Class-VI Sub-Physics 27.04.2020

Chapter-1 Matter (Revision)

1. What is Fusion?
   Ans- The process of change of a substance from solid state to liquid state on absorption of heat energy at a particular temperature is called fusion.
2. What is Boiling?
   Ans-The process of change of a substance from a liquid state to its gaseous state at a particular temperature is called boiling.
3. Differentiate between boiling and evaporation?
   - **Evaporation**-
     i. It is the process of conversion of a liquid into its vapour state at any temperature below its boiling point.
     ii. It is a slow process.
     iii. It takes place at all temperatures.
   - **Boiling-**
     i. It is the process of conversion of a liquid into its gaseous state at a particular temperature.
     ii. It is a rapid process
     iii. It takes place at a particular temperature.
4. What is Sublimation?
   Ans- The process of change of a substance directly from the solid state to the gaseous state , without passing through the liquid state is called sublimation.
5. Give two examples of sublimable substances.
   Ans- Naphthalene ball, Ammonium chloride

Class-VI Sub-Physics 30.04.2020

Chapter-1 Matter(Revision)

1. Give one difference between atoms and molecules.
   Ans-Atoms may or may not have independent existence. While molecules have independent existence.
2. What are fluids? Give two examples.
   Ans-Substances that can flow are called fluids.
   e.g-Gases (Carbon dioxide, hydrogen),liquids(water, alcohol)
3. Give two examples for each of the following :
   a) Substances which sublime , ans-Naphthalene, Camphor
   b) Substances which are rigid and not compressible, ans-Glass, stone
4. Name the phenomenon which causes the following changes:
   a) Formation of water vapour from water-Vaporisation
   b) Disappearance of camphor when exposed to air-Sublimation
   c) Conversion of ice into water-Melting
   d) Conversion of water into steam-Boiling
5. Define- Interconversion of states of matter
   Ans-The process by which matter changes from one state to another and back to original state, without any change in its chemical composition.

Class-VI Sub-Physics 04.05.2020

Chapter -1 Matter(Revision)

1. Give reasons-
   i. When a teaspoon of sugar is added to half a glass of water and stirred , the water level in the glass remains unchanged.
   Ans-Because the sugar particles are adjusted between the water molecules as inter-molecular gaps are more in liquids.
   ii. When an empty gas jar is inverted over a gas jar containing a coloured gas, the gas also spreads into the empty jar.
   Ans-Because gases can diffuse or flow in all directions.
2. Define:

a) Cohesive force-The force of attraction between particles of the same substance is called cohesive force.
b) Diffusion-The intermixing of two or more substances due to motion of their particles in order to get a uniform mixture is called diffusion.
c) Brownian motion-The haphazard ,random motion of suspended particles on the surface of a liquid or in air is called Brownian motion.

Chapter-1 Matter (Revision)

Q.1. Write whether the following statements are true or false.

a. Only water can exist in three different states.-True
b. Solids have large inter-molecular space.-False
c. There is no difference between boiling and evaporation.-False
d. The intermolecular force of attraction is the weakest in gases.-True
e. A gas has no free surface.-True

2. Why a solid does not flow, but a liquid flows?

Ans-In solids there is a strong force of attraction between the molecules and the space between them is very negligible. The molecules are therefore , not free to move. They merely vibrate about their mean positions. But in the case of liquids ,the molecules are not very closely packed. They do not attract each other as strongly as the molecules of solids. Thus , the intermolecular spaces are larger and the molecules are able to move around more freely .This makes a liquid flow.

Class-VI **Sub-Physics**

20.04.2020

Lesson- 2

Physical Quantities and Measurement

- Measurement-Measurement is a comparison of an unknown quantity with a known fixed quantity of the same kind.
- Characteristics of a unit:-
  i. It should be of convenient size.
  ii. It must be universally accepted, i.e. its value must remain same at all places and at all times.
- Four basic measurements in our daily life are: measurement of length, measurement of mass, measurement of time and measurement of temperature
- Fundamental quantities-

Fundamental Quantities

No.	Quantities	unit
1.	Length	meter [m]
2.	Mass	kilogram [kg]
3.	Time	second [s]
4.	Electric current	ampere [A]
5.	Temperature	kelvin [K]
6.	Amount of substance	mole [mol]
7.	Luminous intensity	candela { cd }

Class-VI Sub-Physics 23.04.2020

Lesson-2(Physical quantities and Measurement)

Study Material-

- **Measurement**=nu, where u=unit, n=number which tells us how many times that unit is contained in that quantity.
- Three systems of units for measurement -
  i. C.G.S system
  ii. F.P.S system
  iii. M.K.S system

The units of length, mass and time in these system are-

System	Unit and symbol of length	Unit and symbol of mass	Unit and symbol of time
1. C.G.S.	centimetre (cm)	gram (g)	second (s)
2. F.P.S.	foot (ft)	pound (lb)	second (s)
3. M.K.S.	metre (m)	kilogram (kg)	second (s)

- Measurement of length-
  Length is the distance between two points.
- Unit of length-S.I unit of length is metre(m)
- Simple multiple and sub-multiple of metre
  Multiple-Kilometre(km)
  Submultiples- Centimetre(cm)
  Millimetre(mm)
  - Devices for measuring length-
    i. A metre ruler
    ii. A measuring tape

to record measurements of the frame to prepare and fix a door in a frame. Moreover, measurements have to be taken to prepare the grounds for playing badminton, tennis, volleyball, etc. Clock or watch is used to record time. When we learn about different objects and events, we come across quantities like length, breadth, time, speed, temperature, volume, etc. These quantities can be measured and are called physical quantities.

2.1 MEASUREMENT OF LENGTH

Length is defined as the separation or distance between two points in space.

Length is one of the fundamental physical quantities. A ruler is used to measure the length of an object. It is also used to measure the length of a straight line. A non-stretchable string or thread is used to measure the length of a curved line.

Longer lengths are measured through measuring tape, then goes the ruler scale and then the Vernier caliper and screw gauge for small to minute as well as accurate measurement.

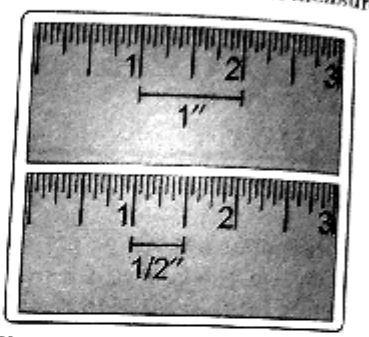
2.1.1 Measuring Devices

For measuring the length of any object, we require to choose a proper measuring device. For example, for measuring small lengths like length of line segments, we use a scale 15 cm long (ruler) provided in the geometry box. Stiff steel tape and a flexible tape are generally used by masons, carpenters and civil engineers. Flexible measuring tape is generally used by tailors to measure your chest, waist and other body dimensions. A metre rod is used by the cloth merchants.

A ruler is one of the most common measuring instruments. It comes in many sizes and shapes, depending on what it is needed for. The yardstick is a long ruler (3 feet long) and a measuring tape is yet another type of ruler, made of flexible cloth or metal tape. Each may look different, but are used essentially the same way. Rulers and other measuring tapes might come in both standard and metric units. It is important to know the difference between these types of measurement.

Measuring with a ruler:

A ruler is a measuring stick marked with units for measuring along its edge. These can be made of plastic, cardboard, wood, metal, or fabric. These can be for either English (inches) or metric (centimetres) units of measurement.



Reading a ruler starts with understanding what all of the ticks mean. The largest ticks on a ruler represent a full inch and the distance between each large tick is 1 inch. The large ticks that are in between the inch markings are half-inch markings and the distance between an inch tick and a half-inch tick is 1/2 inch.

Metric rulers have centimetre and millimetre markings. The larger markings on a metric ruler represent a centimetre.

The smaller ticks on a metric ruler represent a millimetre. There are 10 millimetres in a centimetre and so there are 9 millimetre ticks between each centimetre tick.

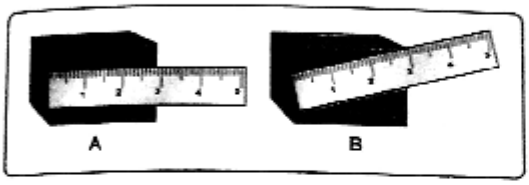
Suppose we want to measure the length of a given rectangular block with a ruler.

The following precautions have to be observed:

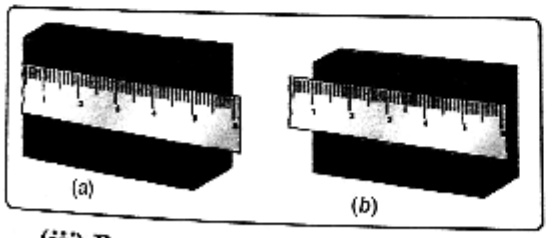
***(i)* Proper placement of scale :** Measure the length of the block by placing the scale in two different positions as shown in Figures A and B.

Figure A represents the correct position of the scale to measure the length of the block. Figure B represents the wrong placement of the scale. In this position, you will measure more than the actual length. Hence, for correct measurement of length:

- The scale should be placed along the length to be measured as shown in Fig. A.
- The scale should be placed very close to the object to be measured.

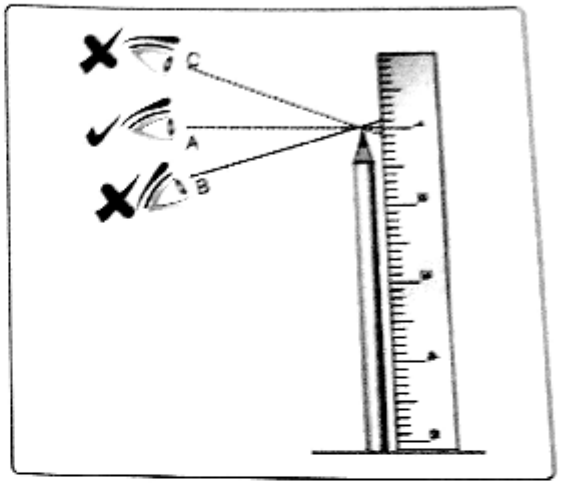


***(ii)* When the zero mark of the scale is damaged :** Due to the repeated use, the left end of the scale carrying zero mark gets damaged. So, in order to measure the length of the object, we usually do not start from zero mark of the scale. In such cases, you should use any other full mark of the scale. Then you must subtract the reading of this full mark from the reading at the other end. For example, in Figure (*b*), the reading at the one end is 1.0 cm and at the other end, it is 5.5 cm. Therefore, the length of the object is 5.5 – 1.0 = 4.5 cm.



***(iii)* Proper position of the eye while reading the scale :** Due to the thickness of metre scale or ruler, the eye must always be placed vertically above the mark being read in order to avoid error due to wrong position of the eye. In the figure given below, the correct position A of the eye gives the reading of 1.0 cm. From positions B and C, the readings are 0.9 cm and 1.1 cm respectively.

Thus, the readings from position B and C are not correct.



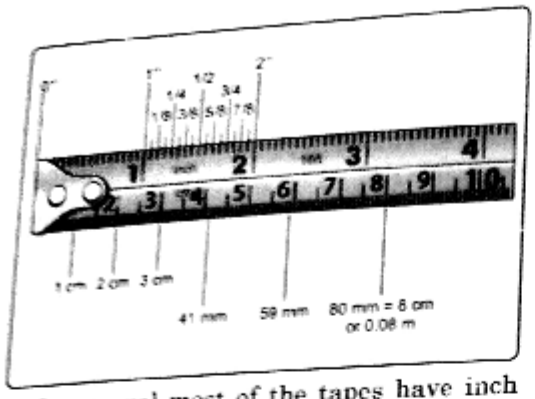
Position of eye for proper reading of the scale

***(iv)* When the marking on the scale are not uniform:** To minimize the error due to non-uniform markings on the measuring scales, measure the length several times using different parts of the measuring scale. Take the average of all the observations to get the value nearest to the actual length.

Measuring with a measuring tape:

Tape measures are only one of many devices used for taking measurements but it is the most widely used in one form or another.

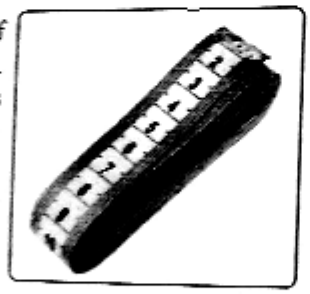
Tape measures come in all sizes, shapes and the amount of length it will measure, for example, a 6 foot will measure anything up to 6 feet in length or a 12 foot will measure up to 12 feet in length and so on. The illustration shows a 16 foot tape measure.



In general most of the tapes have inch markings on one side that starts with one and goes to the extent of the tape, example being that a 16 foot tape measure will have inch markings up to at least 192 inches. The other side of the tape will be in centimetre.

Another type of measuring tape is a flexible tape. You might has seen this tape at a tailors shop. He uses it to take measurement for your dress. One side of this tape is marked in centimetre and the other side in inches.

2.1.2 Units of length measurement



The unit of length is metre (m). There are distances much smaller and much bigger than metre. Thus, smaller and bigger units are also used.

(a) To measure small distances/ lengths: To measure the length of your pencil or the length of your Physics book, you do not require a metre rod for measurements. The length of pencil and the Physics book are much less than a metre. It is, therefore, convenient to express these lengths in smaller units. Centimetre is taken as a unit for these measurements.

1 metre (m) = 100 centimetre (cm)

The thickness of an electric wire or a coin is much smaller than a centimetre. So you will require a still smaller unit. Such small lengths can be expressed in the unit called millimetre.

1 centimetre (cm) = 10 millimetre (mm)

1 metre (m) = 1000 millimetre (mm)

Sometimes the unit inch (inch) is also used to measure small distances.

(b) To measure big/long distances or lengths : On the other hand, to measure long distances (like the distance between two cities), metre will be an unsuitable unit. Hence, a large unit of length is needed. This unit is called kilometre.

1 kilometre (km) = 1000 metre (m)

Relationships :

1 m = 100 cm

1 m = 1000 mm

It is seen that all multiples or sub-multiples require multiplication or division by 10 or 100 or 1000 for metre conversion. A system of this type where interconversions between bigger and smaller units can be achieved by multiplying or dividing with power of ten is called 'Metric System'. It avoids the difficult arithmetic calculations involved in changing from one unit to the other.

2.2 MEASUREMENT OF MASS

You must have experienced that a glass of water feels lighter than a jug of water. It is because the quantity of water (matter) in the glass is less than the quantity of water (matter) contained in the jug.

Mass is, therefore, defined as the quantity of matter contained in a body.

Mass is measured using a balance. The unknown mass of a body is compared with a known value of mass. We obtain the value of an unknown mass in terms of a known value of mass. There are different types of balance:

A beam balance is used to measure costly substances like gold and silver; a physical balance is used in the laboratory; a grocer's balance is used by shopkeepers to measure various items; and an electronic balance is used for high accuracy and precision.

2.2.1 Units of Mass

The standard unit of mass is kilogram. It is written as kg. However, the scientists, pharmacists and goldsmiths need to measure very small quantities of the substances. The small quantities of substances are expressed in the units of gram (g) and milligram (mg).

1 kilogram (kg) = 1000 gram (g)

1 (g) = 1000 mg

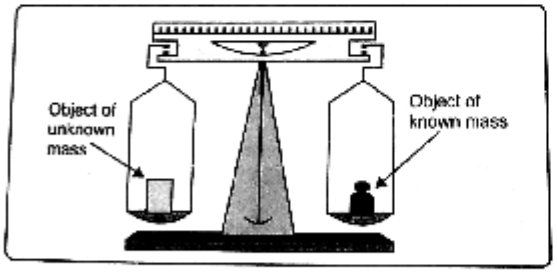
When you buy large quantities of coal or wheat, it is convenient to express the mass of these large quantities in larger units such as quintal or tonne.

1 quintal = 100 kg

1 tonne = 10 quintal

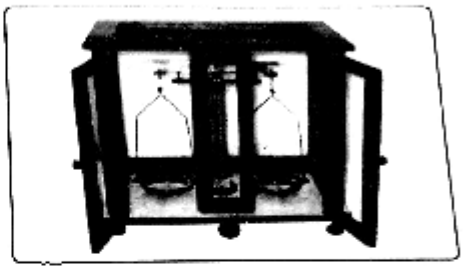
2.2.2 Beam Balance

The quantity of matter is measured in terms of mass. The mass of a body is measured accurately by beam balance, comparing its mass with standard masses. The beam balance in the figure, is used by grain, coal or fire wood merchants.



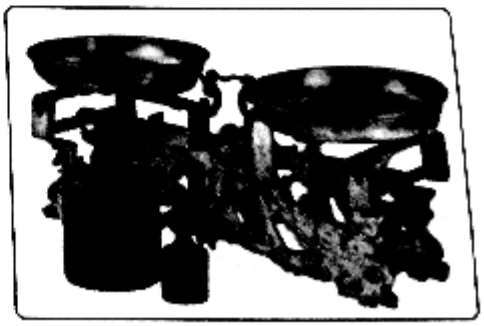
The beam balances are used by retailers, grocers and vegetable sellers.

- A beam balance for nearly accurate measurement of mass of costly things like gold, silver, cardamom or cinnamon, a sensitive physical balance (shown below) is utilised. The physical balance consists of a light and rigid beam of brass, a metallic pillar, a wooden base, two pans, a metallic pointer and an ivory scale.
- The device is enclosed in a box to avoid the effect of wind.
- A weight box containing standard weights comes with the balance.



- The mass of a body is found by placing the body in one pan, placing some standard weights in the other and then calculating it from the standard weights placed and the resting point of the pointer.
- If the resting point of a physical balance coincides with the zero resting point, then the mass at the resting point gives the correct mass of the body.

If you go to a grocer and ask for 500 g of rice, he puts the standard mass of 500 g in the left hand pan and goes on adding rice in the right hand pan till the beam is horizontal. For measurement of this mass, he uses a beam balance.



2.2.3 Electronic Balance

An electronic balance is a device used to find accurate measurements of mass. It is used very commonly in laboratories for weighing chemicals to ensure a precise measurement of those chemicals for use in various experiments. Electronic balances may also be used to weigh food and other grocery items.

Electronic balances have gained popularity in the modern world and not in vain. In comparison to the physical balances electronic devices have got certain advantages: they have no bulky mechanical details, are reliable, accurate and durable. The latter fact is explained easily: the balance is in equilibrium, the mechanical parts are all stable and fixed and it means, they do not wear out that quickly.

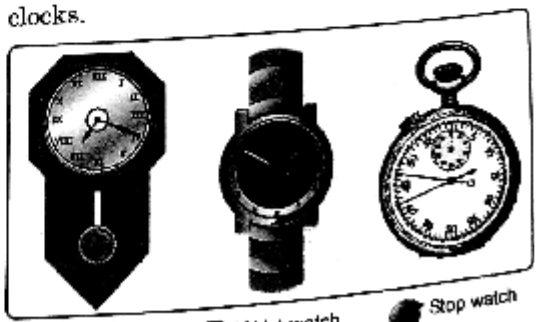
These machines display the mass of an object in digits. These machines are very accurate and convenient to use. They are generally used for weighing fractional mass as well as heavy mass.

Electronic Balance Precautions :

- Make sure the balance is level and on a stable surface.
- Make sure the range of the balance is appropriate for the mass being measured.
- Make sure the balance reads to the correct decimal place. (Also, known as readability: 0.1g, 0.001g, 0.0001g etc.)
- Make sure the pan is free of particles and substances, as this could affect results.
- Carefully transfer substance from stock container to the weighing vessel. Add the substance in small increements until the desired mass is present in the weighing vessel.
- Discard any substance still present on the scoop or spatula.
- Never return stock chemicals to the container.

2.3 MEASUREMENT OF TIME

Time is defined as the gap between two events. Time has a very important role to play in planning various activities in our routine life. We measure time with the help of clocks or watches. In olden days, the repetition of events was studied to count the time interval. For example, the time between sunrise to sunset or to the next sunrise, the duration between one full moon to another full moon, etc., were considered to measure time interval. Later, some events which repeated themselves regularly and that too after equal intervals of time were found out. These events are called periodic. The principle of periodic motion is even used nowadays in the mechanically operated wall clocks, wrist watch, watches and clocks.



Wall clock Wrist watch Stop watch

Stop clocks and stop watches can be started and stopped at will. They are used where we need to find the time taken for an event, such as time taken by an athlete to run a hundred metre race.

For primitive peoples it was satisfactory to divide the day into such things as early morning, mid-day, late afternoon, and night. However, as societies became more complex, the need developed to more precisely divide the day. The modern convention is to divide it into 24 hours, an hour into 60 minutes, and a minute into 60 seconds.

Time is measured with the help of the mean solar day. A mean solar day is the time taken by the earth to complete one rotation on its axis. To measure time, a mean solar day is divided into twenty four equal intervals and each interval is called an hour. An hour is further divided into sixty equal parts each part forms a minute. One minute is further divided into sixty equal parts and each part forms a second.

2.3.1 Units of Time

The second is the SI unit of time. It's abbreviated as 's', hence,

1 mean solar day = 24 hours
1 hour = 60 minutes
= 1/24-th part of a mean solar day
1 minute = 60 seconds
= 1/1440-th part of a mean solar day
1 second = 1/86400-th part of a mean solar day

Some bigger units of time are the year, decade and millennium. Hence,

1 day = 24 hours
1 year = 365 days
1 decade = 10 years
1 century = 100 years or 10 decades
1 millennium = 1000 years or 10 centuries.

2.3.2 Converting 24 hour time into 12 hour time

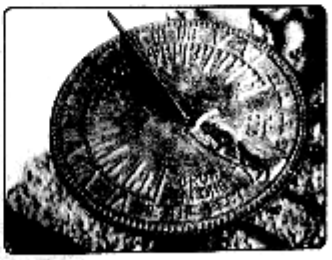
00:00 on the 24 hour clock means, it is 12 O'clock at midnight and 12:00 hours is 12 O'clock at noon. On the 12 hour clock, the time between 00:00 hours and 12 O'clock at noon is am and between 12 O'clock and 00.00 hours at midnight is pm.

When the time is in am in the 12 hour format, the time in the 24 hour format is the same without the am. For example, 2 am in the 12 hour format will be 02:00 in the 24 hour format. Similarly, 11 am in the 12 hour format will be 11:00 hours in the 24 hour clock. The exception to this rule is 12 midnight in the 12 hour clock, which is 00.00 hours on the 24 hour clock.

KNOW ABOUT SUNDIAL

An early device for measuring time was referred to as sundial. A sundial shows the apparent local solar time.It consists of a horizontal circular board with a triangular plate of metal fixed vertically on it. The plate is kept along North South direction. The plate casts its shadow on the board. The edge of the shadow falls at different angles at different times of the day. The position of the shadow was utilised to mark the time of the day.

Some historical sundials still exist in India. You can see these sundials at Jantar Mantar in Delhi and Jaipur. These were built by Maharaja Jai Singh II of Jaipur. The time indicated by sundials is fairly correct. But these sundials have one limitation also, these sundials cannot be used after sunset.

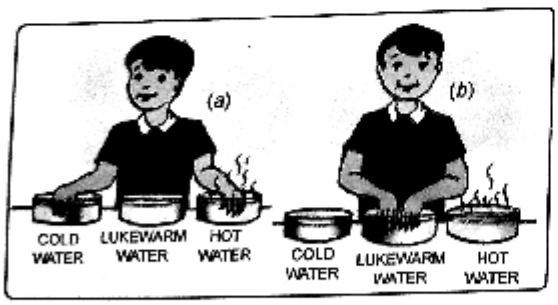


A sundial indicates the apparent local solar time at a given instant in a given location

When the time is in pm on the 12 hour clock, the time on the 24 hour clock is the Time + 12 without the pm. For example, 2 pm on the 12 hour clock is 2 + 12, which is 14:00 hours on the 24 hour clock. If the time is 11 pm on the 12 hour clock, on the 24 hour clock, the time will be 11+12 = 23:00 hours. The exception to this rule is when the time is 12 noon on the 12 hour clock, then the time on the 24 hour clock is 12.00 hours.

2.4 MEASUREMENT OF TEMPERATURE

Take three container bowls. Put cold water in one, hot water in the second and lukewarm water in the third container. Dip your right hand fingers in the cold water and left hand fingers in the hot water [See figure (*a*)]. Keep them for a minute or two. Now, take out the fingers and dip them quickly in the bowl of lukewarm water [See figure (*b*)]. You will feel that the lukewarm water is not equally hot to both the hands. Hence, our sense of touch does not provide us information about the exact estimation of hotness or coldness. It can only give us the relative feeling of hotness or coldness of a body.



The degree of hotness or coldness of a body is called temperature.

It can be measured with the help of a thermometer. The earliest thermometer was made by Galileo in 1592. All thermometers use some physical property that changes uniformly with temperature.

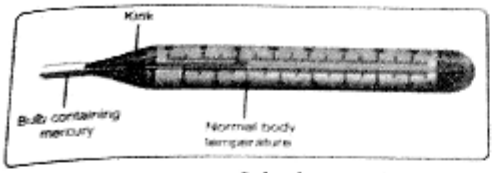
2.4.1 Thermometers

A thermometer is used to measure the temperature of an object. Galileo invented a rudimentary water thermometer in 1592. He called this device a thermoscope. However, this form was ineffective as water froze at low temperatures. In 1714, Gabriel Fahrenheit invented the modern mercury thermometer. A thermometer consists of a long, narrow, uniform glass tube called the stem. The scales in which the temperature is measured are marked on the stem. At the end of the stem, there is a small bulb which contains mercury in it. A capillary tube is inside the glass stem in which mercury expands when the bulb is kept in contact with a hot body. Mercury is toxic, and it is very difficult to dispose it when the thermometer breaks. So, nowadays digital thermometers are used to measure the temperature, as they do not contain mercury.

Thermometers are of the following two types:

1. Clinical thermometer and
2. Laboratory thermometer.

1. Clinical thermometer : A clinical thermometer is used to measure the temperature of the human body, at home, clinics and hospitals. All clinical thermometers have a kink that prevents the mercury from flowing back into the bulb when the thermometer is taken out of the patient's mouth, so that the temperature can be noted conveniently. There are temperature scales on either side of the mercury thread, one in Celsius scale and the other in Fahrenheit scale. Since the Fahrenheit scale is more sensitive than the Celsius scale, body temperature is measured in °F only. A clinical thermometer indicates temperatures from a minimum of 35 °C or 94 °F to a maximum of 42 °C or 108 °F.



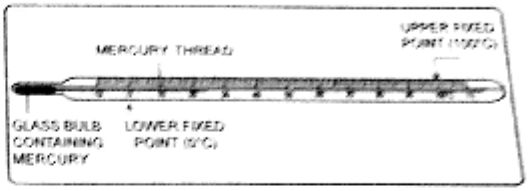
The temperature of the human body does not go beyond this temperature range. The normal temperature of a human body is 37°C. A temperature above 37°C indicates that a person is having fever.

The bore of the clinical thermometer is very fine and there is a kink or a constriction just above the bulb. When the bulb is warm, the mercury in it expands and pushes itself past the kink. When the thermometer is removed from the patient's body, the mercury cools and contracts. The mercury above the kink stays where it is and does not drop. This helps us to read the temperature conveniently. After taking the reading, the mercury is brought back to the bulb by jerking the thermometer.

Precautions to be Followed While Using a Clinical Thermometer :

- The thermometer should be washed before and after use, preferably with an antiseptic solution.
- Jerk the thermometer a few times to bring the level of the mercury down.
- Before use, the mercury level should be below 35 °C or 94 °F.
- Do not hold the thermometer by its bulb.
- Keep the mercury level along your line of sight and then take the reading.
- Handle the thermometer with care. If it hits against some hard object, it may break.
- Do not place the thermometer in a hot flame or in the hot sun.

2. Laboratory thermometer : Laboratory thermometer has markings –10°C as the lower point and 110°C as the upper point. It is used for measuring the temperature in a science laboratory. The stem and the bulb of a lab thermometer are longer as compared to that of a clinical thermometer and there is no kink in the lab thermometer.



A Laboratory Thermometer

Hold the thermometer such that you can see a very thin silvery line inside. The upper end of this line tells you the temperature. Look at the graduations of the thermometer and find the value of temperature represented by one small division on the scale.

Precautions to be Followed While Using a Laboratory Thermometer :

- Do not tilt the thermometer while measuring the temperature. Place it upright.
- Note the reading only when the bulb has been surrounded by the substance from all sides.

2.4.2 Units (Scales of Temperature)

Different units to measure temperature are represented by different scales of temperature. A temperature scale is defined by choosing two reference temperatures and dividing the difference between these two temperatures into a certain number of divisions. Each division is called one degree. The reference temperatures usually used are the melting point of pure ice (at one atmospheric pressure)

called the lower fixed point, and the boiling point of water (at one atmospheric pressure) called the upper fixed point.

The two commonly used temperature scales are :

(*i*) Celsius (°C) and

(*ii*) Fahrenheit (°F) scales.

In scientific calculations Kelvin scale is used.

In Celsius scale the melting point of ice is taken as 0°C and the boiling point of water as 100°C. The difference between the two points is divided into 100 degrees. In Fahrenheit scale the lower fixed point or the melting point of ice is 32 °F and the upper fixed point or the boiling point of water is 212°F. The difference between these two points is divided into 180 degrees.

Conversion between Celsius and Fahrenheit Temperatures :

The Celsius and Fahrenheit scales are related as follows $\frac{C}{5} = \frac{F-32}{9}$, where C and F are the temperatures measured in Celsius and Fahrenheit scales.

2.5 MEASUREMENT OF AREAS

Surface area is defined as the measure of the surface of an object.

The amount of surface occupied or enclosed by the sides of an object is called area. The SI unit for area is the square metre (m^2). The multiples of square metre, like hectare and square kilometre, are used to measure larger areas. Sub-multiples of the square metre, like square centimetre and the square millimetre, are used to measure smaller areas. We use a graph sheet to measure the area of a regular or an irregular surface.

Multiple and Sub-multiple Units of Area

1 hectare = 100 m × 100 m = 10,000 m^2

1 m^2 = (1/10,000) hectare = 10^{-4} hectare

1 km^2 = 1000 m × 1000 m = 1,000,000 m^2

1 km^2 = 100 hectares

Measurement of Area of a Regular Surface

We can find the area of regular surfaces by measuring their linear dimensions like length, breadth etc. and calculating the area using appropriate formulae. The formulae used to find the area of some regular shapes are given below.

Area of a square = side × side

Area of a rectangle = length × breadth

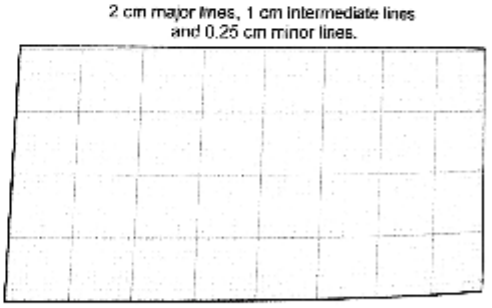
Area of a triangle = $\frac{1}{2}$ × base × height

Area of a circle = π × radius × radius

We can find the area of a small regular surface using a centimetre graph sheet also.

Scales on a graph paper

Graph paper is a writing paper that is printed with fine lines making up a regular grid. The lines are often used as guides for plotting mathematical functions or experimental data and drawing two-dimensional graphs. It is commonly found in mathematics and engineering education settings and in laboratory notebooks.



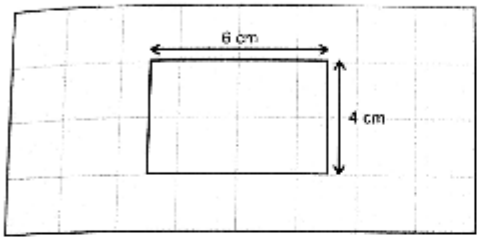
A centimetre graph paper, as shown, has bold lines after every two centimeter. The space between two bold lines is divided into 8 divisions. Each small division is of 1 cm, which is further divided into four divisions of 0.25 cm each.

Measurement of Area of regular Flat Surfaces using a graph paper

We can find the area of a regular flat surface, *e.g.*, a rectangular cardboard, using a graph sheet. For doing this, the rectangular cardboard is placed on a centimetre graph sheet and its outline is drawn. Then the number of complete squares occupied by the cardboard are counted. Let the number of small squares be 'x', then the area of the rectangle is

Area of rectangle = $x \times$ area of one square

$= x \times 1\ cm^2 = x\ cm^2$



Suppose we are given a rectangle of length 6 cm and breadth 4 cm. Place it on a graph paper as shown.

Now, draw an outline of the rectangle.

Count the number of small squares which lie within the rectangle. As we can see the number of squares is 24.

Therefore,

Area of rectangle

$= 24 \times$ area of one small square

$= 24 \times 1\ cm^2 = 24\ cm^2$

If we use the formula for the area of a rectangle we find that

Area of rectangle = length × breadth

$= 6\ cm \times 4\ cm = 24\ cm^2$

Which is same as measured with the help of a graph paper.

The same procedure can be used for other regularly shaped objects.

Let's Sum It Up Again

1. Length, breadth, time, speed. temperature, volume are physical quantities which can be measured.
2. Length is defined as the separation or distance between two points in space.
3. Devices used for measuring length are like ruler, measuring tape.
4. SI unit of length is metre (m), for long distance is kilometre.
5. Mass is defined as the quantity of matter contained in a body. SI unit of mass is kilogram.
6. Devices used to measure mass are beam balance, electronic balance.
7. Time is defined as gap between two events. SI unit of time is second.
8. Conversion of 24 hour time into 12 hour time.
9. The degree of hotness or coldness of a body is called temperature. Two commonly used temperature scales are Celsius (°C) and Fahrenheit (°F) scale. In scientific calculations kelvin scale is used.
10. Conversion between Celsius and Fahrenheit temperature as follow $\frac{C}{5} = \frac{F-32}{9}$.
11. Temperature can be measured by thermometer.
12. Thermometer is used to measure the temperature of an object. Thermometer are of the two types : Clinical thermometer and Laboratory thermometer.
13. Clinical thermometer is used to measure the temperature of human body. Clinical thermometer having both scales Celsius and Fahrenheit and minimum temperature is 35°C or 94°C to a maximum of temperature 42°C or 108°F.

14. Laboratory thermometer used in science laboratory and have scale $-10°C$ to $110°C$.
15. In measurement of areas, surface area is defined as the measure of the surface of an object. SI unit of area is square metre (m^2).
16. Area of regular surface like :

Area of square = side × side

Area of rectangle = length × breadth

Area of triangle = $\frac{1}{2}$ × base × height

Area of circle = π × radius × radius

17. Area of regular flat surface using graph paper.

Exercises

A. SHORT ANSWER TYPE QUESTIONS

1. How many millimetres are in 1 metre ?
2. How can we measure mass of costly things like gold and silver accurately ?
3. What is meant by solar day ?
4. Convert 4 pm on clock to 24 hour clock time.
5. What is the importance of kink in clinical thermometer ?
6. What is the boiling point of water in Fahrenheit scale ?

B. LONG ANSWER TYPE QUESTIONS

1. Write different precautions while using a scale to measure the length of wooden block.
2. Write down similarities and differences between clinical and laboratory thermometer.
3. What precautions should be followed while using a clinical and laboratory thermometer ?
4. Convert the following temperature into Fahrenheit (°F) scale :

   (*a*) 50°C (*b*) 75°C (*c*) 100°C
5. Calculate the area of regular flat surface like a rectangular cardboard using a graph paper.

C. PICK THE CORRECT ONE

1. SI unit of length is :

   (*a*) kelvin (*b*) metre (*c*) kilogram (*d*) all of these
2. Temperature scale commonly used are :

   (*a*) Celsius (°C) (*b*) Fahrenheit (°F) (*c*) Kelvin (*d*) all of these
3. Temperature can be measured by :

   (*a*) thermometer (*b*) measuring tape (*c*) rules (*d*) beam balance
4. Celsius scale in clinical thermometer is :

   (*a*) 40°C to 55°C (*b*) 35°C to 42°C (*c*) 37°C to 55°C (*d*) 10°C to 100°C
5. Area of triangle can measured by formula :

   (*a*) $\frac{1}{2}$ × base × height (*b*) length × breadth (*c*) $\pi \times (\text{radius})^2$ (*d*) side × side

D. FILL IN THE BLANKS

1. When the bulb of thermometer is warm MERCURY in it expands and rises.
2. 100 hectares = 1 km².
3. For accurate small to minute measurement of length RULER is used.
4. 1 tonne = 10 quintal
5. For accurate measurement of mass BEAM BALANCE is used for costly things.
6. Normal temperature of human body is 37°C °C.

E. DEFINE THE FOLLOWING TERMS

1. Length
2. Mass
3. Temperature
4. Area

F. MARK THE STATEMENT AS TRUE OR FALSE

1. Kilometre unit is used to measure long distances. T
2. SI unit of time is hour. F
3. Laboratory thermometer is used to measure temperature of human body as well as in science laboratory
4. Conversion of Fahrenheit into degree celsius is given by $C = \frac{F-32}{9} \times 5$. F
5. 1 second = $\frac{1}{86400}$th part of a mean solar day. T

G. CHOOSE THE ODD ONE OUT GIVING REASON

1. Metre, kilometre, centimetre, kilogram.
2. Gram, kilogram, millimetre, quintal.
3. Temperature, thermometer, degree celsius, beam balance.
4. Length, ruler, thermometer, measuring tape.
5. Second (s), minute (min), stop clock, screw guage.

H. MATCH THE FOLLOWING

Column A		Column B
1. Body temperature	(d)	(a) 1000 g
2. Length	(e)	(b) Fahrenheit scale
3. 94°F to 108°F	(b)	(c) 10 centuries
4. 1 kilogram	(a)	(d) clinical thermometer
5. 1 millennium	(c)	(e) measuring tape

GIVE ONE WORD FOR THE FOLLOWING

1. What is the normal temperature of human body in degree celsius ? 37°C
2. Name a system where interconversions between bigger and smaller units can be achieved by multiplying or dividing with power of ten. METRIC SYSTEM.
3. Which type of balance is used in laboratory ? ELECTRONIC BALANCE.
4. The events which are repeated themselves after regular intervals of time are which events. ↓PERIODIC EVENT
5. Who has invented modern mercury thermometer ? GABRIEL FAHRENHEIT.

Appointments

Q) A) 1) 1m = 1000 millimeter.

2) The mass of costly things like gold and silver can be measured accurately by using a beam balance.

3) 1 solar day = 24 hours.

4) On 24 hour clock 4PM is 16:00 hrs.

5) It is the kink that prevents the mercury from flowing back into the bulb when the thermometer is taken out of the patients mouth, so that the temperature can be noted conveniently.

6) [redacted] 212° F.

$$\frac{C}{5} = \frac{F-32}{9}$$

$$\frac{100}{5} = \frac{F-32}{9}$$

$$20 = \frac{F-32}{9}$$

$$F - 32 = 180$$

$$F = 212°$$

To See What Is Right And Not Doing It Is A Lack Of Courage. – Confucious

Appointments

Q. 2) Similarity between clinical and laboratory thermometer

i) Both use mercury as the thermometric liquid.

→ Difference:-

i) All clinical thermometers have kink, that prevents the mercury from flowing back into the bulb, but laboratory thermometer doesnot have a kink.

ii) The stem and bulb of a laboratory thermometer are longer as compared to that of a clinical thermometer.

4) $50^\circ C$

$$\frac{C}{5} = \frac{F-32}{9}$$

Or, $9C = 5F - 160$

$9 \times 50^\circ = 5F - 160$

$450^\circ = 5F - 160$

$5F = 610^\circ$

$F = \frac{610^\circ}{5} = 122^\circ$

Reading Is To The Mind, As Exercise Is To The Body. – Brian Tracy

Appointments

(b) $75^{\circ}C$

$$\frac{C}{5} = \frac{F-32}{9}$$

$$9C = 5F - 160$$

$$9 \times 75^{\circ} = 5F - 160$$

$$675^{\circ} = 5F - 160$$

$$5F = 835^{\circ}$$

$$F = \frac{835^{\circ}}{5}$$

$$= 167^{\circ}$$

(c) $100^{\circ}C$

$$\frac{C}{5} = \frac{F-32}{9}$$

$$\frac{100}{5} = \frac{F-32}{9}$$

$$20 = \frac{F-32}{9}$$

$$F-32 = 180$$

$$F = 212^{\circ}$$

W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Appointments

1) Length → It is defined as the separation or distance between two points in space.

2) Mass → It is defined as the quantity of matter contained in a body. SI unit of mass is kilogram.

3) Temperature → The degree of hotness or coldness of a body.

4) Surface area → It is defined as the measure of the surface of the object.

JUNE '20 Two Thousand Twenty Friday 05

Week - 23rd • 157-209

Appointments

World Environment Day

1) Kilogram is the unit of mass, where as rest are the unit of length.

2) Millimetre is the unit of length where as rest are the unit of mass.

3) Beambalance measures the mass of a given body, where as the rest are related to measurement of temperature.

4) Thermometer is used to measure temperature, rest are related to measurement of length.

5) Screw Gauge is used to measure length, rest are related to measurement of time.

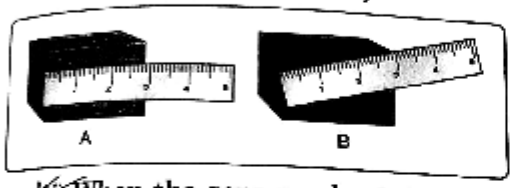
Q.B.1.ANS:-ANSWER TO THIS QUESTION IS GIVEN IN THE NEXT PAGE OF THIS ATTACHMENT.IE PAGE NO 27.

The following precautions have to be observed:

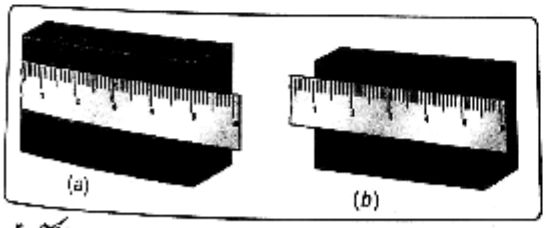
(i) Proper placement of scale : Measure the length of the block by placing the scale in two different positions as shown in figures A and B.

Figure A represents the correct position of the scale to measure the length of the block. Figure B represents the wrong placement of the scale. In this position, you will measure more than the actual length. Hence, for correct measurement of length:

- The scale should be placed along the length to be measured as shown in Fig. A.
- The scale should be placed very close to the object to be measured.

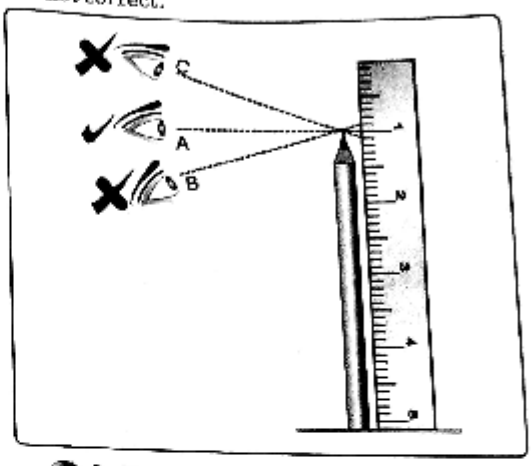


(ii) When the zero mark of the scale is damaged : Due to the repeated use, the left end of the scale carrying zero mark gets damaged. So, in order to measure the length of the object, we usually do not start from zero mark of the scale. In such cases, you should use any other full mark of the scale. Then you must subtract the reading of this full mark from the reading at the other end. For example, in Figure (*b*), the reading at the one end is 1.0 cm and at the other end, it is 5.5 cm. Therefore, the length of the object is $5.5 - 1.0 = 4.5$ cm.



(iii) Proper position of the eye while reading the scale : Due to the thickness of metre scale or ruler, the eye must always be placed vertically above the mark being read in order to avoid error due to wrong position of the eye. In the figure given below, the correct position A of the eye gives the reading of 1.0 cm. From positions B and C, the readings are 0.9 cm and 1.1 cm respectively.

Thus, the readings from position B and C are not correct.



Position of eye for proper reading of the scale

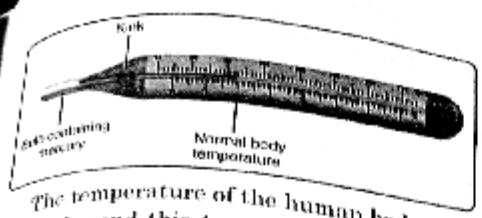
(iv) When the marking on the scale are not uniform: To minimize the error due to non-uniform markings on the measuring scales, measure the length several times using different parts of the measuring scale. Take the average of all the observations to get the value nearest to the actual length.

Measuring with a measuring tape:

Tape measures are only one of many devices used for taking measurements but it is the most widely used in one form or another.

Tape measures come in all sizes, shapes and the amount of length it will measure, for example, a 6 foot will measure anything up to 6 feet in length or a 12 foot will measure up to 12 feet in length and so on. The illustration shows a 16 foot tape measure.

Q.B.2:-ANSWER TO THIS QUESTION IS GIVEN IN THE NEXT PAGE OF THIS ATTACHMENT THAT IS PAGE NO :-29



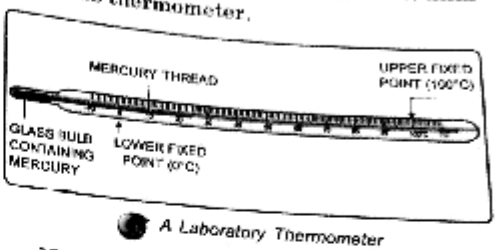
The temperature of the human body does not go beyond this temperature range. The normal temperature of a human body is 37°C. A temperature above 37°C indicates that a person is having fever.

The bore of the clinical thermometer is very fine and there is a kink or a constriction just above the bulb. When the bulb is warm, the mercury in it expands and pushes itself past the kink. When the thermometer is removed from the patient's body, the mercury cools and contracts. The mercury above the kink stays where it is and does not drop. This helps us to read the temperature conveniently. After taking the reading, the mercury is brought back to the bulb by jerking the thermometer.

Precautions to be Followed While Using a Clinical Thermometer :

- The thermometer should be washed before and after use, preferably with an antiseptic solution.
- Jerk the thermometer a few times to bring the level of the mercury down.
- Before use, the mercury level should be below 35 °C or 94 °F.
- Do not hold the thermometer by its bulb.
- Keep the mercury level along your line of sight and then take the reading.
- Handle the thermometer with care. If it hits against some hard object, it may break.
- Do not place the thermometer in a hot flame or in the hot sun.

2. Laboratory thermometer : Laboratory thermometer has markings –10°C as the lower point and 110°C as the upper point. It is used for measuring the temperature in a science laboratory. The stem and the bulb of a lab thermometer are longer as compared to that of a clinical thermometer and there is no kink in the lab thermometer.



A Laboratory Thermometer

Hold the thermometer such that you can see a very thin silvery line inside. The upper end of this line tells you the temperature. Look at the graduations of the thermometer and find the value of temperature represented by one small division on the scale.

Precautions to be Followed While Using a Laboratory Thermometer :

- Do not tilt the thermometer while measuring the temperature. Place it upright.
- Note the reading only when the bulb has been surrounded by the substance from all sides.

2.4.2 Units (Scales of Temperature)

Different units to measure temperature are represented by different scales of temperature. A temperature scale is defined by choosing two reference temperatures and dividing the difference between these two temperatures into a certain number of divisions. Each division is called one degree. The reference temperatures usually used are the melting point of pure ice (at one atmospheric pressure)

Q.NO:E.1.DEFINE THE FOLLOWING TERMS:-

1.S.I UNIT OF LENGTH SHOULD BE MENTIONED IE,METRE(M).

2.S.I UNIT OF MASS SHOULD BE MENTIONED,IE KILOGRAM(KG).

3.UNIT OF TEMPERATURE SHOULD BE MENTIONED,IE CELCIUS,FAHRENHEIT,AND KELVIN.

4.UNIT OF AREA SHOULD BE MENTIONED,IE SQUARE METRE(S.I UNIT).

Q.NO:-F.MARK THE STATEMENT AS TRUE OR FALSE(THE REASONS):-

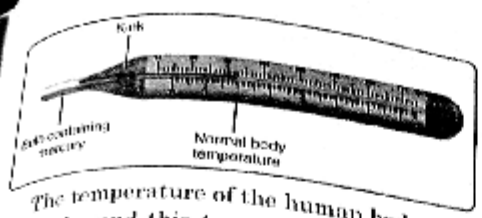
2.S.I UNIT OF TIME IS SECOND

3.LABORATORY THERMOMETER IS USED ONLY IN SCIENCE LABORATORY.

4.CONVERSION OF CELCIUS TO DEGREE FAHRENHEIT IS GIVEN BY THE FOLLOWING FORMULA.

VISCOCITY:-IT IS THE MEASURE OF THE FLUIDS RESISTENCE TO FLOW.SOLIDS HAVE NO VISCOCITY AS IT IS FIXED.IN LIQUIDS VISCOCITY DEPENDS ON THE COHESIVE FORCE.LESSER THE COHESIVE FORCE LESSER THE VISC OCITY.GASES DO HAVE VISCOCITY BUT IT DEPENDS ON TEMPERATURE.HIGHER THE TEMPERATURE HIGHER IS THE VISCOCITY IN GASES.

ADHESIVE FORCE:-FORCE OF ATTRACTION BETWEEN DIFFERENT MOLECULES IS KNOWN AS ADHESIVE FORCE.



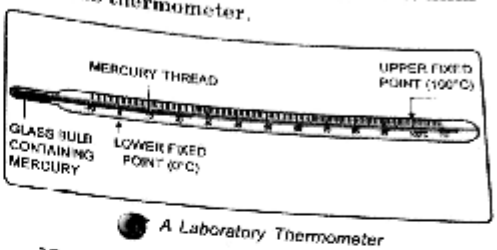
The temperature of the human body does not go beyond this temperature range. The normal temperature of a human body is 37°C. A temperature above 37°C indicates that a person is having fever.

The bore of the clinical thermometer is very fine and there is a kink or a constriction just above the bulb. When the bulb is warm, the mercury in it expands and pushes itself past the kink. When the thermometer is removed from the patient's body, the mercury cools and contracts. The mercury above the kink stays where it is and does not drop. This helps us to read the temperature conveniently. After taking the reading, the mercury is brought back to the bulb by jerking the thermometer.

Precautions to be Followed While Using a Clinical Thermometer :

- The thermometer should be washed before and after use, preferably with an antiseptic solution.
- Jerk the thermometer a few times to bring the level of the mercury down.
- Before use, the mercury level should be below 35 °C or 94 °F.
- Do not hold the thermometer by its bulb.
- Keep the mercury level along your line of sight and then take the reading.
- Handle the thermometer with care. If it hits against some hard object, it may break.
- Do not place the thermometer in a hot flame or in the hot sun.

2. Laboratory thermometer : Laboratory thermometer has markings –10°C as the lower point and 110°C as the upper point. It is used for measuring the temperature in a science laboratory. The stem and the bulb of a lab thermometer are longer as compared to that of a clinical thermometer and there is no kink in the lab thermometer.



A Laboratory Thermometer

Hold the thermometer such that you can see a very thin silvery line inside. The upper end of this line tells you the temperature. Look at the graduations of the thermometer and find the value of temperature represented by one small division on the scale.

Precautions to be Followed While Using a Laboratory Thermometer :

- Do not tilt the thermometer while measuring the temperature. Place it upright.
- Note the reading only when the bulb has been surrounded by the substance from all sides.

2.4.2 Units (Scales of Temperature)

Different units to measure temperature are represented by different scales of temperature. A temperature scale is defined by choosing two reference temperatures and dividing the difference between these two temperatures into a certain number of divisions. Each division is called one degree. The reference temperatures usually used are the melting point of pure ice (at one atmospheric pressure)

NOTE:-STUDENTS ARE TO READ THE REVISION QUESTIONS OF CHAPTER 1 CAREFULLY AND WRITE THEM IN THEIR NOTE BOOK.ALL THE QUESTIONS OF THE EXCERCISES,MATCH THE FOLLOWING,ONE WORD,TRUE FALSE ARE TO BE WRITTEN IN THE COPY.