Unit 7 Measurement

You will observe it in your day to day life, the measurements are necessary in different ways in different phenomena's. If you want to tide a hanging at the door of your class-room then how long thread is required ? How you will decide the length of pitch to play cricket ? How much cloth you buy to stitch your clothes ? At what time you will start from home, if your school starts at 12:30 pm ? In early days approximate measurements were taken by using footsteps, hand, palm, finger etc. In different regions the devices for measurements were different. Let's see, with those devices how the measures were taken.

Take idea about the length of your textbook of science and technology, in terms of your finger.

What to do ?

- ☞ Measure length of your hand. The measured length is ..... figures.
- ☞ Is your measured length is as per your idea ?
- ☞ Is your measurement, measured by each student is same ? Why ? Discuss it...

With above discussion we can say that the length of finger, palm, hand of each person are not same. So in this way standard measurement of any object is not possible.

If such approximate units are used for the measurment of length then which problems can be created.

The measurement and units should be definite so if anybody use any instrument or unit the measure should be same. To get perfect measure of any quantity some standard units and instruments are developed. So above difficulties can overcome.

The standard measure of length is meter. Its small units are centimeter (cm) and millimeters (mm). Large units of length is kilometer (km). To measure length of different objects, different units and instruments are used.

Write as per your day to day life observation :

(1) What is used by the cloth-merchant to measure cloth ?

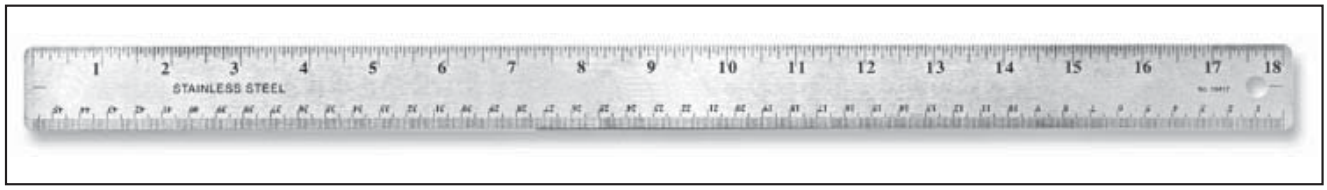
(2) What the tailor master use to measure your cloth ?

(3) What you use to measure the length of line element which you draw or pencil ?

In day to day lite for measurement of different object different scales are used. Let's take idea to take perfect measurement with it.

Measurement of Length

Observe the scale which you have and adjust it as shown in figure.



In the scale upper digits represents measure in centimeter. Calculate the number of small digits in one centimeter. This small division represents the measure in millimeter.

You see ..... Millimeter = 1 centimeter

Similarly, 1000 mm = 100 cm = 1 meter

And 100000 cm = 1000 meter = 1 kilometer

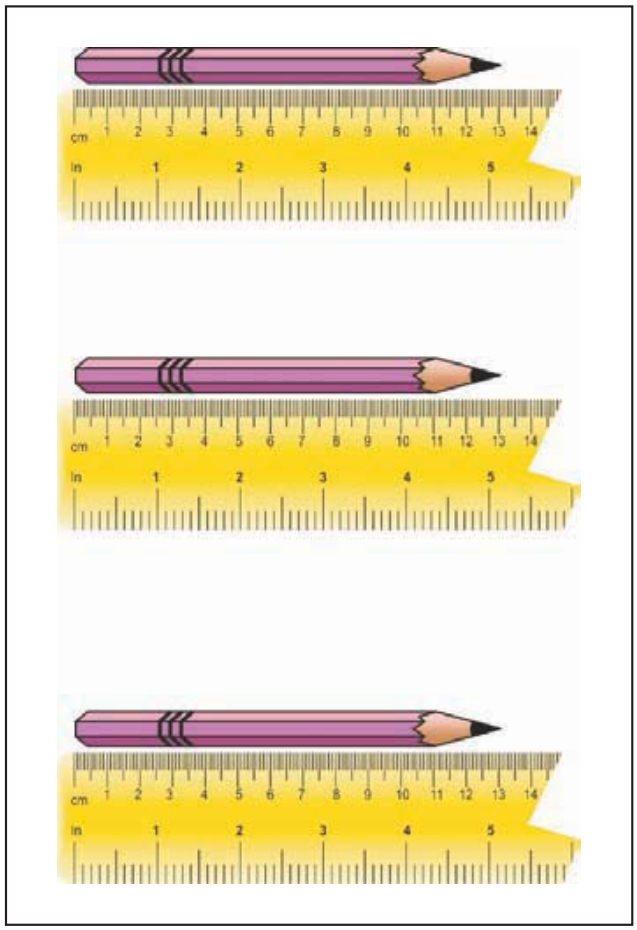
To measure large distance between stars and milkyways the unit "light year", is used.

The distance travelled by light in one year is called 1 light year.

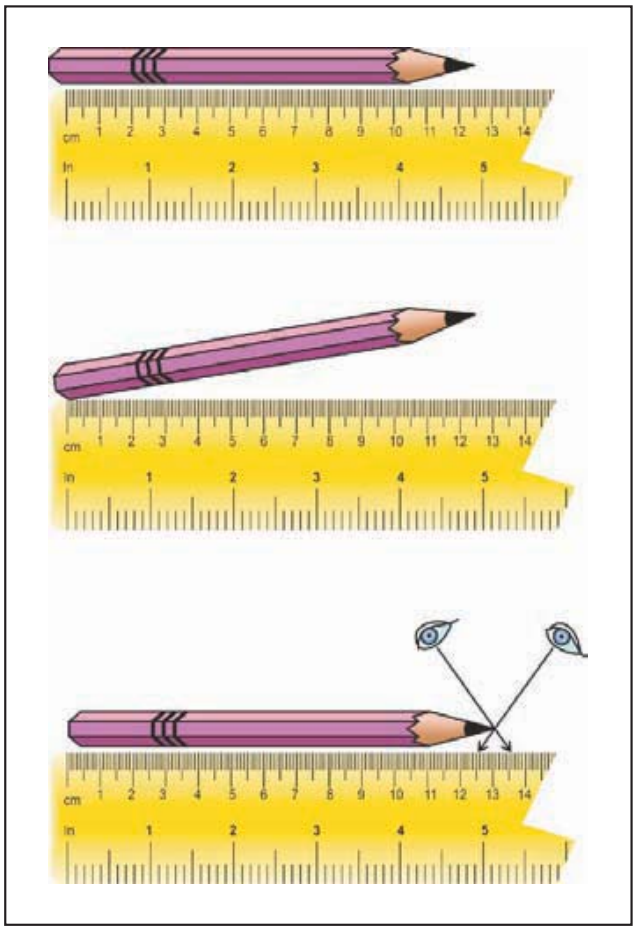
1 light year = 9.46×10^{12} km

Note down from the observation of following pictures that which thing you have to keep in your mind while measuring length of any thing :

Right method



Wrong method

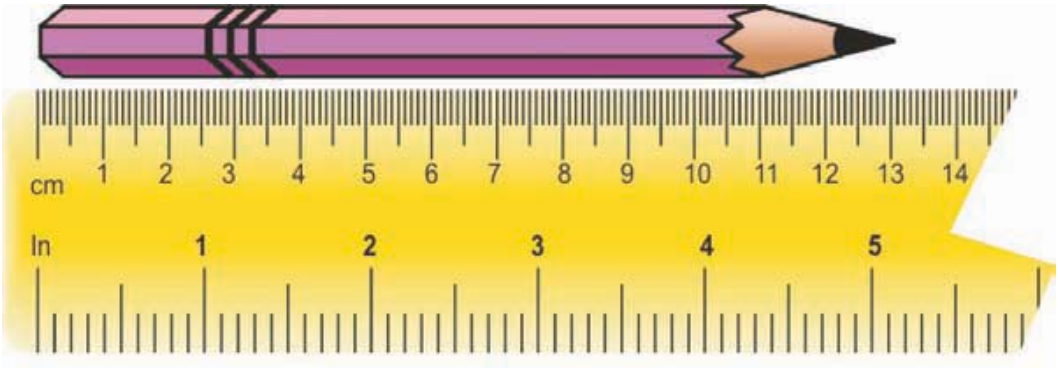


What to do during measurement	Don't do during measurement
1. The starting end of object whose measurement is taken.	1.

What to do during measurement	Don't do during measurement
2. During the measurement, object should be ..... to scale.	2.
3. At the time of the measurement your eye should be...	3.

Adjusting the object as discussed in correct method the digit where other end of object coincide, gives the measure of that object in centimeter. If the other end lies between two embossed digit then calculate numbers of minimum division after first digit. Then the measure is represented in cm-mm or with decimal point.

Measure the length of following object in centimeter and note down it.



Length of pencil ..... cm

Sr. No.	Name of object	Length	Unit
1	Length of the textbook 'Science and Technology'.		
2	Length of your pen/pencil		
3	Breadth of mathematics textbook		
4	The object which you like...		
5	The object suggested by your teacher		

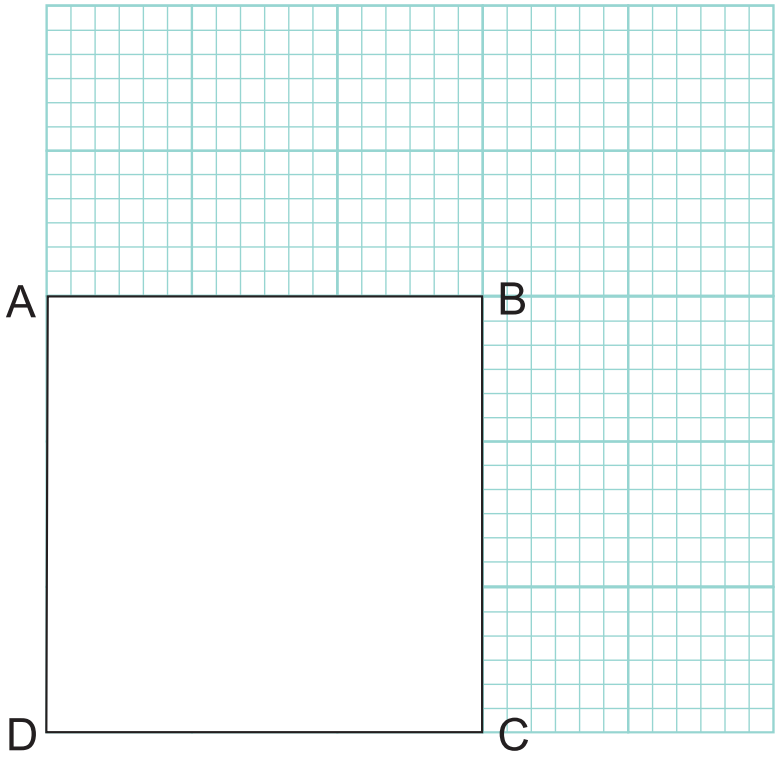
How you will take above observation if your scale is broken at zero ?

What is required ? A graph-paper, three rectangular or square card-piece of different measure.

What to do ?

- ☞ Adjust the piece of card-sheet on the graph-paper as shown in the figure.
- ☞ Draw this borders with pencil.
- ☞ Then remove the piece of card sheet.
- ☞ Name the four point A, B, C, D. Fill the required information in table.
- ☞

Repeat the process for other pieces of card-sheet.



No.	Name	The number of squares in the length of card-sheet	The number of squares in the breadth of card-sheet	Total number of squares occupied by card-sheet
1	Piece 1			
2	Piece 2			
3	Piece 3			

Note down, what is relation between, number of squares in length and breadth and total number of squares occupied by card-sheet ?

If total number of squares occupied by the card-sheet is called area of it in square cm then using length and breadth derive the equation for area.

Area =

The space occupied by any object on the surface is called area of that object. The product of the length and breadth is taken to calculate area. Therefore the unit of area of cm × cm = $(cm)^2$ or square cm, its larger unit is $(meter)^2$ or square meter.

To purchase, the carpet for a room, to buy cloth for uniform, to measure land or form, to fix tiles at home, measure of area is required. Give two more examples where you observed the use of measure of area.

What is required ? Square or rectangle shaped different objects, scale.

What to do ?

- ☞ Collect the objects from your teacher and find the area of those objects.
- ☞ How much time is taken by you to find area, that will be measured by another group.

Name of group	Name of object	Time taken to find area	
		Second	Minute

In this way in your routine life, in many cases you have to measure time. Let's see how this measure is done.

Sit in meditation position.

What to do

- ☞ When your teacher say start the calculation for second as one, two, three by closing your eyes.
- ☞ Stop after one minute when your teacher say.
- ☞ How many seconds you calculated for one minute ?
- ☞ Now calculate the seconds for one minute from the clock to get correct answer.
- ● You will see, 1 minute = ☐ second

You approximate seconds for 1 minute like that in early days when clocks were not discovered people were measuring approximate time with the help of natural phenomenon.

Time duration between two flowering seasons for a tree is approximately one year. Time-interval between two full moon is one month. As per the phase of moon fifteen days interval was decided and two such interval is one month and time-interval between consecutive sun rising is one day. This type of time measuring phenomena was used in early day. Find out such other phenomena and note down.

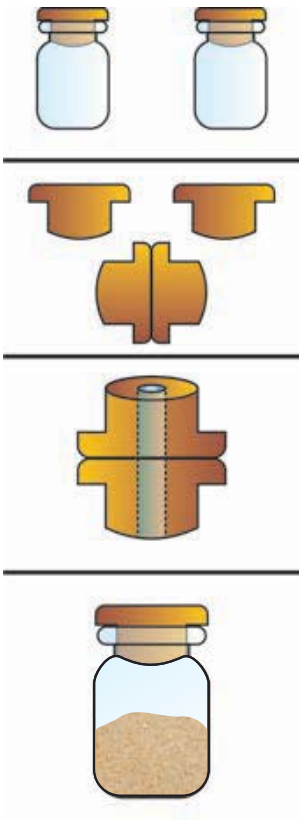
Moreover, the ancient people had developed some time measuring instruments. One such instrument is sand clock. Let's make such sand clock.

Make a sand clock.

What is required ? Two same glass bottles with cork, thin glass tube, sand (or powder of gypsum), gum

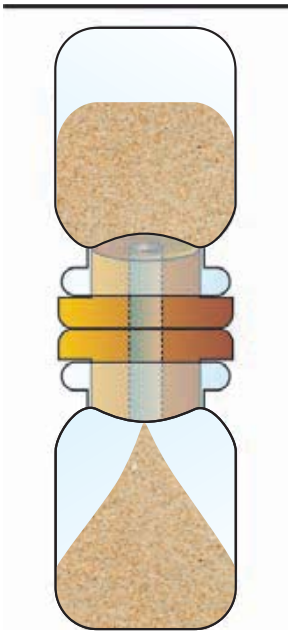
What to do ?

- ☞ Remove the cork of the both same bottles and stick them as shown in figure.
- ☞ From the center of both the cork pass the glass-tube and break its excess part.
- ☞ Fill the sand in one bottle.
- ☞ Insert the cork in it.
- ☞ Fix the another empty bottle on it in inverted position.

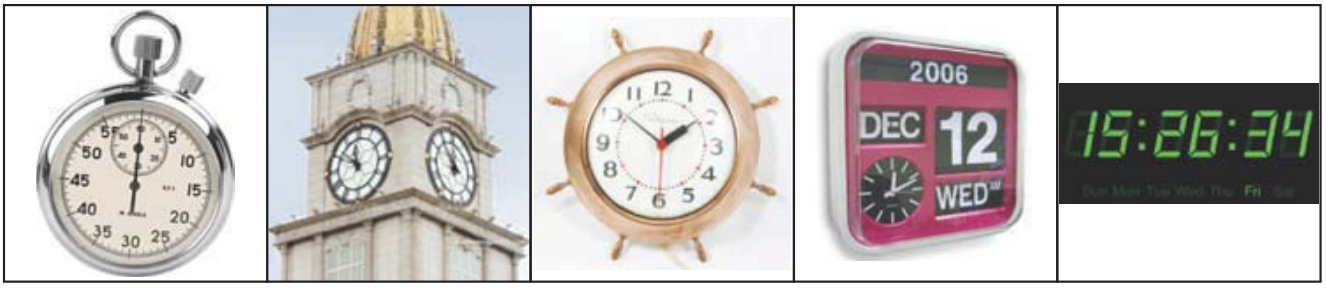


☞ Invert the sand clock and allow the sand to fall from upper bottle to lower bottle. After 1 minute remove the upper bottle and take out the remaining sand from it then again fix it.

Again place it in inverted position and note down the time taken by sand to move in lower bottle. In this way prepare a sand clock of 1 minute.



By inverting this sand clock measure the time to reach the sand in lower bottle. In this way by keeping different amount of sand, the sand clock for different time measurement can be made. When your sports day is celebrated, at the time of running, kabbadi and kho-kho, accurate measure of time is necessary. For this type of accurate measurement digital clock, cell-phone, stop-watch can be used. Different types of watches are shown in the figure. Get the information for those with the help of shown in the following figure. Get the information for those with the help of your teacher or parents.

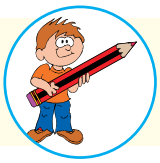


Second is a standard measure of time. Some modern clock can measure time of 1000^{th} part (millisecond) of second. Moreover minute and hour are also unit of measure of time. To measure long time interval, the units like day, month, or year are used. Following are the relation for units.

60 seconds = 1 minute | 60 minute = 1 hour | 24 hour = 1 day | 365 days = 1 year

Using proper instrument and unit, measure the time for your day to day work and note down in the following table :

Sr. No.	Activities in day to day life	Time taken		
		Hour	Minute	Second
1	To brush	00	05	
2	To take bath			
3	For reading			
4	For play a game			
5	For watching TV			
6	To study in school			
7	For breakfast, lunch, dinner			
8	For sleeping			



Q.1 Give answer of the following questions :

(1) Which thing to keep in mind while measuring the length of any onject ?

(2) With the help of which natural phenomena's, one can take idea about the completion of one year ?

(3) Measure the circumference of the trunk of a tree near by your school. Explain how your measure this length.

(4) In the classroom at your seat draw square or rectangle around it and find the area covered by you to seat.

Q.2 Do yourself :

☞ Take thread.

☞ Stretch it from both ends and make red sign at each 10 cm with your sketch pen and scale.

☞ Between two such sign make a black sign at 5 cm.

– In this way make such sign up to 1 meter length

– Keeping some string on both the side to hold it, cut excess string and make knot at both the ends.

– In this way your measuring instrument is prepared, which you can keep in your pocket.

– With the help of this string measure length of any ten objects on the way of your school and note it.

No.	Name of object	Length

Q.3 Can the water-clock be made using plastic bottle and I.V. Set ? How ? Write method of your water-clock and draw the figure.