DELHI PUBLIC SCHOOL,JAMMU
SESSION (1920-21)
FOUNDATION WORKSHEET
SUBJECT-SCIENCE
CLASS-IX

Physics
Chapter: Motion
Topic: Graphical representation of Motion

Introduction:

Motion of body enables us to find velocity, acceleration, distance and displacement covered. These physical quantities may be scalar or vector.

Vector Physical quantity: These are the physical quantities having both magnitude and direction.
For example: Displacement, velocity and force.

Scalar Physical quantity: These are the physical quantities having only magnitude and no direction.
For example: Distance, work and energy.

Distance: It is the actual path length covered between the two positions. It is a scalar quantity (no specific direction) and its SI unit is meter (m)

Displacement: It is the shortest path length covered between the two positions. It is a vector quantity (having specific direction) and its SI unit is meter (m)

Velocity: It is defined as the rate of change of distance. It is a vector quantity and its SI unit is $ms{-}1$.

Acceleration" It is defined as the rate of change of velocity. It is a vector quantity and its SI unit is m$s{-}2$.

Equation of Motion (For Uniformly Accelerated Motion)

Consider an object is moving with constant acceleration ‘a’.

Let the initial velocity be ‘u’ and after time ‘t’ the velocity becomes ‘v’.

The graph between velocity and time for such motion is given below.

From the graph;

Slope gives the measurement of acceleration ‘a’.

Area under v-t graph gives the measurement of displacement ‘s’.

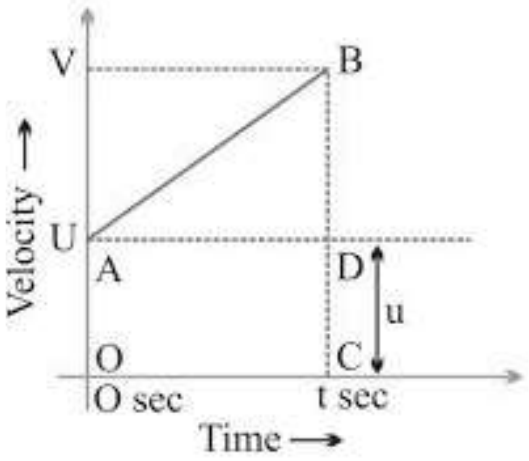
First Equation: v = u + at

Final velocity = Initial velocity + Acceleration × Time

Slope =a= $\frac{v-u}{t}$

Graphical Derivation

Suppose a body has initial velocity ‘u’ (i.e., velocity at time t = 0 sec.) at point ‘A’ and this velocity changes to ‘v’ at point



‘B’ in ‘t’ secs. i.e., final velocity will be ‘v’.

For such a body there will be an acceleration.

a = Change in velocity/Change in Time

⇒ a = (OB - OA)/(OC-0) = (v-u)/(t-0)

⇒ a = (v-u)/t

⇒ v = u + at

Second Equation: s = ut + ½ at2

Distance travelled by object = Area of OABC (trapezium)

= Area of OADC (rectangle) + Area of ΔABD

= OA × AD + ½ × AD × BD

= u × t + ½ × t × (v – u)

= ut + ½ × t × at

⇒ s = ut + ½ at^2 (∵a = (v-u)/t)

Third Equation: $v^2 = u^2 + 2as$

s = Area of trapezium OABC ⇒ $v^2 = u^2 + 2as$

Drill Problems:

1.A scooter acquires a velocity of 54km/h in just 20s after the start. Find the acceleration of the scooter?

Ans: Using 1st equation of motion, $v = u + at$

54km/h=54 ×518ms^{-1} = 15ms^{-1}

$a = \frac{v-u}{t} = \frac{15-0}{20} = 0.75 ms^{-2}$

2. A car is moving on a straight road with constant acceleration. The initial velocity of car is 5m/s and after 10s its velocity becomes 25m/s. Find (a) Acceleration of car (b) distance/displacement travelled by car in first 10s.

Ans: Using 1st equation to find acceleration

$v = u + at$

$a = \frac{v-u}{} = \frac{25-5}{} = 2ms^{-2}$

Using 2nd equation to find distance

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

$S = ut + \frac{1}{2} at^2 = 5 \times 10 + \frac{1}{2} \text{ x } 2 \text{ x } 102 = 50 + 100 = 150\text{m}$

Worksheet
Very Short Answer Questions

1. What is the acceleration of a body moving with uniform velocity?
2. What does the slope of a velocity time graph indicates?
3. What does the area under the velocity time graph indicates?

Short Answer Questions

4. Define velocity and acceleration and give their SI units
5. A body moving with a velocity of 2m/s accelerates at 3ms^{-2}. Find the velocity after 5s?
6. Define scalar and vector physical quantities with two examples for each.

Long Answer Questions

7.Find the third equation of motion graphically and give its significance.

8. A car is moving on a straight road with constant acceleration. The initial velocity of car is 10m/s and after 5s its velocity becomes 30m/s. Find (a) Acceleration of car (b) distance travelled by car in first 10s.

Chemistry
The Matter in Our Surroundings.
Topic: Characteristics of particles of Matter.

Introduction:

Matter is anything which occupies space, has mass and can be felt by one or more of the five senses, i.e; sight, touch, smell, hearing and taste. e.g; book, table, milk, oil, air, oxygen etc. are matter. But heat, light, sound, shadow, love, hate, Radio and TV waves are not matter as they are mass less and do not occupy space.

Characteristics of particles of Matter:

1.Particles of matter have spaces between them

There are small voids between every particle in a matter. This characteristic is the concept behind the solubility of a substance in other substances. Let's try to understand this with an illustration.

Take a glass of water. Put a teaspoon of salt/sugar and mix them properly.
You will observe that the water is still clear and there is no rise in water level. This is because the particles of salt/sugar get into the interparticle spaces between the water particles. This proves that there are voids between particles of a substance. If you add more salt/sugar, it will dissolve until all the space between water particles get filled.

2. Particles of matter are always in motion

Particles of the matter show continuous random movements. The kinetic energy they possess helps them in this movement. The spreading of ink in a beaker of glass, the smell that comes from agarbattis, etc. are few illustrations that show the movement of particles of a substance. When the particles of two different types of matters intermix on their own, the phenomenon is called diffusion.
Diffusion.

Diffusion of particles becomes fast when the temperature is increased. A rise in temperature increases the kinetic energy of the particles, making them move more vigorously.

3. Particles of matter attract each other

Take an iron rod, a stick of chalk, and a pen. Try to break each one of these. Which one of these is easy to break? The iron rod is stronger than the other two items. What makes an item stronger?

Yes, it's the particles in them which are held by the inter-particle force of attraction.
In every substance, there is an inter-particle force of attraction acting between its particles. To break something we need to overcome this force. The strength of the force differs from one substance to another

.
The inter-particle force of attraction and the kinetic energy of the particles primarily determine the physical state of any matter.

Diffusion

When the particles of matter intermix on their own with each other, the phenomenon is called diffusion**.** For example, spreading of ink in water.
During diffusion, the particles are occupying the interparticle spaces.
The rate of diffusion increases with increase in the temperature, due to increase in kinetic energy of the particles.

Worksheet
Very Short answer questions

Q1. What is matter?
Q2. Define the term "Diffusion".
Q3. Which of the following are matter? Chair, air, love, smell, hate, almonds, thought, cold, lemon water, smell of perfume.

Short answer questions

Q4. Give reasons for the following observation: The smell of hot sizzling food reaches you several meters away, but to get the smell from cold food you have to go close.
Q5. A diver is able to cut through water in a swimming pool. Which property of matter does this observation show?
Q6.What are the characteristics of the particles of matter?

Long answer questions

Q7. Describe with an activity that particles of matter are continuously moving.

Q8. How will you prove that particles of matter have space between them?

Biology
The Fundamental Unit Of life

Topic: i) Cell- Discovery
ii) Unicellular and multicellular
iii) Prokaryotes and eukaryotes

INTRODUCTION

Cell - Discovery : The cell was first discovered and named by **Robert Hooke in 1665**. He remarked that it looked strangely similar to cellula or small rooms which monks inhabited, thus deriving the name. However what Hooke actually saw was the dead cell walls of plant cells(cork) as it appeared under the microscope(primitive microscope). This was the first time that someone had observed that living things appear to consist of separate units. The use of the word '**cell'** to describe these units is used till this day in biology.

Fig. Cork

Fig. Cork cells as seen under the microscope

In **1674, Antonie van Leeuwenhoek(1632-1723)**, a Dutch cloth merchant also knon as the 'Father of Microbiology' designed and improved the microscope . He created more than 400 different types of microscopes and was the first one to observe bacteria, Spermatozoa, muscle fibres and blood flow in the capillaries. He named the single –celled organisms, like protozoa and bacteria, as animalcules.

Modern cell theory: In 1838, a German botanist, Mathias Jakob Schleidan (1804-1881) and in 1839, a British Zoologist, Theodor Schwann (1810-1882), independently proposed the cell theory. This was the biggest breakthrough in the cell biology.

1. Cells are the structural units of all the living organisms, as these are the building blocks of an organism.
2. Cells are the physiological units of living organisms and perform all the metabolic activities of organisms.
3. Cells contain the hereditary information (DNA) that is passed during cell division fron one generation to the next.
4. New cells arise from pre-existing cells only and no cell can originate spontaneously.
5. Cell is the smallest and the basic unit of life. All organisms start their life from a single cell.

Unicellular and multicellular organisms

Unicellular organism, also known as a single-celled organism, is an organism that consists of a single cell,unlike a multicellular organism that consists of multiple cells. Unicellular organisms fall into two general categories: prokaryotic organisms and eukaryotic organisms. Prokaryotes include bacteria and archaea.
Many eukaryotes are multicellular, but the group includes the protozoa, unicellular algae, and unicellular fungi. Unicellular organisms are thought to be the oldest form of life, with early protocells possibly emerging 3.8–4 billion years ago. Multicellular organisms are organisms that consist of more than one cell, in contrast to unicellular organisms. All species of animals, land plants and most fungi are multicellular, as are many algae,whereas a few organisms are partially uni- and partially multicellular, like slime molds and social amoebae such as the genus Dictyostelium.

In unicellular organisms- like Bacteria, *Amoeba* and *Paramecium* single cell performs all the functions of the body while as in multicellular organisms like-Plants, animals and human beings different cells becomes specialized to perform different functions.

Prokaryotes and Eukaryotes are considered to be the most important distinction among groups of organisms.Eukaryotic cells contain membrane-bound organelles, such as the nucleus, while prokaryotic cells do not. Differences in cellular structure of prokaryotes and eukaryotes include the presence of mitochondria and chloroplasts, the cell wall, and the structure of chromosomal DNA. Prokaryotes were the only form of life on Earth for millions of years until more complicated eukaryotic cells came into being through the process of evolution.

Prokaryotes and Eukaryotes:
Prokaryotes:

All organisms can be classified into two types based on the complexity of nucleus and other cellular components
.
Prokaryotes [*Pro*- primitive; *karyon* – nucleus]

These are the organisms in which

1. Nuclear region is undefined and contains only nucleic acids.This region is called nucleoid.
2. Nucleus lacks a nuclear membrane
3. Nuclear material includes a single chromosomes , in direct contact with the cytoplasm.
4. Membrane – bound cell organelles are absent.
5. most of the cellular functions are carried out by the cytoplasm.

Bacteria and cyanobacteria are prokaryotes

Eukaryotes:

Eukaryotes [*Eu*- advanced ; *karyon* – nucleus]

These are the organisms in which

 Cells are advanced and complete.

 Nuclear region is properly defined, bounded by a definite nuclear envelope.

 The cell organelles are membrane bound.

 The cellular functions are carried out by cell organelles.

The **unicellular and multicellular plants and animals** are composed of eukaryotic

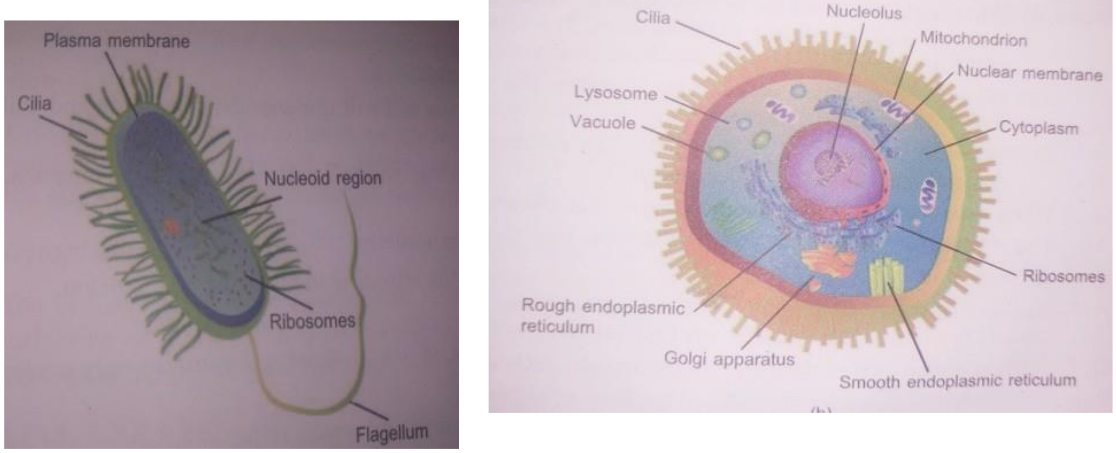


Fig. (a) Prokaryotic cell (b) Eukaryotic cell

Activity:

To prepare temporary stained mount of onion peel

Take a piece of onion and bend it to remove the transparent membranous structure called onion epidermal peel. With help of forcep remove the peel from its inner side. Place the peel in water in a watch glass to prevent the folding or drying of the onion peel. Add a few drops of stain safranin, to the watch glass containing the peel for staining. Transfer the peel from the watch glass on to the slide with the help of a forcep/ brush. Remove excess water / stain with the help of blotting paper and pour few drops of glycerine on the peel. Place a coverslip avoiding formation of any air bubbles. Blot xcess oof glycerine from the edges of the coverslip with the help of a blotting paper.

Observe the slide, first under low power a nd under high power of the microscope.

Fig: Epidermal

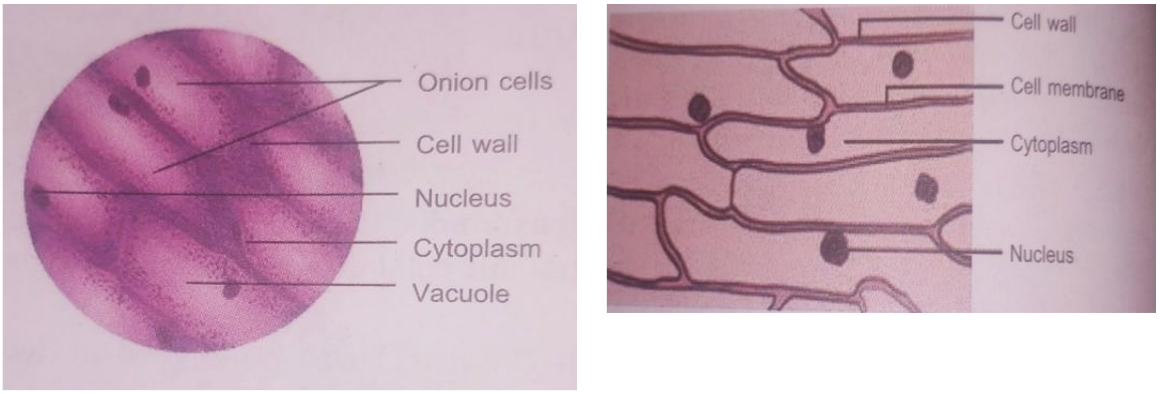


Fig: Epidermal cells of onion peel as seen under the microscope

Inference
The epidermal peel of the onion consists of similar cells with similar structures. These are building blocks of the onion bulb and carry out all the necessary function.

WORKSHEET
Very Short Answer Questions

Q1. Name the scientist who

i) observed the cell for the first time.

ii) observed the first live cell.

Q2. Name any two eukaryotes.

Q3. Who proposed the cell theory and when?

Short Answer Questions

Q4. Why do you place the onion peel in water in Activity?

Q5. Why is a cell called basic unit of life?

Q6. Mention any three characteristics of a prokaryotic cell.

Long Answer Questions

Q7. State the modern cell theory.

Q8. Draw a neat and well labelled diagram of a typical prokaryotic cell.

Q9. Differentiate between unicellular and mulicellular organisms.