GOVERNMENT OF TAMILNADU

STANDARD SIX

TERM - I VOLUME - 3

SCIENCE

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SCIENCE TERM - I
Table of Contents

E - book   Assessment   DIGI links

Unit 1
Measurements

International System of Units - SI

K ► kelvin (temperature)

m ► metre (distance)

A ► ampere (electric current)

s ► second (time)

mol ► mole (amount of substance)

kg ► kilogram (mass)

cd ► candela (intensity of light)

SI BASE UNITS

Learning Objectives

- Able to understand the need for measurement in our life.
- Able to define length, mass, time and volume.
- Able to evaluate the values of some physical quantities in terms of their units and sub units.
- Able to identify zero error and parallax error.
- Able to measure the volume of solids and liquids.
- Able to construct their own measuring tools (models)

Few Questions to start with:

- 📖 Your cousin asks you what your height is. How will you measure and inform him?

- 📖 Your friends decide to play kabbadi. How will you measure and draw the border lines?

- 📖 Your father gives you a bag and asks you to get potatoes. How will you ask the shopkeeper? A bag full of potatoes or how will you ask?

- 📖 Your mom daily gets milk from the milkman. How much does she get? A cup of milk or two tumblers of milk or how?

- 📖 How long will it take to reach your school from your house?

- 📖 How does the shopkeeper measure kerosene while selling it?

Introduction

We have already heard about the words like weight, kilogram, litres, millilitres, kilometre, length, distance etc. In this chapter let's have a deeper look at length, weight, volume and time and the necessity to measure them. To do the tasks given above we need to know about measurement. The comparison of unknown quantities with some known quantities is known as measurement. Measurement of a quantity has two parts: a number and its unit.

What are the measuring tools that you know?

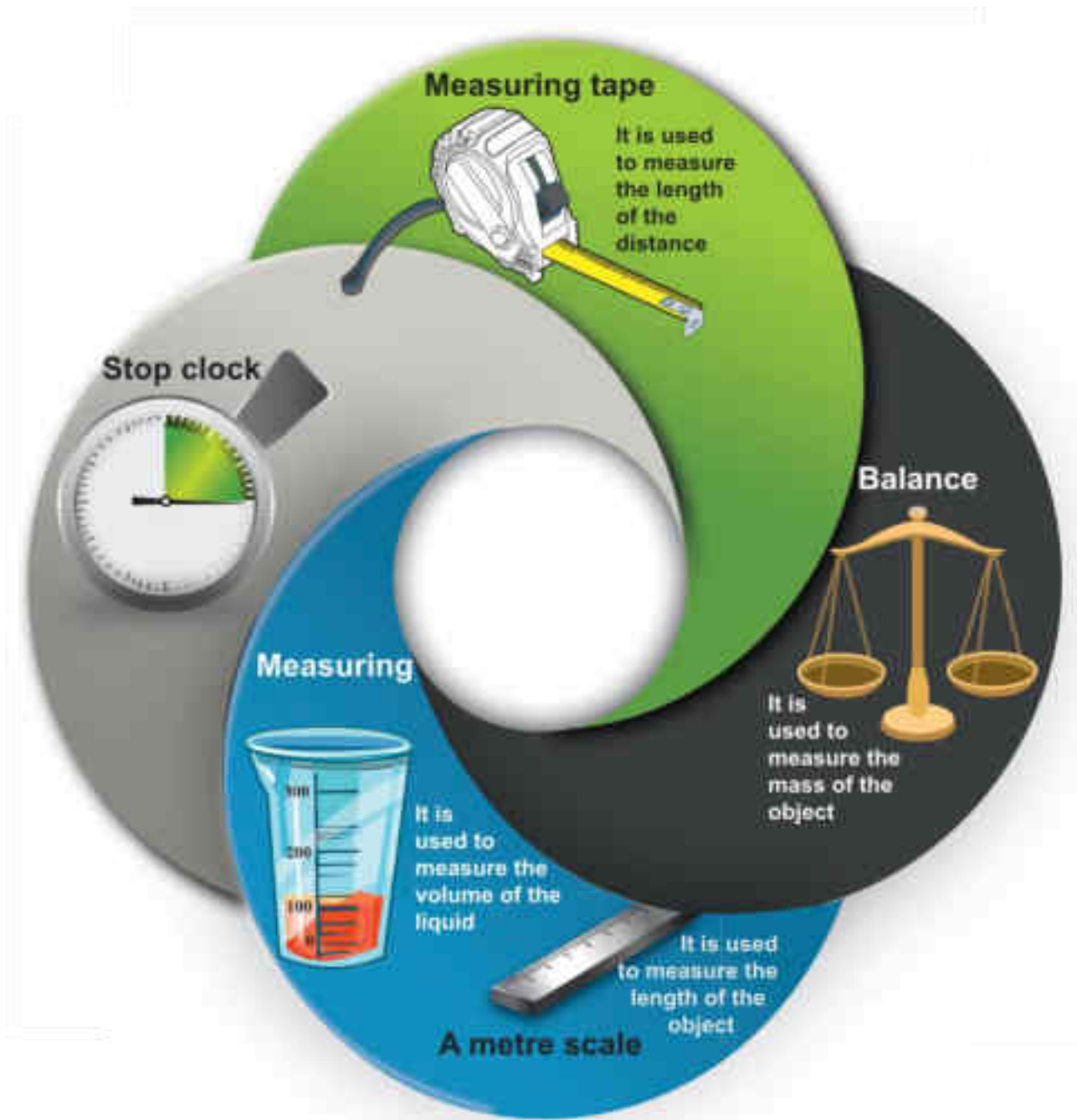Which of these tools will you use to do the tasks listed above and the similar ones?

1.1 Length

What is length? The distance between one end and the other desired end is called as length. It may be the distance

Measuring Tools

Measuring tape — It is used to measure the length of the distance

Stop clock

Balance — It is used to measure the mass of the object

Measuring — It is used to measure the volume of the liquid

A metre scale — It is used to measure the length of the object

between the edges of a book or a table or the corners of a football ground or even from your home to school.

The standard unit of length is 'Metre'. It is represented by letter 'm'. Very small lengths can be measured in mm and cm. Still larger measures, say height of a building, a banner or a lamp post are all measured in metre. How to express still longer lengths? Say distance between two cities or villages or distance between your school and home? It is expressed in kilometre (km).

Know the unit of length

1 km (kilometre) = 1000 m (metre)

1 m (metre)   = 100 cm (centimetre)

1 cm (centimetre) = 10 mm (millimetre)

Think: Can you convert 1 km in terms of cm?

Measure the length of your pencil now. For sure the lengths of all your pencils are not the same.

1. Take the meter scale

2. Check lines with marking 1,2,3,4 ... till 15 (for smaller scales) or till 30 (bigger scales). The distance between 1 and 2 is denotes a centimetre (it is written as 'cm').

3. Notice, in between 1 and 2 there will be smaller markings. If you count, there will be 9 such lines. The distance between any two consecutive smaller markings within a 'cm' denotes a millimetre (written as 'mm').

Let us now understand more about the three important quantities – Length, Mass and Time.
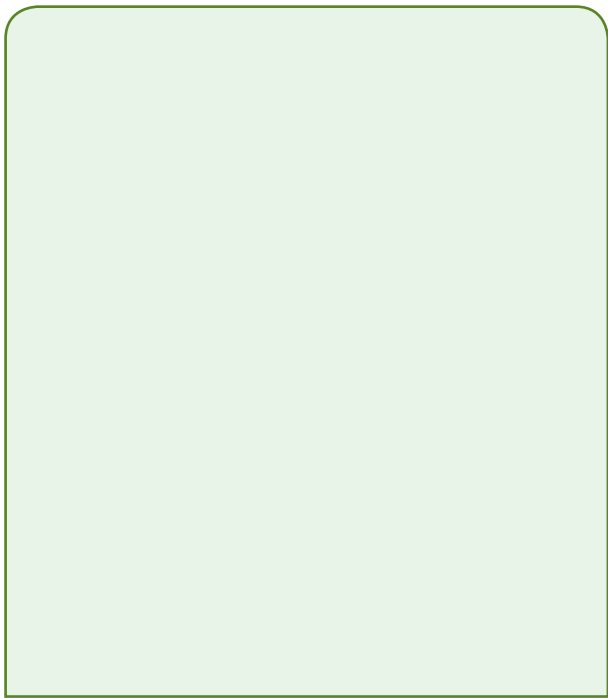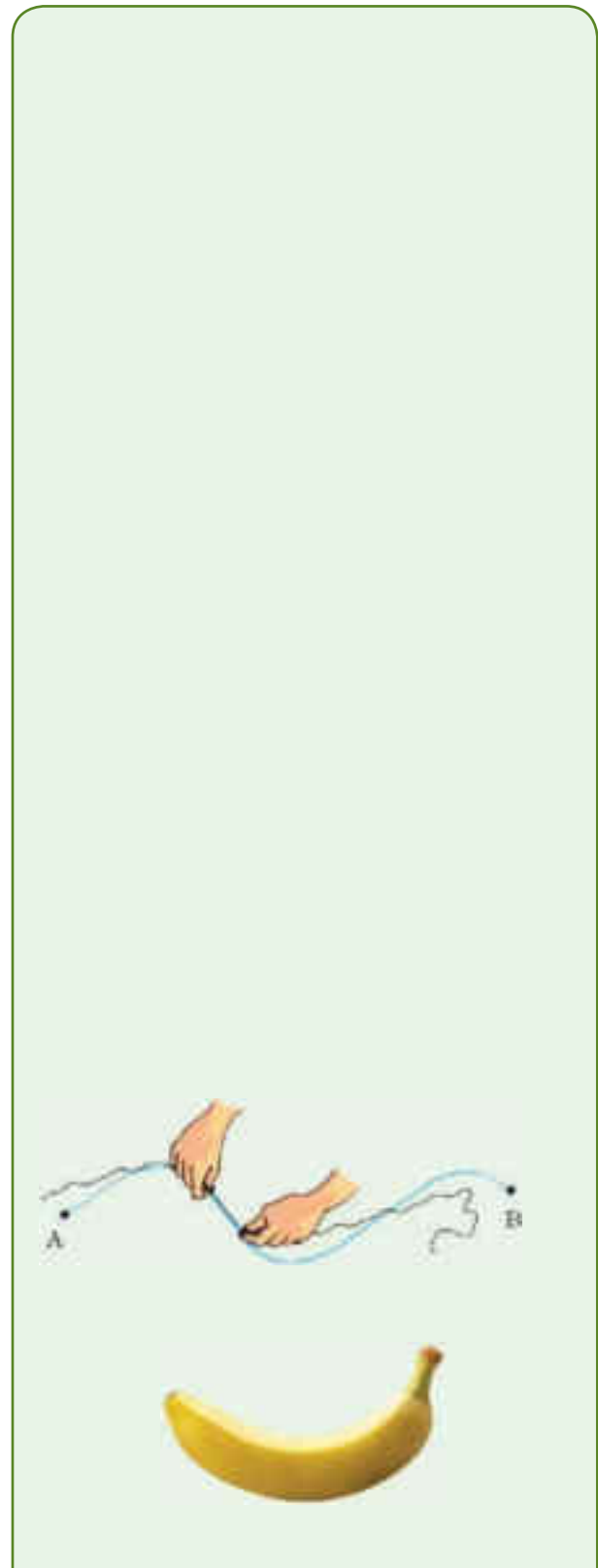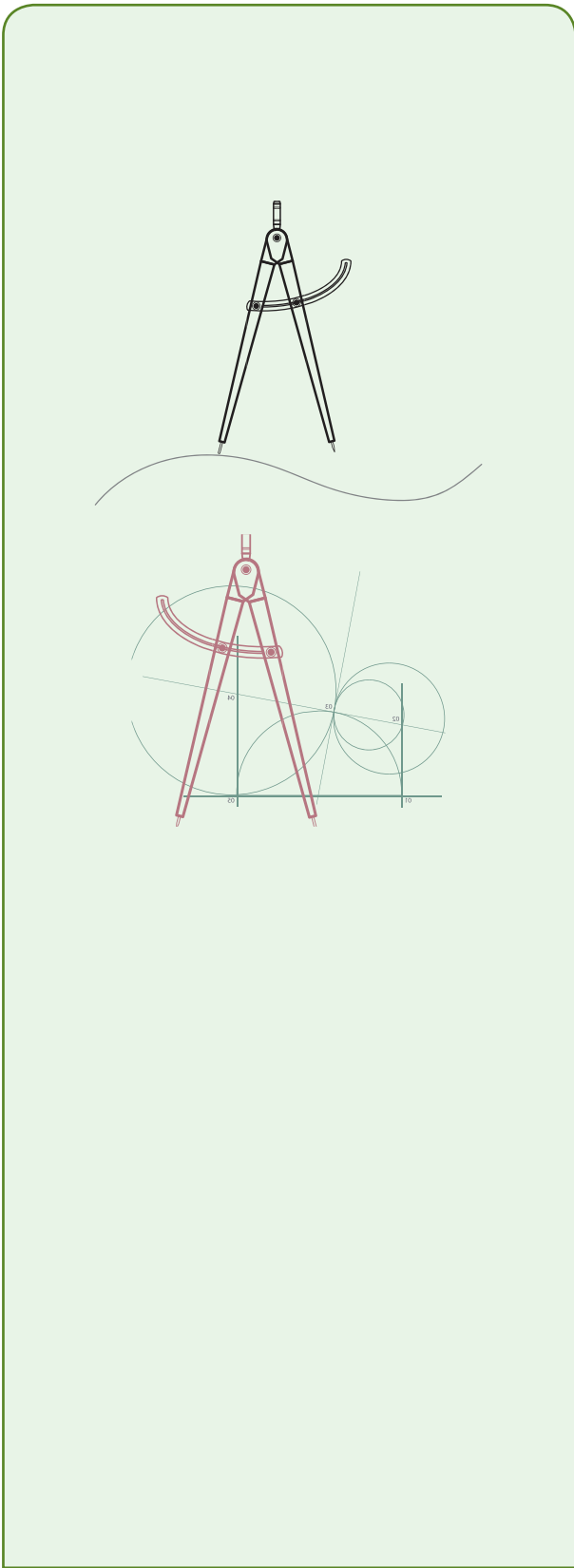
In the given activity, measure the quantities using suitable measuring units and express them with suitable multiple and submultiples.

Picture	Activity	Measuring Unit m/kg/s	Multiple / Submultiple
	Length of tip of pencil.	metre	millimetre
	Length of the pen	_____	_____
	Distance between two cities	_____	_____
	Mass of dry fruits in tablets	_____	_____
	Mass of jewellery	_____	_____

7

cubical box is 1000 cubic cm. It means 1000 cubes each with dimensions 1cm × 1cm × 1cm can be placed inside the box. Try to express this quantity in suitable unit.

1.2.2 Volume of Liquid

Measuring the volume of a liquid is quite easy. Liquids take the shape of the container in which they are kept. A liquid whose volume is to be found can simply

be poured into a graduated container. Graduated cylinders, beakers, pipettes and burettes are available for measuring exact volumes. The volume of liquid is usually measured in litres.


Graduated Cylinder   Beaker   Conical Flask
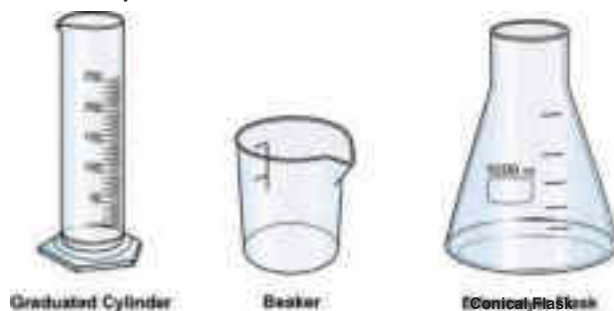
We would have often heard the word litre in our daily life. For an example 1 litre milk packet, 20 litres water can.
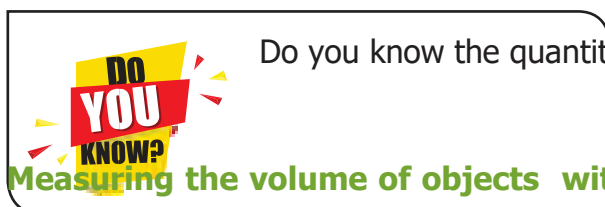
DO YOU KNOW? Do you know the quantity of blood in a human body?

Measuring the volume of objects with irregular shape Suppose you want to measure the volume of an object which has irregular shape. How will you do this? There is no mathematical formula to measure this but there are many ways to do. Remember, volume is the space occupied by an object. We can use this property to measure the volume of an object with irregular shape, for example a stone.

Let us try to find volume of a small piece of stone.
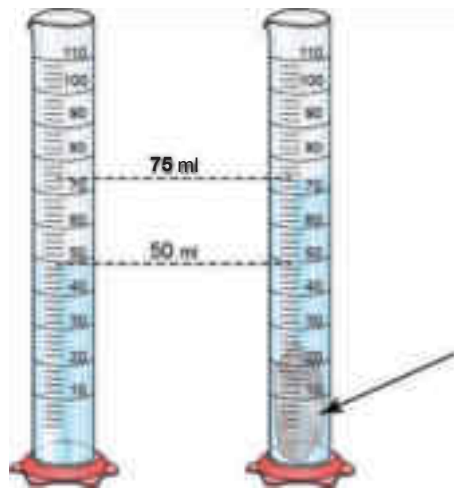
Irregular Shaped

Object

Fill a graduated measuring cylinder with water to certain level, say 50 ml. Tie the stone with a piece of fine thread. Immerse the stone completely into water.

As the stone is immersed, we can observe that water level increases. Why? The stone displaces the water to occupy the space inside the measuring cylinder. How much water would be displaced? It would be equal to the space taken up by stone. So the amount of water displaced will be the volume of the stone. This method is called as water displacement method.

Suppose initially the water level was 50 ml. After you immerse a stone the water level rises to 75 ml. What is the volume water displaced? Volume of the water displaced is 75 ml – 50 ml = 25ml

1ml = 1 cubic cm

25ml = 25 cm^3. the volume of stone = 25cm^3

1.2.3 Volume of gas

We can also measure the volume of gases. Gases expand to fill the container into which they are placed. When you compress, a gas you can