operation of a battery is - **Oxidation-reduction**

68. Which metal is used to galvanise iron - **Zinc**

69. The instrument used to measure the force and velocity of the wind is- **Anemometer**

70. Edward Jenner is associated with - **Small Pox**

71. The scientist who explained about blood circulation for the first time was - **William Harvey**
72. Nitroglycerine is used as - **An explosive**
73. Solar Energy is due to the process of - **Fusion reactions**
74. In a dry cell battery which are used as electrolytes - **Ammonium Chloride and Zinc Chloride**
75. Permanent Research Station of India, Dakshin Gangotri is located at - **Antarctica**
76. Which types of waves are used in a night vision apparatus - **Infrared waves**
77. In order to stay over the same spot on the earth, a geostationary satellite has to be directly Above - **The Equator**
78. Water is used to cool the engines of cars, buses, trucks, etc. It is because water has-**High specific heat**
79. Due to contract of eyeball, a long-sighted eye can only see farther objects which is corrected by using - **Convex lens**
80. Rainwater collected after 30 to 40 minutes of raining is not suitable for drinking because it is - **Acidic**
81. The refining of petroleum is done by the process of - **Fractional Distillation** Physical quantities which are completely described by a magnitude (size) alone are known as - **Scalar quantities**
82. Study of the abundance and reactions of chemical elements and molecules in the universe, and their interaction with radiation is called - **Astrochemistry**
83. Birbal Sahni Institute of Palaeobotany is located at - **Lucknow, Uttar Pradesh**
84. Organelles which is known as the power house of the cells - **Mitochondria**
85. Photosynthesis takes place maximum in red colour and minimum in - **Violet colour**
86. Other name of White Blood Cells is - **Leukocytes**
87. Other name of Red Blood Cells is - **Erythrocytes**
88. Which antiseptic compound is present in Dettol – **Chloroxylenol**
89. What is a compound that is a white solid which absorbs water vapour from the air – **Calcium chloride**
90. To which product of equivalent weight and valency of an element is equal – **Atomic weight**
91. Which element forms the highest number of compounds in the periodic table – **Silicon**
92. How does addition of ethylene dibromide help to petrol – **Elimination of lead oxide**
93. What do we call the process of separation of pure water from impurities – **Distillation**
94. What is the name of gas which is present in both the natural gas and the biogas – **Methane**
95. Of which alloy the commonly used safety fuse-wire is made – **Alloy of Tin and Lead**
96. What is alcohol obtained in the saponification process – **Glycerol**
97. Which is used to dilute oxygen in the gas cylinders used by divers – **Helium**
98. What do cathode rays case when obstructed by metal –**emission of X-rays**
99. With which liqued is anomalous expansion associated – **Water**
100. What is a tick paste of cement, sand and water called – **Mortar**
101. Ethanol containing 5% water By which name is it known – **Rectified spirit**
102. Of which Container radioactive materials should be kept – **Pb**
103. Which is not an anesthetic agent in surgical operations – **Acetone**
104. What is the percentage of Nitrogen, present in ammonium sulphate – **21%**
105. Which is the nuclear particle having no mass and no charge, but only spin – **Neutrino**
106. The pH of fresh milk is 6. When it turns sour, what will be the pH – **Less than 6**
107. How must have metals used to make wires for safety fuses– **Low resistivity and low melting point**
108. Sodium stearate is a salt and how is it used – **To make soap**
109. Which are the two main constituents of granite– **Iron and silica**
110. Which method of water purification does not kill microorganism – **Filtration**
111. Which gase is supporter of combustion – **Oxygen**
112. By which was the presence of Cobalt. in Vitamin B-12 established for the first time – **Borax-Bead test**
113. Which metal can deposit copper from copper sulphate solution – **Iron**
114. Which group of gases contribute to the "Green House effect" – **Carbon dioxide and Methane**
115. On heating, Gypsum loses certain percentage of its water content and what does it become – **Plaster of Paris**
116. A liquid initially contracts when cooled down to 4 degree Celsius but on further cooling down to zero degree Celsius, it expands. What is the name of liquid – **Water**
117. Under which category Magnetic, electrostatic and gravitational forces come – **Non-contact forces**

118. No matter how far you stand from a mirror, your image appears erect, How is the mirror likely to be – **Either plane or convex**

119. Due to which Phenomenon are advanced sunrise and delayed sunset found in the sky – **Refraction of sunlight**

120. Due to which Phenomenon is the formation of colours in soap bubbles – **Interference of light**

121. On which principle a pressure cooker works – **Elevation of boiling point of water by application of pressure**

122. Why does pressure of a gas increases due to increase of its temperature– **Kinetic energies of die gas molecules are higher**

123. By which Newton's may the weight of an object be assigned– **Laws of gravitation**

124. With which field is a current carrying conductor associated – **A magnetic field**

125. On which the linear expansion of a solid rod is independent – **On its time of heat flow**

126. Which doesn't have any effect on velocity of sound – **Pressure**

127. Why does white light into its components – **Due to dispersion**

128. What type of lenses are used in movie projectors – **Convex**

129. During which radioactivity radiation is not emitted – **Cathode rays**

130. An object is undergoing a non-accelerated motion. What is Its rate of change in momentum – **Zero**

131. A particle is moving freely. Then its– **kinetic energy is always greater than zero**

132. If an object undergoes a uniform circular motion, then What will be– **Its velocity changes**

133. In how many hours does geostationary satellite complete its one revolution around the earth – **24 hours**

134. MCB, which cuts off the electricity supply in case of short-circuiting, on which effect does it work – **Magnetic effect of current**

135. A motor vehicle is moving in a circle with a uniform speed. Where will be the net acceleration of the vehicle – **towards the centre of circle**

136. Which property of a proton may change while it moves freely in a magnetic field **– Velocity**

137. During sunrise and sunset, why does sun appears reddish-orange – **Reddish-orange light is least scattered by the atmosphere**

138. Why are ball bearings used in bicycles, cars, etc – **The effective area of contact between the wheel and axle is reduced**

139. By which Signal a television channel is characterised – **Frequency of transmitted signal**

140. What is a good conductor while carrying current – **Electrically neutral**

141. What is the device used for measuring the wavelength of X-rays – **Bragg Spectrometer**

142. Which is responsible for the working of Newton's colour disc experiment – **Persistence of vision**

143. Who is the founder, of quantum theory of radiation – **Plank**

144. What is Photon – **The fundamental unit/quantum of Light**

145. When does a liquid disturbed by stirring come to rest – **Due to Viscosity**

BRANCHES OF SCIENCE

Study of Heavenly bodies is called -**Astronomy**

Study of bacteria and the diseases caused by them is called - **Bacteriology**

Science dealing with the origin and development of mankind is called - **Anthropology**

Study of cells is called - **Cytology**

Science dealing with the functions and the diseases of heart is called - **Cardiology**

Study of skin is called - **Dermatology**

Study of Blood Vascular System is called - **Angiology**

Study of Fungi and fungus diseases is called- **Mycology**

Study of Tumors is called -**Oncology**

Study of Liver and its diseases is called - **Hepatology**

Study of the Nervous system, its functions and its disorders is called - **Neurology**

Branch of Biology dealing with the phenomena of Heredity is called - **Genetics**

Study of causes of Diseases is called - **Etiology**

Study of Ears and their diseases is called - **Otology**

Study of Condition and Structure of Earth is called - **Geology**

Study of Kidneys and its function is called - **Nephrology**

Study of Birds is called - **Ornithology**

Study of Fossils is called - **Palaeontology**

Study of Bones is called - **Osteology**

Study of Soils is called - **Pedology**

Branch of science dealing with Urinary system is called - **Urology**

Study of Viruses is called - **Virology**

Study of resistance of body against infection (immunity) is called -**Immunology**

Study of Muscles is called - **Myology**
Study of development of Embryos is called -**Embryology**
Study of Insects is called - **Entomology**
Study of Female Reproductive System is called - **Gynaecology**
Study of production of Three Dimensional Image using Laser is called - **Holography**
Study of Snakes is called - **Serpentology**
Production of Raw Silk by rearing of Silk Worms is called - **Sericulture**
Study of Algae is called -**Phycology**
Study of diseases, symptoms, cause and remedy is called - **Pathology**
Study of Serum is called - **Serology**
The Breeding, Rearing, and Transplantation of Fish is called - **Pisciculture**
Study of Eyes and its diseases is called - **Opthamology**

LIST OF SCIENTIFIC INSTRUMENT

1. An instrument used in aircrafts for measuring altitudes is called - **Altimeter**
2. 2. An instrument used to measure the strength of an electric current is called - **Ammeter**
3. 3. An instrument to measure the speed, direction and pressure of the wind is called- **Anemometer**
4. An intrument used to measure difference in hearing is called - **Audiometer**
5. An instrument to measure atmospheric pressure and conditions is called - **Barometer**
6. 6. An intrument used to measure potential difference between two points is called - **Voltmeter**
7. An optical instrument used for magnified view of distant objects is called-**Binoculars**
8. An instrument used to measure the diameters of wire, tube or rod is called-**Callipers**
9. An instrument used to measure quantities of Heat is called - **Calorimeter**
10. An apparatus used for charging air with petrol vapours in an internal combustion engine is called – **Carburettor**
11. An instrument used for measuring the temperature of the human body is called-**Thermometer**
12. A device which converts mechanical energy into electrical energy is called- **Dynamo**
13. An instrument used for measuring electrical potential differences is called- **Electrometer**
14. An instrument used for detecting the presence of electric charge is called- **Electroscope**
15. An instrument used for measuring Electric Current is called - **Galvanometer**
16. An instrument used for measuring depth of the ocean is called - **Fathometer**
17. An instrument used for relative density of liquids is called - **Hydrometer**
18. An instrument used for relative density of milk is called - **Lactometer**
19. An instrument used for magnified view of very small objects is called - **Microscope**
20. An apparatus used in submarines for viewing objects lying above the eye level of the observer is called - **Periscope**
21. An instrument used for comparing the luminous intensity of two sources of light is Called - **Photometer**
22. An instrument used to measure high temperature is called - **Pyrometer**
23. An instrument used to measure Rainfall is called - **Rain Gauge**
24. An instrument used for recording the intensity and origin of earthquakes shocks is called – **Siesmograph**
25. An instrument used for measuring angular distance between two objects is called - **Sextant**
26. An instrument used for measuring speed of the vehicle is called - **Speedometer**
27. An apparatus used for converting high voltage to low and vice-versa is called- **Transformer**
28. An instrument that continuously records a barometer's reading of atmospheric pressure. - **Barograph**
29. An instrument used to measure infrared, or heat, radiation. - **Bolometer**
30. An instrument used for measuring growth in plants.- **Crescograph**
31. An instrument used for tracing movement of heart.- **Cardiograph**
32. A clock that keeps very accurate time and determines longitude of a vessel at sea. - **Chronometer**
33. An instrument used to examine internal parts of the body. - **Endoscope**
34. A glass tube for measuring volumes changes in the chemical reactions between gases -**Eudiometer**
35. A machine for reproducing recorded sound. - **Gramophone**
36. An instrument used to measure the moisture content or the humidity of air or any gas. - **Hygrometer**
37. A microphone designed to be used underwater for recording or listening to underwater sound.- **Hydrophone**
38. A device used to measure atmospheric pressure - **Manometer**

39. A device which converts sound waves into electrical signals. - **Microphone**
40. An instrument attached to the wheel of a vehicle, to measure the distance traversed. - **Odometer**
41. An instrument used for reproducing sound.- **Phonograph**
42. An instrument used for measuring Solar radiation is called - **Pyrheliometer**
43. An instrument used for taking angular measurements of altitude in astronomy and navigation is called - **Quadrant**
44. An instrument for measuring a Refractive Index of a substance is called - **Refractometer**
45. An instrument used for Spectrum analysis is called- **Spectroscope**
46. An instrument for measuring blood pressure is called - **Sphygmomanometer**
47. An instrument for measuring and indicating temperature is called - **Thermometer**
48. A medical instrument used for hearing and analysing the sound of Heart is called - **Stethoscope**
49. An apparatus for recording the readings of an instrument and transmitting them by radio is called - **Telemeter**
50. An instrument used for magnified view of distant objects is called- **Telescope**
51. A device that automatically regulates constant temperatures is called - **Thermostat**
52. An instrument used for measuring Viscosity is called - **Viscometer**
53. A small scale calibrated to indicate fractional divisions of the main scale is called- **Vernier Scale**
54. An instrument for testing the refractive power of the eye is called - **Optometer**
55. An instrument designed for visual examination of the eardrum is called -**Otoscope**
56. A device that measures low temperature is called - **Cryometer**
57. An instrument used in an aircraft indicating airspeed is called – **Machmeter**

COMMON NAMES OF CHEMICAL COMPOUNDS:

Common Names	Chemical Compounds	Chemical Formula
Baking Powder	Sodium Bicarbonate	NaHCO3
Blue Vitriol	Copper Sulphate	$CuSO4.5H_2O$
Bleaching Powder	Calcium Oxychloride	$CaOCL_2$
Chloroform	Trichloro Methane	$CHcl_3$
Chalk (Marble)	Calcium Carbonate	$CaCo_3$
Caustic Potash	Potassium Hydroxide	KOH
Caustic Soda	Sodium Hydroxide	NaOH
Dry Ice	Solid Carbondioxide	CO_2
Epsom	Magnesium Sulphate	$MgSo_4$
Gypsum	Calcium Sulphate	$CaSo_4$
Green Vitriol	Ferrous Sulphate	$FeSo_4$
Heavy Water	Deuterium Oxide	D_2O
Vinegar	Acetic Acid	CH_3COOH
Washing Soda	Sodium Carbonate	Na_2CO_3
Slaked Lime	Calcium Hydroxide	$Ca(OH)_2$
Potash Alum	Potassium AluminiumSulphate	$KALSO_4$
Quick Lime	Calcium Oxide	CaO
Plaster of Paris	Calcium Sulphate	$CaSO_42H_2O$
Mohr's Salt	Ammonium Ferrous Sulphate	$FeSO_4(NH_4)_2SO_4.6H_2O$
White Vitriol	Zinc Sulphate	$ZnSo_4.7H_2O$
Marsh Gas	Methane	CH_4
Magnesia:	Magnesium Oxide	MgO
Laughing Gas:	Nitrous Oxide	N_2O

Vermelium:	Mercuric Sulphide	HgS
Sugar:	Sucrose	$C_{12}H_{22}O_{11}$
T.N.T.	Trinitrotoluene	$C_7H_5N_3O_6$
Sand	Silicon Oxide	SiO_2

Vitamins and Minerals

Balance Diet:- It means a diet which contains right amount and types of foods and drink to provide essential nutrients and energy required for proper development of the body cells, tissue and organs. Balance diet should contain right amount of vitamins and minerals for overall development of the body.

Vitamins: Vitamins are organic compounds required in small quantities for optimal health. It enhances the metabolism of proteins, carbohydrates and fats. Vitamins are required for growth in children, formation of hormones, blood cells, tissues and bones. Vitamins cannot be synthesised/produced by the human body, thus, our diet must contain vitamins.

TYPES OF VITAMINS:

Vitamin	Chemical Name	Food Sources	Deficiency Diseases
A	Retinol	Milk, eggs, fish, butter, cheese and liver.	Night blindness, Skin dryness.
B1	Thiamine	Legumes, whole grain, nuts.	Beri-beri.
B2	Riboflavin	Egg, milk, cheese, nuts, bread products.	Inflammation of tongue, sores in the corners of the mouth.
B3	Niacin or Nicotinic acid	Meat, fish, pea nuts, whole grain.	skin disease, diarrhoea, depression, dementia.
B5	Pantothenic acid	Eggs, liver, dairy products.	Fatigue, muscle cramp. Pellagra
B6	Pyridoxine	Organ meats, cereals, corn.	Anaemia, kidney stones, nausea, depression.
B12	Cyanocobalamin	Meat, fish.	pale skin, constipation, fatigue.
C	Ascorbic acid	Oranges, tomatoes, sweet and white potatoes.	Scurvy, anaemia, ability to fight infections decreases.
D	Calciferol	Direct sunlight, fish oils, eggs.	Rickets, osteomalacia.
E	Tocopherol	Vegetable oils, olives, tomatoes, almonds, meat, eggs.	Neurological problems, problems of reproductive system.
K	Phylloquinone or Naphthoquinone	Soyabeans, green leafy vegetables, dairy products, meat.	Failure to clot blood.

Vitamins are further divided into two groups-

(1) Fat soluble vitamins, and

(2) Water soluble vitamins.

Fat soluble vitamins - A, D, E and K.

Water soluble vitamins - Vitamin-B complex (B1, B2, B3, B5, B6, B12), C and Folic acid.

Minerals: Minerals are also essential for proper development of the body. Minerals helps in building strong teeth and bones, skin, hair, proper function of nerves, muscle contraction, maintains heart functions, etc.

TYPES OF MINERALS:

Minerals	Food Sources	Properties	Deficiency Diseases
Calcium	Milk, cheese and other diary products, nuts, green leafy vegetables.	Build and maintain bones and teeth, control heart beat and blood pressure.	Weak teeth and bones, poor development of body.
Iron	Meat, liver, egg yolk, nuts, cereals.	It is required for transportation of Oxygen in the blood. Maintains Haemoglobin level in the blood.	Anaemia, weak immunity.
Iodine	Iodine-enriched salt, milk, cheese.	Iodine is the main building block of thyroid hormone, T3 and T4. It is essential for proper development of the body.	Goitre.
Phosphorus	Meat, fish, poultry, cereals.	It is required in building strong bones and teeth. It also repair cells. It is a component of DNA and RNA.	Poor body growth, weak bones and teeth.
Sodium	Salt	Maintains water balance, blood pressure and nervous system.	Low blood pressure, muscle cramp.
Zinc	Meat, liver, fish, milk, cheese and other diary products.	It is important for the function for the enzymes in the body. It builds immunity and regulates cholesterol levels.	Retarded body growth
Potassium	Fish, milk, pulses, nuts, green vegetables, meat.	It maintains the pH balance of the blood. It controls the water balance of the body.	Low blood pressure, weak muscles.
Magnesium	Green vegetables, nuts, cereals.	Magnesium builds immunity. It is important for nerve cell function and muscle contraction.	It affects nervous system

ORES AND ALLOYS:

ORES:

Metal	Ores
Aluminium (Al)	Bauxite, Corundum, felspar, Cryolite, Kaolin
Antimony (Sb)	Stibnite
Barium (Ba)	Barite, Witherite
Cadmium (Cd)	Greenockite
Calcium (Ca)	Chalk, Quicklime, Calcite, Dolomite, Gypsum, Asbestus
Chromium (Cr)	Chromite
Copper (Cu)	Malachite, Chalcocite, Chalcopyrite, Cuprite
Gold (Au)	Quartz, Calaverite, Silvenites
Iron (Fe)	Hematite, Magnetite, Lemonite, Copper pyrites
Lead (Pb)	Galena
Magnesium (Mg)	Magnesite, Dolomite, Epsom salt, Carnalite
Manganese (Mn)	Pyrolusite
Mercury (Hg)	Cinnabar
Potassium (K)	Carnalite, Sylvite, Potash
Silver (Ag)	Argentite
Sodium (Na)	Rock Salt, Trona, Borax
Strontium (Sr)	Strontianite, Silestine
Tin (Sn)	Cassiterite
Zinc (Zn)	Zincite, Ferulinite , Calamine
Uranium (U)	Uraninite
Tungsten (W)	Wolframite, Scheelite
Nickel (Ni)	Pentlandite, Milarite
Beryllium (Be)	Beryl

Alloys:

Alloy	Components
Brass	Copper and Zinc
Bronze	Copper and Tin
Gun Metal	Copper, Zinc and Tin
German Silver	Copper, Zinc and Nickel
Duralumin	Aluminium, Copper, Magnesium and Manganese

Magnesium	Aluminium and Magnesium
Nickel Steel	Iron and Nickel
Stainless Steel	Iron, Chromium and Nickel
Electrum	Silver and Gold
Solder	Tin and Lead
Invar	Iron and Nickel

Important Facts About Human Body:

Largest and strongest Bone in the body:	**Femur (thigh bone)**
Smallest Bone in the body:	Stapes in ear
Number of Cells in the body:	75 trillion
Volume of Blood in the body:	6 litres (in 70 kg body)
Number of Red Blood Cells(R.B.C.):	1. In male: 5 to 6 million/cubic mm
	2. In female: 4 to 5 million/cubic mm
Life span of Red Blood Cells(R.B.C.):	100 to 120 days
Life span of White Blood Cell(W.B.C.):	3-4 days
Normal White Blood Cell(W.B.C.) count:	5000-10000/cubic mm
Time taken by R.B.C. to complete one cycle of circulation:	20 seconds
Other name of Red Blood Cell (R.B.C.):	Erythrocytes
Largest White Blood Cells:	Monocytes
Smallest White Blood Cells:	Lymphocyte
Who discovered Blood Group:	Karl Landsteiner
Blood Platelets count:	150,000 - 400,000 platelets per micro litre
Haemoglobin (Hb):	1. In male: 14-15 gm/100 c.c. of blood
	2. In female: 11-14 gm/100 c.c. of blood
Hb content in body:	500-700 gm
pH of Urine:	6.5-8
pH of Blood:	7.36-7.41
Volume of Semen:	2-5 ml/ejaculation
Normal Sperm Count:	250-400 million/ejaculation
Menstrual cycle:	28 days
Menopause age:	45-50 years
Blood clotting time:	3-5 minutes
Weight of Brain:	1300-1400 gm in human adult
Normal Blood Pressure (B.P.):	120/80 mm Hg
Universal blood donor:	O
Universal blood recipient:	AB
Average body weight:	70 kg
Normal body temperature:	37 degree celsius
Breathing Rate at rest:	12-16/minute
Number of Spinal Nerves:	31 pairs
Largest Endocrine Gland:	Thyroid gland
Gestation period:	40 weeks or 9 calendar months
Normal Heart Beat at rest:	72 beats per minute
Largest Gland:	Liver
Largest Muscle in the body:	Gluteus Maximus or Buttock Muscle
Smallest Muscle in the body:	Stapedius
Largest Artery:	Aorta
Largest Vein:	Inferior Vena Cava
Largest and longest Nerve:	Sciatic Nerve
Longest Cell:	Neurons (nerve cells)
Minimum distance for proper vision:	25 cm
Pulse rate:	72 per minute
Thinnest Skin:	Eyelids
Weight of Heart:	200-300 gm

Common Drugs and Their Usage:

Drugs/Medicine	Use
Anaesthetics	It is a drug that induces insensitivity to pain.
Antiflatulent	It is a drug that reduces intestinal gas
Antipyretics	It is a drug used to lower body temperature.
Analgesics	It is a drug that is used to prevent or relieve pain. Eg. Aspirin.
Antibiotics	It is a drug that inhibits the growth of or destroys micro-organisms. Eg. Penicillin.
Antihistamines	It is a drug used to relieve symptoms of cold and allergies.
Antispasmodic	It is a drug used to relieve spasm of

	involuntary muscle usually in stomach.
Antacid	It is a drug used for preventing or correcting acidity, especially in the stomach.
Diuretics	It is a drug that promotes the production of urine.
Laxative	It is a drug used to provide relief in constitpation.

Important Scientific Laws and Theories:

1. Archimede's principle - It states that a body when wholly or partially immersed in a liquid, experiences an upward thrust which is equal to the weight of the liquid displaced by it. Thus, the body appears to lose a part of its weight. This loss in weight is equal to the weight of the liquid displaced by the body.

2. Aufbau principle - It states that in an unexcited atom, electrons reside in the lowest energy orbitals available to them.

3. Avogadro's Law - It states that equal volumes of all gases under similar conditions of temperature and pressure contain equal number of molecules.

4. Brownian motion - It is a zigzag, irregular motion exhibited by small solid particles when suspended in a liquid or gas due to irregular bombardment by the liquid or gas molecules.

5. Bernoulli's principle - It states that as the speed of a moving fluid, liquid or gas, increases, the pressure within the fluid decreases. The aerodynamic lift on the wing of an aeroplane is also explained in part by this principle.

6. Boyles's Law - It states that temperature remaining constant, volume of a given mass of a gas varies inversely with the pressure of the gas. Thus,
PV = K (constant), where, P = Pressure and V = Volume.

7. Charles's Law - It states that pressure remaining constant, the volume of a given mass of gas increases or decreases by 1/273 part of its volume at 0 degree celsius for each degree celsius rise or fall of its temperature.

8. Coulomb's Law - It states that force of attraction or repulsion between two charges is proportional to the amount of charge on both charges and inversely proportional to the square of the distance between them.

9. Heisenberg principle (uncertainty principle) - It is impossible to determine with accuracy both the position and the momentum of a particle such as electron simultaneously.

10. Gay-Lussac's Law of combining volumes - Gases react together in volumes which bear simple whole number ratios to one another and also to the volumes of the products, if gaseous — all the volumes being measured under similar conditions of temperature and pressure.

11. Graham's Law of Diffusion - It states that the rates of diffusion of gases are inversely proportional to the square roots of their densities under similar conditions of temperature and pressure.

12. Kepler's Law - Each planet revolves round the Sun in an elliptical orbit with the Sun at one focus. The straight line joining the Sun and the planet sweeps out equal areas in equal intervals. The squares of the orbital periods of planets are proportional to the cubes of their mean distance from the Sun.

13. Law of Floatation - For a body to float, the following conditions must be fulfilled:
(1) The weight of the body should be equal to the weight of the water displaced.
(2) The centre of gravity of the body and that of the liquid displaced should be in the same straight line.

14. Law of conservation of energy - It states that energy can neither be created nor destroyed but it can be transformed from one form to another. Since energy cannot be created or destroyed, the amount of energy present in the universe is always remain constant.

15. Newton's First Law of Motion - An object at rest tends to stay at rest, and an object in motion tends to stay in motion, with the same direction and speed in a straight line unless acted upon by some external force.

16. Newton's Second Law of Motion - The rate of change of momentum of a body is directly proportional to the force applied and takes place in the direction in which the force acts.

17. Newton's Third Law of Motion - To every action there is an equal and opposite reaction.

18. Newton's Law of Gravitation - All particles of matter mutually attract each other by a force directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

19. Ohm's Law - It states that the current passing through a conductor between two points is directly proportional to the potential difference across the two points provided the physical state and temperature etc. of the conductor does not change.

20. Pauli exclusion principle - It explains that no two electrons in the same atom or molecule can have the same set of quantum numbers.

21. Raman effect - It is the change in wavelength that occurs when light is scattered by the atoms or molecules in a transparent medium.

22. Tyndall effect - The scattering of light by very small particles suspended in a gas or liquid.

DISEASE CAUSED BY PROTOZOANS:

1. Malaria	**It is spread by Anopheles mosquitoes. it is a single celled parasite that multiplies in red blood cells of humans. The Plasmodium parasite that causes malaria is neither a virus nor a bacteria**
2. Amoebic dysentery	It is caused by Entamoebahistolytica.
3. Sleeping sickness	It is caused by Trypanosomabrucei.
4. Kala azar	It is caused by Leishmaniadonovani.

TYPES OF DISEASES

List of Diseases caused by Virus, Bacteria, Protozoa and Worm:

Disease caused by Viruses:

1. Chicken pox - It is caused by Varicella-zoster virus.
2. Small Pox - It is caused by Variola virus.
3. Common Cold -It is caused by Rhinovirus.
4. AIDS (Acquired Immunono Deficiency Syndrome) - It is caused by Human Immunodeficiency Virus (HIV).
5. Measles -It is caused by Measles virus.
6. Mumps -It is caused by Mumps virus.
7. Rabies - It is caused by Rabies virus (Rhabdoviridae family).
8. Dengue fever -It is caused by Dengue virus.
9. Viral encephalitis - It is an inflammation of the brain. It is caused by rabies virus, Herpessimplex, polio virus, measles virus, and JC virus.

Disease caused by Bacteria:

1. Whooping Cough - It is caused by a bacterium called Borde tella pertussis.
2. Diphtheria - It is caused by Coryne bacterium diphtheriae.
3. Cholera - It is caused by Vibrio cholerae.
4. Leprosy - It is caused by Mycobacterium leprae.
5. Pneumonia- It is caused by Streptococcus pneumoniae.
6. Tetanus - It is caused by Clostridium tetani.
7. Typhoid - It is caused by Salmonella typhi.
8. Tuberculosis - It is caused by Mycobacterium tuberculosis.
9. Plague - It is caused by Yersinia pestis.

DISEASE CAUSED BY WORMS:

1. Tapeworm	**They are intestinal parasites. It cannot live on its own. It survives within the intestine of an animal including human.**	
2. Filariasis	It is caused by thread	like filarial nematode worms. Most cases of filaria are caused by the parasite known as Wuchereriabancrofti.
3. Pinworm	It is caused by small, thin, white roundworm called Enterobiusvermicularis.	

VITAMINS AND MINERAL DEFICIENCY DISEASES:

1. Anaemia	**It is caused due to deficiency of mineral Iron.**
2. Ariboflavinosis	It is caused due to deficiency of Vitamin B2.
3. BeriBeri	It is caused due to deficiency of Vitamin B.
4. Goitre	It is caused due to deficiency of Iodine.
5. Impaired clotting of the blood	It is caused due to deficiency of Vitamin K.
6. Kwashiorkor	It is caused due to deficiency of Protein.
7. Night Blindness	It is caused due to deficiency of Vitamin A.
8. Osteoporosis	It is caused due to deficiency of mineral Calcium.
9. Rickets	It is caused due to deficiency of Vitamin D.
10. Scurvy	It is caused due to deficiency of Vitamin C.

COMMON HUMAN DISEASES AND AFFECTED BODY PART:

Disease	Affected Body Part
AIDS	Immune system of the body
Arthritis	Joints
Asthma	Bronchial muscles
Bronchitis	Lungs
Carditis	Heart
Cataract	Eye
Cystitis	Bladder
Colitis	Intestine
Conjunctivitis	Eye
Dermatitis	Skin
Diabetes	Pancreas and blood
Diphtheria	Throat
Eczema	Skin
Goitre	Thyroid gland
Glossitis	Tongue
Glaucoma	Eye
Gastritis	Stomach
Hepatitis	Liver
Jaundice	Liver
Malaria	Spleen
Meningitis	Brain and spinal cord
Myelitis	Spinal cord
Neuritis	Nerves
Otitis	Ear
Osteomyelitis	Bones
Paralysis	Nerves and limb
Pyorrhoea	Teeth
Peritonitis	Abdomen
Pneumonia	Lungs
Rhinitis	Nose
Rheumatism	Joints
Tuberculosis	Lungs
Tonsillitis	Tonsils
Trachoma	Eye

SI Units of Measurement:

Quantity	SI Unit	Symbol
Acceleration	Meter/second square	m/s^2
Area	Square meter	m^2
Angular Velocity	Radian/second	ω
Atmospheric Pressure	Pascal	Pa
Capacitance	farad	F
Depth of Sea	Fathom	ftm
Density	Kilogram/cubic meter	kg/m^3
Electric Current	Ampere	A
Electromotive Force	Volt	V
Electrical Conductivity	Ohm/metre	--
Electric Energy	Kilowatt hour	kWh
Electric Power	Watt	W
Electric Charge	Coulomb	C
Electric Potential	Volt	V
Energy	Joule	J
Force	Newton	N (kg m/s^2)
Frequency	Hertz	Hz
Heat	Joule	J
Impulse	Newton second	Ns
Illuminance	Lux	lx
Inductance	Henry	H
Length	Meter	m
Luminous Flux	Lumen	lm
Luminous Intensity	Candela	Cd
Mass	Kilogram	kg
Momentum	Kilogram meter/second	kg m/s
Magnetic Flux	Weber	Wb
Magnetic Flux Density	Tesla	T
Power	Watt	W
Power of Lens	Dioptre	d
Plane Angle	Radian	rad
Radioactivity	Becquerel	Bq
Resistance	Ohm	Ω
Specific Heat	Joule per kilogram kelvin	J/(kg.K)
Solid Angle	steradian	sr
Surface Tension	Newton/square meter	N/m^2
Speed/Velocity	Meter/second	m/s
Temperature	Kelvin	K
Time	Second	s
Viscosity	Pascal second	Pa.s
Volume	Cubic meter	M^3
Weight	Newton	N
Work	Joule	J

DISEASES IN PLANTS

Fungal, Viral and Bacterial diseases in Plants:

Diseases in plants are caused by different agent and affect its different parts. Most plant diseases are caused by fungi, bacteria, and viruses. List of some of the fungal, viral and bacterial diseases are given below:

FUNGAL DISEASES IN PLANTS:

Name of the Crop/Plant	Fungal Disease
Sugarcane	Red Rot
Bajra (Pearl Millet)	Ergot, Green Ear, Smut
Pigeon Pea, Cotton	Wilt
Ground Nut	Tikka
Rice	Blast
Paddy, Papaya	Foot Rot
Wheat Rust,	Powdery Mildew
Coffee	Rust
Potato	Late Blight
Grapes, Cabbage, Cauliflower, Bajra, Mustard	Downy Mildew
Radish, Turnip	White Rust

VIRAL DISEASES IN PLANTS:

Name of the Crop/Plant	Viral Disease
Potato	Leaf Roll, Mosaic
Banana	Bunchy Top
Papaya	Leaf Curl
Tobacco	Mosaic
Carrot	Red Leaf

BACTERIAL DISEASES IN PLANTS:

Name of the Crop/Plant	Bacterial Disease
Beans, Rice	Blight
Cotton	Black Arm
Tomato	Canker
Potato	Ring Rot, Brown Rot

SCIENTIFIC NAMES OF COMMON PLANT/ TREES/ VEGETABLES /CEREALS/FRUITS ETC.:

Common Name of Plant/Vegetables/Cereals/Fruits etc.	Scientific Name of Plant
Apple	Pyrusmalus
Bamboo	Bamboosaaridinarifolia
Brinjal	Solanummelongena
Banana	Musa paradisicum
Black Gram	PalsoesMungo
Banyan	Ficusbenghalensis
Black Pepper	Piper nigrum
Clove	Syzygiumaromaticum
Carrot	Daucascarota
Cucumber	Cucumissativas
Capsicum	Capsicum fruitscence
Chiku	Achrassapota
Cotton	Gossypiumherbaceum
Green Gram	Phaseoliesauicus
Guava	Psidium guava
Ginger	Zingiberofficinale
Garlic	Allium sativum
Jack fruit	Artocarpusintegra
Jowar	Sorghum Vulgare
Kadamb	Anthocephalusindicus
Lemon	Citrus limonium
Maize	Zea mays
Mango	Mangiferaindica
Neem	Azadhirachtaindica
Onion	Allium cepa
Orange	Citrus aurantium
Potato	Solanumtubersum
Pomegranate	Punicagranatum
Peacock Flower (Gulmohar)	Delonixregiarafin
Purple orchid tree (Kachnar)	Bauhinia purpurea
Peepal	Ficusreligiosa Linn.
Pineapple	Ananussativus
Radish	Raphanussativus
Rice	Oryza sativa
Silver Oak	Grevillearobusta
Sandalwood	Santalum album
Spinach	Lactuca sativa
Turmeric	Curcuma longa
Tobacco	Nicotinatobaccum
Tulsi	Ocimum sanctum
Teak	Tectonagrandis Linn.
Tamarind tree	Tamarindusindica
Tomato	Lycopersicanesculentum
Watermelon	Citrullus vulgaris
Wheat	TriticumAestivum

Scientific Names of Common Animals:

Common Name of Animal	Scientific Name of Animal
Cat	Feliscatus
Cobra	Elapidaenaja
Camel	Cameluscamelidae
Cheetah	Acinonyxjubatus
Chimpanzee	Pan troglodytes
Crocodile	Crocodilianiloticus
Chameleon	Chamaeleontidate
Dog	Cannisfamiliaris
Deer	Artiodactyl cervidae
Dolphin	Delphinidaedelphis
Elephant	Proboscideaelephantidae
Frog	Anuraranidae
Fox	Cannisvulpes
Giraffe	Giraffacamalopardalis
Giant Panda	Ailuropodamelanoleuca
Goat	Capra hircus
Housefly	Muscadomestica
Hippopotamus	Hippopotamus amphibius
Horse	Eqquscaballus
Hyena	Hyaenidaecarnivora
Kangaroo	Macropusmacropodidae
Lion	Pantheraleo
Lizard	Saurialacertidae
Mouse	Rodentiamuridae
Panther	Pantherapardus
Pig	Artiodactylasuidae
Porcupine	Hystricomorphhystricidae
Rabbit	Leporidaecuniculas
Rhinoceros	Perrissodanctylrthinocerotidae
Scorpion	Archinidascorpionida
Sea Horse	Hippocampus syngnathidae
Squirrel	Rodentiasciurus
Tiger	Pantheratigris
Zebra	Equidaeburcheli

BLOOD GROUP AND ITS CLASSIFICATION :

K. Landsteiner : Classified human beings (1900) in four groups on the basis of the reaction of their blood: A,B,AB and O.

Blood group	*Carries antigen*	*Carries antibody*	*Can donate blood to*	*Can receive blood from*
A	A	B	A,AB	A,O
B	B	A	B,AB	B,O
AB	A,B	None	Only AB	Universal Accepter
O	None	A,B	Universal donor	Only O

SOME EQUIPMENTS USED TO TRANSFORM ENERGY:

S. No.	Equipment	Energy Transformed
1.	Dynamo	Mechanical energy into electrical energy
2.	Candle	Chemical energy into light and heat energy
3.	Microphone	Sound energy into electrical energy
4.	Loud Speaker	Electrical energy into sound energy
5.	Solar cell	Solar energy into electrical energy
6.	Tube light	Electrical energy into light energy
7.	Electric Bulb	Electrical energy into light and heat energy
8.	Battery	Chemical energy into electrical energy
9.	Electric motor	Electrical energy into mechanical energy
10.	Sitar	Mechanical energy into sound energy

SOME FRUITS AND THEIR EDIBLE PARTS:

Fruits	Edible Part	Fruits	Edible Part
Apple	Fleshy thalamus	Wheat	Starchy endosperm
Pear	Fleshy thalamus	Cashew nut	Peduncle and cotyledons
Mango	Mesocarp	Lichi	Aril
Guava	Entire fruit	Gram	Cotyledons and embryo
Grapes	Pericarp and placenta	Groundnut	Cotyledons
Papaya	Mesocarp	Mulberry	Entire fruit
Coconut	Endosperm	Jackfruit	Bract, Parianth and seed
Tomato	Pericarp and placenta	Pineapple	Bract, Parianth
Banana	Mesocarp and Endocarp	Orange	Juicy hair

MEDICINAL DISCOVERIES:

Inventions/Discoveries	Inventor/Discoveries
Vitamin	F.G.Hopkins, Cosimir Funk
Vitamin-A	Mc. Collum
Vitamin-B	Mc.Collum
Vitamin-C	Holst
Vitamin-D	Mc. Collum
Streptomycin	Selman Waksmann
Heart Transplantation	Christian Bernard
Malaria parasite and treatment	Ronald Ross

First test tube baby	**Edwards and stepto**
Antigen	**Karl Landsteiner**
RNA	**James Watson and ArtherArg**
DNA	**James Watson and Crick**
Insulin	**Banting**
Vaccine of chicken pox	**Edward Jenner**
T.B.bacteria	**Robert Koch**
Diabetes	**Banting**
Penicillin	**Alexander Flemming**
Polio vaccine	**Johan E.Salk**
BCG	**Guerin Calmatte**
Bacteria	**Luvenhauk – Leeuwenhock**
Blood transfer	**Karl Landsteiner**

Some examples of Inertia or Newton's first law

- When a car or train starts suddenly, the passengers bends backward.
- When a running horse stops suddenly, the rider bends forward.
- When a coat/blanket is beaten by a stick, the dust particles are removed.

Newton's second law examples

- it is easier for a strong adult to push a full shopping cart than it is for a baby to push the same cart. Also, it is easier for a person to push an empty shopping cart than a full one.
- train wreck. If a train hits another train of equal force and speed, they will both go the same distance and feel the same force. But if the first train is hooked to a second, the single train will go twice the distance of the double train and will feel twice the force.
- a bowling ball and a marble dropping at the same time.

Newton's third law examples

- When a bullet is fired from a gun with a certain force (action), there is an equal and opposite force exerted on the gun in the backward direction (reaction).
- When a man jumps from a boat to the shore, the boat moves away from him. The force he exerts on the boat (action) is responsible for its motion and his motion to the shore is due to the force of reaction exerted by the boat on him.
- The swimmer pushes the water in the backward direction with a certain force (action) and the water pushes the swimmer in the forward direction with an equal and opposite force (reaction).

The value of G is 6.67 x 10-11 Nm2/kg2.

The acceleration produced in a body due to force of gravity is called acceleration due to gravity (denoted as g) and its value is 9.8 m/ s2

Variation in *g*

- value of *g* decreases with height or depth from earth's surface.
- *g* is maximum at poles.
- *g* is minimum at equator.
- *g* decreases due to rotation of earth.
- *g* decreases if angular speed of earth increases and increases if angular speed of earth decreases.

Weight of a body in a lift

- If lift is stationary or moving with uniform speed (either upward or clown ward), the apparent weight of a body is equal to its true weight.
- If lift is going up with acceleration, the apparent weight of a body is more than the true weight.
- If lift is going down with acceleration, the apparent weight of a body is less than the true weight.
- If the cord of the lift is broken, it falls freely. In this situation the weight of a body in the lift becomes zero. This is the situation of weightlessness.
- While going down, if the acceleration of lift is more than acceleration due to gravity, a body in the lift goes in contact of the ceiling of lift.

Kepler's laws of planetary motion:

- All planets move around the sun in elliptical orbits, with the sun being at rest at one focus of the orbit

- The position vector of the planet with sun at the origin sweeps out equal area in equal time i.e. The areal velocity of planet around the sun always remains constant.

➢ Speed of a planet is maximum when it is at perigee and minimum when it is at apogee.
➢ The orbital speed of a satellite revolving near the surface of earth is 7.9 km / sec.
➢ For earth, escape velocity = 11.2 km/s.
➢ For moon, escape velocity = 2.4 km/s.

Atmospheric pressure decreases with altitude.

- It is difficult to cook on the mountain
- The fountain pen of a passenger leaks in aeroplane at height

➢ Atmospheric pressure is measured by **barometer.**
➢ **Sudden fall** in barometric reading is the **indication of storm**.
➢ **Slow fall** in barometric reading is the **indication of rain**.
➢ **Slow rise** in the barometric reading is the **indication of clear weather**.

Uses of Concave mirror :

- shaving glass.
- reflector for the head lights of a vehicle, search light.
- In ophthalmoscope to examine eye, ear, nose by doctors.
- In solar cookers.

Uses of Convex mirror :

- rear view mirror in vehicle because it provides the maximum rear field of view and image formed is always erect.
- In sodium reflector lamp.

Refraction of light : When a ray of light propagating in a medium enters the other medium, it deviates from its path. This phenomenon of change in the direction of propagation of light at the boundary when it passes from one medium to other medium is called refraction of light.

Some illustrations of Refraction

- Bending of a linear object when it is partially dipped in a liquid inclined to the surface of the liquid.
- Twinkling of stars.
- Oval shape of sun in the morning and evening.
- An object in a denser medium when seen from a rarer medium appears to be at a smaller distance.
- A fish in a pond when viewed from air appears to be at a smaller depth them actual depth A coin at the base of a vessel filled with water appears raised.

Total Internal Reflection: If light is propagating from denser medium towards the rarer medium and angle of incidence is more than critical angle, then the light incident on the boundary is reflected back in the denser medium, obeying the laws of reflection. This phenomenon is called total internal reflection as total light energy is reflected, no part is absorbed or transmitted.

For total internal reflection,

- Light must be propagating from denser to rarer medium.
- Angle of incidence must exceeds the critical angle.

Examples of total internal reflection

- Sparkling of diamond
- Mirage and looming.
- Shining of air bubble in water.
- Increase in duration of sun's visibility-The sun becomes visible even before sun rise and remains visible even after sunset due to total internal reflection of light.
- Shining of a smoked ball or a metal ball on which lamp soot is deposited when dipped in water.
- optical fibre

Difference between concave and convex lens

When a lens is thicker at the middle than at the edges, it is called a convex lens or a converging lens.
When the lens is thicker at the edges than in the middle, it is called as concave lens or diverging lens.
Power of a convex lens is positive and that of a concave lens is negative.

Scattering of light : When light waves fall on small bodies such as dust particles, water particles in suspension, suspended particles in colloidal solution, they are thrown out in all directions.
Scattering of light is maximum in case of violet colour and minimum in case of red colour of light.

Blue colour of sky is due to scattering of light.
The brilliant red colour of rising and setting sun is due to scattering of light.

Interference of light : When two light waves of exactly the same frequency and a constant phase difference travel in same direction and superimpose

then the resultant intensity in the region of superposition is different from the sum of intensity of individual waves. This modification in the intensity of light in the region of superposition is called interference of light.

Diffraction of light : diffraction is the process by which a beam of light or other systems of wave is spread out as a result of passing through a narrow opening or across an edge.

Polarisation of light : Polarisation is the only phenomenon which proves that light is a transverse wave. Light is an electromagnetic wane in which electric and magnetic field vectors vibrate perpendicular to each other and also perpendicular to the direction of propagation. In ordinary light, the vibrations of elecltric field vector are in every plane perpendicular to the direction of propagation of wave. Polarisation is the phenomenon of restricting the vibrations of a light in a particular direction in a plane perpendicular to the direction of propagation of wave.

Human Eye
Least distance of distinct vision is 25 cm.
Defects of human eye and the remedies :

Myopia or short sightedness : A person suffering from myopia can see the near objects clearly while far objects are not clear.
Causes :
- Elongation of eye ball along the axis.
- Shortening of focal length of eye lens.
- Over stretching of ciliary muscles beyond the elastic limit.

Remedy : Diverging lens is used.

Hyperopia or hypermetropia or longsightedness : A person suffering from hypermetropia can see the distant objects clearly but not the near objects.
Causes:
- Shortening of eye ball along the axis.
- Increase in the focal length of eye lens.
- Stiffening of ciliary muscles.

Remedy : A converging lens is used.

Presbyopia : This defect is generally found in elderly person. Due to stiffening of ciliary muscles, eye looses much of its accommodating power. As a result distant as well as nearby objects can-not be seen.
Remedy: two separate lens or a bifocal lens is used.

Astigmatism : This defect arises due to difference in the radius of curvature of cornea in the different planes. As a result rays from an object in one plane are brought to focus by eye in another plane.
Remedy: cylindrical lens is used.

MAGNETISM
Magnetic Substance: On the basis of magnetic behavior, substances can be divided into three categories.

- **Diamagnetic substance:** Diamagnetic substances are such substances which when placed in a magnetic field, acquire feeble magnetism opposite to the direction of magnetic field.

Examples : Bismuth, Zinc, Copper, Silver, Gold, Diamond, Water, Mercury, Water etc.

Paramagnetic Substance : Paramagnetic substances are such substances which when placed in a magnetic field acquire a feeble magnetism in the direction of the field.
Examples: Aluminum, Platinum, Manganese, Sodium, Oxygen etc.

- **Ferromagnetic substance:** Ferromagnetic substances are those substance, which when placed in a magnetic field, are strongly magnetized in the direction of field.

Examples : Iron, Cobalt, Nickel etc.

Curie Temperature : As temperature increases, the magnetic property of ferromagnetic substance decreases and above a certain temperature the substance changes into paramagnetic substance.

Permanent magnets are made of **steel, cobalt steel, ticonal, alcomax and alnico.**

Electromagnets, cores of transformers, telephone diaphragms, armatures of dynamos and motors are made of **soft iron, mu-metal and stalloy.**

SOURCES OF ACID:
Citric acid — Lemons or oranges (Citrus fruits)
Lactic acid — sour milk
Butyric acid — Rancid butter
Tarteric acid — Grapes
Acetic acid — Vinegar
Maleic acid — Apples
Carbonic acid— Soda water aerated drinks
Stearic acid — Fats

Oxalic and — Tomato, wood sorrel.

Conc. H_2SO_4 and HNO_3 is used to wash iron for its galvanization.
Oxalic acid is used to remove rust spot.
Boric acid is a constituent of eye wash.
Formic acid is present in red ants.
Uric acid is present in urine of mammals

Acidic strength
(i) HF < HCl < HBr < HI
(ii) CH_3COOH < H_2SO_4 < HNO_3 < HCl

AQUAREGIA :mixture of nitric acid and hydrochloric acid, in a volume ratio of 1:3.

Uses of HCL :
- In gastric juices are responsible for the digestion.
- Used as bathroom cleaner.
- As a pickling agent before galvanization.
- In the tanning of leather.
- In the dying and textile industry.
- In the manufacture of gelatin from bones.

Uses of HNO_3:
- In the manufacture of fertilizers like ammonium nitrate.
- Nitric acid is used in the purification of gold & silver.
- In the manufacture of explosives like TNT, TNB , Picric acid etc.
- Nitro Glycerin (Dynamite)
- Found in rain water (first shower)
- It forms nitrates in the soil.
- In the manufacture of rayon.
- In the manufacture of dyes & drugs.

Uses of Sulphuric acid (H_2SO_4)
- In lead storage battery.
- In the manufacture of HCl.
- In the manufacture of Alum.
- In the manufacture of fertilizers, drugs, detergents & explosives.

Use of Boric acids :
- As an antiseptic.

Uses of Phosphoric acid :
- Its calcium salt makes our bones.
- It forms phosphatic fertilizers.

Uses of Ascorbic acid : Source of Vitamin C
- **Uses of Citric acid :** Flavoring agent & food preservative.
- **Uses of Acetic acid :** Flavoring agent & food preservative.
- **Uses of Tartaric acid :** Souring agent for pickles, baking powder

PH value of some liquids:

Lemon juice	2.5
Apple juice	3.0
Vinegar	3.0
Urine	4.8
Saliva	6.5
Milk	6.5
Blood	7.4
Toothpaste	9.0

ACID PROPERTY: Blue litmus paper turns red
Methyl orange -orange to pink
Phenolphthalein- colour less

BASE PROPERTY: Red litmus paper turns blue
Methyl orange from orange to yellow
Phenolphthalein from colour less to pink

Uses of some important salts :
Sodium Chloride : flavoring agent in food. In saline water for a patient of dehydration (0.9% NaCl), In the manufacture of HCL etc.

Sodium iodate: Iodized salt to prevent Goitre disease.

Sodium Carbonate : As washing soda, manufacturing of glass etc.
Sodium Benzoate : As a food preservative for pickles.

Potassium nitrate : As a fertilizer giving both K & N to the solid, gun powder ,match sticks etc.

Calcium phosphate: fertilizer

Alum : purification of water, dyeing industry , antiseptic after shave.

Vulcanization of rubber :
Vulcanization is a process of treating the natural rubber with sulphur or some compound of sulphur (SF6) under heat.
Vulcanized rubber is used for manufacturing rubber bands, gloves, car, tyres etc.

FIBERS: Fibres have quite strong intermolecular forces such as hydrogen bonding.
Nylon-6,6, dacron, orlon.

RAYON: Synthetic fibre obtained from cellulose

FUEL GAS
Water gas: mixture of carbon monoxide and hydrogen, high calorific value
Producer gas : mixture of CO and N_2
Coal gas :mixture of H_2, CH_4, CO and other gases like N_2, C_2H_4, 0_2 etc
Oil gas : mixture of H_2, CH_4, C_2H_4, CO and other gases like CO_2
Gobar gas :contains CH_4, CO and, H_2
Natural gas : mixture of gaseous hydrocarbons - methane 85% , ethane, propane butane etc.
LPG: Liquefied petroleum gas - butane and isobutane.

COALS:
Bituminous : Black, hard, smoky, flame, domestic fuel

Lignite : High moisture content burns easily, low calorific value.

Peat : Low grade coal produces less heat & more smoke & ash

Anthracite : Superior quality, hardest form, high calorific value

Compounds of metal and non-metal and their uses :

Ferrous oxide (FeO) : In green glass, Ferrous salt.

Ferric oxide (Fe_3O_4) : In electroplating of ornaments and formation of ferric slat

Ferrous sulphate (FeSO4. 7H20) : In dye industry, and Mohr's salt

Ferric hydroxide [(Fe(OH)3)] : In laboratory reagent and in making medicines.

Iodine (I_2) : antiseptic, In making tincture of iodine.

Bromine (Br_2) : In dye industry, laboratory reagent

Chlorine (Cl_2) : Mustard gas, Bleaching powder.

Hydrochloric acid (HCl) : In the formation of aquaregia and dyes

Sulphuric acid (H_2SO_4) : As a reagent ,In purification of petroleum ,In lead storage battery.

Sulphur dioxide (SO_2) : As oxidants & reductants , bleaching agent

Hydrogen Sulphides (H_2S) : In qualitative analysis of basic radical (group separation)
Sulphur (S) : Antiseptics, vulcanization of rubber, gun powder, medicine.
Ammonia (NH_3) : As reagent in ice factory.

Nitrous oxide (N_20) : Laughing gas, Surgery.

Carbon dioxide (CO_2) : Soda water, Fire extinguisher.

Carbon monoxide (CO) : In phosgene gas

Graphite : As electrodes.

Diamond : Ornaments, Glass cutting, Rock drilling.

Alum [K2SO4 Al2 (SO4)3. 24 H2O] : (i) Purification of water (ii) Leather industry.

Aluminum sulphate [Al2(SO4)3 . 18H20] : In paper industry/fire extinguisher.

Anhydrous aluminium chloride (AlCl3) : Cracking of petroleum.

Mercuric Chloride ($HgCl_2$) : Calomel, Insecticides (Corrosive sublimate)

Mercuric oxide (HgO) : Ointment, poison.

Mercury (Hg) : Thermometer vermillion, amalgam.

Zinc Sulphide (ZnS) : White pigment.

Zinc Sulphate (White vitriol) (ZnSO4 . 7H20) : Lithopone, Eye ointment.

Zinc Chloride ($ZnCl_2$) : Textile industry.

Zinc oxide (ZnO) : Ointment.
Zinc (Zn) : In battery.

Calcium carbide (CaC_2) : Calcium cyanide & acetylene gas.

Bleaching powder [Ca(OCI) Cl] : Insecticides, Bleaching actions.

Plaster of paris : Statue, Surgery.

Calcium sulphate ($CaSO_4 \cdot 2H_20$) : Cement industry.

Calcium carbonate ($CaCO_3$) : Lime & toothpaste

Carbon dioxide (CO_2): Soda water, Fire extinguisher.

Carbon monoxide (CO) : In phosgene gas ($COCl_2$).

Graphite : As electrodes.
Copper sulphate ($CuSO_4$- $5H_20$) : Insecticides, Electric cells.

Cupric oxide (CuO) : Blue & green glass, purification of petroleum

Cuprous Oxide (Cu2O) : Red glass, pesticides.

Copper (Cu) : Electrical wire.

Sodium nitrate (NaNO3) : Fertilizer.

Sodium Sulphate (Glauber salt): Medicine, glass

Sodium bicarbonate (Baking soda) : Fire extinguish bakery, reagent.

Sodium Carbonate (Washing soda) : Glass industry, Paper industries, Removal of permanent hardness of water

Hydrogen peroxide : Oxidants & reductants, Insecticides.

Liquid hydrogen : Rocket fuel.

Facts About Some Metals

- Zinc phosphide is used for killing rats.
- Wood furniture are coated with zinc chloride to prevent termites.
- Excess of copper in human beings causes disease called Wilson.
- Galvanised iron is coated with zinc.
- Rusting of iron is a chemical change which increases the weight of iron.
- Calcium hydride is called hydrolith.
- Calcium hydride is used to prepare fire proof and waterproof clothes.
- In flash-blub, magnesium wire is kept in atmosphere of nitrogen gas
- Titanium is called strategic metal because it is lighter than iron.
- Babbitt metal contains 89% Sn (Tin),Sb (Antimony) and 2% Cu (Copper).
- Chromium trioxide is known as chromic acid.
- Nichrome wire is used in electrical heater
- Potassium carbonate (K2CO3) is known as pearl ash.
- Generally transition metals and their compounds are coloured.
- Zeolite is used to remove hardness of water.
- In cytochrome iron (Fe) is present.
- Selenium metal is used in photo electric cell.
- Gallium metal is liquid at room temperature.
- Palladium metal is used in aeroplane.
- Radium is extracted from pitchblende.
- World famous Eiffel Tower has steel and cement base.
- Actinides are radio-active elements.
- Cadmium rod is used in nuclear reactor to slow down the speed of neutron.
- Sodium peroxide is used in submarine and also to purify closed air in hospital.
- Co(COBALT) is used in cancer treatment.
- Onion and garlic odour due to potassium.
- Oxides of metals are alkaline.
- Silver and copper are the best conductor of electricity.
- Gold and Silver are the most malleable metal.
- Mercury and iron produces more resistance in comparison to the other during the flow of electricity.
- Lithium is the lightest and the most reductant element.
- In fireworks, crimson red colour is due to presence of strontium (Sr). Green colour is due to the presence of Barium in fireworks.
- Barium sulphate is used in X-ray of abdomen as barium meal.
- Barium hydroxide is known as Baryta water.
- Osmium is the heaviest metal and the Platinum is the hardest.
- Zinc oxide is known as flower of zinc. It is also known as Chinese white and used as white paint.
- Silver chloride is used in photo chromatic glass.
- Silver iodide is used in artificial rain.
- Silver nitrate is used as marker during election. It is kept in coloured bottle to avoid decomposition.
- Silver spoon is not used in egg food because it forms black silver sulphide.
- To harden the gold, copper is mixed. Pure gold is 24 carat. Iron Pyrites (FeS2) is known as fool's gold.

- Mercury is kept in iron pot ,because it doesn't form amalgum with iron.
- In tube light there is the vapour of mercury and argon.
- Tetra-Ethyl lead is used as anti knocking compound.
- Lead-pipe is not used for drinking water because it forms poisonous lead hydroxide.
- Fuse wire is made up of lead and tin.
- Chlorofluoro carbon is known as Freon used as refrigerant
- Non-stick utensil is made up of Teflon.
- Chlorine is used to prepare PVC, insecticides herbicides etc. Bromine is used in ethylene bromide synthesis which is mixed with added petrol.
- In the preparation of AgBr which is used in photography.

INERT GASES:

- He, Ne, Ar, Kr, Xe, Rn
- Rn gas are absent in atmosphere.
- Argon is used in Arc. welding & electric bulb.
- Helium and nitrogen mixture used in balloon and , weather indicator etc.
- Neon is used in discharge tube glow light.

CATALYSTS AND IT'S USES:

- **Fe + Mo:** Synthesis of NH_3 by Haber's process.
- **Ni :** Synthesis of vanaspati Ghee (hydrogenation)
- **Pt :** Synthesis of H_2SO_4 by Contact process.
- **NO :** Manufacture of H_2SO_4 by the Lead chamber process.
- **Hot Al_20** : Preparation of Ether from Alcohol.
- **$CuCl_2$**: Preparation of chlorine gas by Deacon process.

Some Important Explosive

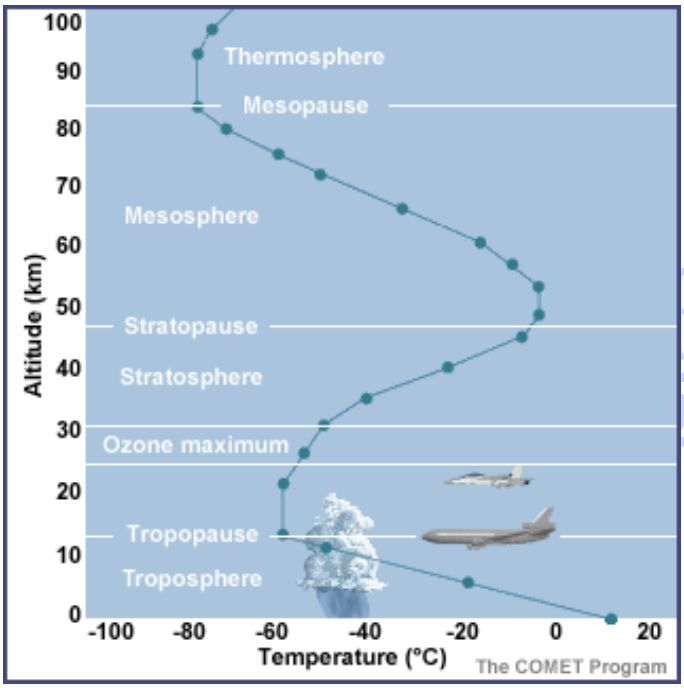
- **Dynamite :** It was discovered Alfred Nobel in 1863. It is prepared by absorption of raw dust with Nitro-glycerin. In modern dynamite Sodium Nitrate is used in place of Nitro-glycerin.
- **TNT:** Tri Nitro Toluene
- **TNB:** Tri Nitro Benzene
- **TNP:** Tri Nitro Phenol or picric acid.
- R.D.X is highly explosive known as plastisizer in which Aluminum powder is mixed to increase the temperature and the speed of fire.

Some Important Facts

- Age of fossils and archeological excavation is determined by radioactive carbon (C-14).
- Chloroform in sunlight forms poisonous gas 'Phosgene' (COCl2).
- To decrease the basicity of soil gypsum is used.
- In the preparation of Talcom powder theophestal mineral is used.
- Potassium chloride is most suitable for the removal of permanent hardness of water.
- To avoid melting of ice gelatin is used.
- Saccharine is prepared from toluene.
- Cream is a type of milk in which amount of fat is increased while -amount of water decrease.
- From one kilogram of honeybee 3500 calorie energy is produces.
- Nitrous oxide is known as laughing gas.
- Bones contain about 58% calcium phosphate.
- Phosphine gas is used in voyage as Holmes signal.
- Chlorine gas bleaches the colour of flower.
- Red phosphorus is used in match industry.
- Urea contains 46% nitrogen.
- In the electroplating of vessel NH4Cl is used.
- Power alcohol is prepared from mixing pure alcohol in benzene which is used as rocket fuel.
- Artificial perfumes are prepared from Ethyl acetate.
- Urea was the first organic compound synthesised in Laboratory.
- Vinegar contains 10% acetic acid.
- Acetylene is used for light production and riping of fruits.
- Ferric chloride is used to stop bleeding.
- Barium is responsible for green colour in fireworks.
- Cesium is used in solar cells.
- Yellow phosphorus is kept in water.
- Sea weeds contains iodine.
- During cooking maximum vitamin is lost.

- For the preparation of silver mirror, glucose is used.
- When cream is separated from milk, it's density increases.
- For artificial respiration mixture of oxygen and helium gas cylinder is used.
- In cold places, to decrease the freezing point ethylene glycol is used.
- Hydrogen peroxide is used for oil paintings.
- Sodium is kept in kerosene oil.
- The heaviest element is Osmium (Os).
- The lightest element and least dense is lithium (Li).
- Fluorine is the most oxidising agent.
- Silver is the best conductor of electricity.
- Radon is the heaviest gas.

LAYERS OF BIOSPHERE AND IT'S APPLICATION:



Troposphere: This is the lowest atmospheric layer and is about seven miles (11 km) thick. Most clouds and weather are found in the troposphere. The troposphere is thinner at the poles (averaging about 8km thick) and thicker at the equator (averaging about 16km thick). The temperature decreases with altitude.

Stratosphere: The stratosphere is found from about 7 to 30 miles (11-48 kilometers) above the Earth's surface. In this region of the atmosphere is the ozone layer, which absorbs most of the harmful ultraviolet radiation from the Sun. The temperature increases slightly with altitude in the stratosphere. The highest temperature in this region is about 32 degrees Fahrenheit or 0 degrees Celsius.

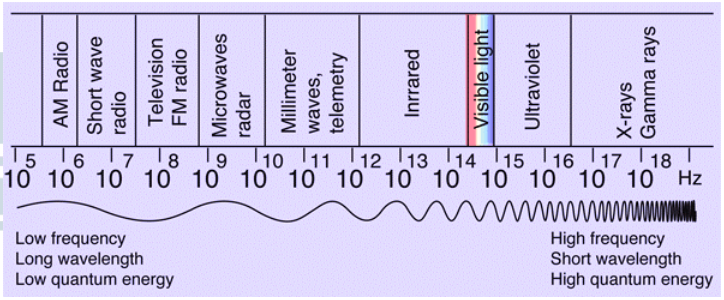
Mesosphere: The mesosphere is above the stratosphere. Here the atmosphere is very rarefied, that is, thin, and the temperature is decreasing with altitude, about –130 Fahrenheit (-90 Celsius) at the top.

Thermosphere: The thermosphere starts at about 55 kilometers. The temperature is quite hot; here temperature is not measured using a thermometer, but by looking at the motion and speed of the rarefied gases in this region, which are very energetic but would not affect a thermometer. Temperatures in this region may be as high as thousands of degrees.

Exosphere: The exosphere is the region beyond the thermosphere.

Ionosphere: The ionosphere overlaps the other atmospheric layers, from above the Earth. The air is ionized by the Sun's ultraviolet light. These ionized layers affect the transmittance and reflectance of radio waves.

RANGE OF WAVES SPECTRUM:



Radio: Your radio captures radio waves emitted by radio stations, bringing your favorite tunes. Radio waves are also emitted by stars and gases in space

Microwave: Microwave radiation will cook your popcorn in just a few minutes, but is also used byastronomers to learn about the structure of nearby galaxies.

Infrared: Night vision goggles pick up the infrared light emitted by our skin and objects with heat. In space, infrared light helps us map the dust between stars.

Visible: Our eyes detect visible light. Fireflies, light bulbs, and stars all emit visible light.

Ultraviolet: Ultraviolet radiation is emitted by the Sun and are the reason skin tans and burns. "Hot" objects in space emit UV radiation as well.

X-ray: A dentist uses X-rays to image your teeth, and airport security uses them to see through your bag. Hot gases in the Universe also emit X-rays.

Gamma ray: Doctors use gamma-ray imaging to see inside your body. The biggest gamma-ray generator of all is the Universe.