

Physics [24 Parts]

1. Liquids

1. Who is Archimedes?

He was one of the greatest Greek thinkers, mathematicians, physicist, engineer, inventor and astronomer of his time that is from BC 287 to BC 212.

2. What is principle of statics?

Physics relating to stationary objects

3. What is hydrostatics?

Science relating to liquids at rest

4. What is one of the principle named after Archimedes?

Archimedes Principles which is important principle of hydrostatics.

5. What is the relationship between pressure and depth?

As liquid increases the depth increases. The pressure depended on the vertical distance from the surface of the liquid.

6. What is the mathematical language for depth and pressure?

$P = \rho d$, Where P is the pressure and d is depth

7. What is the mathematical language for pressure and gravity?

$P = \rho g$, Where P is the pressure and g is the gravity

8. How to combine the three and write a simple formula to calculate the pressure at point in liquid?

$P = \rho d g$

9. How is density measured?

Density = mass/volume

10. How is relative density measured?

RD = density of substance/density of water

11. When do buoyant force comes into existence?

When body is immersed in any fluid (liquid or gas)

12. What is the statement of Archimedes principle?

It stated that when a body is immersed in a fluid, liquid or gas it experiences an apparent loss of weight which is equal to the weight of the fluid displaced.

13. What is the formula for verifying Archimedes principle?

$$(w_1 - w_2) = (w_4 - w_3).$$

Where, w_1 = the weight of the stone in air

w_2 = the weight of stone

w_3 = overflowing water in the beaker

w_4 = weigh the beaker with water

$w_4 - w_3$ = weight of the displaced water

$w_1 - w_2$ = loss of the weight of the stone

14. How is loss of weight measured?

Loss of weight = weight of water displaced

Weight in air - weight in water = density of water * volume of solid

15. How is volume of solid measured?

Volume of solid = $\frac{\text{weight in air} - \text{weight in water}}{\text{density of water}}$

16. How is density of solid measured?

Density of solid = $\frac{w_1}{w_1 - w_2} * \text{density of water}$

17. How can we find density of liquid?

RD = density of substance / density of water

Density of substance = RD * density of water

18. What is hydrometer?

It is an instrument that can be used to find the relative density of liquid.

2. Measurement and Motion

1. Name some measurement instruments?

Meter scale, balance, clock, measuring jar

2. What is measurement?

It is a process of comparison of unknown quantity with a standard quantity of the same kind.

3. What is standard measurement?

Any measurement that gives the same value for all is called standard measurement.

4. What is standard unit?

The units which are used in standard measurement are called as standard units.

5. What are fundamental quantities?

Length, mass and time

6. What is SI units?

It is System International Units

7. What is FPS system?

Foot, Pound Second system

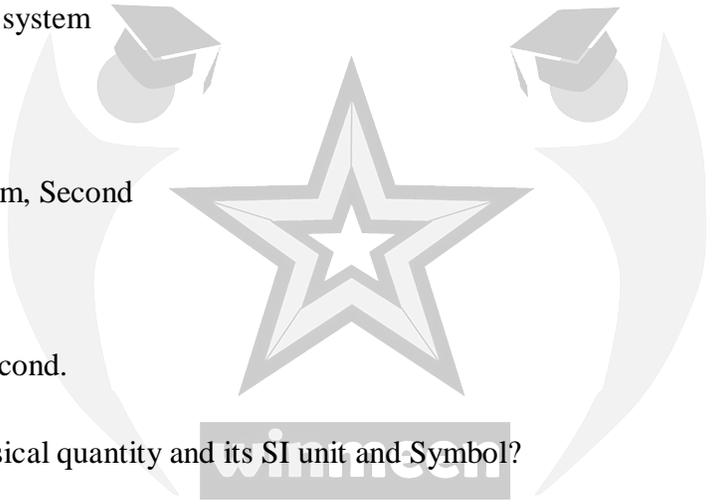
8. What is CGS?

It is Centimeter, Gram, Second

9. What is MKS?

Meter, Kilogram, Second.

10. Name some physical quantity and its SI unit and Symbol?



Physical quantity	SI unit	Symbol
Length	Metre	M
Mass	Kilogram	Kg
Time	Second	s

11. What is length?

The distance between two points is called length.

12. What is kilometer?

Larger distances such as the distance between two places are expressed as kilometer.

13. How is smaller lengths measured?

As centimeter and millimeter.

14. How is 1 meter converted to millimeters?

1000 millimeters

15. Why is sand heaviest?

It is heaviest because the amount of matter contained in sand is more than the amount of matter contained in rice and cotton.

16. What is kilogram?

The mass of a body is the amount of matter contained in it. the SI unit of mass is a kilogram.

17. What is used for measuring larger quantities?

Quintal and metric tone

18. What is time?

Time is the interval between two events. The SI units of time is second.

19. How are larger time intervals expressed?

As minutes, hour, day, week, month, year

20. What is millisecond or microsecond?

Any time interval less than 1 second is expressed as millisecond or microsecond.

21. How is time calculated?

- 1 minute = 60 seconds
- 1 hour = 60 minutes
- 1 day = 24 hours
- 1 year = 365 ¼ days
- 1 second = 1000 milliseconds
- 1 second = 1000000 microseconds

3. Measurement

1. How is length is measured?

Metre

2. What is area?

The measure of a surface is known as area

3. How is area measured?

Area = Length * breadth

The unit of area will be metre*metre = (metre)²

4. What are derived quantities?

Volume and density

5. What is derived quantity?

Quantities which have got the multiplication or division of fundamental physical quantities are called as derived quantities.

6. How is unit of length measured?

S. No	Unit of length	Unit of area
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1	Centimeter(cm)	square centimeter
2	Millimetre (mm)	Square millimetre
3	Feet (ft)	Square feet (ft ²)

7. How is area of agricultural fields measured?

Measured in acre and hectare.

1 Acre = 4047 m² = 100 cent

1 hectare = 2.47 acre

8. What is square?

Its area is measured as length * length and the formula used is I^2

9. What is rectangle?

Its area is length * breadth and the formula used is $I b$

10. What is triangle?

Its area is $\frac{1}{2} * \text{base} * \text{height}$ formula used is $\frac{1}{2} bh$

11. What is circle?

Its area $\pi = \frac{22}{7}$ or 3.14

12. What is volume?

It is the space occupied by a body is called its volume.

13. What is volume of regular objects?

Volume = base area * height

14. What is the unit of volume of milli metre and centimeter?

- Unit of length milli metre (mm) unit of volume is cubic millimeter (mm³)
- Unit of length of centimeter (cm) unit of volume of cubic centimeter (cm³)

15. how is one cubic centimeter otherwise called as?

1 millilitre or ml

16. Which is used to measure and transfer a definite volume of liquid?

Pipette

17. What is the unit volume of the substance?

Density

18. What is oscillation?

It is one complete to and fro motion.

19. What is time period?

It is the time taken to complete one oscillation

20. What is length of the pendulum?

The distance between the point of the suspension and the centre of the bob is called as length of the pendulum.

21. What is amplitude?

It is the distance up to which the bob is pulled from the position of rest.

4. Measurements

1. What is Le Systeme International d` Unites?

SI system of units

2. When was decision on uniform system of measurement introduced?

1971

3. What is the uniform system of measurement called as?

SI system units

4. How many fundamental quantities are there?

Seven

5. How is temperature measured?

It is measure of degree of hotness or coldness of a body. It has different scales like Celsius, Fahrenheit etc

6. What is Kelvin Scale?

It is the primary unit of temperature in SI system

7. How can we avoid negative values in Celsius scale?

By using Kelvin Scale

8. What is the number of divisions between upper and lower fixed points?

In Celsius scale it is 100 and in Fahrenheit Scale is 180

9. What is ampere?

SI unit for electric current is ampere

10. What is mole?

SI unit for amount of substance is mole

11. What is candela?

It is the SI unit for luminous intensity

12. What are the units of lengths?

- 10 millimetre (mm) = 1 centimetre (cm)
- 10 centimetres = 1 deimetre (dm) = 100 millimetres
- 10 decimetres = 1 metre (m) = 1000 millimetres
- 10 metres = 1 decametre (dam)
- 10 decametres = 1 hectometre (hm) = 100 metre
- 10 hectometres = 1 kilometre (km) = 1000 metres

13. What is units of area?

- 100 square millimeters (mm²) = 1 square centimeter (cm²)
- 100 square centimeters = 1 square decimeter (dm²)
- 100 square decimeters = 1 square metre (m²)
- 100 square metres = 1 square decameter (dam²) = 1 are
- 100 square decameters = 1 square hectometer (hm²) = 1 hectare (ha)
- 100 square hectometers = 1 square kilometer (km²)

14. What are the units of liquid volume?

- 10 millilitres = 1 centilitre
- 10 centilitres = 1 decilitre (dl) = 100 millilitres
- 10 decilitres = 1 litre = 1000 millilitres
- 10 litres = 1 decalitre (dal)
- 10 decalitres = 1 hectolitre (hl) = 100 litres
- 10 hectolitres = 1 kilolitre (kl) = 1000 litres

15. What is the units of mass?

- 10 milligrams = 1 centigram
- 10 centigrams = 1 decigram = 100 milligrams
- 10 decigram = 1 gram = 1000 milligrams

- 10 grams = 1 decagram
- 10 decagrams = 1 hectogram = 100 grams
- 10 hectograms = 1 kilograms = 1000 grams
- 1000 kilograms = 1 megagram or 1 metric ton

5. Measurement and Measuring Instrument

1. What was the writing of Claudius Ptolemy?

He wrote that the moon, the sun and all the planets around the Earth in an almost circular path.

2. Who was the first to point out that Mercury, Venus, Saturn, Jupiter and Mars moved in a path that seemed to be centered around the sun not the Earth?

Claudius Ptolemy

3. Who built his own telescope?

Galileo

4. Who discovered three moons of Jupiter?

Galileo

5. What is range of the instrument?

The values between the minimum measurable values and the maximum value that can be measured is called the range of the instruments.

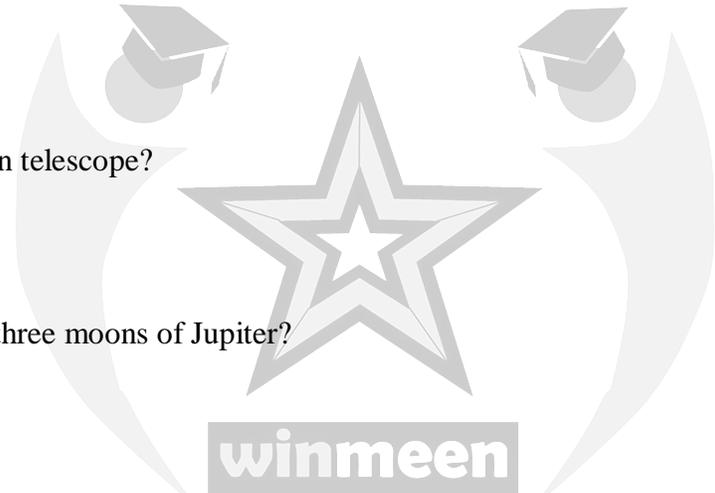
6. What are the three important characteristics of measuring instruments?

Least count, range, zero error

7. What is least count?

The smallest value that any instrument can measure is called as least count of the instrument.

8. What is observed value?



The value that is read off the instrument is called the observed value to which we apply the zero error correction and obtain the measured value.

9. Name the dimensions and SI unit?

Dimension	SI Unit
Length	Metre
Mass	Kilogram
Time	Second
Electric current	Ampere

10. Which is called as base unit?

The metre, the gram, the second and the ampere are known as the base units, to which we can add some prefixes.

11. What is base unit of mass?

Gram

12. What is SI unit of mass?

Kilogram

13. What is vernier caliper?

It is a device that is used a great deal in engineering work and in workshops which manufacture things.

14. What is called as ingenious device?

Vernier caliper because it has two scales with fairly large least counts are used in conjunction with one another to measure very small values of length.

15. What are the tips for measuring?

1. Recorded values of measurements must always be accompanied by the appropriate units.

2. As far as possible, measurements must be tabulated.

3. Values must be recorded to the appropriate decimal place.

16. Who was Pierre Vernier?

Pierre Vernier (1580 - 1637) was a French government official. Vernier was taught Mathematics and science by his father who was a lawyer and engineer.

17. What is the formula for Vernier Caliper principle?

Object length = Main scale reading + (Vernier coincident*least count)

18. What do Vernier Caliper consists of ?

- A thin long steel bar graduated in cm and mm (4). This is the Main scale.
- Fixed perpendicular to the bar at the left end of the steel bar carrying the main scale is an upper fixed jaw and a lower fixed jaw.
- To the right of the fixed jaws mounted on the steel bar is a slider with a upper movable jaw and a lower movable jaw.
- The slider can be fixed to any position using the tightening screw or friction nut.
- The Vernier scale (6) is marked on the slider and moves along with the movable jaws and the slider.
- The lower jaws (1) are used to measure the external dimensions and the upper jaws (2) are used to measure the internal dimensions of objects.

- The thin bar attached to the Vernier scale at the right side (3) is called the depth probe and is used to measure the depth of hollow objects.

19. What is beam balance?

A beam balance compares the sample mass with a standard reference mass (known masses such as 100g, 200g etc.). Least counts of 20g to 50 mg are possible.

20. What is Physical balance?

It is used in laboratories. It is similar to the beam balance but is a lot more sensitive and can measure mass of an object correct to a milligram.

21. What is two pan balance?

This type of balance is commonly used for measuring mass in shops. This balance too compares the sample mass with a standard reference mass. The pans rest on top of the beam and can be conveniently placed on a table top. Least counts are generally in the region of 10g to 50g.

22. What is Chandelier?

The pendulum as a reliable measure of time was first articulated by Galileo in 1602. In those days many lamps would be mounted on a large glass arrangement suspended from the ceiling. Such an elaborate arrangement was called a “chandelier”.

23. What is pendulum?

A pendulum is a heavy bob suspended by a light thread. The length [L] of the pendulum is measured from the point of suspension or pivot to the centre of gravity of the bob.

24. What is oscillation?

When the pendulum

is displaced from the centre position and released, it begins to swing to and fro. One complete to and fro motion is called an oscillation.

25. What is sundial?

The sundial has a stick or object to cast a shadow on the horizontal surface. As

the sun moves across the sky, the position of the shadow moves on the dial face to indicate time.

The least count of such sundials again varied a great deal and

improved from about one hour to about 15 minutes in the later years.

26. What is water clock?

It was an evenly marked container with a float and pointer into which water dripped in at a fixed rate. As the water dripped into the container, the level of water increased. The time was read off on the level markings on the wall of the container.

27. What is sand clock?

It was made up of two rounded glass bulbs connected by a narrow neck of glass, between them.

28. What is atomic clock?

Atomic clocks are the most accurate timekeepers ever known. The best ones lose or gain 1 second in 109 days (approximately 2739726 years).

6. Measuring Instruments

1. What is physics?

Physics is the most basic science, which deals with the study of nature and natural phenomena. It is a science of measurement.

2. What is screw gauge?

The Screw Gauge is an instrument to measure the dimensions of very small objects upto 0.01 mm. The Screw Gauge consists of a 'U' shaped metal frame.

3. What is pitch scale?

On the cylinder parallel to the axis of the screw a scale is graduated in millimeter called Pitch Scale.

4. What is head scale?

One end of the screw is attached to a sleeve. The head of the sleeve is divided into 100 divisions called the Head Scale.

5. What is principle of screw gauge?

The *screw gauge* works under the principle of the screw. When a screw is rotated in a nut, the distance moved by the tip of the screw is directly proportional to the number of rotations.

6. What is pitch of screw?

The pitch of the screw is the distance between two successive screw threads. It is also equal to the distance travelled by the tip of the screw for one complete rotation of the head.

7. What is the least count of screw gauge?

The distance moved by the tip of the screw for a rotation of one division on the head scale is called the least count of the Screw Gauge.

8. What is zero error of screw gauge?

When the plane surface of the screw and the opposite plane stud on the frame are brought into contact, if the zero of the head scale coincides with the pitch scale axis, there is no zero error.

9. What is positive zero error?

When the plane surface of the screw and the opposite plane stud on the frame are brought into contact, if the zero of the head scale lies below the pitch scale axis, the zero error is positive.

10. What is negative zero error?

When the plane surface of the screw and the opposite plane stud on the frame are brought into contact, if the Zero of the head scale lies above the pitch scale axis, the zero error is negative.

11. How to measure diameter with thin wire?

- Determine the Pitch, the Least Count and the Zero Error of the Screw Gauge.
- Place the wire between the two studs.
- Rotate the head until the wire is held firmly but not tightly, with the help of ratchet.
- Note the reading on the pitch scale crossed by the head scale (PSR) and the head scale division that coincides with the pitch scale axis (H.S.C).
- The diameter of the wire is given by $P.S.R + (H.S.C \times L.C) \pm Z.C$
- Repeat the experiment for different portions of the wire.
- Tabulate the readings.
- The average of the last column reading

12. How to measure long distance?

For measuring long distances such as distance of the moon or a planet from the earth, special methods are adopted. Radio echo method, laser pulse method and parallax method are used to determine very long distances. Units such as astronomical unit and light year are used to measure distance in space.

13. What is astronomical unit?

Astronomical Unit is the mean distance

of the centre of the sun from the centre of the earth. Astronomical Unit (AU) = $1.496 \times 10^{11} \text{m}$

14. What is light year?

Light year is the distance travelled by light in one year in vacuum. Distance travelled by light in one year in vacuum = Velocity of light \times 1 year (in seconds)

$$= 3 \times 10^8 \times 365.25 \times 24 \times 60 \times 60$$

$$= 9.467 \times 10^{15} \text{ m}$$

Therefore , 1 light year = $9.467 \times 10^{15} \text{ m}$

7. Types of Energy

1. Why do we need energy?

We need energy to perform both mental and physical activities like thinking, reading, analysing, running, walking, cycling, climbing, playing and jumping.

2. Where from the energy did the vehicles get from?

The bus, the boat and the helicopter get the energy to run from fuel

3. Define Energy.

Energy as the capacity or ability to do work. The unit of energy is joule.

4. What are the Types of Energy ?

There are many different types of energy. Some of them are:

- Mechanical energy
- chemical energy
- light energy
- sound energy
- electrical energy

- heat energy
- wind energy.

5. What is Mechanical Energy?

Mechanical energy is the energy possessed by an object due to its movement or position.

6. What are the types of Mechanical Energy?

There are two types of mechanical energy.

- Potential energy
- Kinetic energy.

7. What is meant by Potential Energy?

The energy possessed by an object by virtue of its position or configuration is called potential energy.

8. What is meant by Kinetic energy?

The energy possessed by a body by virtue of its motion is called kinetic energy.

9. How do Hydro power stations generate Electricity?

Potential energy and kinetic energy are inter convertible. This property is used to generate electricity in

hydro-electric power stations.

10. What is the process of generating electricity?

When water is stored in a dam, the stored water contains potential energy. When this water is allowed to flow down, it changes into kinetic energy. This kinetic energy of water is used to rotate the turbines and generate electricity.

11. What are the uses of Mechanical Energy?

Uses:

- i) Mechanical energy can bring a moving body to rest or can make a body at rest to move.
- ii) Using wind energy, we can generate electricity through windmills.

12. What is meant by Chemical Energy?

Energy that is stored in the bonds of chemical compounds is called chemical energy. Chemical energy is released during a chemical reaction, often in the form of heat and light.

13. Which energy is used to enable us to work?

The food we eat undergoes chemical reaction and releases energy to enable us to work.

14. What are the uses of chemical energy?

Uses:

1. The chemical energy stored in the food of plants and animals is used for their growth and function.
2. A battery or an electric cell converts chemical energy into electrical energy.
3. While using fuels, chemical energy is converted into heat energy and light energy.

15. What is Electrical Energy?

In an electric bulb, electrical energy is converted into light energy and in an electric fan, electrical energy is converted into mechanical energy. In a windmill, the wind energy (kinetic energy) is converted into electrical energy.

16. What are the Uses of Electrical Energy?

1. In industries, electrical energy is used to operate machines and is also used in telecommunication.
2. In cities, electrical energy is used to run electric trains.

17. How was the Heat energy is formed?

The chemical energy stored in wood, kerosene and LPG is converted into heat energy. Due to friction and chemical reaction, heat energy is produced.

18. List out the uses of Heat energy?

Uses:

1. We get rain due to evaporation of water from water bodies. It is because of the heat energy from the sun.
2. In a thermal power station, of electricity is generated from the heat energy obtained by burning coal.
3. In an electric stove, electric iron etc., electrical energy is converted into heat energy.

19. From where do we have Solar Energy?

The energy obtained from the sun is called solar energy.

20. What are the uses of solar energy?

Uses:

1. Solar energy is directly used in solar heater, solar cooker etc.,
2. Solar cells are used in artificial satellites, watches, calculators and is used to operate solar vehicles.

21. Which energy is converted to produce electricity in Neyveli and Ennore, Thermal Power Station?

In Tamilnadu, at Neyveli and Ennore, thermal power stations, coal is burnt to generate electricity. Here the chemical energy of coal is first converted into heat energy and then into electrical energy.

22. How do the Loud Speaker Works?

The loudspeaker converts electrical energy into sound energy

23. How the Plants converts Energy?

During photosynthesis, plants convert light energy from the sun into chemical energy and store it.

24. Give some Examples for electrical energy into sound Energy?

In electric doorbells and horns of automobiles, electrical energy is converted into sound energy.

25. How does the Torch Light Worked?

In a torch light, the chemical energy of the cell is first converted into electrical energy and then into light energy.

26. Define the Law of Conservation of Energy?

Energy can neither be created nor be destroyed, but can be transformed from one form into another. This is called the Law of Conservation of Energy.

27. how energy conversion takes place, when an electric motor pumps water?

To operate the electric motor, electrical energy is used. This electrical energy is converted into kinetic energy, sound energy and heat energy.

Electrical energy \rightarrow Kinetic energy + Sound energy + Heat energy (To operate the (to lift water) (released when electric motor works) electric motor).

8. Motion

1. What is mean by Speed?

The most obvious feature of an object in motion is speed. It is a measure of how fast or slow an object is moving.

2. Give one Example for measuring Speed?

Two of the most exciting events in any sports meet is the 100m dash and 4x100m relay. Though all athletes run the same distance, the athlete who runs the distance in the shortest

time will be the winner. In other words, the athlete who has the highest speed or is the fastest will win.

3. What is speed?

- Speed of a body is the distance travelled by the body in one second.
- $\text{SPEED} = \text{DISTANCE TRAVELLED} / \text{TIME TAKEN}$
- Distance travelled is measured in metre and time in second
- Therefore, the unit of speed is metre / second . [m / s].
- It can also be expressed in kilometre / hour [km / h]

4. How do you find out the distance covered by an Object in a given time?

The speed of an object, we can find out the distance covered by it in a given time. All we do is to multiply the speed and time.

$$\text{Distance covered} = \text{Speed} \times \text{Time}$$

5. Explain the term Variable Speed?

The speed of a bus during a journey may vary. When the bus is nearing a bus stop, its speed decreases. On the highways the bus travels with greater speed. But in a city or town it travels with less speed due to heavy traffic. The bus has different speeds at different time intervals. So we say that it has variable speed.

6. How do you calculate the average speed?

We can calculate the average speed $\text{Average speed} = \text{Total distance travelled} / \text{total time taken}$

7. What is Uniform Speed?

If a body moves with the same speed at all times we say that it has uniform speed.

8. What is Displacement?

Displacement is the shortest distance between two points in a particular direction.

9. What is velocity? And how will you measure it?

velocity is the displacement of a body in one second.

$$\text{VELOCITY} = \text{DISPLACEMENT} / \text{TIME TAKEN}$$

Its unit is m / s. Velocity is nothing but speed in a definite direction.

10. What is Acceleration? How will you measure it?

Acceleration is the measure of change in velocity. Acceleration is the change of velocity in one second.

Acceleration = change in velocity / Time taken . Its unit is m / s².

11. Define negative acceleration? Give an example?

If the velocity of a moving body decreases, we say that it has negative acceleration or retardation or deceleration. Example : A train slows down to stop at a station.

12. What will happen when a ball is thrown up vertically?

As the ball rises, its velocity gradually decreases till it becomes zero i.e., the body is decelerated. When the ball falls down its velocity gradually increases i.e., it is accelerated.

13. What is meant by acceleration due to Gravity?

- The deceleration or acceleration is due to the earth's gravitational force. It is known as acceleration due to gravity.
- It has an average value of 9.8 m/s² on the surface of the earth and is represented as g.
- g=9.8m/s². This means that the velocity of a body decreases by 9.8 m/s every second when it is thrown up and the velocity increases by 9.8 m/s every second when it falls down

14. What is Hang-gliding?

- Hang-gliding is a sport in which a pilot flies a light un-motorized aircraft called a hang glider launched by foot.
- Most modern hang-gliders are made of aluminium alloy. The pilot is safe when fastened to a harness suspended from the frame of the glider.

15. What is Paragliding?

Paragliding is the latest aero sport. A paraglider is a non-motorized, foot launched inflatable wing, easy to transport, launch and land. It is basically a parachute made of special nylon or polyester fabric. The pilot is clipped to a harness in a comfortable sitting position. A paraglider is much lighter than a hang glider and easier to operate.

9. Force and Pressure

1. Explain the term Force?

Force is a push or a pull acting on an object which changes or tends to change the state of the object.

2. What is the Unit of Force?

In the International system of units (SI System), the unit of force is newton (N).

3. What is the reason behind for the unit force (N)?

Sir Issac Newton (1642 - 1727) One of the greatest scientists the world has ever seen. He was an English- mathematician, -physicist and astronomer. The SI unit of force is named after him.

4. Point out the other Units to measure the force?

There are also other units that are used to measure force. They are dyne, kilogram weight and pound weight.

5. What is mean by State of Motion?

A change in either the speed of an object or its direction of motion or both is described as a change in its state of motion. Thus, a force may bring a change in the state of motion of an object.

6. What is Contact Force?

A force that can cause or change the motion of an object by touching it is called Contact force.

7. What is Muscular Force?

The force Which is caused by the action of muscles. Hence this force is known as muscular force.

8. What is Frictional Force?

The ball slows down due to the force acting between the ball and the ground. It is the force of friction which causes the ball to rest. The frictional force is always in a direction opposite to the direction of motion of the object

9. What is Non – Contact Force?

A non-contact force is any force applied to an object by another body without any contact.

10. Explain Magnetic Force?

Is it necessary to bring the two magnets in contact to observe the force between them? No. A magnet can exert a force on another magnet without touching it. Magnetic force is a non contact force.

11. What is Gravitational Force?

Why are objects fall towards the earth? It is because the earth pulls them down. This force is called the force of gravity. This is an attractive force. This is an example for non-contact force.

12. What is electrostatic force?

Force exerted by a charged body on another charged or uncharged body is known as electrostatic force. This force acts when the bodies are not in contact. The electrostatic force is another example of non contact force

13. What is Pressure? how will you measure it?

Pressure is defined as the force acting on a unit area. Pressure = Force/ Area on which it acts

The SI unit of pressure is N/m^2 . It is also called pascal (Pa)

14. Is Pressure exerted by liquids and gases?

You know that liquids and gases are called fluids. Solids always exert pressure downwards. But the fluids exert pressure in all Directions. Fluids exert pressure on all bodies immersed in them and also on the walls of the container that holds them.

15. Is the Pressure of the liquid is depends upon the Gravitational force .Give one Example?

On the earth we have more gravitational force and hence the pressure exerted by the glass of water will be more. On the moon, the gravitational force is less compared to our earth. Hence the pressure exerted by a glass of water is less on the moon. So, pressure of a liquid depends on gravitational force.

16. How the Pressure of the liquid is calculated?

The pressure of a liquid can also be calculated by using a formula $p = hdg$

p = pressure of a liquid

h = height of the liquid column

d = density of the liquid

g = acceleration due to gravity

17. Define Pascal's Law.

The pressure applied to an enclosed liquid gets transmitted equally to every part of the liquid. This property was first demonstrated by Pascal and is called Pascal's law.

18. Is Air Exerts pressure on the wall of Objects . Explain it with Example.

We must have walked on the road while there is a strong wind. How did we feel? Did we feel any force while walking against the wind? What happens to the bicycle tube when it has a puncture From the above observations you can say that air also exerts pressure on the walls of their container.

19. What is Atmospheric Pressure?

The earth is surrounded by air all around. This thick envelope of air is called the atmosphere. The atmospheric air extends up to many kilometers above the surface of the earth. The pressure exerted by this air column is known as the atmospheric pressure.

20. How the Atmospheric pressure is decrease?

The atmospheric pressure at sea level is approximately $1,00,000 \text{ N/m}^2$ (or 10^5 N/m^2). As we go higher and higher above the earth surface, the atmospheric pressure decreases.

21. How the Atmospheric Pressure is Measured?

The atmospheric pressure is not the same at all places. It decreases as we go above the earth's surface. The instrument used to measure the atmospheric pressure is called Barometer.

22. What are the instrument that we used to measure the Atmospheric pressure?

In 1643, an Italian scientist named Torricelli invented the first barometer. It was a mercury barometer. Aneroid barometer and Fortin's barometer are other instruments used to measure the atmospheric pressure.

23. What is Friction?

The force which opposes the action of sliding your foot on the floor is called 'friction'. Friction is the force created whenever two surfaces move or try to move over each other.

24. How was the Friction is Caused?

Friction is caused by the irregularities on the two surfaces in contact. Even those surfaces which appear very smooth have a large number of irregularities on them. Irregularities on the two surfaces lock into one another. When we attempt to move any surface, we have to apply a force to overcome the interlocking. On rough surfaces there are larger number of irregularities. So the force of friction is greater if a rough surface is involved.

25. What are the Factors which are affecting Friction?

The force of friction depends on two main factors 1. Mass of the body 2. Nature of the surfaces in contact As the mass of the body increases, the force of friction also increases. A football when kicked goes farther than a cricket cork ball since the mass of the cricket ball is more than that of the foot ball. Friction is less when the surface is smooth. This you can understand by rolling a stone on a tar road(rough surface) and a house floor (smooth surface).

26. What are the Advantages of Friction?

1. We are able to walk or run properly- on- the- floor- because of friction. If there is less or no friction we will slip and fall down.
2. It would not be possible to light a match stick without friction between its head and the side of the matchbox.
3. Cars and buses are able to run on the roads because of the friction between the wheels and the road.
4. We cannot write on paper without friction between the tip of a pen or a pencil and the paper.

27. What are the Disadvantages of Friction?

1. Friction produces heat. This heat causes wear and tear of the machinery parts.
2. Vehicle tyres and soles of footwear wear out because of friction.

10. Motion

1. What is datum?

We take a point on the ground and we measure all distances with respect to this point which we call the datum.

2. What is frame of reference?

The three imaginary lines representing the three axes together with the datum is called the frame of reference.

3. What is state of motion?

A body is said to be in the state of motion, when it changes its position with respect to a datum over time.

4. What are the parameter for motion?

- A datum and a frame of reference
- The position of the object in relation to the datum or frame of reference
- Time

5. What are the types of motion?

- Linear motion – where the object moves along a straight line.
- Circular motion – where the object moves along a circular path.
- Oscillatory motion – where an object describes a repetitive to and fro movement retracing its original path in the opposite direction.
- Random motion – where the motion of the object does not fall in any of the above categories.

6. What is distance?

It is the length of the actual path followed by an object or body while moving from one point to another.

7. What is displacement?

It is the shortest distance between two points and is a vector quantity where direction is an essential feature.

8. Differentiate between distance and displacement?

- Distance: It is the length of the actual path followed by an object or body, while moving from one point to another.
- Displacement: It is the shortest distance between two points.
- Distance: It is a scalar quantity (having only magnitude).
- Displacement It is a vector quantity (having magnitude and direction)
- Distance: It is measured in metres in the SI system. It is measured in metres in a particular direction in the SI system.
- Displacement It is not a unique quantity and is always path dependent.
- Distance: It is only dependent on the starting point and the ending point and is independent of the path followed. It is unique to a given pair of points.
- Displacement: It can either be equal to or greater than displacement.
- Distance: It is either equal to or lesser than the distance. Distance in any direction would be a positive quantity, since direction is inconsequential.

- Displacement: It can be a negative quantity. If displacement in one direction is assumed to be positive then the displacement in the opposite direction would be a negative quantity

9. What is speed?

Speed is the rate of change of distance with respect to time or the distance travelled per unit time. The SI unit of speed is metres per second. It is a scalar quantity

10. What is velocity?

Velocity is the rate of change of displacement with respect to time. It is the displacement per unit time. The SI unit of velocity is metres per second. It is a vector quantity and therefore, the direction must always be specified along with the magnitude and the units.

11. What is acceleration?

Acceleration is the rate of change of velocity with respect to time or it is the rate of change of velocity in unit time. It is a vector quantity. The SI unit of acceleration is m/s per second, also written as m/s^2 or ms^{-2} .

12. What is uniform speed?

Uniform speed/ velocity means that the speed/velocity remains constant over time. In the world around us, we notice that the speed of objects keeps changing from time to time. In such a case the distance/displacement – time graphs would not be a straight line.

13. What is slope of line?

The value DE/AD is called the slope of the line.

14. What are the three equation of motion?

$$v = u + at$$

$$s = ut + \frac{1}{2} at^2$$

$$v^2 - u^2 = 2as$$

15. What is circular motion?

The movement of an object in a circular path is called circular motion.

16. What is centripetal acceleration?

Uniform circular motion is a special case, where the speed of an object remains constant but the direction keeps on changing.

17. What is centripetal force?

The force that keeps the body going around in circular motion is called the Centripetal force. The Centripetal force acts perpendicular to the velocity and is always directed radially inwards towards the centre of the circle.

11. Work, Power and Energy

1. What is work?

Work is said to be done, when a force acts on a body and the point of application of the force is displaced in the direction of force.

2. Which results in acceleration?

When a force acts on a body at rest, it results in acceleration, which in turn results in velocity and displacement. In the definition of work, however, we are merely concerned about the resultant displacement and not the rate at which the displacement happens (velocity).

3. What is weight of object?

The weight of an object is the force of gravity acting on the object. When the object is lifted up from the ground to a point above, then work is said to be done against the force of gravity.

4. How is work measured?

Work (W) is measured as the product of the force (F) and the displacement (S) in the direction of the force. $W = F \times S$

5. What is SI unit of work?

The SI unit for measuring the quantity of work done is the joule

6. How is joule considered?

One joule of work is said to be done when a force of one newton acting on a body displaces it by one metre.

7. What is power?

Power (P) is defined as 'the rate of doing work'. It can also be defined as 'the work done per unit time'.

8. How is power calculated?

Power (P) is calculated by dividing the work done (W) by the time taken (t) to do that work.

Power = work/time

9. What is SI unit of power?

The SI unit for measuring power is Watt. Power is said to be one watt when one joule of work is done in one second

10. What is energy?

Energy is defined as the capacity to do work.

11. What is SI unit of energy?

The SI unit for measuring energy is the same as that of measuring work, which is the joule.

12. Name some forms of energy?

Some important forms of energy are: chemical energy, light energy, heat energy, electrical energy, nuclear energy, sound energy and mechanical energy.

13. How do objects get energy?

(i) Energy in some other form is converted and added to the energy that the object already possesses. Energy can never be created.

(ii) Work is done.

14. What is law of conservation of energy?

‘Energy can neither be created nor destroyed; it can only be changed from one form to another.’

15. What is isolated system?

When there are no influencing factors on the system from the surroundings, then we call it an isolated system or a closed system.

16. What is mechanical energy?

When a work is done on an object, then the object gains energy. The energy acquired by objects upon which work is done is known as mechanical energy.

17. What will be the result of work done on an object?

When work is done on an object, then it can result in one of the following:

- (i) Increase in speed. (Kinetic Energy)
- (ii) Increase in height or state of strain. (Potential Energy)

18. What is kinetic energy?

Energy possessed by an object due to its motion (or velocity) is called kinetic energy

19. What is the formula for kinetic energy?

Kinetic energy can be calculated using the formula $KE = \frac{1}{2} mv^2$ where 'm' is the mass of the moving body and 'v' is its velocity.

20. What is potential energy?

The energy possessed by a body by virtue of its position or due to a state of strain, is called potential energy.

12. Laws of Motion and Gravitation

1. What is force?

Force is one which changes or tends to change the state of rest or of uniform motion of a body. Force is a vector quantity. Its SI unit is newton.

2. What is balanced force?

Forces acting on an object which do not change the state of rest or of uniform motion of it are called balanced forces

3. What is unbalanced force?

The block moves in the direction of the greater force. The resultant of two opposite forces acts on an object and brings it to motion. These opposite forces are called unbalanced forces.

4. What is laws of motion?

Galileo observed the motion of objects on an inclined plane. The first law of motion is stated as: An object remains in the state of rest or of uniform motion in a straight line unless compelled to change that state by an applied unbalanced force.

5. What is inertia?

The tendency of objects to stay at rest or to keep moving with the same velocity, unless it is acted by an external force is called inertia.

6. What is momentum?

The momentum 'p' of an object is defined as the product of its mass 'm' and velocity 'v'.

$$p = mv$$

7. What is second law of motion?

The second law of motion states that the rate of change of momentum of an object is directly proportional to the applied unbalanced force in the direction of force. Suppose an object of mass 'm' is moving along a straight line with an initial velocity 'u', it is uniformly accelerated to velocity 'v' in time 't' by the application of constant force 'F', throughout the time 't'.

Rate of change of momentum = change of momentum/time

8. What is one unit of force?

One unit of force (1N) is defined as the amount of force that produces an acceleration of 1 ms^{-2} in an object of 1 kg mass.

9. What is Newton third law of motion?

Newton's third law of motion states

that for every action there is an equal and opposite reaction. It must be remembered that the action and reaction always act on two different objects.

10. What is conservation of momentum?

The law of conservation of momentum states that, in the absence of external unbalanced force, the total momentum of a system of objects remains unchanged.

11. What is collision?

The total momentum before collision is equal to the total momentum after collision. The total momentum of two objects remain unchanged due to collision in the absence of external force. This law holds good for any number of objects.

12. What is magnitude of moment of force?

The magnitude of the moment of force about a point is defined as the product of the magnitude of force and the perpendicular distance of the point from the line of action of the force.

13. What is momentum of force?

Moment of force = $F \times d$.

14. What is Newton's law of gravitation?

Every object in the universe attracts every other object with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

15. What is mass?

Mass is the quantity of matter contained in a body.

16. What is weight?

Weight is the gravitational force acting on a body. It is a measure of how strongly gravity pulls on that body.

17. What is acceleration related to gravity?

The acceleration produced in a body on account of the force of gravity is called acceleration due to gravity.

18. What is Chandrayana I?

Chandrayaan-1 is a moon-traveller or moon vehicle.

19. When was ISRO launched?

It was launched by the Indian Space Research Organization (ISRO) in October 2008 from Srihari Kota in Andrapradesh and operated until August 2009.

20. What are the achievements of Chandrayana I?

The discovery of wide-spread presence

of water molecules in lunar soil.

- Chandrayaan's Moon Mineralogy Mapper has confirmed that moon was once completely molten.
- European Space Agency payload- Chandrayaan-1 imaging X-ray spectrometer (CIXS) detected more than two dozen weak solar flares during the mission.
- The terrain mapping camera on board Chandrayaan-1 has recorded images of the landing site of the US space-craft Apollo-15, Apollo-11.
- It has provided high-resolution spectral data on the mineralogy of the moon.
- Lunar Laser Ranging Instrument (LLRI) covered both the Lunar Poles and additional lunar region of interest.
- The X-ray signatures of aluminium, magnesium and silicon were picked up by the CIXS X-ray camera.
- The Bulgarian payload called Radiation Dose Monitor (RADOM) was activated on the very same day of its launch and worked till the mission ended.
- More than 40,000 images have been transmitted by Chandrayaan camera in 75 days.
- The Terrain Mapping Camera acquired images of peaks and craters. The moon consists mostly of craters.
- Chandrayaan beamed back its first images of the Earth in its entirety.
- Chandrayaan-1 has discovered large caves on the lunar surface that can act as human shelter on the moon.

21. What is cryogenics?

The term Cryogenics is from Greek and means “the production of freezing cold”.

22. What is space station?

A space station is an artificial structure designed for humans to live and work in the outer space for a certain period of time.

13. Magnetism

1. Which is used to lift heavy iron loads?

Cranes are used to lift heavy iron loads.

2. Which is used in cranes?

Powerful magnets

3. What is the use of powerful electromagnets?

Powerful electromagnets are used to operate electromagnetic trains, lifts and escalators.

4. What is magnet?

There was a region called Asia Minor, where there was a town called Magnesia. It was full of mountains, rocks and plateaus. The only occupation for the people was grazing the cattle. There was a shepherd named Magnes.

5. How did magnet got its name?

As it was discovered by Magnes, they called it Magnet and also Magnetite. Magnetite was the ore with attracting property found in that region.

6. What are called as magnetic stones?

Magnetite's are natural magnets. They are called magnetic stones.

7. What is called as leading stones?

Natural magnets do not have a definite shape. When a magnet is freely suspended, it always comes to rest in north- south direction. That is why they are called leading stones or lode stones.

8. What is artificial magnets?

After learning the method of changing the piece of iron into magnet (magnetization) we have been making and using several kinds of magnet.

Such man-made magnets are called artificial magnets.

9. What is magnetic substances?

Substances that are attracted by magnet are called magnetic substances.

Iron, cobalt, nickel are magnetic substances.

10. What are non-magnetic substances?

Substances that do not get attracted by magnet are called non-magnetic substances. Paper, plastic are called non- magnetic substances.

11. What are poles of magnet?

The ends of a magnet have the strongest magnetic force. So most of the iron filings cling to the ends of the magnet. They are called poles of the magnet.

12. Which rests at north-south direction?

A freely suspended magnet always comes to rest in north-south direction.

13. What is north and south pole?

North seeking pole is called north pole. South seeking pole is called south pole

14. What is magnetic compass?

The Magnetic compass has been designed by using this directive property of the magnet.

15. What is electro- magnetic train?

Electromagnetic train is also called as suspension train. In France, it is called flying train. It does not require diesel or petrol.

14. Electricity

1. Which helps us to see in dark and heat up food?

Electricity lights up the bulbs for us to see even in the dark and heats up the oven to cook food.

2. How do we get electricity at home and school?

- The electricity we use at home and school comes from the substation in the neighborhood which draws power from the larger power stations.
- These power stations get electricity from the electrical plants.
- From the power station, electricity flows through cables and wires to the step up transformers where the voltage is raised to facilitate long distance travel.
- The substation transformers receive the current, lower the voltage and send it to pole transformers.
- From these transformers, electricity is supplied to homes, schools and buildings, wherever required.

3. What is turbines?

Inside the power stations, there are huge rotating wheels called turbines.

4. What is generator?

A simple generator consists of a coil of wire that rotates between the poles of a strong magnet. As the coil rotates, electric current is generated.

5. Give note on Tamil Nadu leads?

- Wind energy is an important, free, renewable, clean and non-polluting energy source.

- In a wind farm, huge windmills convert wind energy into electrical energy. Tamilnadu is the No.1 state in India, with the highest wind power generating capacity of about 5,000 MW.
- Most wind farms are in Thoothukudi, Kanyakumari and Thirunelveli Districts of Tamilnadu.

6. What is electric cell?

The electric cell is a source of electric current. It is a device which converts chemical energy into electrical energy.

7. What is electrolyte?

An electric cell has two different metal plates called electrodes kept inside a chemical called electrolyte.

8. What are the types of electric cell?

Primary and secondary cells

9. What is primary cell?

Primary cells are intended to be used only once and then discarded. They cannot be reused as the chemicals get used up, when the cells are in use and cannot be recharged.

10. What are secondary cells?

Secondary cells can be recharged and reused many times. They are also called Storage cells.

11. Who developed electric cell?

The first electric cell was developed by an Italian scientist Luigi Galvani and then improved by Alessandro Volta. It has been further developed into the modern day cell or torch battery. Now, we also have rechargeable alkali cells and solar cells. These solar cells convert light energy into electrical energy.

12. What is electric circuit?

An electric circuit is the continuous or unbroken closed path along which electric current flows from the positive terminal to the negative terminal of the battery.

13. What do the electric circuit made of?

A circuit generally has:

- a) A source of electric current - a cell or battery.
- b) Connecting wires - for carrying current.
- c) A device that consumes the electricity - a bulb.
- d) A key or a switch – This may be connected anywhere along the circuit to stop or allow the flow of current. When the current flows, the circuit is said to be closed. When the current does not flow, the circuit is said to be open.

14. What is galvanometer?

Galvanometer is an instrument used to detect the flow of current in electrical circuits. When current flows through the galvanometer, the needle gets deflected.

15. What is electric switch?

An electric switch is a device that opens or closes an electric circuit

16. What is electric eel?

The Electric eel is an electric fish. It is capable of generating powerful electric shocks for hunting its prey and for self defence. The electric eel lives in the fresh water of the Amazon and the Orinoco river basins in South America.

17. What is conductors?

The materials that allow electric current to pass through them are conductors

18. What is electric fuse?

The wires will get overheated and the appliance will get damaged. This situation arises as a result of some fault in the circuit and can be extremely dangerous as it could cause fire. To prevent electric appliances from getting damaged as a result of excessive flow of current through them, a safety device called fuse is used. The fuse is a safety device used in an electric circuit.

19. What is miniature circuit breaker?

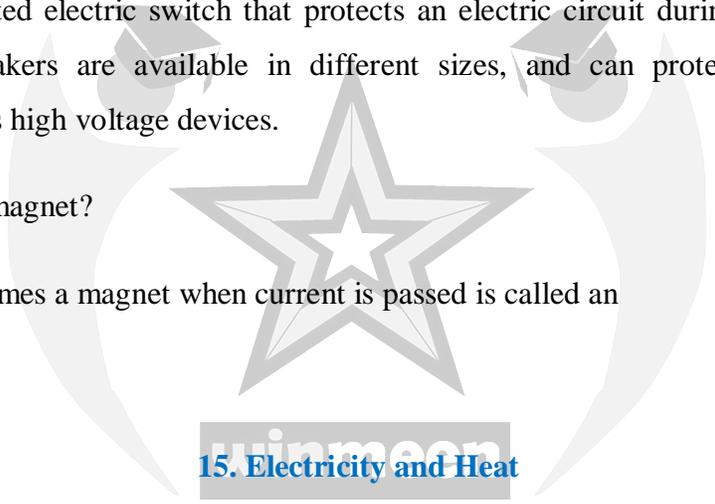
A miniature circuit breaker is an

automatically operated electric switch that protects an electric circuit during overload or short circuit. Circuit breakers are available in different sizes, and can protect small household appliances as well as high voltage devices.

20. What is electro magnet?

A material that becomes a magnet when current is passed is called an

Electromagnet



15. Electricity and Heat

1. How is electricity useful to us?

Electricity plays a very important role in our daily life. It is a form of energy that helps us in many ways. Most of the comforts of modern life would not be there, if there is no electricity.

2. What is power station?

power station is a place where electricity is produced on a large scale by using various sources of energy like water, wind, heat etc.

3. How is electric power controlled?

The electric power thus produced is used through circuits and controlled by switches.

4. What is electric circuit?

The flow of current requires a closed conducting path. This path is made by connecting a cell or a battery, a switch (key) and a bulb by means of wires. This

closed conducting path is known as an electric circuit.

5. What is simple circuit?

A circuit made up of a cell, a switch and a bulb is known as a simple circuit. When

the switch is put on, the bulb glows. This is because there is a continuous or closed path for the electric current to flow.

6. What is parallel circuit?

Observe the second circuit. Here each bulb is connected to the battery terminals by separate wires. This type of circuit is known as parallel circuit.

7. What is series of circuit?

The first circuit as described above is given here. When you look at the circuit, it is obvious that the bulbs are connected end to end. This type of circuit is known as series circuit.

8. What are conductors?

We know that the metals like copper, aluminium, iron, gold, etc. allow electric current to pass through them. They are called Conductors.

9. What is insulators?

Materials like wood, plastic, rubber, glass etc. do not allow electric current to pass through them. They are called Insulators.

10. Why is water good conductor of electricity?

The water we get from sources such as taps, hand pumps, wells and ponds

is not pure. It contains some small amount of natural salts and so, this water is a good conductor of electricity.

11. What is electrodes?

The two conductors that are immersed in the solution where the current enters and exits the solution are called electrodes (the copper plates in the above activity).

12. What is electrolyte?

A substance that conducts electric current either in the form of a solution or in a fused state is called an electrolyte (copper sulphate solution in the above activity).

13. What is electrolysis?

The process by which an electrolyte is decomposed with the help of electricity is called electrolysis.

14. What is electro refining?

This is a process by which metals like gold and silver are refined or purified.

15. What is electro plating?

This is a process in which a layer of one metal is coated over another metal by electrolysis.

16. What is lightening?

The most dramatic natural phenomenon we observe on the earth is lightning. Lightning is an electric spark.

17. What is static electricity?

Static electricity is the accumulation of electrical charges on the surface of a non-conducting material. It is called “static” because there is no current flow .

18. What are atom made of?

The atom is made of 3 types of particles. They are: (i) electrons(ii) protons (iii) neutrons.

19. What are the kinds of charge?

There are two kinds of charges.

a). Positive charge - the charge that is acquired by the glass rod when rubbed with silk

b). Negative charge – the charge that is acquired by the plastic rod when rubbed with wool.

20. What is electroscope?

An electroscope is a device used to detect and measure electric charges. It works on the principle of transfer of charges by Conduction or Induction.

21. What are the different ways of transferring heat?

They are:

(i) Conduction

(ii) Convection

(iii) Radiation.

22. What is radiation?

The process by which heat is transferred without the help of any material or medium is called radiation.

16. Electricity and Energy

1. What is electric circuit?

A continuous and closed path of an electric current is called an electric circuit.

2. What is electric current?

Electric current is expressed by the amount of charge flowing through a particular area of cross section of a conductor in unit time.

3. What is coulomb?

The SI unit of electric charge is coulomb.

4. What is Ampere?

The electric current is expressed by a unit called ampere (A), named after the French Scientist Andre - Marie Ampere.

5. What is one ampere?

When one coulomb of charge flows in one second across any cross section of a conductor, the current in it is one ampere.

6. What is electrical potential difference?

The electric potential difference between two points in an electric circuit is the work done in moving a unit positive charge from one point to the other.

Potential difference (V) = work done / change

7. What is voltmeter?

The potential difference is measured by an instrument called voltmeter.

8. What is Ohm's law?

Ohm's law states that at constant temperature the steady current (I) flowing through a conductor is directly proportional to the potential difference (V) between its ends.

$I \propto V$ (or) $V/I = \text{Constant}$

9. How can we connect resistors?

Resistors can be connected in (a) series (b) parallel.

10. What is heating effect of electric current?

The rest of the energy may be expended in heat to raise the temperature of the gadget. If the electric circuit is purely resistive, the energy of the source continuously gets dissipated entirely in the form of heat. This is known as heating effect of electric current.

11. What is Joule's law?

Thus for a steady current I , the amount of heat H produced in time t is

$$H = W = VQ$$

since, $Q = It$

Applying Ohm's law we get $H = I^2 Rt$.

This is known as Joule's law of heating.

The law implies that heat produced in a resistor is (1) Directly proportional to the square of current (I^2) for a given resistance, (2) directly proportional to the resistance (R) for a given current, (3) directly proportional to the time(t) for which the current flows through the resistor.

12. What is role fuse?

A common application of Joule's heating is the fuse used in electric circuits. It consists of a piece of wire made up of an alloy (37% Lead, 63% Tin).

13. Name the colour of wires and their use?

- One of the wires in the supply, usually with red insulation, is called live wire.

- Another wire, with black insulation, is called neutral wire. In our country, the potential difference between the two are 220 V.
- Another wire in green insulation is called earth wire.

14. What is electric power?

The rate of consumption of electric energy is termed as electric power. The power P is given by $P = VI$ (or) $P = I^2R$. The SI unit of electric power is watt (W). 1 watt is the power consumed by a device that carries 1 A of current when operated at a potential difference of 1 V. Thus, $1 \text{ W} = 1 \text{ volt} \times 1 \text{ ampere} = 1 \text{ V A}$

15. What is commercial use of electric energy?

One watt hour is the energy consumed when one watt of power is used for one hour. The commercial unit of electric energy is kilowatt hour (KWh), commonly known as unit.

16. What is electrolysis?

When the current is passed through aqueous or molten solutions of inorganic acids, bases and salts, the conduction of electricity is always accompanied by chemical decomposition of the solutions. Such solutions are called electrolytes and the phenomenon of the conduction of electricity through electrolytes by chemical decomposition is called electrolysis.

17. What is electrochemical cells?

The cells in which the electrical energy is derived from the chemical action are called electrochemical cells.

18. What is primary cell?

The cells from which the electric energy is derived by irreversible chemical reaction are called primary cells. The primary cell is capable of giving an electro motive force(emf), when its constituents, two electrodes and a suitable electrolyte, are assembled together. The main primary cells are Daniel cell and Leclanche cell. These cells cannot be recharged.

19. What is leclanche cell?

A Leclanche cell consists of a glass vessel which is filled with ammonium chloride solution. Ammonium chloride solution acts as an electrolyte.

20. What is lead acid accumulators?

A lead-acid accumulator, the anode and cathode are made of lead dioxide and lead respectively. The electrolyte is dilute sulphuric acid. As power is discharged from the accumulator, both the anode and cathode undergoes a chemical reaction that progressively changes them into lead sulphate. When the anode and cathode are connected by a wire, the current flows from anode to cathode through the wire.

21. What is secondary cells?

The advantage of secondary cells is that they are rechargeable. The chemical reactions that take place in secondary cells are reversible.

22. What is accumulator?

When current is applied to a lead-acid accumulator, the electrochemical reaction is reversed. This is known as recharging of the accumulator.

23. What are good source of energy?

A good source of energy would be one

- Which would do a large amount of work per unit volume of mass
- Be easily accessible
- Be easy to store and transport

- Most importantly be economical.

24. What is the use of thermal power plant?

The term thermal power plant is used since fuel is burnt to produce heat energy which is converted into electrical energy.

25. What is hydro power plant?

Hydro power plants convert the potential energy of falling water into electricity. Since there are very few waterfalls which could be used as a source of potential energy, hydro power plants are associated with dams.

26. What is biomass?

Given the large amount of live stock in India, this can also assure us a steady source of fuel. Since these fuels are plant and animal products, the source of these fuels is said to be biomass.

27. What is solar energy?

The sun has been radiating an enormous amount of energy at the present rate for nearly 5 billion years and will continue radiating at that rate for about 5 billion years more. Only a small part of solar energy reaches the outer layer of the earth's atmosphere. Nearly half of it is absorbed while passing through the atmosphere and the rest reaches the earth's surface.

28. What is wind energy?

The kinetic energy of the wind can be used to do work. This energy was harnessed

by windmills in the past to do mechanical work. For example, in a water-lifting pump, the rotatory motion of windmill is utilized to lift water from a well. Today, wind energy is also used to generate electricity.

29. What is radio-active elements?

The phenomenon of spontaneous emission of highly penetrating radiations such as α , β , and γ rays by heavy elements having atomic number greater than 82 is called radioactivity and the substances which emit these radiations are called radioactive elements.

30. What is nuclear fission?

The process of breaking up of the nucleus of a heavier atom into two fragments with the release of large amount of energy is called nuclear fission.

31. What is nuclear fusion?

Nuclear fusion is a process in which two or more lighter nuclei combine to form a heavier nucleus

32. What is thermo nuclear reaction?

The fusion process can be carried out only at extremely high temperature of the order of 10^7 K because, only at these very high temperatures the nuclei are able to overcome their mutual repulsion. Therefore before fusion, the lighter nuclei must have their temperature raised by several million degrees. The nuclear fusion reactions are known as thermo nuclear reactions.

33. What is the fusion reaction in nuclear bomb?

The fusion reaction in the hydrogen bomb is $1\text{H}2 + 1\text{H}3 \rightarrow 2\text{He}4 + 0\text{n}1 + \text{Energy}$.

34. What is the advantage of nuclear reactivity?

- Nuclear reactivity is a measure of the state of a reactor regarding criticality.
- It is a useful concept to predict how the neutron population of a reactor will change over time.
- If a reactor is critical, that is, the neutron production is exactly equal to the neutron destruction, then the reactivity is zero.

- If the reactor is super critical (neutron production > neutron destruction) then the reactivity is positive i.e, unsafe. If the reactor is sub critical (neutron production < neutron destruction) then the reactivity is negative i.e, safe.

35. What is radiation exposure measured?

The radiation exposure is measured by the unit called roentgen(R). One roentgen is defined as the quantity of radiation which produces 1.6×10^{12} pairs of ion in 1 gram of air.

36. What is high and low tide?

Due to the gravitational pull of the moon on the earth, the level of the water in the sea rises and falls. If you live near the sea or ever travel to some place near the sea, try and observe how the sea-level changes during the day. The phenomenon is called high and low tides and the difference in sea levels gives us tidal energy.

37. What is wave energy?

The kinetic energy possessed by huge waves near the sea-shore can be trapped in a similar manner to generates electricity. The waves are generated by strong winds blowing across the sea. Wave energy would be a viable proposition only where waves are very strong.

17. Magnetic Effect of Electric Current and Light

1. Give detail on Oersted?

Name : Oersted

Born : 14th August 1777

Birth place : Langeland Denmark

Died : 9th March 1851

Best known for : The study of electromagnetism

2. What is magnetic field?

The region surrounding the magnet, in which the force of the magnet can be experienced, is called magnetic field.

3. What is magnetic line of force?

The lines along which the iron filings align themselves represent magnetic lines of force.

4. What do the magnetic field have?

Magnetic field is a quantity that has both magnitude and direction. The direction of the magnetic field is taken to be the direction in which a north pole of the compass needle moves inside it.

5. Which indicates magnetic field magnitude?

If the current is increased, the deflection also increases. It indicates that the magnitude of the magnetic field produced at a given point increases as the current through the wire increases.

6. Which produces magnetic field?

An electric current flowing through a conductor produces a magnetic field. The field so produced exerts a force on a magnet placed in the vicinity of a conductor.

7. What is Fleming's left hand rule?

When the direction of the current and that of the magnetic field are perpendicular to each other, the force is perpendicular to both of them. Stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular. If the forefinger points in the direction of magnetic field and the middle finger points in the direction of current, then the thumb will point in the direction of motion or the force acting on the conductor.

8. What is electric motor?

An electric motor is a rotating device that converts electrical energy into mechanical energy.

9. What is commutator?

A device that reverses the direction of flow of current through a circuit is called a commutator. In electric motors the split ring acts as a commutator.

10. What electromagnetic induction?

The emf produced in this way is called an induced emf and the phenomenon is known as electromagnetic induction.

11. What is induced current?

The induced emf will cause a current to flow through the conductor. Such a current is known as induced current.

12. What makes conductor moves?

When a current-carrying conductor is placed in a magnetic field, it experiences a force. This force causes the conductor to move.

13. What is Fleming's right hand rule?

Stretch the thumb, forefinger and middle finger of right hand so that they are mutually perpendicular to each other. If the forefinger indicates the direction of the magnetic field and the thumb shows the direction of motion of conductor, then the middle finger will show the direction of induced current.

14. What is electric generator?

In an electric generator, mechanical energy is used to rotate a conductor in a magnetic field to produce electricity.

15. What is AC?

Alternating Current

16. What is DC?

Direct Current

17. What is advantage of AC over DC?

An important advantage of AC over DC is that electric power can be transmitted over long distances without much loss of energy

18. What is light?

An object reflects light that falls on it. This reflected light when received by our eyes, enables us to see things.

19. What is reflection of light?

A highly polished surface, such as a mirror, reflects most of the light falling on it.

20. What are laws of light?

(i) The angle of incidence is equal to the angle of reflection($i = r$)

(ii) The incident ray, the normal to the mirror at the point of incidence and the reflected ray, all lie in the same plane

21. What is concave mirror?

A spherical mirror whose reflecting surface is curved inwards is called a concave mirror.

22. What is convex mirror?

A spherical mirror whose reflecting surface is curved outwards is called a convex mirror.

23. What is pole?

The centre of the reflecting surface of a spherical mirror is a point called the pole. It is represented by the letter P.

24. What is centre of curvature?

The reflecting surface of a spherical mirror forms a part of a sphere. This sphere has a centre. This point is called the centre of curvature of the spherical mirror. It is represented by the letter C.

25. What is radius of curvature?

The radius of the sphere of which the reflecting surface of a spherical mirror forms a part, is called the radius of curvature.

26. What is principal of axis?

The imaginary straight line passing through the pole and the centre of curvature of a spherical mirror is called the principal axis.

27. What is principal focus?

The reflected rays appear to come from a point on the principal axis. This point is called the principal focus of the convex mirror. The principal focus is represented by the letter F.

28. What is focal length?

The distance between the pole and the principal focus of a spherical mirror is called the focal length. It is represented by the letter f .

29. What is aperture?

The effective diameter of the reflecting surface of spherical mirror is called its aperture.

30. What are the uses of convex mirrors?

Convex mirrors are commonly used as rear-view mirrors in vehicles. These mirrors are fitted on the sides of the vehicle, enabling the driver to see traffic behind him/ her to facilitate safe driving. Convex mirrors are preferred because they always give an erect image. Also they have a wider field of view as they are curved outwards.

While dealing with the reflection of light by spherical mirrors, we shall follow a set of sign conventions called the New Cartesian Sign Convention. In this convention, the pole (P) of the

mirror is taken as the origin. The principal axis of the mirror is taken as the X axis (X' X) of the coordinate system. The conventions are as follows.

ACTIVITY 17.11

- (i) The object is always placed to the left of the mirror.
- (ii) All distances parallel to the principal axis are measured from the pole of the mirror.
- (iii) All the distances measured to the right of the origin (along +X axis) are taken as positive while those measured to the left of the origin (along -X axis) are taken as negative
- (iv) Distances measured perpendicular to and above the principal axis (along +Y axis) are taken as positive.
- (v) Distances measured perpendicular to and below the principal axis (along -Y axis) are taken as negative.

31. What is mirror formula?

In a spherical mirror, the distance of the object from its pole is called the object distance (u). The distance of the image from the pole of the mirror is called the image distance (v). You already know that the distance of the principal focus from the pole is called the focal length (f). There is a relationship between these three quantities given by the mirror formula which is expressed as $1/v + 1/u = 1/f$ This formula is valid in all situations.

32. What is refraction of light?

The observations of light indicate that light does not travel in the same direction in all media. It appears that when travelling obliquely from one medium to another, the direction of propagation of light in the second medium changes. This phenomenon is known as refraction of light.

33. What are the laws of refraction?

Refraction of light is due to change in the speed of light as it enters from one transparent medium to another. Experiments show that the refraction of light occurs according to certain laws. The following are the laws of refraction of light.

(i) The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.

(ii) The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media. This law is also known as Snell's law of refraction.

34. What is lens?

A transparent material bound by two surfaces, of which one or both surfaces are spherical, forms a lens.

35. What is power of lens?

The power of a lens is defined as the reciprocal of its focal length.

36. What is dioptre?

The SI unit of power of a lens is 'dioptre'. It is denoted by the letter D.

37. What is retina?

The human eye is like a camera. Its lens system forms an image on a light-sensitive screen called the retina.

38. What are the defects of vision?

There are mainly three common refractive defects of vision. These are:

(i) Myopia (near - sightedness)

(ii) Hypermetropia (far-sightedness)

(iii) Presbyopia

39. What is Myopia?

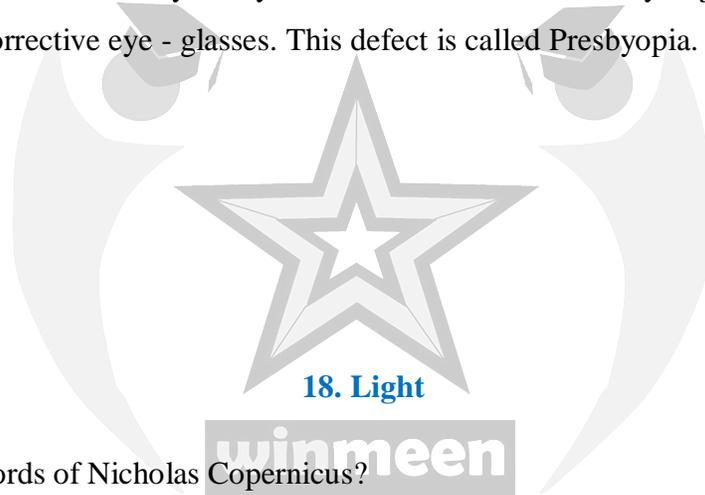
Myopia is also known as nearsightedness.

40. What is hypermetropia?

Hypermetropia is also known as farsightedness

41. What is presbyopia?

The power of accommodation of the eye usually decreases with ageing. For most people, the near point gradually recedes away. They find it difficult to see nearby objects comfortably and distinctly without corrective eye - glasses. This defect is called Presbyopia.



1. What were the words of Nicholas Copernicus?

The polish scientist Nicholas Copernicus suggested that “The earth is not stationary. It spins on its own axis and revolves around the Sun”.

2. When was International year of astronomy declared?

The year 2009 was declared the “International Year of Astronomy”.

3. What are sources of light?

The objects that emit light are called as sources of light.

4. What are the types of light?

Sources of light are of two types : natural and artificial.

5. What are luminous bodies?

During the day, we are able to see with the help of sunlight and during the night, we can see with the help of light from the electric bulb, torch light, candle etc. Bodies that emit light on their own are called luminous bodies.

6. What are non-luminous bodies?

Objects like table, chair etc. do not emit light on their own. Objects like these that do not emit light on their own are called non-luminous bodies.

7. How do we see objects?

We see an object we need the following

- a. source of light
- b. object to be seen
- c. observer.

8. What is rectilinear propagation of light?

When the cylinder was bent the same candlelight/object could not be seen. This is because light travels in a straight line. This property is called rectilinear propagation of light .

9. What is the observation of pinhole camera?

The light that comes from the object passes through the pinhole and forms an inverted image on the tracing paper. When the distance between the pinhole and the tracing paper is increased, the size of the image also increases. When the distance is decreased, the size of the image decreases. If the size of the pinhole is increased, the clarity of the image decreases and the image becomes blurred.

10. What are translucent objects?

The objects which allow the light to pass through them partially are called translucent objects.

11. Give some examples of translucent objects?

Air with dust particles, mist, ground glass, a sheet of paper smeared with oil are some more examples of translucent objects.

12. What is transparent objects?

The objects which allow light to pass through them are called transparent objects.

13. What are opaque objects?

The objects which do not allow light to pass through them are called opaque objects.

14. What are the properties of shadow?

- Shadow is always formed on the opposite side of the light source.
- It only shows the shape or outline of the object and not the details.
- A shadow cast by an intense beam of light is dark.
- A shadow is always black regardless of the colour of the object and the light source.
- The size of a shadow varies depending on the distance between the object and the source of light, and the distance between the object and the screen.
- (As the distance between the object and the source of light increases the size of the shadow decreases and as the distance between the object and the screen increases the size of the shadow increases)
- Source of light, an opaque object and the shadow will always lie in a straight line.

15. What is reflection?

When a tennis ball is thrown against a wall, it bounces back. Similarly when a beam of light falls on a smooth shining surface, it bounces back into the same medium (solid, liquid or gas). This phenomenon is called reflection.

16. How are eclipse formed?

Shadow is cast since light travels in straight line. Solar and lunar eclipses occur because of this property of light. When the sun, the earth and the moon come in a straight line eclipses are formed.

17. What is lunar eclipse?

When the earth comes between the sun and the moon, lunar eclipse occurs . This happens on a full moon day.

- The Sun - source of light
- The Earth - opaque object
- The Moon-screen

When the shadow of earth falls on the moon, the moon is hidden. This is called lunar eclipse.

18. What is solar eclipse?

When the moon comes between the sun and the earth, solar eclipse occurs. This happens on a new moon day.

- The Sun - source of light
- The Moon - opaque object
- The Earth-screen

When the shadow of the moon falls on the earth, the sun is hidden. This is called solar eclipse.

19. Heat and Light

1. What is heat?

The energy which can be transferred from a hotter body to a colder body and which produces a sensation of hotness or coldness is called heat.

2. What are the sources of heat?

Sun, combustion, friction, electric current,.

3. Do sun gives heat?

The sun gives out heat besides light.

4. What is combustion?

Burning of coal, kerosene etc., produces heat. These are called fossil fuels since they are made from the remains of plants and animals that died millions of years ago and were buried deep inside the earth.

5. What is nuclear fusion?

The sun gives us 3.8×10^{26} joule of heat energy per second. This energy is produced by nuclear fusion.

6. What is friction?

The weather becomes very cold in winter. If we rub our hands together, they become warm. The faster we rub, the hotter they become. Rubbing two things together produces heat due to friction. The ancient man used friction to produce a spark. Sometimes he rubbed two flint stones to make a fire.

7. What is electric current?

When electric current flows through a conductor heat energy is produced. The water heater, iron box, electric kettle etc. work on this principle.

8. What is thermometer?

The sensation of hotness or coldness is relative, we use thermometers to measure the temperature.

9. What are the two different scales to measure for temperature?

Thermometers have two different scales to measure temperature.

a) Centigrade or Celsius scale.

b) Fahrenheit scale.

10. What is Kelvin Scale?

The SI unit of temperature is kelvin(K)

- Kelvin scale is also known as absolute scale of temperature
- On this scale 0 kelvin = - 273°C 0 K(kelvin) is also known as absolute zero

11. Why thermometer use mercury?

- It is opaque and shiny.
- Does not stick to glass.
- It is a good conductor of heat.
- It shows large expansion for small temperature changes.
- It expands uniformly.
- In some thermometers ALCOHOL is used.

12. What is laboratory thermometer?

The laboratory thermometer consists of a thick walled glass tube enclosing a fine uniform bore capillary tube. There is a cylindrical bulb at one end. The bulb and a part of the stem are filled with mercury.

13. What clinical thermometer?

Clinical thermometers are available with Fahrenheit markings. They are also available with both Celsius and Fahrenheit markings.

14. What is light?

Light is a form of energy that gives us the sense of vision. The absence of light causes darkness. To see objects, our eye should receive light from them.

15. What is reflection?

When light falls on a transparent material like clear glass it passes through it. However, when it falls on opaque objects like table, chair, etc. some of it bounces back. This bouncing back of light from a surface is called reflection.

16. What is mirror?

A mirror is used by us every day for looking at our own image while combing our hair or washing our face. A mirror is a shiny surface which reflects almost all the light falling on it.

17. What is curved mirrors?

The mirror with the bulged reflecting surface is called a convex mirror and the mirror with a hollow reflecting surface is called a concave mirror. These are known as curved mirrors.

18. What is spherical mirror?

Any curved surface is a part of a sphere. Hence convex and concave mirrors are referred to as spherical mirrors.

19. What is real mirror?

The image formed on the paper or screen is called a real image.

20. What is VIBGYOR?

The colours are Violet, Indigo, Blue, Green, Yellow, Orange and Red represented as VIBGYOR.

21. What is depression?

The splitting up of white light into its seven constituent colours is called dispersion.

22. What is spectrum?

This band of colours is called a spectrum.

20. Light and Sound

1. What is reflection?

The bouncing of light from the surface of a body is known as reflection.

2. What is ray?

The path taken by the light is known as a ray and is represented by a straight line with an arrow mark. The arrow mark denotes the direction of the light.

3. What is parallel beam?

Two or more rays form a beam. When the rays are parallel it is called as parallel beam.

4. What is Convergent beam?

If the rays meet at a point (converge), they form a convergent beam.

5. What is divergent beam?

If the rays move away from a point it is called as divergent beam.

6. What is reflected ray?

The light ray that comes out from the reflecting surface after reflection is called a reflected ray.

7. What is normal?

The perpendicular line drawn to the surface at the point of incidence is called a normal.

8. What is angle of incidence?

The angle between the incident ray and the normal at the point of incidence is called the angle of incidence (i).

9. What is angle of reflection?

The angle between the reflected ray and the normal drawn from the point of incidence is called the angle of reflection (r).

10. What is incident ray?

A light ray which strikes the surface is called an incident ray.

11. What is law of reflection?

1. The incident ray, the reflected ray and the normal to the surface at the point of incidence lie in the same plane.

2. The angle of incidence is equal to the angle of reflection

12. What is regular reflection?

Reflection from a polished surface is called Regular reflection.

13. What is irregular reflection?

Reflection from a rough (unpolished) surface is called irregular or diffused reflection.

14. What is multiple images?

We are aware that a plane mirror forms only a single image of an object. But two or more mirrors are arranged to form number of images of an object. These are called Multiple Images.

15. How does periscope work?

The working of a periscope is based on the principle of successive reflections from two plane mirrors. It consists of two plane mirrors facing each other fixed at 45° to the frame work of a tube.

16. What is refraction?

The bending of ray of light when it passes from one medium to another is called refraction.

17. What is denser medium?

The direction of deviation depends on the densities of the two media. The medium of greater density is known as denser medium. Ex : Glass

18. What is lower medium?

The medium of lower density is known as rarer medium. Ex: Air

19. Describe about human eye?

- The human eye has a convex lens.
- The convex lens of an eye forms an image of the object on a screen called the retina.
- The retina is covered by a large number of nerve fibres(optic fibres) which sensitive to light.
- They carry the image by means of optic nerves to the brain.

20. What is power of accommodation of eye?

The human eye focusses the image for different objects at different distances by changing the focal length of the lens. This is done by the ciliary muscles, which stretch and relax to change the focal length of the lens. This action of the eye is called the power of accommodation of the eye.

21. Why is sound important?

Sound plays an important role in our lives. It helps us to communicate with one another. It is difficult to communicate without talking. Every one and everything around us produce sounds.

22. What is sound?

Sound needs a medium for propagation. Sound can travel through solid, liquid and gases. It can not travel through vacuum.

23. How do we hear sounds?

A vibrating body causes air molecules to vibrate. These vibrations reach our ear and are collected by the pinna and then funnelled into the ear tube. The vibrations strike the eardrum and start vibrating. The ear drum sends the vibrations to the inner ear. From there the signal goes to the brain. That is how we hear sounds.

24. What is prongs and stem?

A tuning fork is made of steel. The two upper ends of the tuning fork are called the 'prongs', while the lower end is called the 'stem'.

25. What is frequency?

The number of oscillations per second is called the frequency. Frequency is expressed by hertz – Hz.

26. What is time period?

The time taken by the vibrating body to complete one vibration or oscillation is called the time period. The unit of period is second(s).

27. What is amplitude?

The maximum displacement of a vibrating body from its mean position is called amplitude. The unit of amplitude is metre (m)

28. What is audible sound?

The human ear can hear the range of audible frequencies between 20 Hz and 20000 Hz. They are called audible sounds.

29. What is inaudible sound?

Sounds of frequencies lesser than 20 Hz and greater than 20000 Hz can not be heard by the human ear. They are called inaudible sounds.

30. What is noise?

Any unpleasant sound is called noise.

31. What is noise pollution?

Unwanted sound from any source that causes discomfort of any kind is called noise pollution.

32. What are the harmful effects of noise pollution?

- Exposure to sudden high noise level can damage to the eardrum.
- High levels of noise can also lead to nervous tension and increase in blood pressure.
- Noise also disturbs sleep, increases stress and causes headache

33. What are the steps to control noise pollution?

- 1.The use of loudspeaker in functions should be stopped.
- 2.Cars and other vehicles should not produce loud sounds.
- 3.T.V and Musical systems should be listened at low volumes.

34. What is optical fiber?

An optical fibre is a device based on the principle of total internal reflection. Optical fibres are thin, flexible and transparent strands of glass which can carry light along them very easily. A bundle of such thin fibres forms a light pipe.

35. What are the uses of optical fiber?

1. Optical fibres are used to transmit communication signals.
2. In medicine, optical fibres are used in endoscope and laparoscopes.

21. Sound

1. What are the significance of sound?

- Sound makes it possible for us to communicate with one another through speech.
- It enables us to share our thoughts and ideas with others.
- Musical sound gives us pleasure.
- Sounds from radio and television give us information and entertainment.
- Horn sounds (honking of vehicles) alert us and keep us safe on the road.

2. What is vibration?

Vibrations are “repeated small to and fro motion of objects”.

3. How is sound waves created?

Sound waves are created by vibrating bodies and sound is a sensation 'heard' by the listener.

4. How do sound waves travel?

Sound waves can travel through liquids, solids as well as gases. The substance (solid, liquid or gas) through which the sound waves travel is called a medium. Sound waves need a material medium to propagate; they cannot travel through vacuum.

5. Who proved sound waves cannot travel through vacuum?

Robert Boyle, the scientist, proved that sound waves cannot pass through vacuum or empty space.

6. What is waves?

A wave is a series of disturbances that move through a medium. The particles of the medium do not move from the source to the destination, but the disturbance alone is carried from the source to the destination.

7. What are the characteristics of wave?

Waves that require a material medium to propagate, such as sound waves, are referred to as mechanical waves. Mechanical waves are of two kinds - longitudinal waves and transverse waves. Some waves such as electromagnetic waves do not require a medium to propagate and can travel through vacuum.

8. What are the types of wave?

- Electromagnetic Waves Mechanical Waves (Transverse waves) (eg. Light waves, Infrared waves, Ultraviolet waves, etc.)
- Mechanical Waves which is further classified as Longitudinal waves eg: sound waves
Transverse waves eg: water waves

9. What is longitudinal waves?

“If the particles of a medium vibrate in a direction, parallel to or along the direction of the propagation of wave, it is called a longitudinal wave.”

10. What is compression and rarefaction?

Compression is the area with maximum pressure, rarefaction is the area with minimum pressure.

11. What is transverse waves?

“If the particles of the medium vibrate in a direction, perpendicular to the direction of propagation, the wave is called a transverse wave.”

12. Discuss about transverse waves?

- Particles of the medium vibrate in a direction which is perpendicular to the direction of propagation.
- Crests and troughs are formed
- Can travel through solids and surfaces of liquids.
- eg. Water waves

13. Discuss about longitudinal waves?

- Particles of the medium vibrate in a direction which is parallel to the direction of propagation.
- Compressions and rarefactions are formed.
- Can travel through solids, liquids and gases.
- eg. Sound waves

14. What is amplitude?

The maximum displacement of a particle from the mean position is called amplitude. Its unit is metre.

15. What is time taken?

Time taken by a particle of the medium to complete one vibration is called Time period. Its unit is second.

16. What is frequency?

The number of vibrations completed by a particle in one second is called frequency . Its unit is hertz.

$$n = 1/T$$

17. What is wave length?

Distance moved by a wave during the time a particle completes one vibration. Its unit is metre.

18. What is relationship between velocity of wave, wave length and frequency?

Distance travelled by a wave in one Time period, T, Distance λ Time

Velocity, $V = \text{Distance}/\text{Time} = \lambda/T$

But Frequency $n = 1/T$

Therefore $v = n\lambda$

19. How do sound travel?

Sound travels almost five times faster through water and twenty times faster through iron than it travels in air. Speed of light ($3 \times 10^8 \text{m/s}$) is even faster than the speed of sound (340m/s).

20. What is echo?

Sound waves can be reflected from large surfaces such as large walls of a building, sides of a hill or the walls of a cave. When reflected sound waves reach the ear, it can be heard distinctly after the original sound has stopped. This is called an Echo.

21. What is reverberation?

The repeated reflections that result in the persistence of sound, often referred to as ‘rolling sound’ is called reverberation.

22. Who gave first proof for radio waves?

Hertz, a German scientist, gave the first experimental proof of the existence of radio waves.

23. What is the audible range of sound for human and some animals?

- Human 20 - 20,000 Hertz
- Elephant 16 - 12,000 Hertz
- Dolphins 70 - 1,50,000 Hertz
- Cat 100 - 32,000 Hertz

24. What is SONAR?

The word “SONAR” is an acronym for “Sound, Navigation And Ranging”. A sonar consists of transmitter, detector, and display. The transmitter produces and transmits pulses of ultrasonic waves.

These waves travel through water and after striking some underwater object such as the seabed or a shoal of fish, get reflected and are received by the detector.

25. What is ultra sonic waves?

‘Ultrasonic waves’ can be used to visualize inner organs of the human body. Pulses of ultrasonic waves are passed through parts of the body, which get reflected by organs. When several pulses are sent and received, it is possible to build a picture of the object reflecting the wave pulses. This is called ultrasonography.

26. Who was first to make attempt on Doppler Effect?

Doppler was the first to explain this phenomenon and hence, it has been named after him as the Doppler Effect.

22. Heat and Gas Law

1. What is heat?

“Heat is a form of energy transfer between two systems or between a system and its surroundings due to temperature difference between them”. We represent heat transfer by the symbol Q .

2. What is specific heat capacity?

“Specific Heat Capacity (SHC) is the heat required to raise the temperature of unit mass of a substance through unit temperature”. The symbol for specific heat capacity is c .

3. How is specific heat capacity defined?

“The amount of heat energy required to raise the temperature of 1 kg of a substance through 1 K.” The SI unit of SHC is $J\ kg^{-1}\ K^{-1}$.

4. What is thermal capacity?

Thermal capacity is the “quantity of heat required to raise the temperature of an object through $1\ K$ ”. Its unit is joule / kelvin (J/K or JK^{-1}). Thermal Capacity of an object = $m \times c$

5. What is latent heat?

Early scientists were amazed at the fact that heat energy seemed to be absorbed by the substance without any change in temperature. They therefore, called it “Latent Heat”. The word “latent” means – present but not visible (hidden).

6. What is latent heat of vaporization?

The latent heat required to evaporate a liquid is referred to as the latent heat of vaporization.

7. What is latent heat of fusion?

The latent heat required to melt a substance is referred to as the latent heat of fusion.

8. What is specific latent fusion?

The Specific Latent Heat of Fusion of any substance is the quantity of heat energy required to melt one kilogram of a substance without change in temperature.

9. What is Boyle`s law?

Boyle`s Law states that “Temperature remaining constant, the pressure of a given mass of gas is inversely proportional to its volume”.

10. Who is Robert Boyle?

Robert Boyle is best known for his work in physics and chemistry. He formulated Boyle`s law. He is regarded as the first modern chemist. He described the elements as primitive, simple and perfectly complete bodies. From 1661, the term ‘element’ has been reserved for material substances.

11. What is Charles law?

Charles’ Law states that “Pressure remaining constant, the volume of a given mass of gas is directly proportional to the absolute temperature”.

12. Who is Jacques Charles?

Jacques Charles was a French inventor, scientist, mathematician, balloonist and a Professor of Physics in Paris. He found the relation between the temperature and the volume. His experiment revealed that all gases expand and contract to the same extent when heated through the same temperature intervals. He constructed the first hydrogen balloon, which brought him fame and royal patronage. He also invented the hydrometer.

13. What is Kelvin Scale?

The zero of the Kelvin scale corresponds to -273°C and is written as 0K (without the degree symbol). One division on the Kelvin scale has the same magnitude of temperature as one division of the Celsius or Centigrade scale. Thus 0°C corresponds to +273K.

Kelvin scale(K) = Celsius scale (0°C) + 273

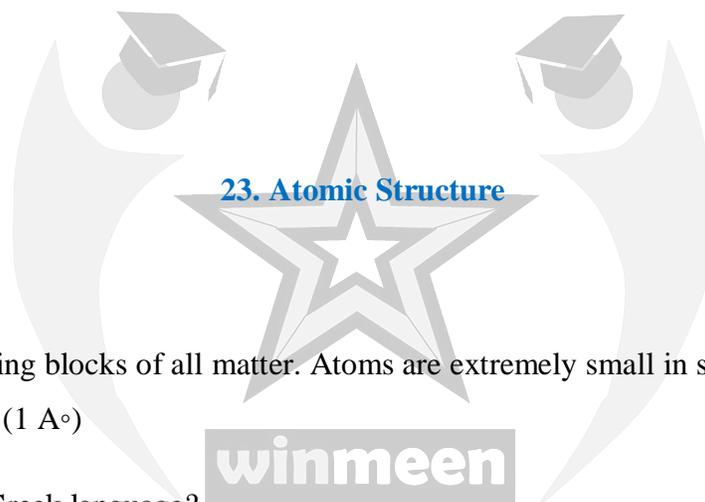
Celsius scale (0°C) = Kelvin scale (K) – 273

14. Who is Lord Kelvin?

Lord Kelvin was a physicist and an engineer. He is widely known for his significant contribution to thermodynamics. He devised the Kelvin scale of temperature. The unit of temperature was named after him to honour his outstanding contribution and achievements.

15. Who received Nobel Prize in Physics 2015?

The Nobel Prize in Physics, 2015 was awarded jointly to Takaaki Kajita and Arthur B. McDonald “ for the discovery of neutrino oscillations, which shows that neutrinos have mass”.



1. What is atom?

Atoms are the building blocks of all matter. Atoms are extremely small in size and are expressed in terms of 10^{-10} m (1 \AA)

2. What is atom in Greek language?

In Greek language, atom means 'incapability of being cut'.

3. What are the laws of chemical combination?

- Law of Conservation of Mass
- Law of Definite Proportion
- Law of Reciprocal Proportion
- Law of Multiple Proportion and
- Gay Lussac's Law of Combining Volume

4. What is law of definite proportion?

The Law of Definite Proportions can be stated as. "A pure chemical compound prepared by any method consists of the same elements combined together in a fixed proportion by mass".

5. What is law of conservation of mass?

The Law of Conservation of Mass can be stated thus: "Mass can neither be created nor destroyed during a physical or a chemical change".

6. What was Dalton`s atomic theory based on?

- Matter is made up of small, indivisible particles called atoms.
- Atoms can neither be created nor destroyed.
- Atoms of the same element are identical in all respects.
- Atoms of different elements are different in all respects.
- Atoms of different elements may combine with each other in a fixed simple whole number ratio to form "compound atoms" (or molecules).
- The atom is the smallest particle of matter that takes part in a chemical reaction.

7. What is atomic electricity?

The first direct experimental evidence to prove the electrical nature of matter came from Michael Faraday. He demonstrated through his experiments that electricity is composed of particles called 'atoms of electricity'.

8. Who proposed concept on electron?

It was George Johnstone Stoney, an Irish Physicist, who first proposed the term 'electron' for 'atom of electricity' in 1891. His contribution to research in this area laid the foundations for the eventual discovery of particles by J.J. Thomson in 1897.

9. Who found visible rays travelling between two electrodes?

In 1878, Sir William Crookes, while conducting an experiment using a discharge tube, found certain visible rays travelling between two metal electrodes. These rays are known as Crooke's Rays or Cathode Rays.

10. What is CRT?

The discharge tube used in the experiment is now referred to as Crookes tube or more popularly as Cathode Ray Tube (CRT).

11. What is negative electrode?

The electrode which is connected to the negative terminal of the battery is called the cathode (negative electrode).

12. What is positive electrode?

The electrode connected to the positive terminal is called the anode (positive electrode).

13. What is florescent material?

When invisible radiation falls on materials like zinc sulphide, they emit a visible light (or glow). This is called fluorescent material.

14. What are the properties of Cathode rays?

- Cathode rays travel in straight lines parallel to each other
- Cathode rays are made up of small particles that have mass and kinetic energy.
- Cathode rays are negatively charged particles
- The direction of deflection indicates that the cathode rays consist of negatively charged particles. These negatively charged particles are called electrons.
- The nature of the cathode rays does not depend on the nature of the gas filled inside the tube or the cathode used.

15. What was the concept of Goldstein?

The presence of positively charged particles in the atom has been precisely predicted by Goldstein based on the conception that the atom being electrically neutral in nature, should necessarily possess positively charged particles to balance the negatively charged electrons.

16. What is protons?

When hydrogen gas was taken in a discharge tube, the positively charged particles obtained from the hydrogen gas were called PROTONS.

17. What are the properties of Anode Rays?

1. Anode rays travel in straight lines.
2. Since they rotate the light paddle wheel placed in their path, they consist of material particles.
3. Anode rays are deflected by electric and magnetic fields. Since they are deflected towards the negatively charged plate, they consist of positively charged particles.
4. The properties of anode rays depend upon the nature of gas taken in the discharge tube.
5. The mass of the particle is the same as the atomic mass of the gas inside the discharge tube.

18. What is compared to Thomson atomic model?

Thomson's Atomic Model can be compared to a watermelon or a ripened guava. The red edible portion of the watermelon represents the positive sphere. The black seeds look like the electrons embedded in an atom. Thomson's scientific model of the atom is popularly known as the 'plum pudding' model.

19. What are the findings of Thomson on atom?

1. An atom consists of a positively charged sphere with electrons embedded in it.
2. The positive and negative charges are equal in magnitude; hence the atom as a whole is electrically neutral.

24. Atomic Structure

1. Who proposed the idea of atom as small particle?

John Dalton proposed the idea of the atom as the smallest possible particle of any substance.

2. Who explained neutrality of atom?

J.J.Thomson's atomic theory explained the electrical neutrality of atoms, it could not reveal the presence of nucleus in an atom, which was later proposed by Ernest Rutherford in 1909.

3. Who is father of nuclear physics?

Ernest Rutherford, a British physicist probed atoms with alpha particles. He was known as the "father of nuclear physics". He was awarded the Nobel prize for his contribution to the structure of atom in 1908.

4. What was Rutherford's Experiment?

A stream of alpha particles was made to pass through a thin gold foil of about 4×10^{-5} cm thickness. Most of the alpha particles did go through the foil in a straight line. Some alpha particles were deflected through an average angle of 90° . Rarely the path of 1 in 20,000 alpha particles scored a direct hit on the nucleus and returned in an angle of 180° .

5. What is alpha particle?

Alpha particles are helium ions He^{2+} (2 protons, 2 neutrons and no electrons). The mass of an alpha particle is about 8000 times the mass of an electron. Velocity of alpha particles is about 2×10^7 m/s.

6. What was Rutherford's theory of Atom?

- Atom has a very small nucleus at the centre.
- There is a large empty space around the nucleus.
- Entire mass of an atom is due to the mass of nucleus.
- Electrons are distributed in the vacant space around the nucleus.
- The electrons are moving in circular paths around the nucleus.

7. Who is Niels Bohr?

Niels Bohr was born on October 7, 1885 in Copenhagen, Denmark. He was also an outstanding soccer player. He worked with Rutherford at the University of Manchester. Bohr's theory

became the basis for modern physics known as Quantum Mechanics. Bohr received the Nobel Prize for physics in 1922.

8. Discuss about Bohr law?

- Niels Bohr modified Rutherford's atom model and put forth the following postulates.
- In atoms, electrons revolve around the nucleus in stationary circular paths.
- These paths are called orbits or shells or energy levels.
- As long as electrons revolve in the same orbit, it does not lose or gain energy.
- The circular orbits are numbered as 1, 2, 3, 4 or designated as K, L, M, N shells.
- These numbers are referred to as principal quantum numbers (n).
- As we move away from the nucleus, the energy of the orbit constantly increases.
- Maximum number of electrons that can be accommodated in an energy level (n) is given by $2n^2$.
- When an electron absorbs energy, it jumps from lower energy level to higher energy level.
- When an electron returns from higher energy level to lower energy level, it gives off energy.

9. What is orbit?

Orbit is defined as the path, by which electrons revolve around the nucleus.

10. What are neutrons?

In 1932, James Chadwick observed that when beryllium was exposed to alpha particles, particles with about the same mass as protons were emitted. These emitted particles carried no electrical charge. Hence, they were called as neutrons.

11. What is isotopes?

Atoms of the same element with different number of neutrons are called isotopes.

12. What are the fundamental particle of atom?

Protons: They are positively charged particles. They are present inside the nucleus.

Electrons: They are negatively charged particles. They revolve around the nucleus in circular orbits.

Neutrons: They are neutral particles. They are present inside the nucleus.

13. What are the sub atomic particles?

Besides Electrons, Protons and Neutrons, there are many sub-atomic particles such as:

- *ff* Mesons
- *ff* Positrons
- *ff* Neutrinos
- *ff* Quarks
- *ff* Pions
- *ff* Gluons

13. What is nucleons?

The elementary particles such as protons and neutrons are collectively referred to as nucleons.

14. What is atomic number?

The Atomic number of an atom can be defined as the number of protons present in the nucleus of the atom or the number of electrons present outside the nucleus of the atom. Thus the atomic number of hydrogen would be one and that of helium would be two. The symbol of Atomic Number is Z.

15. What is mass number?

The mass number (A) is defined as the sum of the number of protons and neutrons present in the nucleus of an atom of an element.

16. What are isotopes?

Isotopes are atoms of an element that differ in mass numbers, but have the same atomic number.

17. What are the characteristics of isotopes?

- Isotopes of an element differ in mass numbers only.
- Difference in mass number is due to the difference in number of neutrons.
- Isotopes of an element have the same chemical properties.
- However, variation in physical properties is noted in isotopes.
- Elements having isotopes exhibit fractional atomic mass.

18. What are the uses of isotopes?

- Many isotopes find use in medical field.
- Iron-59 isotope is used in the treatment of anaemia.
- Iodine-131 isotope is used in the treatment of goitre.
- Cobalt-60 isotope is used in the treatment of cancer.
- Phosphorous-32 isotope is used in eye treatment.
- Carbon-11 isotope is used in brain scan.

19. What are K,L,M,N?

It is known that atoms consist of a positively charged nucleus with protons and neutrons in it. Negatively charged electrons constantly revolve around the nucleus in a set of orbits. The electron orbits are numbered as 1, 2, 3, etc. Starting from the orbit closest to the nucleus. These orbits are also called K, L, M, N shells, as mentioned in the atom model proposed by

Niels Bohr.

20. What are cell number and maximum number of electrons?

First shell (K) $2(1^2) = 2$

Second shell (L) $2(2^2) = 8$

Third shell (M) $2(3^2) = 18$

Fourth shell (N)

$$2(4-1) = 32$$

21. What is valence electrons?

The number of electrons in the outer energy level (orbit) of an atom are the ones that can take part in chemical bonding. These electrons are referred to as the valence electrons.

22. Give the electronic name of elements given below?

- Hydrogen H
- Helium He
- Lithium Li
- Beryllium Be
- Boron B
- Carbon C
- Nitrogen N
- Oxygen O
- Fluorine F
- Neon Ne
- Sodium Na
- Magnesium Mg
- Argon Ar

