

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/279450031>

# A Textbook of Practical Science for Grade 8

Book · January 2013

DOI: 10.13140/RG.2.1.2244.7206

---

CITATIONS

0

---

READS

60,011

2 authors, including:



**Prakash Parajuli**

University of Texas at San Antonio

15 PUBLICATIONS 7 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



Metallic Thin Film Deposition and Characterization [View project](#)

# **A Text Book of Practical Science Class VIII**

**Authors:**

<b>Prakash Parajuli</b>	<b>Bishnu Parajuli</b>
MSc, Physics	MSc, Physics

**ASIA PUBLICATIONS (PVT.) LTD.**

**Bagbazar, Kathmandu, Nepal**

**Tel: 4232879, 4239174, 4257462**

**Fax.: 4239190**

## Special Thanks goes to:

### Admirable Persons:

Mr. Narayan Parajuli  
Mr. Laxman Parajuli

### Advisers:

Mr. Dan Bdr. K.C.  
Principal of Arjun English Boarding  
High School  
Tamghas, Gulmi  
&  
Mr. Keshav Parajuli  
Head of department of science  
Gulmi

---

<b>Title</b>	:	A Text Book of Practical Science
<b>Publisher</b>	:	<b>ASIA PUBLICATIONS PVT. LTD.</b> Bagbazar, Kathmandu Tel: 4232879, 4239174, 4257462 Fax. 4239190
<b>Author</b>	:	<b>Writer</b>
<b>Edition</b>	:	<b>First- 2012 A.D.</b>
<b>@</b>	:	<b>Publisher</b>
<b>Computer Type</b>	:	<b>Kulchandra, Pradip Parajuli &amp; Suma Poudel</b>
<b>Computer Setting &amp; Design</b>	:	<b>Asia computer Section</b>

---

**Price : Rs.180/-**

# Preface

Our world has witnessed great changes and development in the last few decades. Today, everyday is a day of new discovery, invention and achievement in the field of science and Technology. These discoveries, inventions and achievements are the results of practical education. This book is an attempt to present the subject in a special way, because it was felt that competent material to explain the subject was somewhat found lacking in the market. It is hoped that the shortage, or rather the need, will be fulfilled. This book 'A Textbook of practical Science' has evolved as an outcome of a long time classroom teaching experience of the authors. The contents of this book have been presented in accordance with the needs of the students as well as the teachers. So, the authors believe that it is a complete book required for the syllabus prescribed by curriculum development centre (CDC).

This book is expected to deserve a significant result because of the following special features:

- Correct and lucid explanation of the way to perform experiment.
- Scientific explanation of the experiment by theory and Interpretation which helps students to understand the laws related to the experiment.
- All the materials are accessible in the simple lab required to perform experiment which are explained in this book.
- Way to write experiment with practical copy.
- Syllabus provided by CDC with Model Question and Marking Scheme.
- Prepared accordance with the syllabus issued by CDC.
- Viva questions related to each and every experiment are included.

## Guide lines for Teachers and Students

- ❖ All the science teachers are requested to spend at least 1 day per week in lab.
- ❖ Explain all the information and principles regarding the experiment before performing that experiment.
- ❖ To perform project work, all the students of the class must be divided into different group of about 5 students.

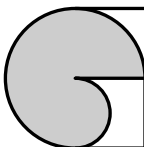
This book is a result of a long inspiration and moral support of many visible and invisible persons. We are grateful to all of them. We are thankful to Mr. Sachin

Pandey (Bro). Mr. Arjun Acharya, Mr.Jagat Psd.Pandey & Mr. Binaya Banjade for their co-operative suggestions and help.

At last, heartily thanks to Mr. Nabnidhi Pant of Asia publication for publishing this book and both Himal G. C., Kumar Dulal for their attractive layout designing of this book.

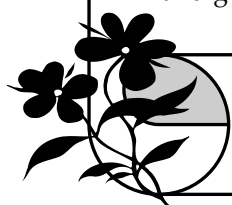
We have tried our best to avoid errors in the presentation of contents, and we are entirely responsible for the errors, if any, found in the book. We will be thankful to all the readers who point out the weakness and provided us with suggestions for the improvement of the book.

**Authors**



## Instruction for the students to write Experiment:

- After performing experiment in the lab write all the Experiment in your practical copy systematically (Provided with this textbook).
- No need to write Procedure for the experiment of Physics and Chemistry.
- Write the experiment only on one side of the copy and draw figures on the drawing page provided on the left side.
- Write comments on the right page of the copy after drawing figure in Biology.
- Get information related to the practical by reading Viva-Questions.
- At least 30 experiments must be performed in the lab within one academic session.
- Submit the experiment and get signed from your Science teacher.
- Fill the experiment and date on the table provided in this book and get signed from your Science teacher.



# CONTENTS

Expt.No.	Name of the Experiment	Page No.
	<b>PHYSICS</b>	<b>1-35</b>
1.	To determine the Area of Irregular object.	1
2.	To determine the Mass and Volume of an Irregular object.	2
3.	To verify the Principle of Simple Machine in a Laboratory by using Lever.	3
4.	To study the relation between Pressure and Area.	6
5.	To study the relation between the Pressure exerted by liquid with depth.	7
6.	To study Pascal's Law in Laboratory.	7
7.	To prove that atmosphere exist pressure.	8
8.	To study the relation between Mass and change in Temperature.	9
9.	To determine the Upper fixed point of a Thermometer.	10
10.	To study the Reflection of Light and verify laws of reflection by using plane mirror.	14
11.	To study the Nature and Position of the image formed by Concave mirror when object is place beyond 2F.	15
12.	To study the Nature and Position of the image formed by Concave mirror when object is place at 2F or C.	16
13.	To study the nature of the image formed by Concave mirror when object is place in between 2F and F.	18
14.	To study the Nature and Position of the image formed by Concave mirror when object is placed at F.	19
15.	To study the Nature and Position of the image formed by Concave mirror when object is placed between F and O (pole).	20
16.	To study the Nature and Position of the image formed by Concave mirror when object is placed at infinity.	22
17.	To study the Nature and Position of the image formed by convex mirror when object is placed in front of the mirror.	23
18.	To study the Refraction of Light and verify Laws of Refraction.	24
19.	To study the Transmission of Sound in Solid.	26
20.	To study the Transmission of Sound in Liquid.	26
21.	To study the Magnetic field of any Bar Magnet.	29
22.	To study the property of Electric Charge.	29
23.	To draw different symbol used in Electric Circuit.	31
24.	To study the Series and Parallel combination of Cells.	32
25.	<b>Project work:</b> To prepare a model of Series & Parallel combination of bulbs.	33
	<b>Viva Questions</b>	34

## **Chemistry**

36–45

- |     |   |    |
|-----|---|----|
| 26. | To study the process of crystallization and obtain the crystal of copper sulphate (CuSO <sub>4</sub> ). | 36 |
| 27. | To separate the pigment of Blue and Red ink from the mixture by using Paper Chromatography.             | 37 |
| 28. | To identify Acid, Base and Salt.  | 37 |
| 29. | To study Rusting in Laboratory.   | 39 |
| 30. | To prove that air contains oxygen.  | 40 |
| 31. | To measure the Percentage of Oxygen in air.   | 41 |
| 32. | To prove that Air contains Water Vapor.   | 42 |
| 33. | To prove that air contains Carbon Dioxide gas.  | 43 |
|     | <b>Viva Questions</b>   | 44 |

## **Biology Astronomy and Geology**

46–75

- |     |   |    |
|-----|---|----|
|     | <b>To Study the different parts of Compound Microscope</b>                                      | 46 |
| 34. | To study the Museum Specimen of following organisms and classify with one diagnostic character: | 47 |
| 35. | To observe the following Organism and classify it with one characteristic.                      | 55 |
| 36. | To observe the Permanent slide of the following Organism and classify with one character.       | 62 |
| 37. | To observe the Permanent slide of,  | 63 |
| 38. | To prepare the Temporary slide of Onion Cell and observe it through microscope.                 | 64 |
| 39. | To prepare the Temporary slide of Human cheek cell and observe it through microscope.           | 64 |
| 40. | To draw the fig of Reproduction of Amoeba, Hydra, Spirogyra?                                    | 65 |
| 41. | To draw the fig of Alimentary canal of Human beings.  | 66 |
| 42. | Study the different parts of Mustard plant and draw its life cycle.                             | 67 |
| 43. | To verify that Green Leaf contains Starch.  | 67 |
| 44. | To show that light is necessary for Photosynthesis.   | 68 |
| 45. | To show that oxygen is evolved during Photosynthesis.   | 70 |
| 46. | To show that carbon dioxide gas is necessary for the Photosynthesis.                            | 71 |
| 47. | To study different types of Rocks   | 72 |
| 48. | To study the Components of Soil.  | 73 |
| 49. | To draw the fig of Solar System   | 74 |
| 50. | To Prepare the Model of Volcanic Eruption   | 74 |
| 51. | A Sample of Excursion Report  | 75 |
|     | <b>Viva Questions</b>   | 76 |
|     | <b>Specification Grid &amp; Model Questions</b>   | 79 |
|     | <b>Experimental Sheet</b>   | 85 |



# Πηψισιχσ

Experiment No.1

**To determine the Area of Irregular object.**

Materials Required:

- Irregular object(leaf)
- Graph paper
- Pencil

Theory:

Any objects which have fixed dimension i.e. length, breadth and height is called regular object where as not having fixed dimension is called irregular object. The space covered by a plane surface of any object is called Area. The area of regular object can be determined by using different formula according to their shape, but the area of irregular object is determined by using graph paper.

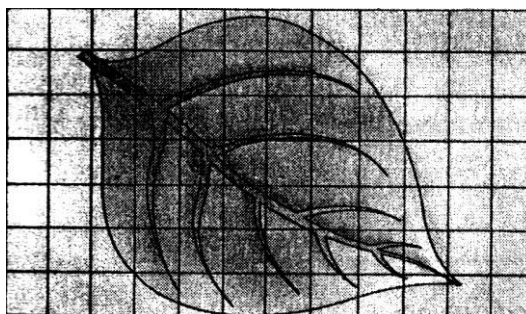


Fig : Leaf in a graph paper

In graph paper,

Area of 25 small box of graph paper =  $100\text{mm}^2$

Area of 1 small box of graph paper =  $4\text{mm}^2$

Procedure:

- Take a leaf and a graph paper.
- Put the leaf on a graph paper and draw its outline by using pencil.
- Remove leaf from the paper and count the number of small boxes covered by leaf let it be a. Now count those small boxes which are covered half or more than half by the boundary line let it be b.
- Don't count the boxes which are covered less than half by the boundary line.
- Find total number of small boxes by adding a and b and fill the table below.

Observation of table:

No. of full boxes(a)	No. of half & more than half filled boxes (b)	Total no. of boxes (a+b)	Area $(a+b) \times 4 = \text{mm}^2$

Result:

From the above experiment it is found that the area of the given leaf is ...mm<sup>2</sup> and.....cm<sup>2</sup>.

Precaution:

- Graph paper must be of larger in size than leaf.
- Boxes covered by leaf must be counted carefully and correctly.

Experiment No. 2

### To determine the Mass and Volume of an Irregular object.

Materials Required:

- Irregular object (stone)
- Graduated measuring cylinder
- Water
- Spring balance
- String or Thread

Theory:

Mass of any object is defined as the matter contained in any object. The space occupied by any object is called volume. The volume of regular object is determined by using different formula according to their shape, and the volume of irregular object is determined by using measuring cylinder.

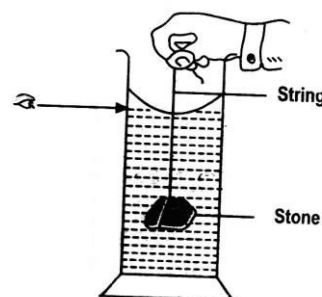


Fig : Measuring cylinder with stone

Procedure:

- Take a stone and tie it with string.
- Take its weight (mass m) by using spring balance.
- Take a measuring cylinder and fill it with water upon certain levels say V<sub>1</sub>.
- Mark the level of water.
- Keep the stone gently into the cylinder till it is completely immersed.
- Note the level of water i.e. final level say V<sub>2</sub> and fill the table below.

Observation table:

Mass	Volume of water in measuring cylinder		Volume of stone ( $V_2 - V_1$ )
	Before the stone is inserted ( $V_1$ )	After the stone is inserted ( $V_2$ )	

Result:

From the above experiment it is found that the volume of given stone is .....cm<sup>3</sup>.

Precaution:

- Measuring cylinder, water and stone must be such that the water must not be overflowed while putting stone.
- Eyes must be focused straightly in the lower meniscus of water surface.
- The size of the stone must be suitable.
- The stone must be placed gently.
- Readings must be taken carefully.

Experiment No.3

**To verify the Principle of Simple Machine in a Laboratory by using Lever.**

Materials Required:-

- Wooden plank(Plywood)
- Spring balance
- Stone (1kg)
- Triangular wooden block (fulcrum)
- Scale

Theory:

Principle of simple machine states that, if there is no friction, in balance condition of a machine, output work and input work are equal.

Mathematically,

output work = input work.

i.e.  $L \times L_d = E \times E_d$

Where,

L is Load,  $L_d$  is Load distance i.e. Distance between Load and Fulcrum, E is Effort,  $E_d$  is Effort Distance i.e. Distance between Effort and Fulcrum

Procedure:

- Take a wooden plank of length 2 m, breadth 10 cm and width as small as possible.

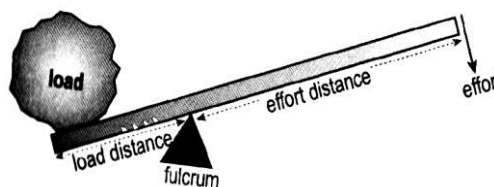


Fig : Lever

- Put a plank above the triangular block as shown in the fig.
- Take the weight of the stone by using the spring balance and put stone at one end of a bar.
- Apply force from other end of the bar by using spring balance and note down the Effort required to balance the Load.
- Measure load distance and Effort distance by using scale and fill the table below:

Observation Table:

S.N	Load(L)	Load distance(Ld)	Effort(E)	Effort distance(Ed)	$L \times Ld$	$E \times Ed$	Remarks
1							$E \times Ed =$ $L \times Ld$
2							
3							

Conclusion:

From the above experiment it is found that in the balanced condition of Lever the Product of Load and Load distance is equal to the Product of Effort and Effort distance.

Precaution:

- Suitable Mass of stone must be taken.
- Reading must be taken carefully.
- Load, Load distance, Effort, Effort distance must be measured in balanced condition of Lever.

## Viva questions

### Measurement and Simple machine

1. What is regular object?  
✎ Object having fixed dimension i.e. fixed length , breadth and height
2. What is irregular object?  
✎ Object which do not have fixed dimension i.e. fixed length , breadth and height
3. Define area?  
✎ Surface covered by any object is called Area.
4. Define volume.  
✎ Space occupied by any object is called volume.
5. How the volume of irregular object is measured?  
✎ By using measuring cylinder

6. How the area of irregular object is measured?  
✎ By using graph paper
7. What is SI unit of volume?  
✎  $\text{m}^3$
8. What is the relation between  $\text{m}^3$  and  $\text{cm}^3$ ?  
✎  $1\text{m}^3=100^3\text{cm}^3$
9. What is the relation between liter and  $\text{m}^3$ ?  
✎  $1000 \text{ liter} =1 \text{ m}^3$
10. What is Mechanical advantage?  
✎ Ratio of Load to the Effort
11. What is the unit of mechanical advantage?  
✎ There is no unit.
12. Define lever?  
✎ Lever is a rigid, straight or bent bar which is capable of rotating about a fixed axis is called fulcrum.
13. Write the example of second class lever.  
✎ Wheel barrow
14. What is the formula of velocity ratio?  
✎  $V.R=\text{Load distance} / \text{Effort distance}$ .
15. State principle of lever.  
✎ If there is no friction, in balanced condition of a lever output work and input work are equal.  
I.e.  $L \times L_d=E \times E_d$
16. State principle of simple machine.  
✎ If there is no friction, in balance condition of a machine output work and input work are equal.  
Mathematically, output work = input work.  
I.e.  $L \times L_d =E \times E_d$
17. Forceps is which class of Lever?  
✎ Third class

#### Experiment No. 4

##### To study the relation between Pressure and Area.

Materials Required:

- Brick
- Foam

Theory:

Pressure is defined as force acting per unit area acting perpendicular to the surface.

Mathematically,

Pressure = **Fehler!**

Or,  $P = \text{Fehler!}$

Or,  $P \propto \text{Fehler!}$

This shows that the pressure exerted is more if area of contact is less.

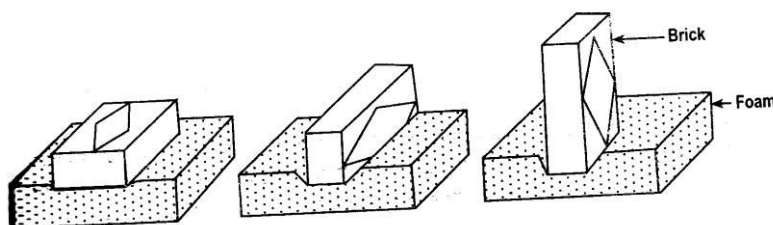


Fig : Brick and Foam

Procedure:

- Take three Foams of identical size and thickness.
- Take three Bricks of identical shape and size.
- Put these three bricks on Foam in three different ways as shown in figure.
- Observe pressure exerted by three Bricks and compare each other.

Interpretation:

Since the Area in contact in between brick and foam in 3<sup>rd</sup> fig. is less, Pressure exerted is more.

Conclusion:

From the above experiment it is found that the Pressure exerted is inversely proportional to the Area of contact.

Precaution:

Foams and bricks must be identical.

#### Experiment No.5

##### To study the relation between the Pressure exerted by liquid with Depth.

Materials Required:

- A tin can with three holes within a vertical line.
- Water
- Tripod stand

Theory:

The pressure exerted by liquid in any vessel is given as,

$$P = h d g$$

Where,  $P$  = pressure,  $h$  = depth of liquid column,  $d$  = density of liquid and  $g$  = acceleration due to gravity

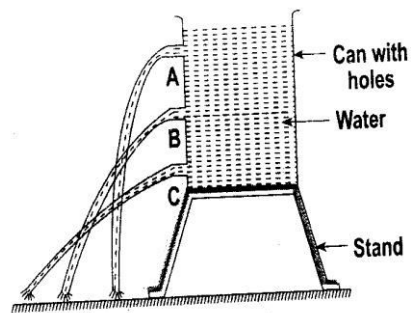


Fig : Water coming from different holes

Procedure:

- Take a tin can with three side holes A, B and C at different heights as shown in the fig.
- Close the holes A, B and C
- Fill the can with water.
- Open these holes A, B and C simultaneously.
- Observe the Pressure of liquid coming from each hole.

Interpretation:

In the above experiment depth of hole C is greater than other so pressure of liquid coming from hole C is large.

Conclusion:

From the above experiment it is found that the Pressure exerted by liquid increases with increase in depth.

Precaution:

- The size of all three holes must be same.
- The depth of three holes must be different.
- Three holes must be opened simultaneously

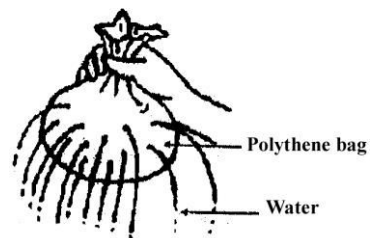
Experiment No.6

### To study Pascal's Law in Laboratory.

Materials Required:

- Plastic Bag
- Pin or needle
- Water

Theory:



Pascal's law states that, "when pressure is applied on a liquid enclosed in a vessel, it is transmitted equally in all the direction."

Fig : Verification of Pascal Law

Procedure:

- Take a polythene bag and fill it with water and close its mouth with a piece of thread.
- Hold this polythene bag gently where it is tied by thread.
- Make many holes of same size at the same height with the help of needle. And apply force slowly to the bag.
- Observe the water coming out through these different holes.

Interpretation:

Since the height of all the holes is same water comes out with same pressure.

Conclusion:

From the above experiment it is found that the pressure exerted by the liquid is same in all the direction at the same height.

Precaution:

- Reasonable plastic bag with water must be taken.
- Bag must be hold at the point where it is tied.
- Holes must be equal in size and at the same height.
- Bag must be forced slowly.

Experiment No.7

**To prove that Atmosphere exist pressure.**

Materials Required:

- Glass tumbler
- Water
- Post card

Theory:

The Earth is surrounded by air. This region of surrounds the earth which is surrounded by the air is called atmosphere. It is mixture of different gases. The pressure exerted by this atmosphere is called **atmospheric pressure**  $\text{Nm}^{-2}$  at the sea level.

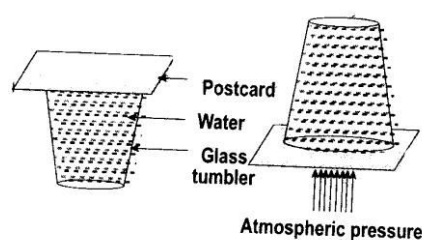


Fig : Verification of presence of Atmospheric pressure

Procedure:



- Take a glass tumbler filled with water and cover it with a post card.
- Invert the glass tumbler supporting the post card against the glass tumbler with your palm.
- Hold the glass in your hand and remove the supporting palm slowly.
- Observe that post card will not fall down.

Interpretation:

In the above experiment, since the atmospheric pressure is greater than pressure inside the glass so post card does not fall down.

Conclusion:

From the above experiment it is found that the atmosphere exerts pressure on a body from its all sides.

Precaution:

- The glass tumbler must be filled completely.
- There must not be any leakage of water from glass tumbler during the time of inverting.
- Palm must be removed slowly.

Experiment No:-8

**To study the relation between Mass and change in Temperature.**

Materials Required:

- Two identical beaker
- Two identical spirit lamp
- Two stands
- Two thermometer
- Water
- Stopwatch

Theory:

According to the heat equation the change in temperature of any substance depends upon the mass and the heat energy supplied i.e. if equal amount of heat energy is supplied the temperature of body with less mass will be higher.

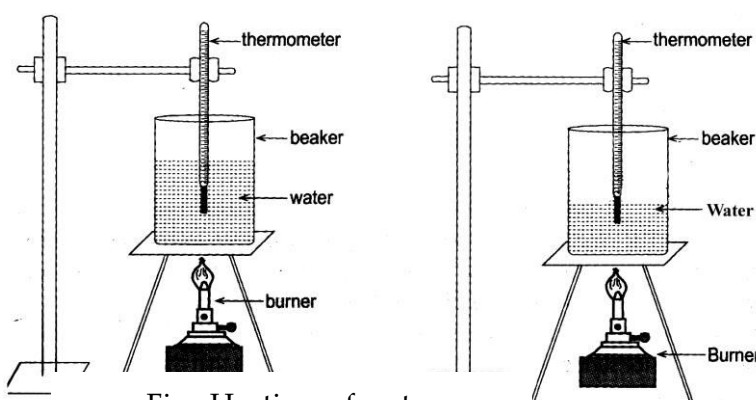


Fig : Heating of water

Procedure:

- Take two identical beakers.
- Fill one beaker with 50ml of water and another with 100 ml of water.
- Set up the apparatus as shown in figure 8.1.
- Take the initial temp of mixture by using thermometer.
- Heat the beaker with spirit lamp.
- Observe the final temperature.
- Find the difference in temperature and fill the table below.

Observation Table:

S.N	Volume of water (V)	Initial temperature ( $T_1$ )	Final temperature ( $T_2$ )	Different ( $T_2 - T_1$ )
i.	50 ml			
ii.	100 ml			

Interpretation:

In the above experiment since the mass of water in 1<sup>st</sup> beaker is less than the mass in 2<sup>nd</sup> beaker difference in temperature in 1<sup>st</sup> beaker is large.

Conclusion:

From the above experiment it is found that if equal amount of heat energy is supplied to two bodies containing different mass the change in temperature of body with less mass is higher.

Precaution:

- Beaker and spirit lamp must be identical.
- Beakers must be heated for exactly same time.
- Temperature must be noted carefully.

Experiment No.9

**To determine the Upper fixed point of a Thermometer.**

Materials Required:

- Retort stand
- Round-Bottom flask
- Tripod stand
- Burner or spirit lamp
- Wire gauge
- Thermometer
- L – shaped glass tube
- Water

- Cork
- Stop watch

Theory:

The Thermometer is a device which is used to measure Temperature. Upper fixed point of any thermometer is the temperature of pure boiling water or steam at normal pressure (760mm of Hg). It is  $100^{\circ}\text{C}$  in Celsius scale,  $212^{\circ}\text{F}$  in Fahrenheit scale and  $373\text{K}$  in Kelvin scale.

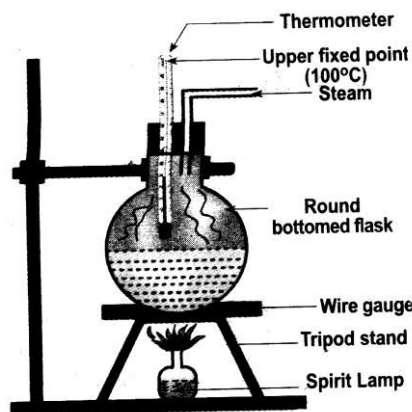


Fig : Determination of Upper Fixed Point of water

Procedure:

- Fill about half of the round bottom flask with water.
- Fix thermometer and a L- shaped glass tube on the mouth of the round bottomed flask by using a cork as shown in the figure.
- Keep the flask over a tripod stand.
- Heat the flask with a spirit lamp till the steam is generated.
- Note the temperature every minute by using stop watch
- Heat the water for about 7 minutes even after boiling, and the constant temperature in the thermometer is obtained.

Interpretation:

In the above experiment temperature of water rises up to  $100^{\circ}\text{C}$  only.

Conclusion:

From the above experiment it is found that the Upper Fixed of the thermometer is  $100^{\circ}\text{C}$ .

Precaution:

The bulb of thermometer must not touch the water.

## Viva Questions

### Pressure and Heat

1. Define density.  
✎ Mass per unit volume is called density.
2. What is the value of  $g$  in SI and CGS unit?  
✎ On earth surface the value of  $g$  is  $9.8 \text{ m/s}^2$  and  $980 \text{ cm/s}^2$
3. Define pressure.  
✎ Force per unit area acting perpendicularly.
4. What is the SI and CGS unit of pressure?  
✎ SI unit =  $\text{N/m}^2$  and CGS unit =  $\text{Dynes/cm}^2$
5. Define 1 pascal.  
✎ Pressure exerted by 1 N force in  $1 \text{ m}^2$  area.
6. What are the factors on which liquid pressure depends?  
✎ Height of liquid column, density of liquid and acceleration due to gravity
7. State Pascal's Law.  
✎ When pressure is applied on a liquid enclosed in a vessel, it is transmitted equally in all the direction
8. What is the unit of density in SI and CGS unit?  
✎ CGS unit  $\text{gm/cm}^3$  and SI unit  $\text{kg/m}^3$
9. What is the density of water in SI and CGS unit?  
✎  $1 \text{ gm/cm}^3$  and  $1000 \text{ kg/m}^3$
10. What is the formula of relative density?  
**Put bullet** Relative density = **Fehler!**
11. What is the SI and CGS unit of force?  
**Put bullet** SI= N and CGS=dyn
12. Write the formula of pressure.  
**Put bullet**  $P = \text{Fehler!}$
13. Define heat and temperature.  
✎ Total sum of kinetic energy of all the molecules is called heat where as the average K.E of the molecule is temperature.
14. What is the unit of heat in SI unit and CGS unit?  
✎ SI unit- joule  
✎ CGS unit-ergs  
1 joule=  $10^7$  ergs.

15. What is the unit of temperature in SI unit?  
✎ Kelvin.
16. Write relation between different temperature scales.  
✎ **Fehler! = Fehler!= Fehler!= Fehler!**
17. What is the relation of Joule and calorie?  
✎  $4.2 \text{ J} = 1 \text{ calorie}$
18. What is the temperature of healthy person?  
✎  $37^{\circ}\text{C}$  or  $98.6^{\circ}\text{F}$  or  $310\text{K}$
19. At what temperature water has highest density?  
✎  $4^{\circ}\text{C}$
20. Which devices are used to measure Heat and temperature?  
✎ Heat=calorimeter  
Temperature=Thermometer
21. Write down the Boiling point and Melting point of Mercury and Alcohol.  

	Freezing	Boiling
Mercury	$-39^{\circ}\text{C}$	$357^{\circ}\text{C}$
Alcohol	$-117^{\circ}\text{C}$	$78^{\circ}\text{C}$
22. What is upper fixed point?  
✎ Upper fixed point of any thermometer is the temperature of pure boiling water or steam at normal pressure (760mm of Hg).
23. What is lower fixed point?  
✎ Lower fixed point of any thermometer is the temperature of melting ice at normal pressure (760mm of Hg).
24. When two bodies of unequal masses are heated by same amount of heat energy whose temperature will be high?  
✎ Object having less mass.
25. On which factors does heat energy depend?  
✎ Number of molecules and kinetic energy of each molecule.
26. What is the principle of thermometer?  
✎ Liquid expands on heating.
27. What is the relationship between pressure and Area?  
✎ Inversely proportional
28. What is the relationship mass between and pressure exerted by liquid?  
✎ No relation
29. Define atmosphere.

- ✎ This region of air which is surrounded by the air is called atmosphere.
30. What is atmospheric pressure?  
 ✎ The pressure exerted by this atmosphere is called atmospheric pressure.
31. What is the value of atmospheric pressure at sea level?  
 ✎  $1.01 \times 10^5 \text{ P}$

Experiment No.10

**To study the Reflection of Light and verify laws of Reflection by using Plane mirror.**

Materials Required:

- A drawing board
- A plane mirror
- A sheet of paper
- Pins
- Thumb pins
- Scale
- Protractor
- pencil

Theory:

The phenomenon of returning of light in the same medium after striking a surface is called reflection of light. This can be studied by using plane mirror. The laws of reflection are:-

- The incident ray, reflected ray and normal at the point of the incidence all lie on the same plane.
- The angle of incidence is equals to the angle of reflection i.e.  $\angle i = \angle r$

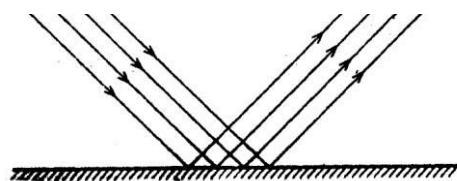


Fig : Reflection of light through plane mirror

Procedure:

- Fix a white sheet of paper on drawing board with the help of thumb pins.
- Draw a straight line XY on the middle of the paper.
- Draw a line AO and stick two pins a and b as shown in the figure on the line.
- Place a plane mirror upright on the line XY.
- Observe the image of the pins formed by the mirror on the other side and fix two more pins c and d so that they are in a straight line as the image of the two pins a and b.

- Remove the mirror and pins a and b from the line AO and other pins c and d also.
- Join the marks made by the pins c and d with the help of scale so that it meets at o, and denotes OB.
- Measure the angle of incidence  $\angle i$  and angle of reflection  $\angle r$  and fill the table below.

Observation Table:

Angle of incidence ( $\angle i$ )	Angle of reflection ( $\angle r$ )	Remarks $\angle i = \angle r$

Conclusion:

From the above experiment it is found that:-

- The incident ray, reflected ray and normal at the point of incidence all lie on the same plane.
- The angle of incidence is equals to the angle of reflection i.e.  $\angle i = \angle r$

Experiment No.11

**To study the Nature and Position of the image formed by Concave mirror when object is place beyond 2F.**

Materials Required:

- White chart paper
- Concave mirror
- Pencil
- Scale

Theory:

When the ray of light coming from the object, parallel to the principle axis is incident on the mirror, it gets reflected. This reflected ray meets the reflected rays passing through the focus, So that the image is formed. When object is placed beyond 2F or C of a concave mirror, its image is formed between C and F with the following characteristics:

- Real
- Inverted
- Smaller

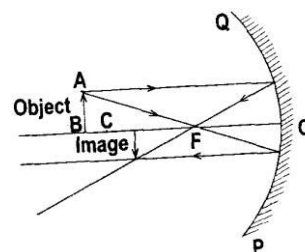


Fig : Ray diagram of Concave mirror when object is placed beyond 2F.

Procedure:

- Take a white chart paper and a concave mirror.

- Draw the outline of concave mirror by placing it in the middle of chart paper, and remove that mirror from paper.
- Indicate the middle point of aperture of the mirror (PQ) as 'O' and it is called as pole.
- Draw a straight line through 'O' called principal axis and indicate center of curvature 'C' at the distance of 4cm on both the sides of mirror.
- Indicate point F at the middle of C and O. This is called focus and the distance OF is called focal length.
- Shade the outer surface of PQ.
- Place the object beyond 2F or C by an upward arrow and denote by AB.
- Draw line parallel to principle axis from top of object such that it gets reflected from aperture of mirror and the reflected ray passes through F.
- Draw next ray from top of object and focus, and draw the reflected ray parallel to the principle axis as shown in the figure.
- Get the intersecting point of two reflecting rays.
- Draw normal to the principle axis from this intersecting point, this is the image of object AB which is denoted by A'B'.

Conclusion:

From the above experiment it is found that the image of an object placed beyond 2F of a concave mirror is formed in between F and 2F on the same side of the mirror with the following characteristics:

- Real and inverted
- Smaller in size.

Precaution:

- Sharp pencil must be used.
- The rays must be represented by an arrow.
- Correct measurement must be taken.

Experiment No.12

**To study the Nature and Position of the image formed by Concave mirror when object is place at 2F or C.**

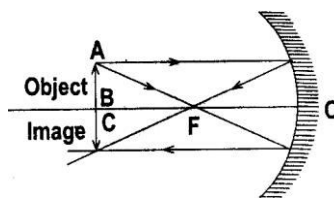
Materials Required:

- White chart paper
- Concave mirror
- Pencil
- Scale

Theory:



When the ray of light coming from the object, parallel to the principle axis is incident on the mirror, it gets reflected. This reflected ray meets the reflected rays passing through the focus, So that the image is formed. When object is placed at  $2F$  of a concave mirror its image



is formed at  $2F$  on the same side of the object with the following characteristics:

Fig.: Ray diagram of Concave mirror when object is at  $2F$

- Real
- Inverted
- Same size of the object.

Procedure:

- Take a white chart paper and a concave mirror.
- Draw the outline of concave mirror by placing it in the middle of chart paper, and remove that mirror from paper.
- Indicate the middle point of aperture of the mirror (PQ) as 'O' and it is called as pole.
- Draw a straight line through 'O' called principal axis and indicate center of curvature 'C' at the distance of 4cm on both the sides of mirror.
- Indicate point F at the middle of C and O. This is called focus and the distance OF is called focal length.
- Shade the outer surface of PQ.
- Place the object at  $2F$  or C by an upward arrow and denote by AB.
- Draw line parallel to principle axis from top of object such that it gets reflected from aperture of mirror and the reflected ray passes through F.
- Draw next ray from top of object and focus, and draw the reflected ray parallel to the principle axis as shown in the figure.
- Get the intersecting point of two reflecting rays.
- Draw normal to the principle axis from this intersecting point, this is the image of object AB which is denoted by A'B'.

Conclusion:

From the above experiment it is found that the image of an object placed at  $2F$  of a concave mirror, image is formed at  $2F$  on the same side of the mirror with the following characteristics:

- Real and inverted
- Same size of the object

Precaution:

- Sharp pencil must be used.
- The rays must be represented by an arrow.
- Correct measurement must be taken.

Experiment No.13

**To study the Nature and Position of the image formed by Concave mirror when object is place in between  $2F$  and  $F$ .**

Materials Required:

- White chart paper
- Concave mirror
- Pencil
- Scale

Theory:

When the ray of light coming from the object, parallel to the principle axis is incident on the mirror, it gets reflected. This reflected ray meets the reflected rays passing through the focus, So that the image is formed. When object is placed in between  $2F$  and  $F$  of a concave

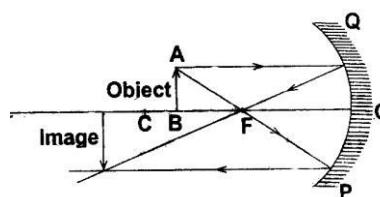


Fig : Ray diagram of concave mirror when object is in between  $F$  and  $2F$

mirror its image is formed beyond  $2F$  on the same side of the object with the following characteristics:

- Real
- Inverted
- Large in size

Procedure:

- Take a white chart paper and a concave mirror.
- Draw the outline of concave mirror by placing it in the middle of chart paper, and remove that mirror from paper.
- Indicate the middle point of aperture of the mirror (PQ) as 'O' and it is called as pole.
- Draw a straight line through 'O' called principal axis and indicate center of curvature 'C' at the distance of 4cm on both the sides of mirror.
- Indicate point F at the middle of C and O. This is called focus and the distance OF is called focal length.
- Shade the outer surface of PQ.
- Place the object in between C and F by an upward arrow and denote it by AB.

- Draw line parallel to principle axis from top of object such that it gets reflected from aperture of mirror and the reflected ray passes through F.
- Draw next ray from top of object and focus, and draw the reflected ray parallel to the principle axis as shown in the figure.
- Get the intersecting point of two reflecting rays.
- Draw normal to the principle axis from this intersecting point, this is the image of object AB which is denoted by A'B'.

Conclusion:

From the above experiment it is found that the image of an object placed in between 2F and F of a concave mirror, image is formed beyond 2F on the same side of the mirror with the following characteristics:

- Real and inverted
- Large in size

Precaution:

- Sharp pencil must be used.
- The rays must be represented by an arrow.
- Correct measurement must be taken

Experiment No.14

**To study the Nature and Position of the image formed by Concave mirror when object is placed at F.**

Materials Required:

- White chart paper
- Concave mirror
- Pencil
- Scale

Theory:

When the ray of light coming from the object, parallel to the principle axis is incident on the mirror, it gets reflected. This reflected ray meets the reflected rays passing through the focus, So that the image is formed. When object is placed at F of a concave mirror its image is formed at infinity with the following characteristics:

- Real
- Inverted
- Highly Magnified

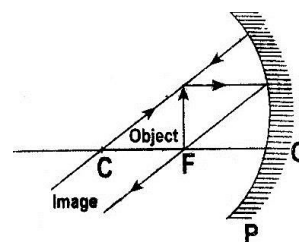


Fig: Ray diagram of concave mirror when object is at F

Procedure:

- Take a white chart paper and a concave mirror.
- Draw the outline of concave mirror by placing it in the middle of chart paper, and remove that mirror from paper.
- Indicate the middle point of aperture of the mirror (PQ) as 'O' and it is called as pole.
- Draw a straight line through 'O' called principal axis and indicate center of curvature 'C' at the distance of 4cm on both the sides of mirror.
- Indicate point F at the middle of C and O. This is called focus and the distance OF is called focal length.
- Shade the outer surface of PQ.
- Place the object at F by an upward arrow and denote it by AB.
- Draw line parallel to principle axis from top of object such that it gets reflected from aperture of mirror and the reflected ray passes through F.
- Draw the line from the top of object and centre of curvature C (2F).
- Observe the two reflected parallel rays so that the image is formed at infinity.

Conclusion:

From the above experiment it is found that the image of an object placed at F of a concave mirror, image is formed at infinity with the following characteristics:

- Real and Inverted
- Highly magnified in size

Precaution:

- Sharp pencil must be used.
- The rays must be represented by an arrow.
- Correct measurement must be taken

Experiment No.15

**To study the Nature and Position of the image formed by Concave mirror when object is placed between F and O (pole).**

Materials Required:

- White chart paper
- Concave mirror
- Pencil
- Scale

Theory:

When the ray of light coming from the object, parallel to the principle axis is incident on the mirror, it gets reflected. This reflected ray meets the reflected rays passing through

the focus, So that the image is formed. When object is placed in between F and O of a concave mirror its image is formed behind the mirror with the following characteristics

- Virtual
- Inverted
- Highly Magnified

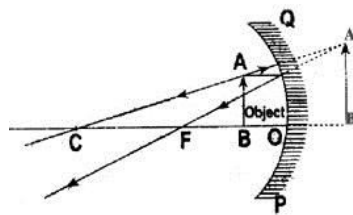


Fig.: Ray diagram of Concave mirror when object is in between F & O.

Procedure:

- Take a white chart paper and a concave mirror.
- Draw the outline of concave mirror by placing it in the middle of chart paper, and remove that mirror from paper.
- Indicate the middle point of aperture of the mirror (PQ) as 'O' and it is called as pole.
- Draw a straight line through 'O' called principal axis and indicate center of curvature 'C' at the distance of 4cm on both the sides of mirror.
- Indicate point F at the middle of C and O. This is called focus and the distance OF is called focal length.
- Shade the outer surface of PQ.
- Place the object in between F and O by an upward arrow and denote it by AB.
- Draw line parallel to principle axis from top of object such that it gets reflected from aperture of mirror and the reflected ray passes through F.
- Draw the line from the top of object and centre of curvature C (2F).
- Observe the two reflected diverging rays.
- Back produce these reflected rays. So that the image is formed behind the mirror.
- Draw normal from the intersecting point to get image of the object.

Conclusion:

From the above experiment it is found that the image of an object placed in between F and O of a concave mirror, is formed behind the mirror with the following characteristics:

- Virtual and erect
- Highly magnified in size

Precaution:

- Sharp pencil must be used.
- The rays must be represented by an arrow.
- Correct measurement must be taken.

## Experiment No.16

**To study the Nature and Position of the image formed by Concave mirror when object is placed at infinity.**

Materials Required:

- White chart paper
- Concave mirror
- Pencil
- Scale

Theory:

When the ray of light coming from the object, parallel to the principle axis is incident on the mirror, it gets reflected. This reflected ray meets the reflected rays passing through the focus, So that the image is formed. When object is placed at infinity on a concave mirror its image is formed at the Focus of the mirror on the same side with the

following characteristics:

- Real
- Inverted
- Highly Diminished

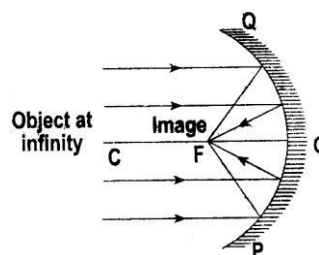


Fig.: Ray diagram of concave mirror when object is placed at infinity

Procedure:

- Take a white chart paper and a concave mirror.
- Draw the outline of concave mirror by placing it in the middle of chart paper, and remove that mirror from paper.
- Indicate the middle point of aperture of the mirror (PQ) as 'O' and it is called as pole.
- Draw a straight line through 'O' called principal axis and indicate center of curvature 'C' at the distance of 4cm on both the sides of mirror.
- Indicate point F at the middle of C and O. This is called focus and the distance OF is called focal length.
- Shade the outer surface of PQ.
- Draw parallel lines parallel to the Principle axis representing the object at infinity.
- Draw the reflected rays such that all of them meet at F this is the image of object.

Conclusion:

From the above experiment it is found that the image of an object placed at infinity of a concave mirror, is formed at the focus of the mirror with the following characteristics:

- Real and inverted

- Highly Diminished in size

Precaution:

- Sharp pencil must be used.
- The rays must be represented by an arrow.
- Correct measurement must be taken.

Experiment No.17

**To study the Nature and Position of the image formed by convex mirror when object is placed in front of the mirror.**

Materials Required:

- White chart paper
- Convex mirror
- Pencil
- Scale

Theory:-

When the ray of light coming from the object parallel to the principal axis is incident on the mirror it gets reflected. These reflected rays are produced back such that it meets the principal axis at focus. The above rays' meets the rays joining top of object and centre of curvature(C), so that the image is formed behind the mirror in between F and O with the following characteristics:

- Virtual
- Erect
- Diminished

Procedure:

- Take a white chart paper and a convex mirror.
- Draw the outline of concave mirror by placing it in the middle of chart paper, and remove that mirror from paper.
- Indicate the middle point of aperture of the mirror (PQ) as 'O' and it is called as pole.

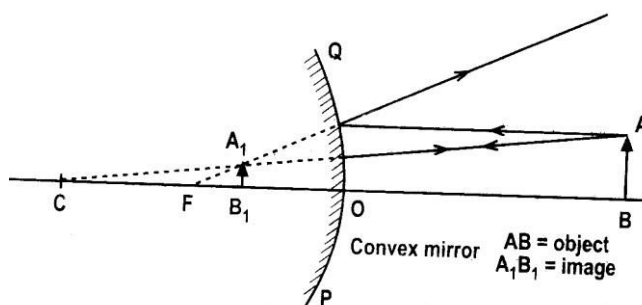


Fig : Ray diagram of convex mirror when object is in front of the mirror.

- Draw a straight line through 'O' called principal axis and indicate center of curvature 'C' at the distance of 4cm on both the sides of mirror.
- Indicate point F at the middle of C and O. This is called focus and the distance OF is called focal length.
- Place the object between F and C by an upward arrow and denote it by AB.
- Draw a line parallel to the principle axis from top of object such that the reflected ray diverges.
- Produce reflected rays back such that the rays meet the principal axis at F.
- Draw next ray from top of object and centre of curvature on other side of the mirror.
- Get the intersecting point of two produced reflected rays.
- Draw normal to the principal axis from this intersecting point, this is the image of the object denote it by A'B'.

Conclusion:

From the above experiment it is found that the image of an object placed in front of convex mirror at any point is formed in between F and O on the other side of mirror with the following characteristics:

- Virtual and erect.
- Diminished in size.

Precaution:

- Sharp pencil must be used.
- The rays must be represented by an arrow.
- Correct measurement must be taken.

Experiment No.18

### To study the Refraction of Light and verify Laws of Refraction.

Materials Required:

- Glass slab
- White chart paper
- Chart board
- Pencil
- Thumb pin

Theory:

The bending of light when it passes from one medium to another is called refraction of light. It is due to the difference in velocity of light in different medium. The Laws of Refraction are:

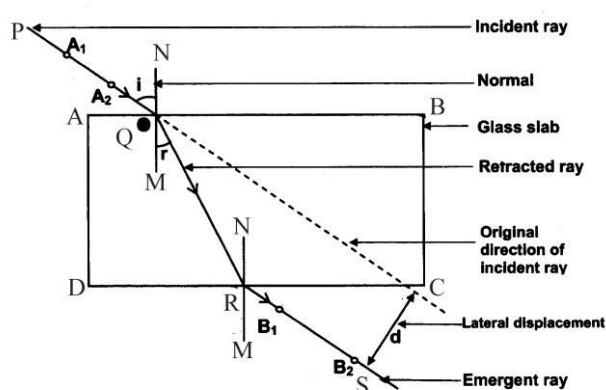


Fig : Refraction of light through glass slab.



- The incident ray, refracted ray & normal lies in the same plane.
- When the light passes from rarer to denser medium it bends towards the normal and when light passes from denser to rarer medium it bends away from the normal.
- The ratio of sine of incident angle to the refracted angle is constant and called as Snell's Law. i.e.  $\mu = \frac{\sin i}{\sin r}$  **Fehler!**  
Where,  $\mu$  is known as Refractive Index.

Procedure:

- Place a rectangular glass slab on a white sheet of chart paper and fix it on a board.
- Draw the boundary of the slab as ABCD.
- Take any point Q on boundary line AB and draw line PQ which represent incident ray. Then fixed three points on this line PQ.
- Remove the glass slab and draw normal line MN such that  $\angle PQN = i$ , incident angle is formed. Also produce imaginary line QC as shown in fig.
- Put the slab in its original place.
- Observe the image of pins from side DC and fix the image by using pin such that all the pins in the board must be in a straight line.
- Take out the slab from board remove all the pins and draw the line RS following points. This RS is emergent ray.
- Draw normal MN to the surface DC at point R and join QR.

From fig:

ABCD is a glass slab

Q = Incident ray

QR = Refracted Ray

Rs = Emergent Ray

$\angle i$  = Incident angle

$\angle r$  = Refracted angle

- Measure the angle  $i$  and  $r$  using protector then fill the table below:

Observation Table:-

Angle of Incidence( $i$ )	Angle of Refraction( $r$ )	Refractive index ( $\mu$ ) = <b>Fehler!</b>

Result:

From the above experiment it is found that:

- The incident ray, refracted ray and normal lies on the same plane AB.
- When the light passes from rarer to denser medium it bends towards the normal and when light passes from denser to rarer medium it bends away from the normal.

- The refractive index of glass is .....

Precaution:

- The image of the pins must be observed carefully and correctly.
- The pins representing object and image must in same straight line while observing through glass slab.
- The distance between two pins must be at least 8 cm
- The refractive index must be of the order of 1.3-1.7 as its actual value is 1.5.

Experiment No.19

### **To study the Transmission of Sound in Solid.**

Materials Required:-

- Desk
- Pencil

Theory:

The phenomenon due to which sound travels from one medium to another is called the transmission of sound. For the transmission of sound medium is required. The speed of sound is more in solid than in liquid and then in gas.



Fig. : Transmission of sound in solid

Procedure:

- Put one of your ear on one of the end of the desk as shown in the fig.
- Ask your friend to write on the other end of the desk.
- Observe the sound produced by the pen while writing on the desk.

Interpretation:

Due to the transmission of sound in solid, sound of writing is observed.

Conclusion:

From the above experiment it is found that sound can transmit in the solid.

Precaution:

Another ear must be closed while listening the sound.

Experiment No.20

### **To study the Transmission of Sound in Liquid.**

Materials Required:

- Bucket with water

- Bell
- Hammer

Theory:

The phenomenon due to which sound travels from one medium to another is called the transmission of sound. For the transmission of sound medium is required. The speed of sound is more in solid than in liquid and then in gas.

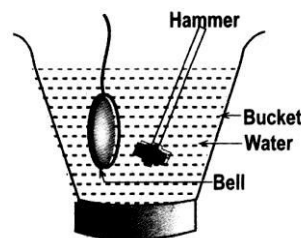


Fig : Transmission of sound in liquid

Procedure:

- Take a bucket more than half filled with water.
- Suspend a bell inside the water and so not let the bell to touch any side of bucket.
- Now strike the bell with hammer.
- Observe the sound of hitting.

Interpretation:

Due to the transmission of sound in liquid, sound of hitting is observed.

Conclusion:

From the above experiment it is found that sound can transmit in the liquid.

Precaution:

While suspending the bell, it must not touch the side of bucket.

### Viva Questions

#### Light and sound

1. What is the speed of light in Air?  
✎  $3 \times 10^8 \text{ m/s}$
2. What is the speed of light in glass?  
✎  $2 \times 10^8 \text{ m/s}$
3. What is the speed of light in water?  
✎  $2.2 \times 10^8 \text{ m/s}$
4. What is the reflection of light?  
✎ Returning of light in the same medium after striking another medium is called reflection of light.

5. What is the magnification of plane mirror?  
✎ 1
6. What is the velocity of sound in Air?  
✎ 332 m/s
7. What is the velocity of sound in water?  
✎ 1400 m/s
8. What is the velocity of sound in glass?  
✎ 1500 m/s
9. Which mirror is converging and diverging?  
✎ Concave: converging  
Convex: diverging
10. What are the uses of concave mirror?  
✎ Torch light, head light, search light, shaving mirror etc.
11. Where is convex mirror used?  
✎ Side light of vehicle
12. Write the Nature and position of image formed by concave mirror when object is placed at following different places.

Position of objects	Position of image	Size and nature of image
Beyond C	In between F & C	Real, inverted and smaller in size
C	C, same side	Real, inverted & equal in size
Between C and F	Beyond C	Real, inverted & magnified
F	Infinity	Real, inverted & highly magnified
Between F and P	Behind mirror	Virtual, erect & large in size

10. Why stick appears to be bending in water?  
✎ Due to refraction of light
11. Why does light refract?  
✎ Due to the difference in velocity of light in different medium
12. What is the size of image formed by convex mirror?  
✎ Smaller than object
13. Define wave.  
✎ The disturbances set up in any medium is called wave.

### Experiment No.21

#### **To study the Magnetic field of any Bar Magnet.**

Materials Required:

- Bar- magnet
- Chart- paper(two)
- Pencil
- Iron dust

Theory:

The space around a magnet where magnetic force can be experienced by a magnetic body is called magnetic field of a magnet. In a bar magnet the magnetic field is more at the ends than in the middle. Magnetic field is represented by the magnetic lines of force which flow from the north to the south and these lines of force never intersect each other.

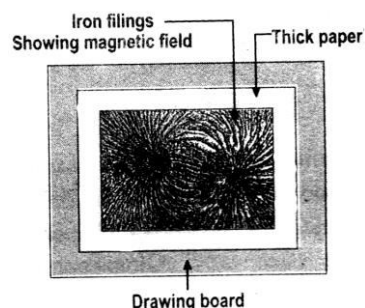


Fig.: Magnetic field of a bar magnet

Procedure:

- Take a white chart paper and fix on a table. Keep a bar magnet at the middle of the board.
- Place next chart paper over the bar magnet which was placed facing N-S direction.
- Scatter the iron dust on the paper.
- Hit the paper gently and study the arrangements of the iron dust.

Conclusion:

From the above experiment it is found that bar magnet have magnetic field around it and this can be represented by the magnetic lines of the force.

Precaution:

- Sharp pencil must be used to indicate the position of compass.
- Strong bar magnet must be taken.
- Iron dust must be scattered carefully.
- The magnet must be placed carefully.

### Experiment No.22

#### **To study the properties of Electric Charge.**

Materials required:

- Stand

- Plastic
- Ball pens
- Wooden cloth
- Glass rod
- Silk piece

Theory:

Electrical property of a particle or a body is called electric charge. Electric charges are of two types they are:

1. +ve charge &
2. -ve charge

The charge of the proton is called +ve charge and the charge of electron is called as -ve charge. Similar charges repel each other whereas dissimilar charges attract each other.

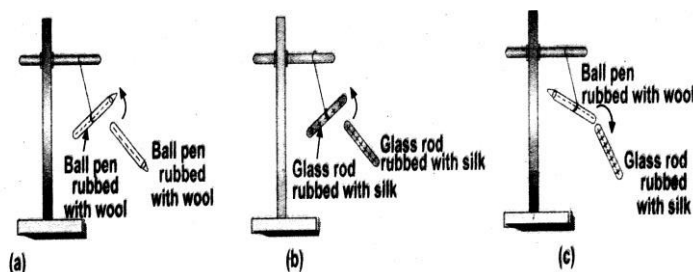


Fig : Verification of properties of charges

Procedure:

- Take a plastic ball-pen and charge it by rubbing with a woolen piece.
- Suspend it freely with a stand as shown in the figure (do not touch the ball-pen with the stand).
- Charge the other ball-pen in the same way and bring it close to the suspended ball-pen. Observe it. (Fig. a).
- Now, rub two glass rods with silk piece and repeat the activity as mentioned above (Fig. b).
- Repeat the activities by using a glass rod rubbed with silk piece and a plastic ball pen rubbed with wool (Fig. c).
- Observe the difference between 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> activities i.e. repulsion of ball pen and glass rod in activity 1<sup>st</sup> and 2<sup>nd</sup> and attraction in the 3<sup>rd</sup> activity.

Interpretation:



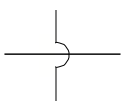

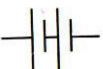
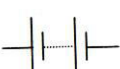
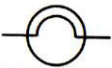



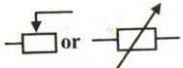







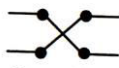
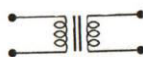
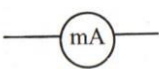
In the above experiment when ball pen and plastic rod are rubbed with woolen clothes +ve charge is acquired whereas with silk cloth -ve charge is acquired so repulsion and attraction occurs.

Conclusion:

From the above experiment it is found that Similar charges repel each other whereas dissimilar charges attract each other.

Experiment No.23

**To draw different symbol used in Electric Circuit.**

Direction of current 	Jointed wire  Jointed Wire	Not jointed wire 
Cells  Cell   Two Cells  Many Cells	Bulb  Electric bulb	Open switch  Switch
Resistance  or  Resistance	Rheostat  Rheostat	Ammeter  Ammeter
Voltmeter  Voltmeter	Voltmeter  Voltmeter	Fuse  Fuse
Light indicator  Light indicator	Ac source  ac source	One wire crossing another  One wire crossing another
Reversing key  Reversing key	Transformer  Transformer	Milli-ammeter  Milliammeter
Galvanometer		

 Galvanometer		
---	--	--

Experiment No. 24

### To study the Series and Parallel combination of Cells.

Materials Required:

- 6 cells (1.5 V each)
- Bulbs (2)
- Connecting wire.

Theory:

A single cell may not provide sufficient current or P.d on electrical circuit so cells are connected in series & parallel combination according to the needs of electrical circuit. If the

+ve terminal of the one cell is connected to the –ve terminal of the second and so on it is called series combination. If the cell with e.m.f.  $V_1$ ,  $V_2$ ,  $V_3$  are connected in series then the equivalent voltage is ,

$$V = V_1 + V_2 + V_3$$

If the +ve terminal of all the cells are connected together at one common point and –ve terminals at another common point, it is called parallel combination. If the cell with e.m.f.  $V_1$ ,  $V_2$ ,  $V_3$  are connected in parallel then the equivalent voltage is,

$$V = V_1 = V_2 = V_3$$

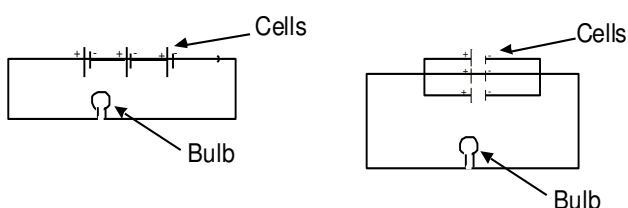


Fig : Series and parallel combination of cells .

Procedure:

- Take three cells having emf 1.5 V.
- Connect three cells in series i.e. connect positive terminal of one cell to the negative terminal of other and so on as shown in the fig.
- Connect positive and negative terminal of cells to the positive and negative terminal of bulb respectively.
- Observe the brightness of the bulb.
- Take 3 such cells and connect in parallel i.e. positive terminals of all the cells are connected to one point and negative terminals are connected at other point.



- Connect positive and negative terminals of cells to the positive and negative terminal of bulb respectively.
- Observe the brightness of bulb.
- Compare the brightness among two combinations.

Interpretation:

Since equivalent voltage in the circuit in series combination is more than the parallel combination bulb is brighter in series combination.

Conclusion:

From the above experiment it is found that the equivalent voltage of series combination is more than parallel combination.

Precaution:

- The batteries must be well.
- The polarity must be connected correctly and carefully.

Experiment No. 25

### Project work

**To prepare a model of Series & Parallel combination of bulbs.**

Materials Required:

- Bulbs (6)
- Switches(4)
- Batteries(9V and 9V)
- Connecting wires

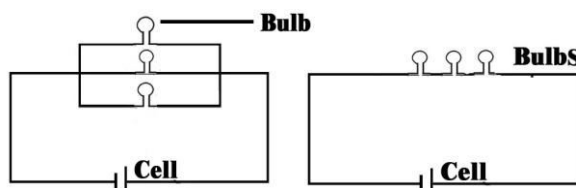


Fig : Series and Parallel combination of bulbs.

Procedure:

- Take three bulbs and 9V batteries.
- Connect the circuit as shown in the 1<sup>st</sup> figure by using two bulbs.
- Switch on the circuit and observe the brightness of the bulb.
- Add one more bulb in the circuit and observe the change in brightness and fill the table below.
- Connect two bulbs in parallel with 9V batteries as shown in 2<sup>nd</sup> figure and observe the brightness.
- Add one more bulb in the circuit and observe change in brightness of the bulb and fill the table below.

- Fix all the bulbs and wires in the chart board paper.
- Submit it to your science teacher.

Observation Table:

(Give tick for suitable one)

For series combination

Fig. No.	Voltage	No. of Bulbs	Brightness of the bulb	
			More	Less
1				
2				

For parallel combination

Fig. No.	Voltage	No. Of Bulbs	Brightness of the bulb	
			More	Less

Precaution:

- Circuit must be connected carefully.
- Suitable length of the wire must be used.

### Viva Questions

#### **Electricity and Magnetism**

1. What is magnetic field?
  - ✎ The area around the magnet up to which its magnetic force can be experienced
2. What is the direction of magnetic lines of force?
  - ✎ North to south
3. Define charge.
  - ✎ The Electrical property of a particle or a body is called electric charge
4. What is cell?
  - ✎ Source of current electricity which convert chemical energy into electrical energy
5. What is circuit?
  - ✎ The path for the flow of current
6. What is current?

- ✎ The rate of flow of charge is called current.
- 7. What is unit and formula of current?
  - ✎ Current ( $I$ ) =  $Q/T$  and its unit is A.
- 8. What is the unit of charge?
  - ✎ Coulomb
- 9. Which charge is produced when glass rod is rubbed with silk?
  - ✎ Negative
- 10. Which charge is produced when Ebonite rod is rubbed with fur?
  - ✎ Positive
- 11. Write full form of AC and DC.
  - ✎ AC=Alternate current
  - DC=Direct current
- 12. What is the frequency of electricity supplied in Nepal?
  - ✎ 50 Hz
- 13. What is the voltage of electricity supplied in Nepal?
  - ✎ 220 volt
- 14. What is the meaning of 50 Hz AC?
  - ✎ The polarity of current changes 50 times per second.
- 15. What is the meaning of 50 W written in bulb?
  - ✎ Bulb can convert 50 joule electrical energy into heat and light energy in 1 sec.
- 16. What is advantage of series combination of bulbs?
  - ✎ Brightness of the bulb can be changed.
- 17. What is the advantage of parallel combination of bulbs?
  - ✎ Bulb can withstand long time.
- 18. What is series combination of cells?
  - ✎ If the +ve terminal of the one cell is connected to the -ve terminal of the second and so on it is called series combination.
- 19. What is parallel combination of cells?
  - ✎ If the +ve terminal of all the cells are connected together at one common point and -ve terminals at another common point, it is called parallel combination



# Chemistry

## Experiment No. 26

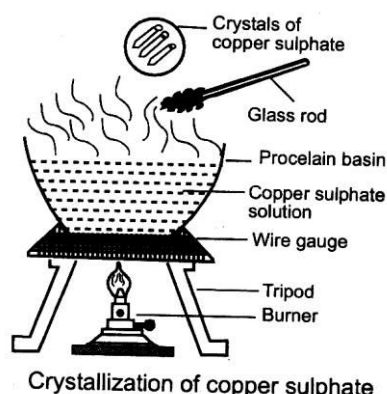
To study the process of crystallization and obtain the crystal of copper sulphate ( $\text{CuSO}_4$ ).

Materials Required:

- Beaker
- Water
- $\text{CuSO}_4$
- Tripod stand
- Sprit lamp
- Glass rod
- Wire gauge

Theory:

Crystal is a piece of solid which has regular and definite geometrical shape, smooth surface and sharp edges that composed its boundary. The process of formation of crystal is called crystallization.



Procedure:

- Prepare a saturated solution of  $\text{CuSO}_4$ .
- Heat the above solution.
- Dissolve additional copper sulphate on this solution.
- Cool this above solution for 2-3hrs.
- Observe the crystal of  $\text{CuSO}_4$ .
- To get the complete structure observe this crystal through microscope.

Conclusion:

From above experiment the crystal of copper are obtained from saturated solution.

Precaution:

- Little amount of solute must be added each time and dissolved completely before adding next time.
- Sufficient amount of water must be taken to make solution.
- The saturated solution must be heated for about one minute only.

### Experiment No.27

To separate the pigment of Blue and Red ink from the mixture by using Paper Chromatography.

Materials Required:

- i. A strip of filter paper
- ii. Mixture of Red and Blue ink
- iii. Vessel
- iv. Stick

Theory:

Chromatography is a technique that is used for separating the components of a mixture by passing it through a column or sheet of absorbing material. Paper chromatography is a technique in which filter

paper is used as in absorbent materials for separating the coloring pigment from mixture.

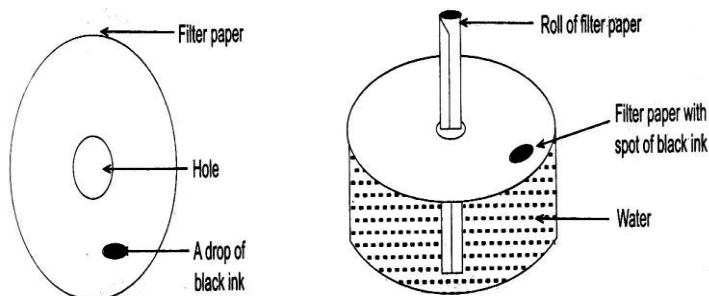


Fig : Paper Chromatography

Procedure:

- Take a mixture of blue and red ink in a vessel.
- Adjust a strip of filter paper with the help of stick in such a way that the filter paper must not touch the vessel as shown in the fig.
- Leave the apparatus for 2 hours
- Observe the red and blue coloring pigments on the filter paper forming ring.

Conclusion:

From the above experiment the red and blue coloring pigments are separated from the mixture.

Precaution:

- A strip of filter paper must be used.
- The filter paper must not touch the bottom of vessel.

### Experiment No.28

To identify Acid, Base and Salt.

Materials Required:

- Test tube ( 6 )
- Hydrochloric acid (HCl)

- Sodium hydroxide (NaOH) solution
- Sodium Chloride (NaCl) solution
- Litmus paper( Blue and Red)
- Methyl Orange
- Phenolphthalein solution

Theory:

Acid is defined as the substance which gives hydrogen ion when dissolved in water where as base are metallic oxide and hydro oxides which gives  $\text{OH}^-$  ion in aqueous solution. Salt are the neutral substance formed by the reaction of acid and base.

Indicator are the chemical compounds used for identifying whether a given substances is acidic or basic in nature. Litmus paper, Phenolphthalein and methyl orange are common indicators. They show the following change of color in acidic, basic and neutral solution.

Indicators	Acidic solution	Basic solution	Neutral solution
1. litmus paper	Red	Blue	No change in color
2. Methyl orange	Red	Yellow	No change in color
3. Phenolphthalein	Colorless	Pink	No change in color

Procedure:

- Take three test tubes A, B and C.
- Fill test tube A with HCl, B with NaOH solution and C with NaCl solution
- Take blue and red litmus paper and dip it in all three test tubes.
- Observe the change in color and fill the table below
- Take methyl orange in three different test tubes.
- Add little amount of HCl, NaOH and NaCl in the above three test tubes.
- Observe the change in color and fill the table below
- Repeat the above steps by taking phenolphthalein solution.

Observation Table:

Indicators	Test tube A	Test Tube B	Test tube C	Remarks
Red litmus paper				A is acid B is base C is salt
Blue litmus paper				
Phenolphthalein				
Methyl orange				

Conclusion:

From the above experiment three solutions are identified as acid , base or salt by using indicators.

Precaution:

- i. The solution of an acid, base and salt must be more concentrated.
- ii. Reasonable amount of acid, base and salt and indicator must be taken.
- iii. Change in color must be observed carefully.

Experiment No.29

To study Rusting in Laboratory.

Required materials:

- A beaker
- A stand
- A test tube
- Wad of steel wool
- Water
- Match box

Theory:

The reddish brown layer on the surface of the iron is called rust. The process of formation of rust by the slow oxidation of iron into iron oxide due to the atmospheric oxygen in the presence of water vapor is called rusting.

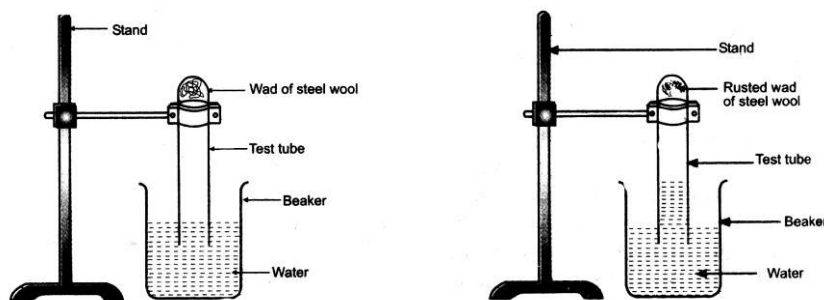
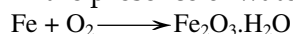


Fig : Rusting of iron.

Procedure:

- Take a test tube and pour some water into it to make its bottom wet.
- Place wad of steel wool at the bottom of the test tube such that the wad of steel wool sticks to the wall of the test tube.
- Take a beaker with water
- Adjust the test tube leaving the wad of steel wool in the beaker with a stand as shown in the figure.
- Mark the level of water in the inverted test tube
- Leave the apparatus for about two days.

- Observe the color of wad of wool as reddish brown due to rust and the raise of level of water in the test tube.
- Takeout the test tube by closing the mouth by thumb and introduce a glowing match stick in the test tube.

Interpretation:

In the above experiment due to the consumption of Oxygen during Rusting match stick extinguishes.

Conclusion:

From the above experiment it is found that rusting occurs in iron in the presence of  $O_2$  and  $H_2O$ .

Precaution:

- The wad of steel wool must stick at the bottom of the test tube.
- Apparatus must be set carefully.

Experiment No.30

To prove that air contains Oxygen.

Materials Required:

- Water trough
- Bell jar with cork
- Water
- Small porcelain basin
- Phosphorus and match box

Theory:

Air is the composition of mixture of different gases. The main gases of an air are Nitrogen and oxygen. The composition is:

Gases in air	% by volume
Nitrogen	78.07
Oxygen	20.98
Carbon dioxide	0.03
Argon	0.85
Neon	0.002
Other inert gases	0.008
Water vapor	0.06



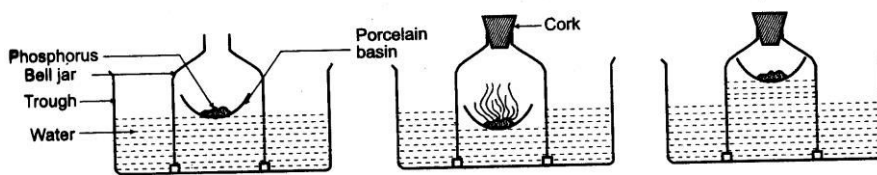


Fig : Verification of presence of oxygen in air.

Procedure:

1. Take some phosphorus in a porcelain basin
2. Place the basin floating on the water in a trough.
3. Cover it with a bell jar.
4. Note the water level in the bell jar.
5. Burn the phosphorus carefully and close the bell jar immediately by using a cork as shown in the figure.
6. Now observe the water level in the bell jar.

Interpretation:

In the above experiment due to the presence of Oxygen gas, phosphorous burns and the water level rises but at last match stick extinguishes due to the lack of Oxygen.

Conclusion:

From the above experiment it is found that air contains Oxygen.

Experiment No.31

To measure the Percentage of Oxygen in air.

Materials Required:

- Scale
- A beaker
- A stand
- A test tube
- Wad of steel wool
- Water
- Scale

Theory:

Air is the composition of mixture of different gases. The main gases of an air are Nitrogen and oxygen. The composition is:

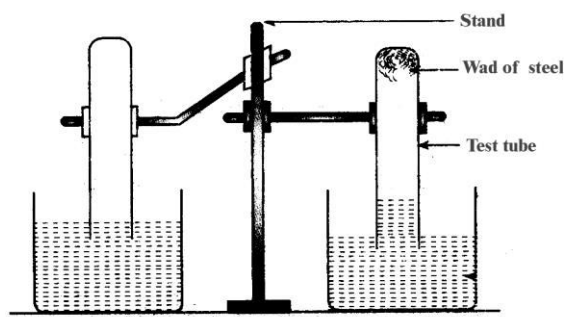


Fig : Measurement of volume of oxygen in air

Gases in air	% by volume
Nitrogen	78.07
Oxygen	20.98
Carbon dioxide	0.03
Argon	0.85
Neon	0.002
Other inert gases	0.008
Water vapor	0.06

Procedure:

- Take two test tubes of same size and insert a wad of steel wool such that it sticks to the wall of one of them.
- Take two beakers with water.
- Adjust the test tubes and beakers with a stand as shown in the figure.
- Leave the apparatus for about 2 hrs.
- Observe the rise of water in the test tube.
- Measure the length of test tube which is outside the water and part inside water.
- Find percentage length of water in the test tube, you will get around 20%.

Interpretation:

During rusting Oxygen is consumed so level of water increases in the test tube.

Conclusion:

From the above experiment it is found that one fifth of air contains oxygen.

Precaution:

- The wad of steel wool must stick at the bottom of the test tube.
- Length must be measured carefully.

Experiment No.32

To prove that Air contains Water Vapor.

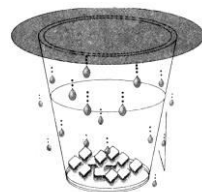
Materials Required:

- Glass tumbler
- Ice-cubes
- water

Theory:

Air is the composition of mixture of different gases. The main gases of an air are Nitrogen and oxygen. **The main gases of an air are Nitrogen and oxygen.** The composition is:

Gases in air                      % by volume



Nitrogen	78.07
Oxygen	20.98
Carbon dioxide	0.03
Argon	0.85
Neon	0.002
Other inert gases	0.008
Water vapor	0.06

Fig : Water vapor in air.

Procedure:

- Take a glass tumbler with some water and ice tubes
- Place the glass tumbler on a table.
- Cover the glass with a lid.
- Observe the outer surface of the glass tumbler after sometime.
- Observe the water droplets on the outer surface of glass tumbler.

Interpretation:

Water droplets are seen on the outer surface of glass tumbler due to the condensation of water vapor present in air.

Conclusion:

From the above experiment it is found that air contains water vapor.

Precaution:

Perform the experiment carefully.

Experiment No.33

To prove that air contains Carbon Dioxide gas.

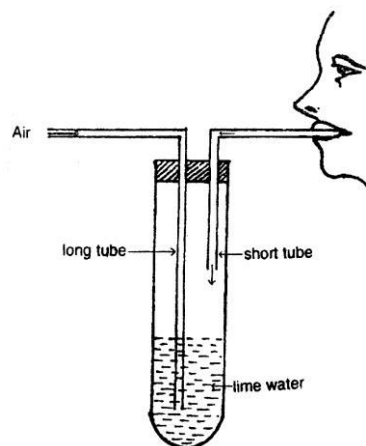
Materials Required:

- A beaker
- Lime water

Theory:

Air is the composition of mixture of different gases. The main gases of an air are Nitrogen and oxygen. The composition is:

Gases in air	% by volume
Nitrogen	78.07
Oxygen	20.98
Carbon dioxide	0.03
Argon	0.85
Neon	0.002
Other inert gases	0.008



Water vapor 0.06  
 When CO<sub>2</sub> reacts with lime water it forms CaCO<sub>3</sub> which is milky. Fig : Passage of CO<sub>2</sub> in lime water  

$$\text{Ca(OH)}_2 + \text{CO}_2 \longrightarrow \text{CaCO}_3 + \text{H}_2\text{O}$$

Procedure:

1. Take some lime water in a beaker or a test tube as shown in the fig.
2. Pass CO<sub>2</sub> gas by blowing our through delivery tube.
3. Observe the change in color of lime water.

Interpretation:

Due to the formation of CaCO<sub>3</sub> the color is Milky.

Conclusion:

From the above experiment it is found that air contains carbon dioxide gas.

Precaution:

Apparatus must be fitted carefully.

## Viva Questions

1. What is crystal?  
 ✎ Crystal is a piece of solid which has regular and definite geometrical shape, smooth surface and sharp edges that composed its boundary.
2. What is the mass of electron?  
 ✎  $9.1 \times 10^{-31} \text{kg}$
3. What is the mass of proton?  
 ✎  $1.67 \times 10^{-27} \text{kg}$
4. What is the relation between mass of proton and neutron?  
 ✎ Equal
5. What is atomic no?  
 ✎ Number of proton
6. What is molecular weight?  
 ✎ No. of proton+ No. of neutron
7. What is chromatography?  
 ✎ Chromatography is a technique that is used for separating the components of a mixture by passing it through a column or sheet of absorbing material.
8. What is indicator?

- Indicator are the chemical compounds used for identifying whether a given substances is acidic or basic in nature.
9. Write the name and source of acids used in daily life.
- |                 |                              |
|-----------------|------------------------------|
| ✎ Name of acids | source                       |
| Citric acid     | lemon                        |
| Acetic acid     | vinegar                      |
| Carbonic acid   | soda water                   |
| Tartaric acid   | fruits                       |
| Formic acid     | acid produced when ant bites |
| Ascorbic acid   | sour fruits                  |
| Lactic acid     | sour milk                    |
10. Write the name and uses of bases used in daily life.
- |                     |                 |
|---------------------|-----------------|
| ✎ Bases             | uses            |
| Potassium hydroxide | ash             |
| Sodium hydroxide    | to prepare soap |
| Aluminum            | used in gastric |
11. Write the name and usos of salts used in daily life.
- |                    |                              |
|--------------------|------------------------------|
| ✎ Name of salt     | uses                         |
| Sodium chloride    | to eat                       |
| Copper sulphate    | insecticides                 |
| Magnesium sulphate | medicine during constipation |
| Calcium sulphate   | to join the fractured        |
12. What is the change in color of indicator in acid Base and salt?
- |                 |                 |                |                    |
|-----------------|-----------------|----------------|--------------------|
| ✎ Indicators    | Acidic solution | Basic solution | Neutral solution   |
| litmus paper    | Red             | Blue           | No change in color |
| Methyl orange   | Red             | Yellow         | No change in color |
| Phenolphthalein | Colorless       | Pink           | No change in color |
13. Write the composition of air on the basis of volume.
- |                   |            |
|-------------------|------------|
| ✎ Gases in air    | %by volume |
| Nitrogen          | 78.07      |
| Oxygen            | 20.98      |
| Carbon dioxide    | 0.03       |
| Argon             | 0.85       |
| Neon              | 0.002      |
| Other inert gases | 0.008      |
| Water vapor       | 0.06       |
14. Which gas is necessary for burning?

☒ Oxygen



To Study the different parts of Compound Microscope

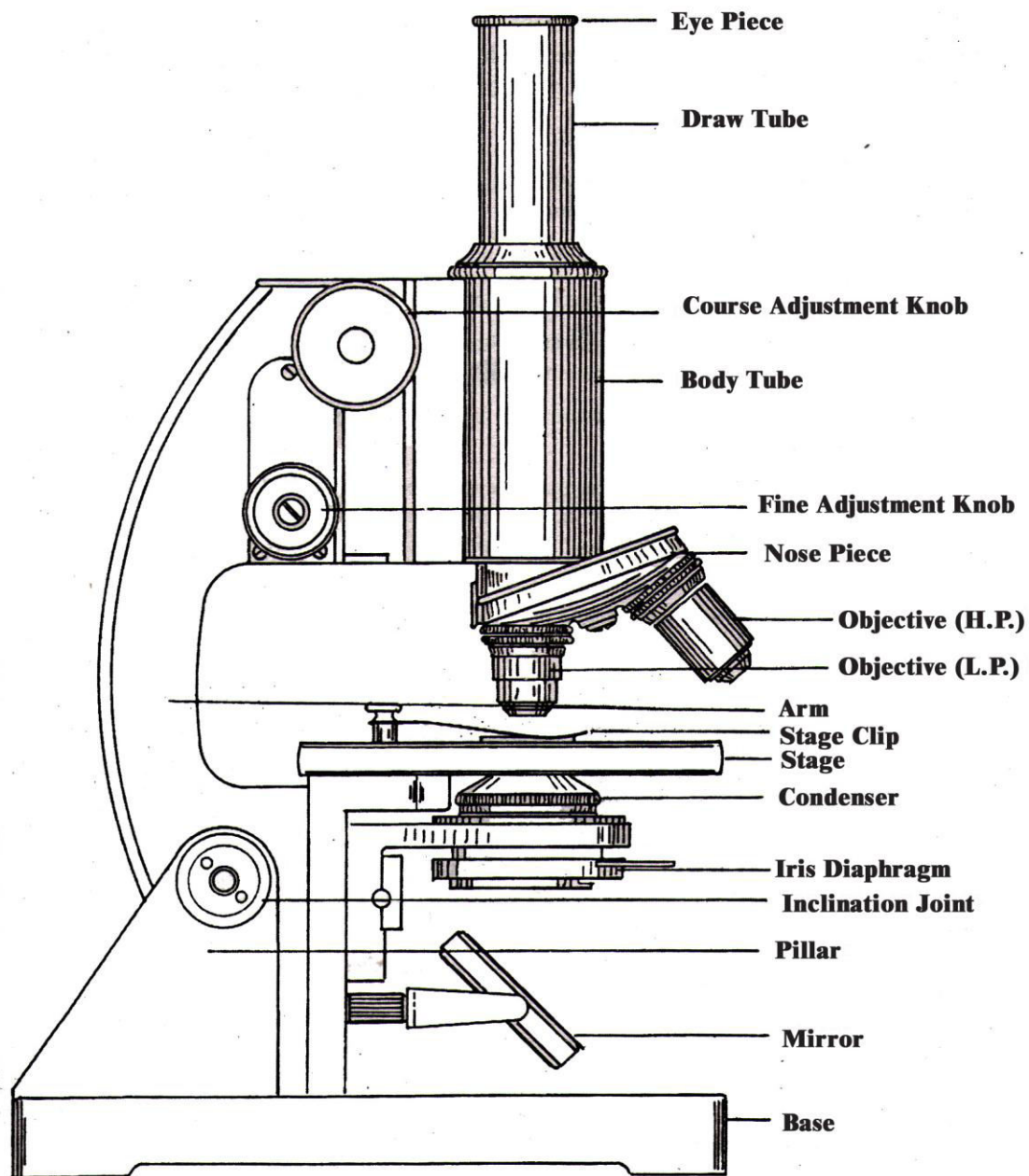
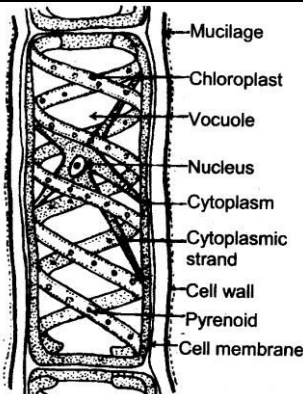
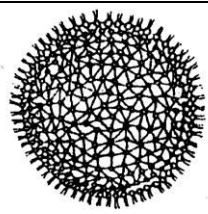


Fig : Compound Microscope

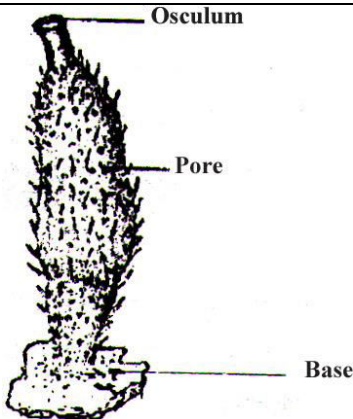

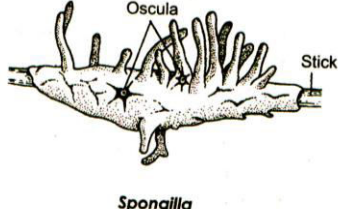
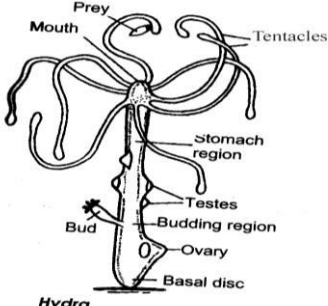
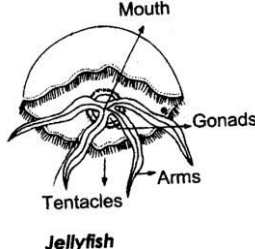
# Biology + Astronomy and Geology

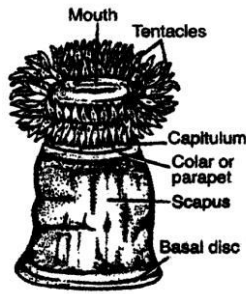
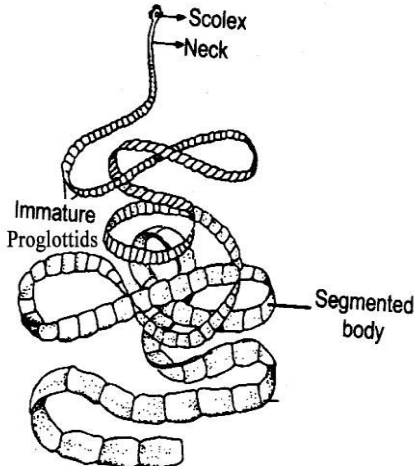
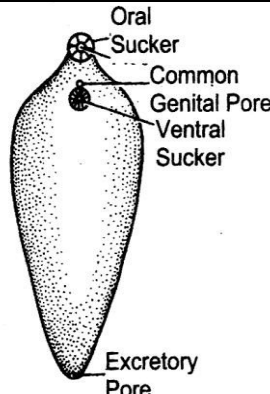
Experiment No.34

To study the Museum Specimen of following organisms and classify with one diagnostic character:

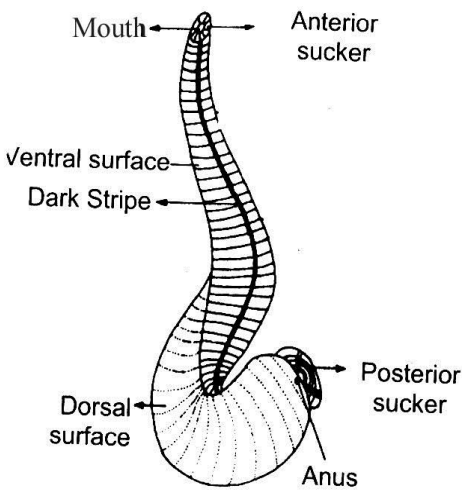
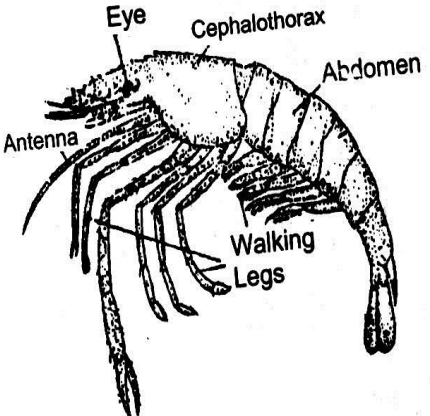
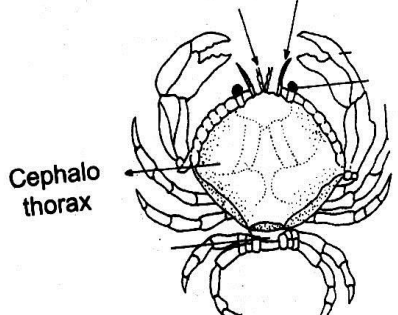
Name of Organisms	Classifications	Figure
Spirogyra	Kingdom :- Plantae Sub kingdom :- Cryptogams Division :- Thalophyta Sub division :- Algae Example :- Spirogyra Characteristics :- Make it's own food	 <p style="text-align: center;"><i>Spirogyra</i></p>
Volvox	Kingdom :- Plantae Sub kingdom :- Cryptogams Division :- Thalophyta Sub division :- Algae Example :- Volvox Characteristics :- Green in color	 <p style="text-align: center;"><i>Volvox</i></p>

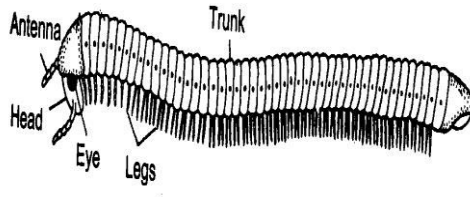
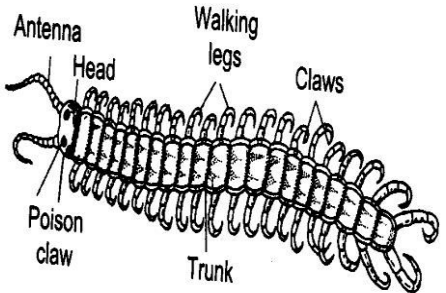
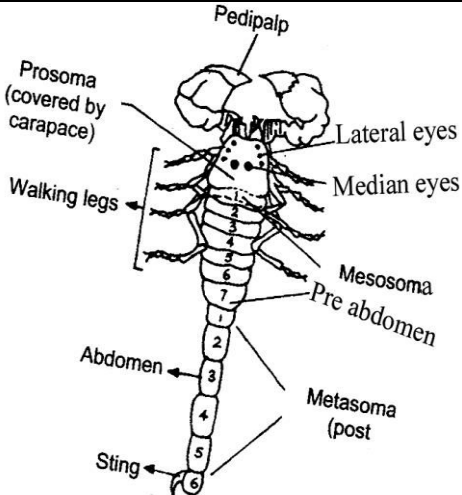


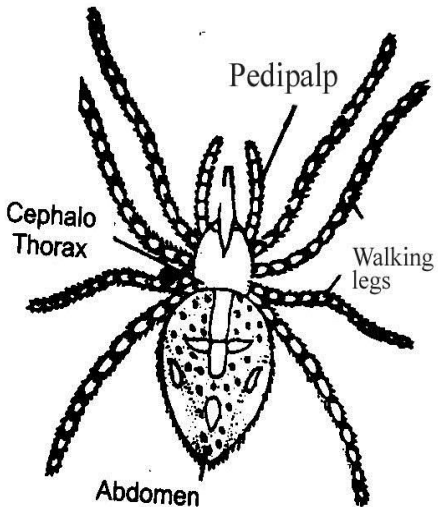
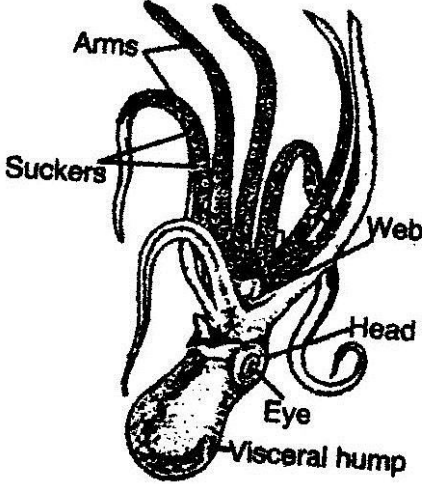
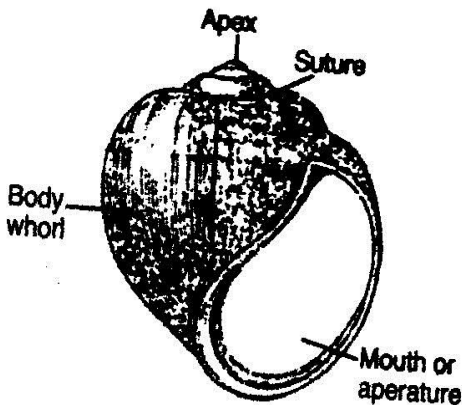
Sponge	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Porifera Example :- Sponge Characteristics :- Body contains pores	
Euspongia	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Porifera Example :- Euspongia Characteristics :- Found in marine water	
Spongilla	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Porifera Example :- Spongilla Characteristics :- Mostly found in marine water	
Hydra	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Coelenterate Example :- Hydra Characteristics :- It has mouth but no anus	
Jelly fish	Kingdom :- Animal Subkingdom :- Invertebrate Division :- Coelenterate Example :- Jelly fish Characteristics :- It contains coelenteron	


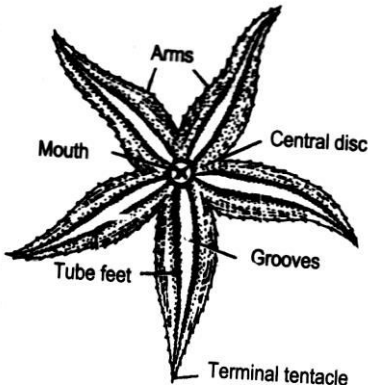
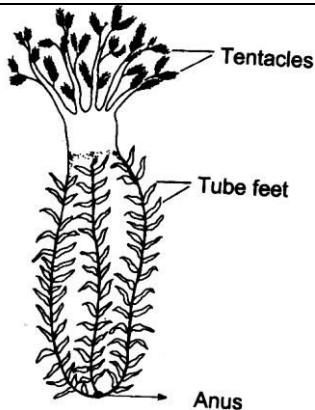
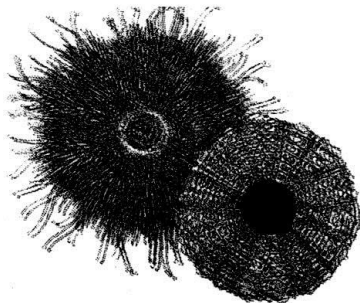
	cavity	
Sea anemone	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Invertebrate</p> <p>Phylum :- Coelenterate</p> <p>Example :- Sea anemone</p> <p>Characteristics :- They have large hollow cavity</p>	 <p>Sea anemone</p>
Tape worm	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Invertebrate</p> <p>Phylum :- Platyhelminthes</p> <p>Example :- Tape worm</p> <p>Characteristics :- Body is segmented</p>	
Liver fluke	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Invertebrate</p> <p>Phylum :- Platyhelminthes</p> <p>Example :- Liver fluke</p> <p>Characteristics :- Body is flattened</p>	

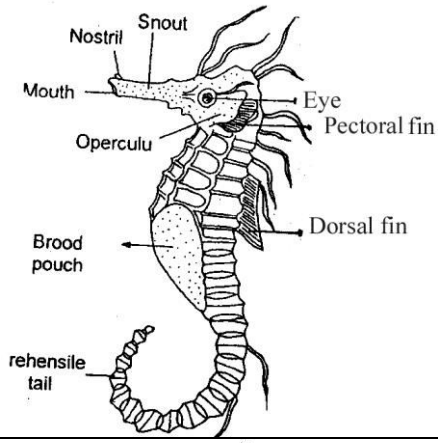
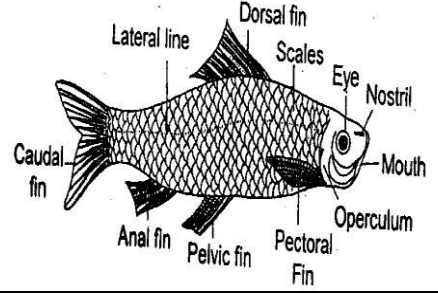
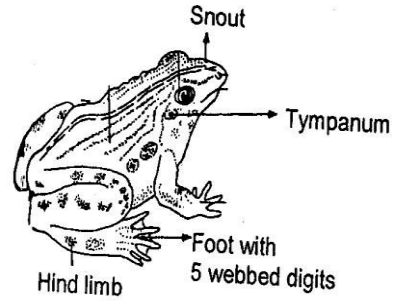
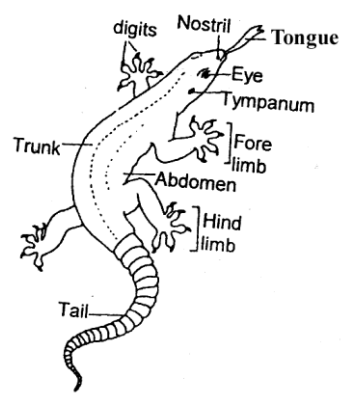
Ascaris	Kingdom :- Animalia Subkingdom :- Invertebrate Phylum :- Nematelminthes Example :- Ascaris Characteristics :- Body is Bilaterally symmetrical	<p>The diagram illustrates the external anatomy of Ascaris. The male specimen on the left is longer and has a curved tail. The female specimen on the right is shorter and has a more rounded posterior end. Labels include Mouth, Excretory pore, Lateral line, Tail, and Anus for the male, and Anus for the female.</p>
Earthworm	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Annelida Example :- Earthworm Characteristics :- They have segmented body	<p>The diagram shows a detailed view of an earthworm's body segments. It highlights the Genital Papillae, Female genital opening, and Male genital pore. The posterior end shows the Anus and the Anal Segment. Setae (bristles) are shown on the segments. Numbers 13, 14, 15, and 16 are also labeled near the genital openings.</p>

Leech	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Invertebrate</p> <p>Phylum :- Annelida</p> <p>Example :- leech</p> <p>Characteristics :- They have segmented body</p>	 <p>The diagram illustrates the external anatomy of a leech. It shows a segmented body with a prominent dark stripe running along the ventral surface. At the anterior end, there is a mouth and an anterior sucker. At the posterior end, there is a posterior sucker and an anus. The dorsal surface is also indicated.</p>
Prawn	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Invertebrate</p> <p>Phylum :- Arthropoda</p> <p>Example :- Prawn</p> <p>Characteristics :- They have exoskeleton</p>	 <p>The diagram shows a prawn from a lateral view. Key features labeled include the eye, cephalothorax, abdomen, antenna, and walking legs. The segmented nature of its body and limbs is clearly visible.</p>
Crab	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Invertebrate</p> <p>Phylum :- Arthropoda</p> <p>Example :- Crab</p> <p>Characteristics :- They have exoskeleton</p>	 <p>The diagram depicts a crab from a dorsal view. The cephalothorax is centrally located, with legs extending outwards. The segmented structure of the limbs and body is evident.</p>

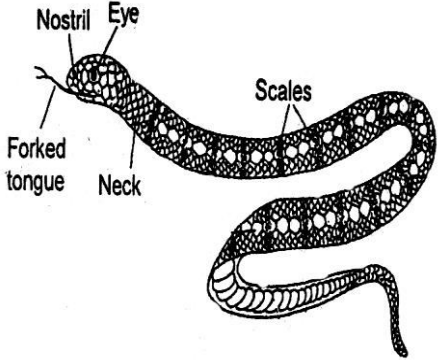
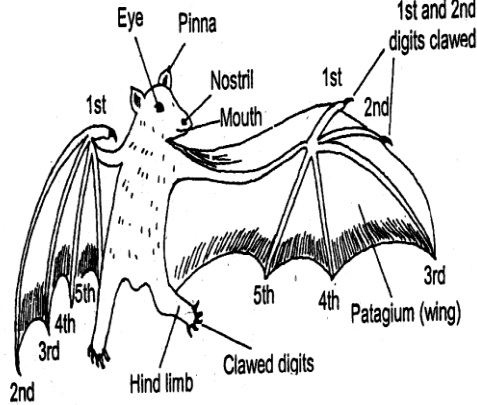
Millipede	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Arthropoda Example :- Millipede Characteristics :- They have many pairs of legs	
Centipede	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Arthropoda Example :- Centipede Characteristics :- They have segmented body	
Scorpion	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Arthropoda Example :- Scorpion Characteristics :- They do not have compound eyes and feelers	

Spider	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Invertebrate</p> <p>Phylum :- Arthropoda</p> <p>Example :- Spider</p> <p>Characteristics :- They do not have compound eyes and feelers</p>	 <p>The diagram illustrates a spider from a dorsal view. It has a segmented body divided into a cephalothorax and an abdomen. Eight jointed walking legs are attached to the cephalothorax. Two pedipalps are located at the front of the cephalothorax. The abdomen is oval-shaped with various markings.</p>
Octopus	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Invertebrate</p> <p>Phylum :- Mollusca</p> <p>Example :- Octopus</p> <p>Characteristics :- They are unisexual</p>	 <p>The diagram shows an octopus with its head at the bottom. It has eight arms extending upwards, each covered in suckers. A web is visible between some of the arms. The head features a large eye and a prominent, bulbous visceral hump. The body is covered in a pattern of dark spots.</p>
Snail	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Invertebrate</p> <p>Phylum :- Mollusca</p> <p>Example :- Snail</p> <p>Characteristics :- They are unisexual</p>	 <p>The diagram depicts a snail shell, which is a coiled, spiral structure. The apex is the topmost point of the shell. The sutures are the lines where the different whorls of the shell meet. The body whorl is the largest and most prominent part of the shell. The mouth or aperture is the opening at the bottom of the shell.</p>

Slug	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Mollusca Example :- Slug Characteristics :- They are unisexual	
Star fish	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Echinodermata Example :- Star fish Characteristics :- Body is covered with calcareous spines	
Sea-Cucumber	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Echinodermata Example :- Sea cucumber Characteristics :- Body is covered with calcareous spines	
Sea-urchin	Kingdom :- Animalia Sub kingdom :- Invertebrate Phylum :- Echinodermata Example :- Sea urchin Characteristics :- Body is covered with calcareous spines	

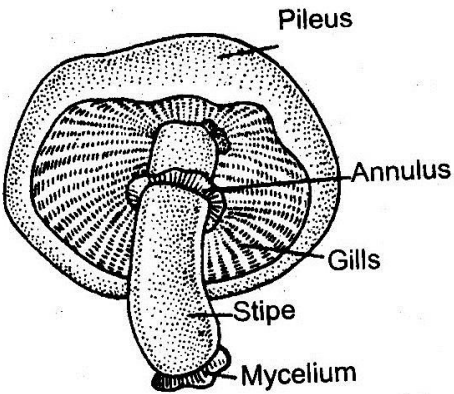
Sea horse	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Vertebrate</p> <p>Phylum :- Chordata</p> <p>Class :- Pisces</p> <p>Example :- Sea horse</p> <p>Characteristics :- Fertilization is external.</p>	
Fish	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Vertebrate</p> <p>Phylum :- Chordata</p> <p>Class :- Pisces</p> <p>Example :- Fish</p> <p>Characteristics :- Fertilization is external</p>	
Frog	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Vertebrate</p> <p>Phylum :- Chordata</p> <p>Class :- Amphibia</p> <p>Example :- Frog</p> <p>Characteristics :- Skin is thin, soft &amp; moist</p>	
Lizard	<p>Kingdom :- Animalia</p> <p>Sub kingdom :- Vertebrate</p> <p>Phylum :- Chordata</p> <p>Class :- Reptilia</p> <p>Example :- Lizard</p> <p>Characteristics :- They are cold blooded animal</p>	

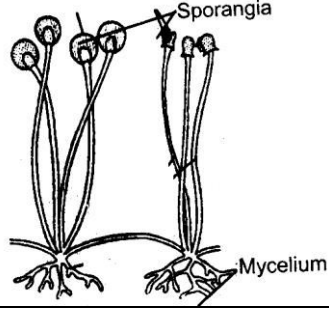
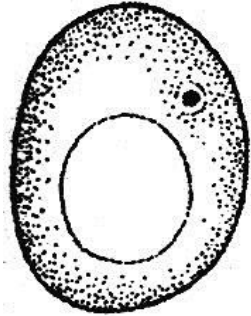
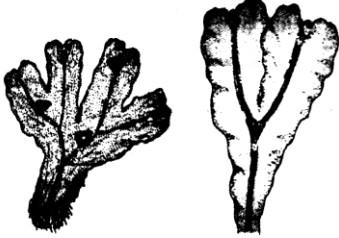
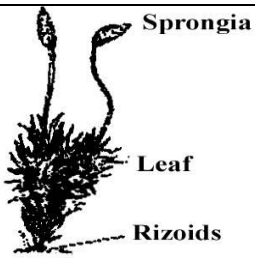



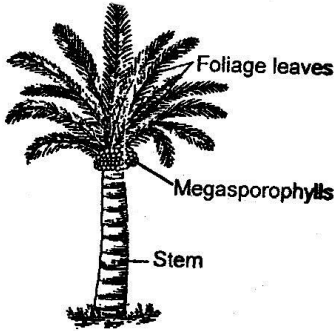
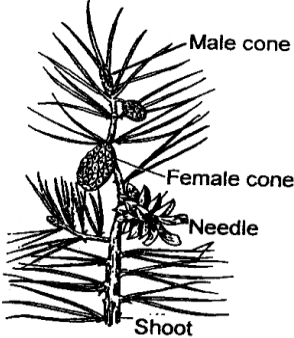
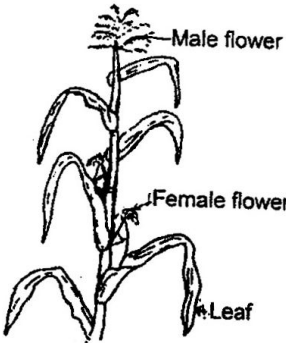
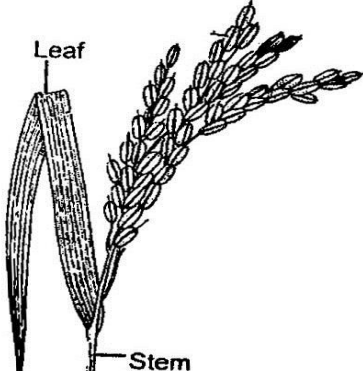
Snake	Kingdom :- Animalia Sub kingdom :- Vertebrate Phylum :- Chordata Class :- Reptilia Example :- Snake Characteristics :- They are cold blooded animal	
Bat	Kingdom :- Animalia Sub kingdom :- Vertebrate Phylum :- Chordata Class :- Mammalia Example :- Bat Characteristics :- Presence of Mammary gland	

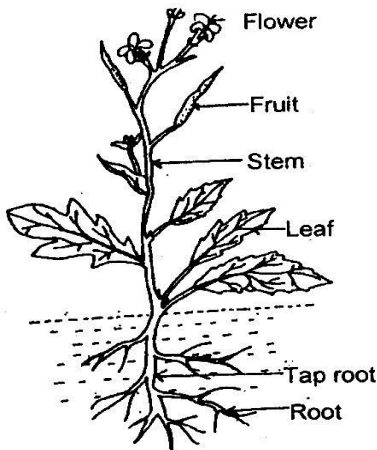
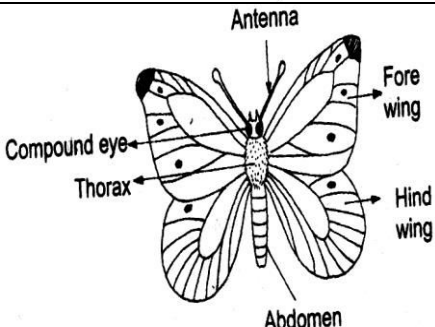
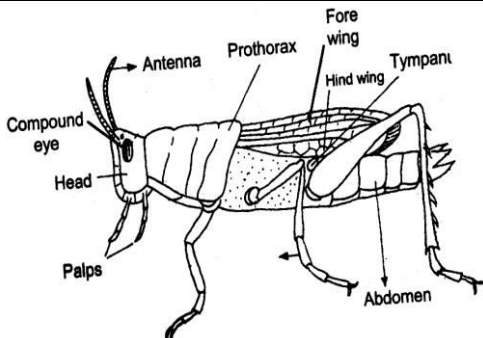
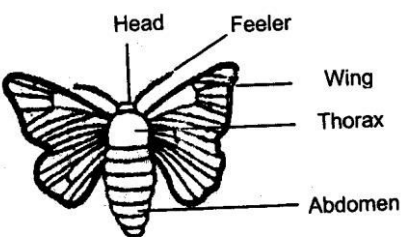
#### Experiment No.35

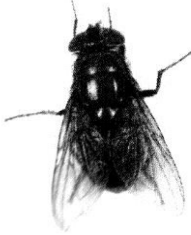

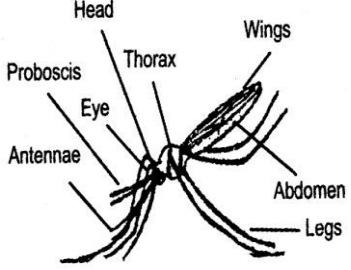
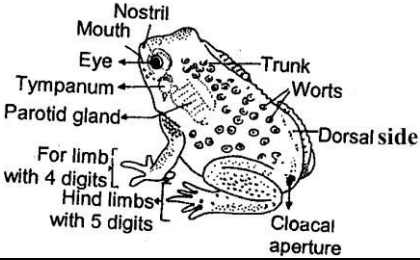
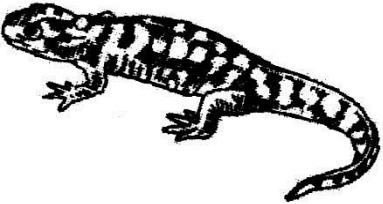
**To observe the following Organism and classify it with one characteristic.**

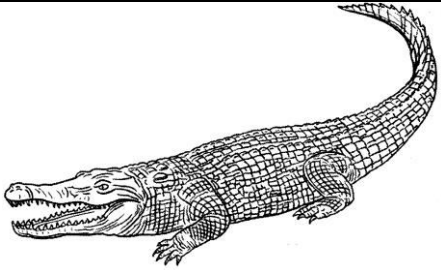
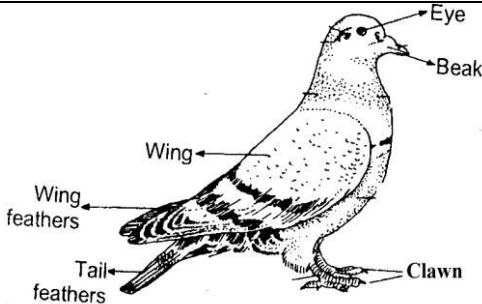

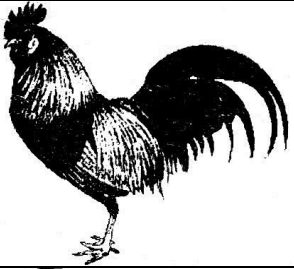
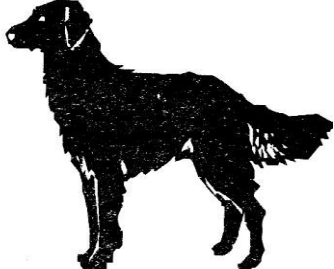
Name of Organisms	Classifications	Figure
Mushroom	Kingdom :- Plantae Subkingdom :- Cryptogams Division :-Thallophayta Sub-Division :- Fungi Example :- Mushroom Characteristics :- They do not contain chlorophyll	

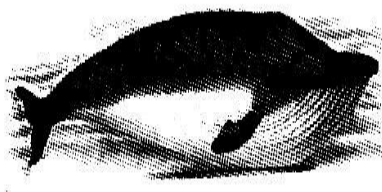
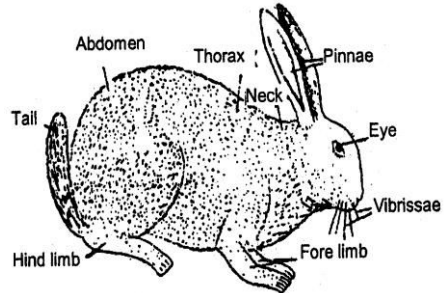
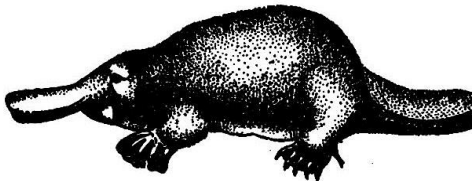
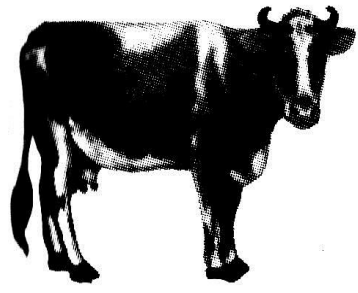
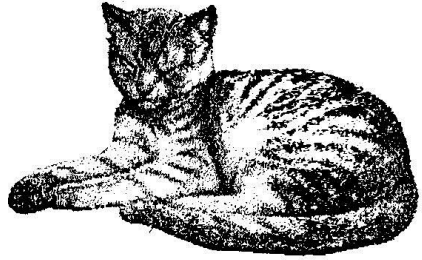
Mucor	Kingdom :- Plantae Subkingdom :- Cryptogams Division :-Thallophyta Sub-Division :- Fungi Example :- Mucor Characteristics :- They do not contain chlorophyll	 <p>Sporangia</p> <p>Mycelium</p>
Yeast	Kingdom :- Plantae Subkingdom :- Cryptogams Division :-Thallophyta Sub-Division :- Fungi Example :- Yeast Characteristics :- They grow in dead and decaying matter	
Marcantia	Kingdom :- Plantae Subkingdom :- Cryptogams Division :- Bryophyta Example :- Marcantia Characteristics :- They grow in moist place	
Funaria	Kingdom :- Plantae Subkingdom :- Cryptogams Division :- Bryophyta Example :- Mucor Characteristics :- They are amphibian plant	 <p>Sprongia</p> <p>Leaf</p> <p>Rizoids</p>
Fern	Kingdom :- Plantae Subkingdom :- Cryptogams Division :- Pteridophayta Example :- Fern Characteristics :- They have feather like leaves	

Cycas	Kingdom :- Plantae Subkingdom :- Phanerogams Division :- Gymnosperms Example :- Cycas Characteristics :- Flowers are replaced by cones	
Pine	Kingdom :- Plantae Subkingdom :- Phanerogams Division :- Gymnosperms Example :- Pine Characteristics :- Flowers are replaced by cones	
Maize	Kingdom :- Plantae Subkingdom :- Phanerogams Division :- Angiosperms Class :- Monocot Example :- Maize Characteristics :- They have hollow stem	
Rice	Kingdom :- Plantae Subkingdom :- Phanerogams Division :- Angiosperms Class :- Monocot Example :- Rice Characteristics :- They have fibrous root system	

Mustard	Kingdom :- Plantae Subkingdom :- Phanerogams Division :- Angiosperms Class :- Dicot Example :- Mustard Characteristics :- They have tap root system	 <p>The diagram shows a mustard plant with a central stem. At the top, there are small flowers. Below the flowers, there are leaves and a developing fruit. The root system is shown below the ground line, featuring a single, thick tap root and several smaller lateral roots. Labels include: Flower, Fruit, Stem, Leaf, Tap root, and Root.</p>
Buttterfly	Kingdom :- Animalia Subkingdom :- Invertebrate Phylum :- Arthropoda Example :- Butterfly Characteristics :- They have paired lateral jointed appendages	 <p>The diagram shows a butterfly from a dorsal view. It has a central body with a head, thorax, and abdomen. Two pairs of wings are attached to the thorax: the larger forewings and the smaller hindwings. The wings have a pattern of spots and lines. Labels include: Antenna, Compound eye, Thorax, Fore wing, Hind wing, and Abdomen.</p>
Grass hopper	Kingdom :- Animalia Subkingdom :- Invertebrate Phylum :- Arthropoda Example :- Grass hopper Characteristics :- They have paired lateral jointed appendages	 <p>The diagram shows a grasshopper from a side view. It has a large, segmented body with a head, thorax, and abdomen. It has three pairs of jointed legs. The hind legs are particularly large and powerful. There are also antennae and compound eyes. Labels include: Antenna, Compound eye, Head, Palps, Prothorax, Fore wing, Hind wing, Tympani, and Abdomen.</p>
Silk worm	Kingdom :- Animalia Subkingdom :- Invertebrate Phylum :- Arthropoda Example :- Silk worm Characteristics :- The head bears a pair of feathery antennae	 <p>The diagram shows a silk worm (caterpillar) from a dorsal view. It has a segmented body with a head, thorax, and abdomen. The head is small and bears a pair of feathery antennae. The body is covered in small hairs. Labels include: Head, Feeler, Wing, Thorax, and Abdomen.</p>

House fly	Kingdom :- Animalia Subkingdom :- Invertebrate Phylum :- Arthropoda Example :- housefly Characteristics :- The head bears a pair of feathery antennae	
Bee	Kingdom :- Animalia Subkingdom :- Invertebrate Phylum :- Arthropoda Example :- Bee Characteristics :- Body is divided into three parts	
Mosquito	Kingdom :- Animalia Subkingdom :- Invertebrate Phylum :- Arthropoda Example :- Mosquito Characteristics :- Body is divided into three parts	
Toad	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Chordata Class :- Amphibia Example :- Toad Characteristics :- Skin is thin, soft & moist	
Salamander	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Chordata Class :- Amphibia Example :- Salamander Characteristics :- They have 3 chambered heart	

Crocodile	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Chordata Class :- Reptilia Example :- Crocodile Characteristics :- They have 4 chambered heart	
Pigeon	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Chordata Class :- Aves Example :- Pigeon Characteristics :- They have Pneumatic bone	
Danphe	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Chordata Class :- Aves Example :- Danphe Characteristics :- They have Pneumatic bone	
Hen	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Chordata Class :- Aves Example :- Hen Characteristics :- They have Pneumatic bone	
Dog	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Chordata Class :- Mammalia Example :- Dog Characteristics :- They have mammary gland	

Whale	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Chordata Class :- Mammalia Example :- Whale Characteristics :- It is aquatic	
Rabbit	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Mammalia Example :- Rabbit Characteristics :- They have mammary gland	
Platypus	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Chordata Class :- Mammalia Example :- Platypus Characteristics :- They have mammary gland	
Cow	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Chordata Class :- Mammalia Example :- Cow Characteristics :- They have mammary gland	
Cat	Kingdom :- Animalia Subkingdom :- Vertebrate Phylum :- Mammalia Example :- Cat Characteristics :- They have mammary gland	

Experiment No.36

**To observe the Permanent slide of the following Organism and classify with one character.**

Chlamydomonas

Classification:

Kingdom	:	Plantae
Subkingdom	:	Cryptogams
Division	:	Thallophyta
Class	:	Algae
Example	:	Chlamydomonas
Characteristics	:	They can move.

Figure

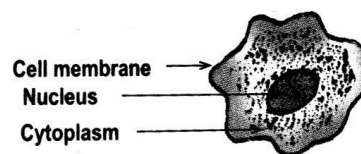


Amoeba

Classification:

Kingdom	:	Animalia
Subkingdom	:	Invertebrate
Phylum	:	Protozoa
Example	:	Amoeba
Characteristics	:	Presence of false leg called pseudopodia

Figure

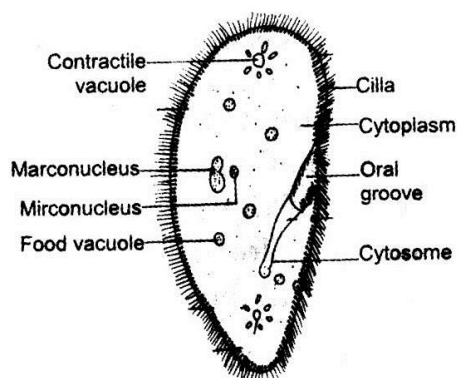


Paramecium

Classification:

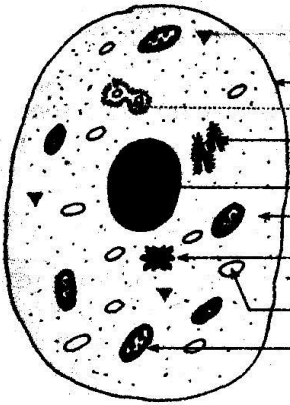
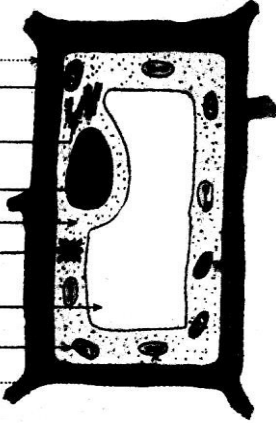
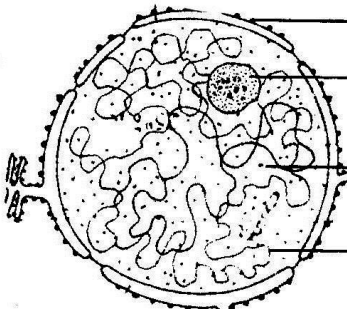
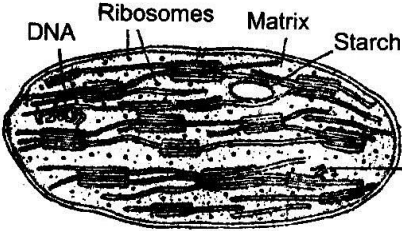
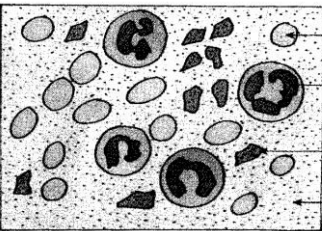

Kingdom	:	Animalia
Subkingdom	:	Invertebrate
Phylum	:	Protozoa
Example	:	Paramecium
Characteristics	:	Presence of legs called cilia

Figure:





**To observe the permanent slide of,**

<p><b>Animal cell</b></p>  <p>Labels for Animal cell:</p> <ul style="list-style-type: none"> <li>Lysosome</li> <li>Cell wall</li> <li>cell membrane</li> <li>Centrosome</li> <li>Endoplasmic reticulum</li> <li>Nucleus</li> <li>Cytoplasm</li> <li>Golgi bodies</li> <li>Vacuoles</li> <li>Mitochondria</li> <li>Plastid</li> </ul>	<p><b>Plant cell</b></p>  <p>Labels for Plant cell:</p> <ul style="list-style-type: none"> <li>Lysosome</li> <li>Cell wall</li> <li>Cell membrane</li> <li>Centrosome</li> <li>Endoplasmic reticulum</li> <li>Nucleus</li> <li>Cytoplasm</li> <li>Golgi bodies</li> <li>Vacuoles</li> <li>Mitochondria</li> <li>Plastid</li> </ul>
<p><b>Nucleus</b></p>  <p>Labels for Nucleus:</p> <ul style="list-style-type: none"> <li>Nuclear membrane</li> <li>Nucleolus</li> <li>Nucleoplasm</li> <li>Chromatid fibres</li> </ul>	<p><b>Plastid</b></p>  <p>Labels for Plastid:</p> <ul style="list-style-type: none"> <li>DNA</li> <li>Ribosomes</li> <li>Matrix</li> <li>Starch</li> <li>RNA</li> </ul>
<p><b>Blood cell</b></p>  <p>Labels for Blood cell:</p> <ul style="list-style-type: none"> <li>RBC</li> <li>WBC</li> <li>Blood Platelets</li> <li>Blood Plasma</li> </ul>	<p><b>Skin</b></p>  <p>Labels for Skin:</p> <ul style="list-style-type: none"> <li>Hair</li> <li>Sweat pore</li> <li>Epidermis</li> <li>Dermis</li> <li>Sensory corpuscle</li> <li>Sebaceous</li> <li>Sweat gland</li> <li>Sub-cutaneous</li> </ul>

#### Experiment No.38

**To prepare the Temporary slide of Onion cell and observe it through microscope.**

Materials Required:

- Fleshy leaf from onion bulb
- Forceps
- Glass slides
- Cover slip
- Water
- Microscope

Procedure:

- Take out a fleshy leaf from an onion bulb with the help of forceps.
- Peel off the thin upper membrane of this leaf.
- Color the cells for a few minutes by dipping it in safranin.
- Put a drop of water in the centre of a glass slide.
- Place a bit of colored membrane on the slide and cover it with a cover slip.

Interpretation:

Brick like arrangement of cell with prominent Nucleus, Protoplasm etc is observed.

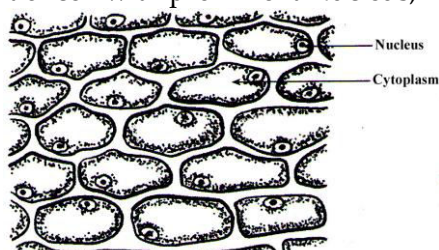


Fig : Onion cells

Conclusion:

From the above experiment Temporary slide of Onion cell is prepared and observed.

#### Experiment No.39

**To prepare the Temporary slide of Human cheek cell and observe it through microscope.**

Materials Required:

- Scalpel
- Glass slides

- Microscope
- Cover slip
- Water

Procedure:

- Scrap gently the inside of your cheek with a scalpel.
- Color the cells for few minutes by dipping it in the safranin.
- Place a drop of water on a glass slide.
- Put the tissue in the liquid and cover it with a cover slip.
- Examine under the microscope.

Interpretation:

Group of irregular cells with prominent Cell membrane, Nucleus etc is observed.

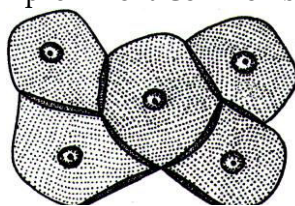


Fig : Human cheek cell.

Conclusion:

From the above experiment Temporary slide of Human Cheek cell is prepared and observed.

Experiment No.40

**To draw the fig of Reproduction of Amoeba, Hydra and Spirogyra**

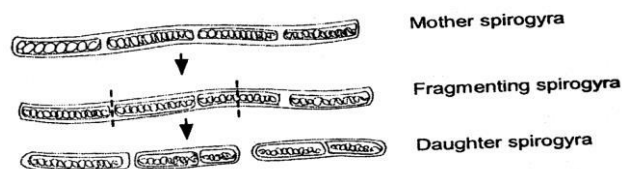


Fig. Reproduction of Spirogyra

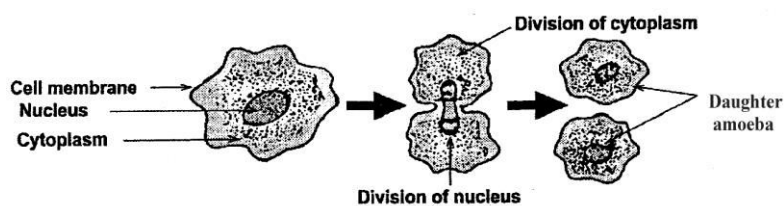


Fig. Reproduction of Amoeba

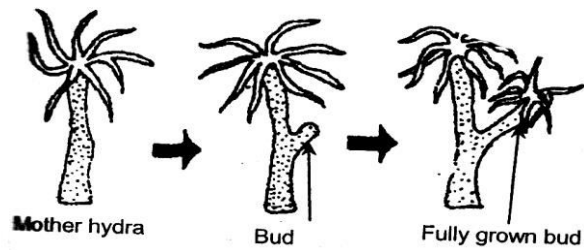


Fig. Reproduction of Hydra

Experiment No.41

To draw the fig of Alimentary canal of Human beings.

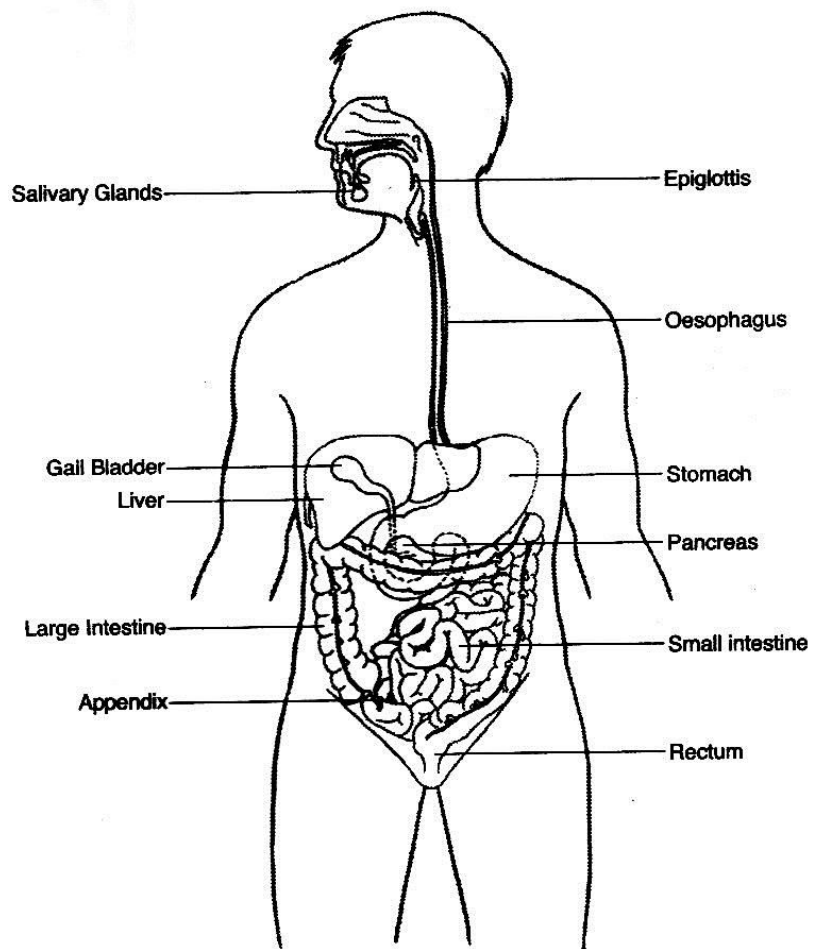


Fig : Alimentary canal of Human beings

Experiment No. 42

**Study the different parts of Mustard plant and draw its life cycle.**

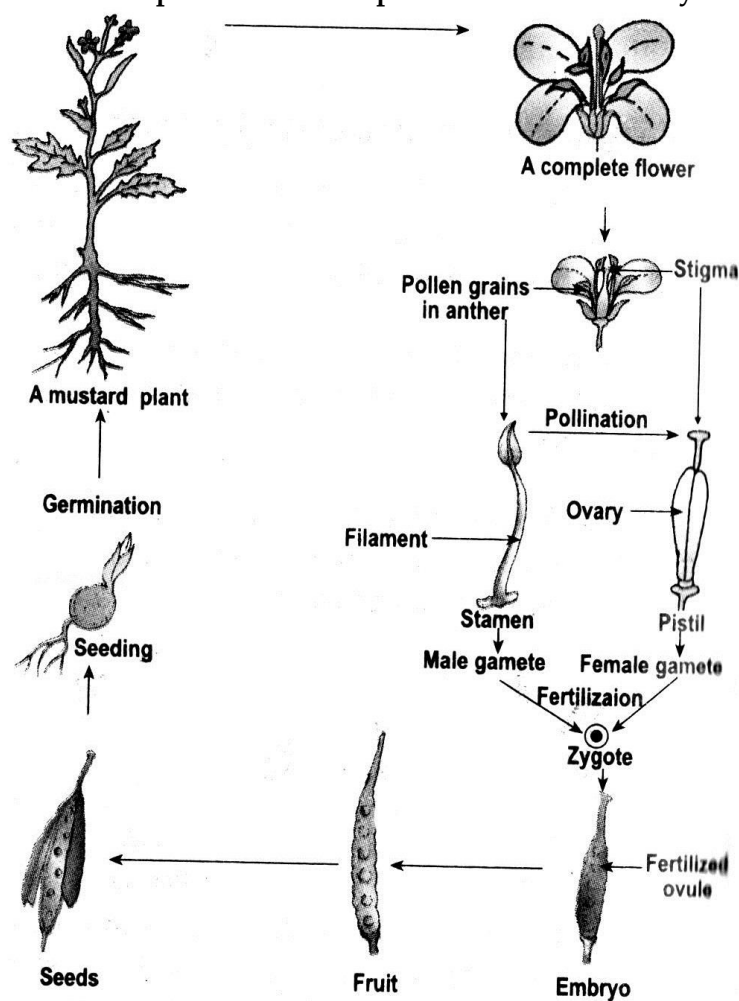


Fig : Life cycle of mustard

Experiment No.43

**To verify that Green Leaf contains Starch.**

Materials Required:

- Leaf
- Beaker

- Iodine solution
- Water
- Alcohol
- Forceps
- Petridis
- Dropper

Theory:

Green leaf can prepare their food themselves. This food is called starch. And the process of formation of food is called photosynthesis. Photosynthesis occurs in green leaves of plant.

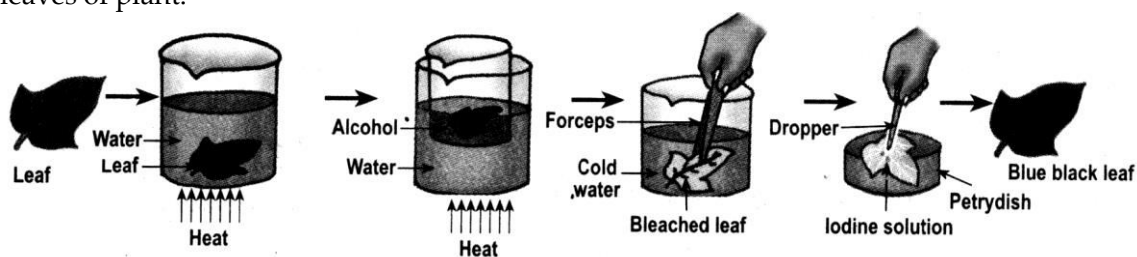


Fig : Steps for starch test

Procedure:

- Take a leaf from a healthy green plant.
- Boil it in water for five minutes.
- Put this leaf in a 90% solution of ethanol.
- Take out the leaf from solution and wash it with cold water.
- Put the leaf in a Petridish containing Iodine solution.
- Observe the change in color of leaf into blue.

Interpretation:

Due to the presence of starch in leaf the color becomes blue.

Conclusion:

From the above experiment it is found that green leaf of a plant contains Starch.

Precaution:

- Leaf must be taken from a plant which is growing in sun light.
- Leaf must be placed carefully.

Experiment No. 44

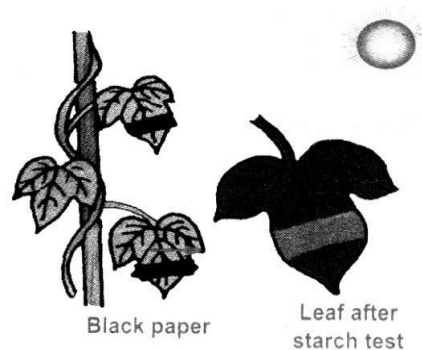
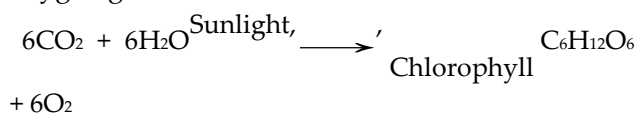
**To show that light is necessary for Photosynthesis.**

Materials Required:

- Potted plant
- Black paper
- Leaf
- Beaker
- Iodine solution
- Water
- Alcohol
- Forceps
- Petridis
- Dropper

Theory:

Photosynthesis is the process of formation of food by a green plant in a leaf containing chlorophyll in the presence of sun light carbon oxygen and water. During this process carbon oxygen gas is evolved.



Procedure:

- Take a potted plant
- Put this plant in a dark room for about two days.
- Take one leaf from above plant.
- Boil it in water for five minutes.
- Put this leaf in a 90% solution of ethanol.
- Take out the leaf from solution and wash it with cold water.
- Put the leaf in a Petridis containing Iodine solution.
- Observe the same color of leaf.
- Place a piece of black paper in the middle portion of leaf and keep the plant in sun light for about two hours.
- Observe the change in color of same part of leaf only i.e. uncovered part of leaf.

Interpretation:

When leaf is covered by black paper, due to the lack of sun light, leaf cannot prepare food so there is no change in color.

Conclusion:

From the above experiment it is found that sun light is necessary for photosynthesis.

Precaution:

- Leaf must be covered such that light can not enter.
- Leaf must be placed carefully.

Experiment No.45

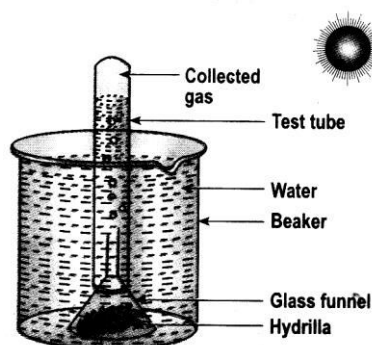
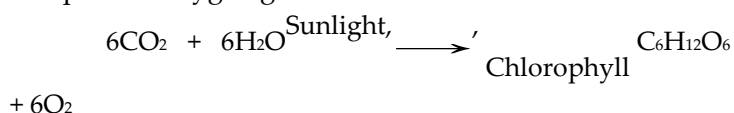
### To show that Oxygen is evolved during Photosynthesis.

Materials Required:

- Beaker
- Test tube
- Conical flask
- Aquatic plant like Hydrilla

Theory:

Photosynthesis is the process of formation of food by a green plant in a leaf containing chlorophyll in the presence of sun light carbon dioxide and water. During this process oxygen gas is evolved.



Procedure:

- Take some branches of Hydrilla plant.
- Take a beaker with water
- Put the branches of Hydrilla in that beaker.
- Invert the funnel in the beaker such that all the branches will be covered by the funnel.
- Put sufficient amount of water in the beaker and invert test tube filled with water above the funnel.
- Keep this apparatus in the sun light for some hours.
- Observe the bobbles in the test tube and decrease in the level of water in the test tube.
- Take out the test tube from water and bring a burning mach stick near to the mouth of test tube it glows brightly.

Interpretation:

In the above experiment due to the formation of oxygen gas water level decreases in the test tube and burning mach stick glows brightly.

Result:

From the above experiment it is found that oxygen gas is evolved during photosynthesis.



Precaution:

- The branches of Hydrilla must be fresh.
- Experiment must be performed in the sun light.

Experiment No. 46

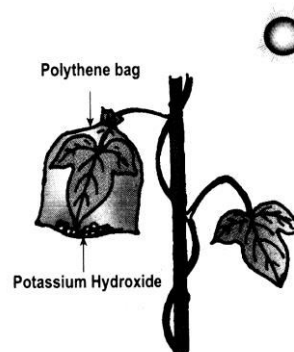
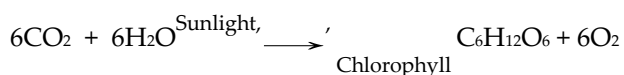
**To show that carbon dioxide gas is necessary for the Photosynthesis.**

Materials Required

- Potted plant
- Plastic bag
- Caustic potash (KOH)
- Leaf
- Beaker
- Iodine solution
- Water
- Alcohol
- Forceps
- Petridis
- Dropper

Theory:

Photosynthesis is the process of formation of food by a green plant in a leaf containing chlorophyll in the presence of sun light carbon dioxide and water. During this process oxygen gas is evolved.



Procedure:

- Take a potted plant and put in a dark room for about two days.
- Put caustic potash in the plastic bag and cover the leaf of plant tightly as shown in the figure.
- Put this apparatus in the sun light about four hours.
- After some times take a leaf covered by plastic and next free leaf. And perform the starch test as below.
- Boil it in water for five minutes.
- Put this leaf in a 90% solution of ethanol.
- Take out the leaf from solution and wash it in cold water.
- Put the leaf in a Petridis containing Iodine solution.

- Observe the change in color of free leaves and no change in color of a leaf covered by plastic.

Interpretation:

Within two days all the carbon dioxide is absorbed by leaf and caustic soda so there is no starch in the leaf covered by plastic.

Result:

From the above experiment it is found that carbon dioxide gas is necessary for photosynthesis.

Precaution:

- Leaf must be covered by plastic tightly so that air can not enter.

Experiment No.47

### **To study different types of Rocks.**

Materials Required:

Different types of rocks.

Theory:

Rocks are the mixture of minerals which are found naturally in the earth crust e.g. Gypsum, Quartz, Mica, Gabbro, basalt etc.

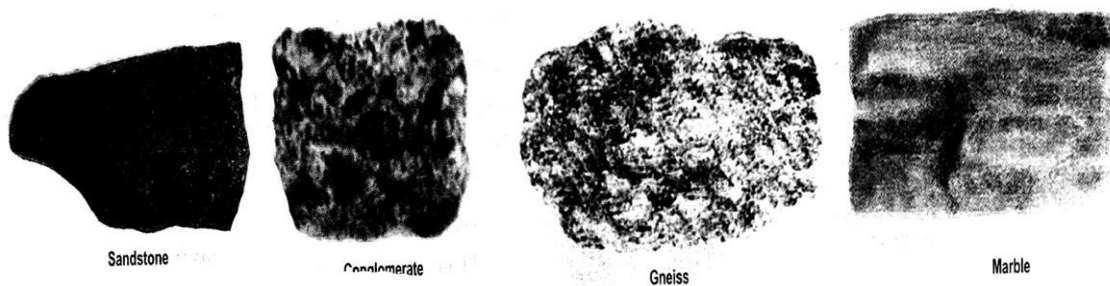
There are three types of rocks they are:

- Igneous rock
- Metamorphic rock
- Sedimentary rock

Igneous rocks are those rocks which are formed due to the solidification of magma e.g. Granite, Dunite.

When the sediment remains for thousands of years on the inner part of earth, it gets cemented together and forms a rock called sedimentary rock. E.g. Conglomerate rock

Metamorphic rocks are those rocks which are formed due to some change in igneous and sedimentary rock due to heat, pressure etc. e.g. Marbles changes into lime stone.



Procedure:

- Collect the samples of different rocks available in the lab or collect from the surroundings
- Classify them into three types of rocks and write three characteristics of metamorphic, sedimentary rock and igneous rock in the table below:

Observation Table:

	S.N.	Igneous Rock	sedimentary Rock	Metamorphic Rock
characteristics	1			
	2			
	3			
Rocks				

Conclusion:

From the above experiment different types of rocks are classified.

Experiment No.48

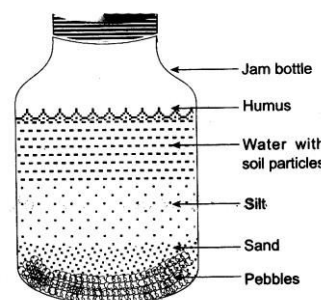
### To study the Components of Soil.

Materials Required:

- Jam bottle
- Water
- Sample soil

Theory:

When mechanical and chemical weathering acts on rocks for millions of years the rocks break on the surface of earth and it mix with other different minerals and forms soil. Soil is made up of tiny grains of weathered rock, minerals, water, and air which may be mixed with humus.



Procedure:

- Take a jam bottle with more than half of water in it.
- Put the sample soil in it.
- Close the bottle with its lid and shake it well.
- Place the bottle still for some minutes.
- When the heavy particles settle down, study the different components of the soil in it.
- List the materials seen in different layers. These are the components of that soil.

Fig : Components of the soil

Conclusion:

From the above experiment different components of the soil are studied.

Precaution:

- Sufficient amount of water must be taken.
- Bottle must be shaken gently.

Experiment No. 49

**To draw the fig of Solar System**

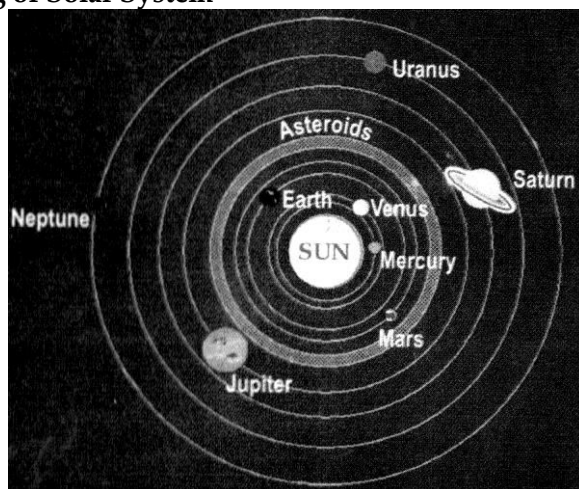


Fig : Solar system

Experiment No.50

**To Prepare the Model of Volcanic Eruption**

Materials Required:

- Vinegar (acid)
- Baking powder( Bicarbonate of alkali soda)
- Plastic

Theory:

In the inner part of earth the temperature is high so that iron, nickel etc. are found in molten state is called magma. The coming out of magma from cracks and weak rock above it, is called volcano. The mouth of volcano is called crater. The molten mass that comes out is called lava. Volcano are of two types active and passive.

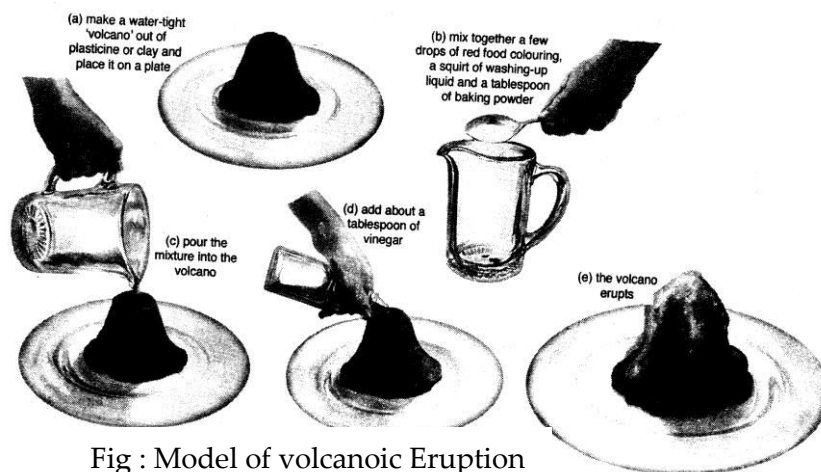


Fig : Model of volcanoic Eruption

Procedure:

- Make a water tight volcano out of plasticize or clay and place it on a plate.
- Mix together a few drops of red food coloring, a squirt of washing up liquid and a table spoon of backing powder. Pour the mixture into the volcano.
- Add about a table spoon vinegar.
- Observed the eruption of volcano

Interpretation:

The vinegar and baking powder react together to form a salt, water and carbon dioxide gas so gives eruption.

Result:

From the above experiment we have prepared a model of volcanic eruption.

Experiment No. 51

### A Sample of Excursion Report:

Group or Name:-.....

1. Place, Date and Time of Excursion:-

.....  
.....

2. Objective of the excursion:-

.....  
.....

3. Area of Excursion/ Matters of Observation:-

.....  
.....

4. Observation/Findings of the excursion and materials collected :-

.....  
.....

5. Interesting Features of the excursion:-

.....  
.....

6. Problem Faced during the excursion :-

.....  
.....

7. Conclusion:-

.....  
.....

## Viva Questions

### **Biology + Astronomy and Geology**

1. What is Binomial system of Nomenclature?

- ✎ The way of giving scientific name of any organism by two names i.e. Generic name & specific name is called Binomial system of nomenclature.

2. Write scientific name of following organisms?

- ✎ Man                      - *Homo sapiens*.  
Cat                        - *Felis domestica*.

Elephant	- <i>Elephes maximus</i>
Tiger	- <i>Panthera Tigrina</i>
Mustard	- <i>Brassica compestris</i>
Frog	- <i>Rana tigrina.</i>
Pipal	- <i>Ficus religiosa.</i>
Cauliflower	- <i>Brassica olerica.</i>
Maize	- <i>Zea mays.</i>
Pea	- <i>Pisum sativum.</i>
Cow	- <i>Bos premigenus</i>

3. Who is known as the father of Taxonomy?  
☐ Carlous Linnaeus.
4. What are cold blooded and warm blooded animals?  
☐ Cold blooded are those animals which can change their body temperature with surroundings whereas warm blooded animals can't change.
5. What is cell wall made up of?  
☐ Cellulose
6. What is the percentage of following gases on human body on the basis of mass?  
☐

Oxygen	65%
Carbon	18%
Hydrogen	10%
Nitrogen	3%
Others	4%
7. What is cell membrane made up of?  
☐ Protein and lipid
8. In which cell does plastid is absent?  
☐ Animal cell
9. In which cell does centriole is absent?  
☐ Plant cell
10. What is the function of Nucleus?  
☐ To help in cell division and reproduction, also carries hereditary materials to offspring's.
11. Which ameba causes dysentery?  
☐ Entamoeba Histolytica
12. What is protoplasm?  
☐ The semi transparent brown like liquid present inside cell.

13. What are found in protoplasm?  
 ✎ Elements: Oxygen, carbon, Nitrogen etc  
 Molecule : water, protein, carbohydrate etc.
14. Which blood cell doesnot contain nucleus?  
 ✎ RBC
15. What is the function of Platelets?  
 ✎ Blood clotting
16. Where RBC are formed?  
 ✎ Bone marrow
17. What is the function of WBC?  
 ✎ It acts as a immune system.
18. Write a chemical equation of photo synthesis system?  

$$6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow[\text{Chlorophyll}]{\text{Sunlight, '}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$$
19. How many types of rocks are there?  
 ✎ 3 types: Igneous, Sedimentary, Metamorphic.

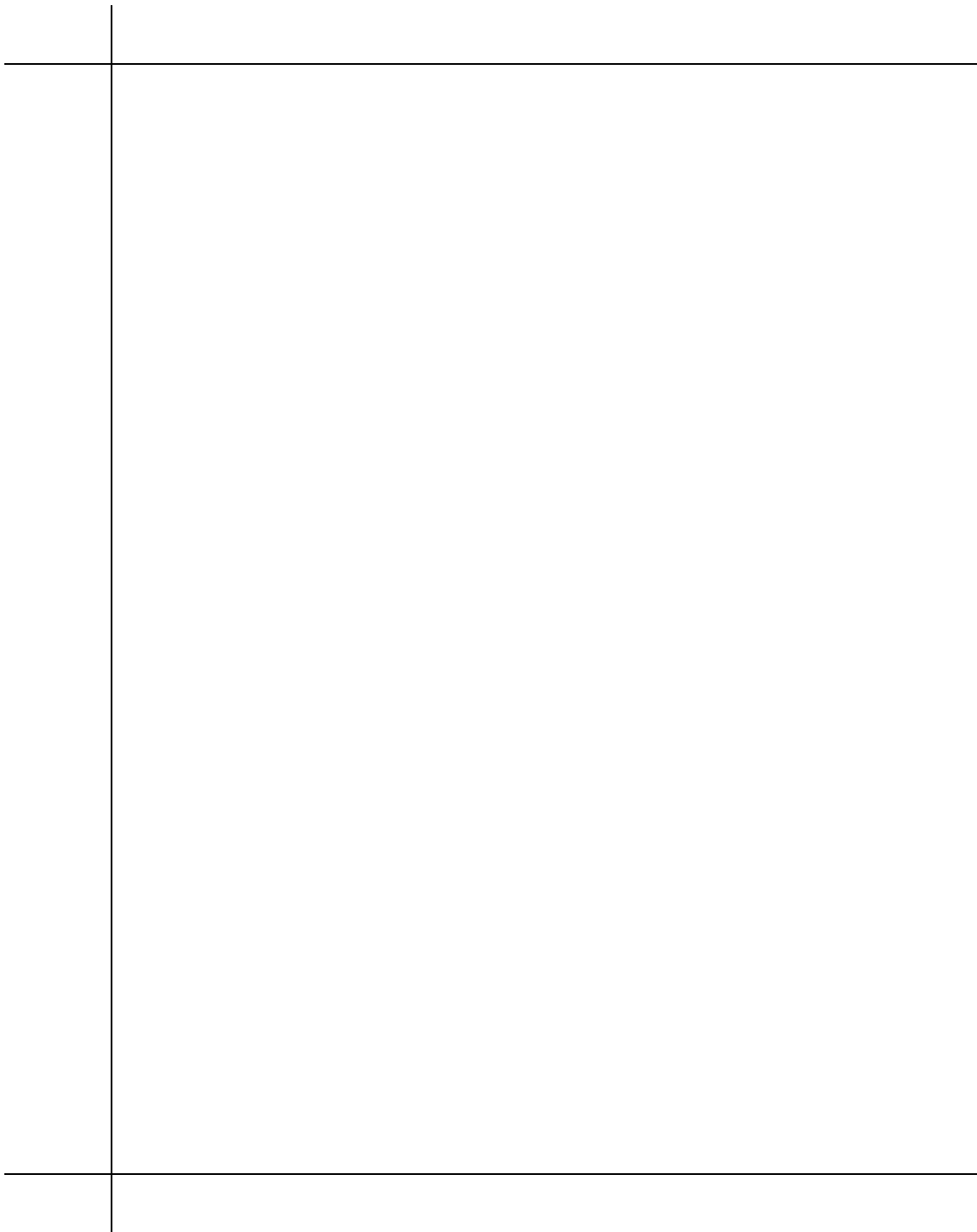






## Records of Experiments

S.N.	Experiments	Page No.	Date	Teacher's Sign
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				

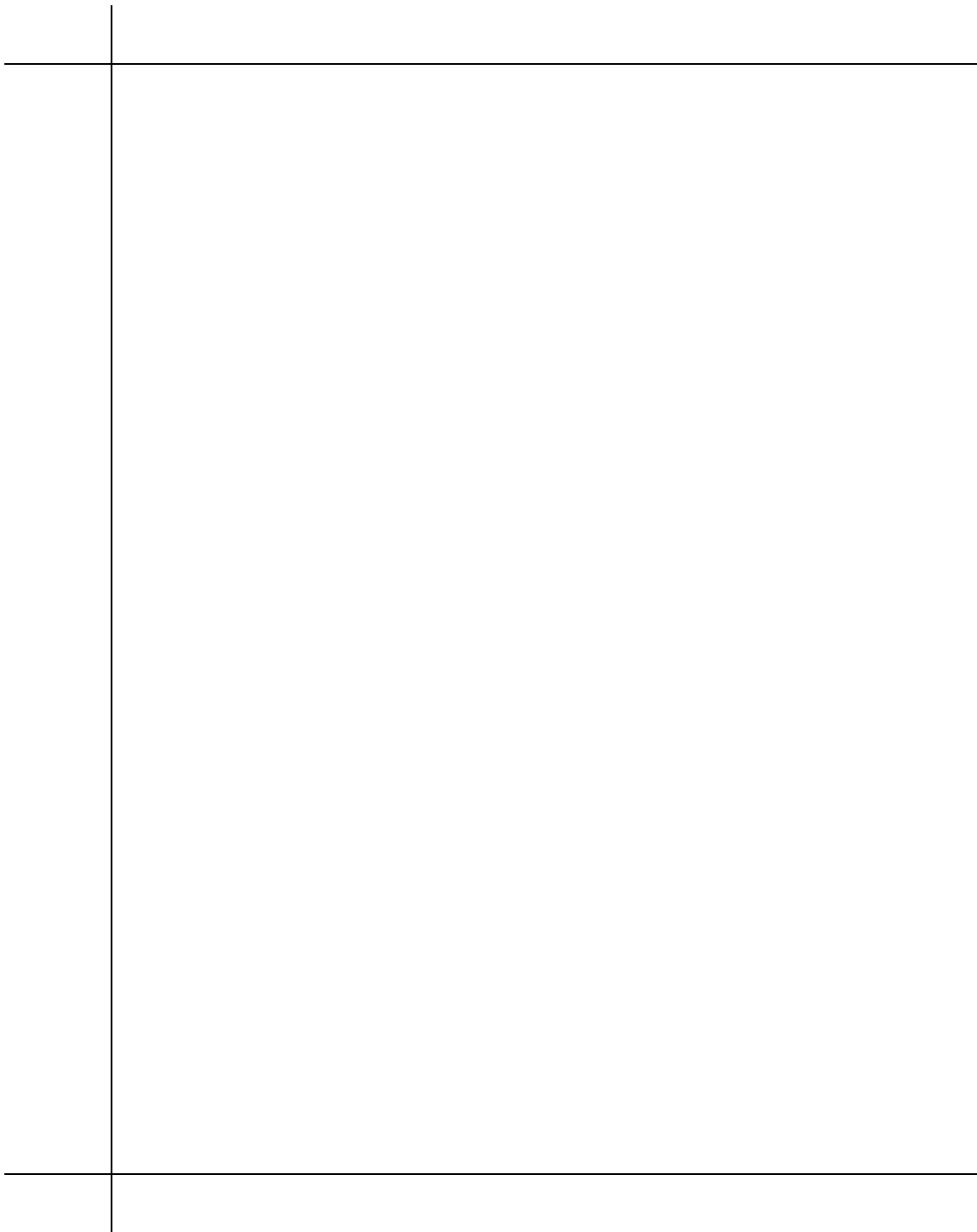


## Experimental Sheet

Experiment No.:

Date:.....

[illegible]

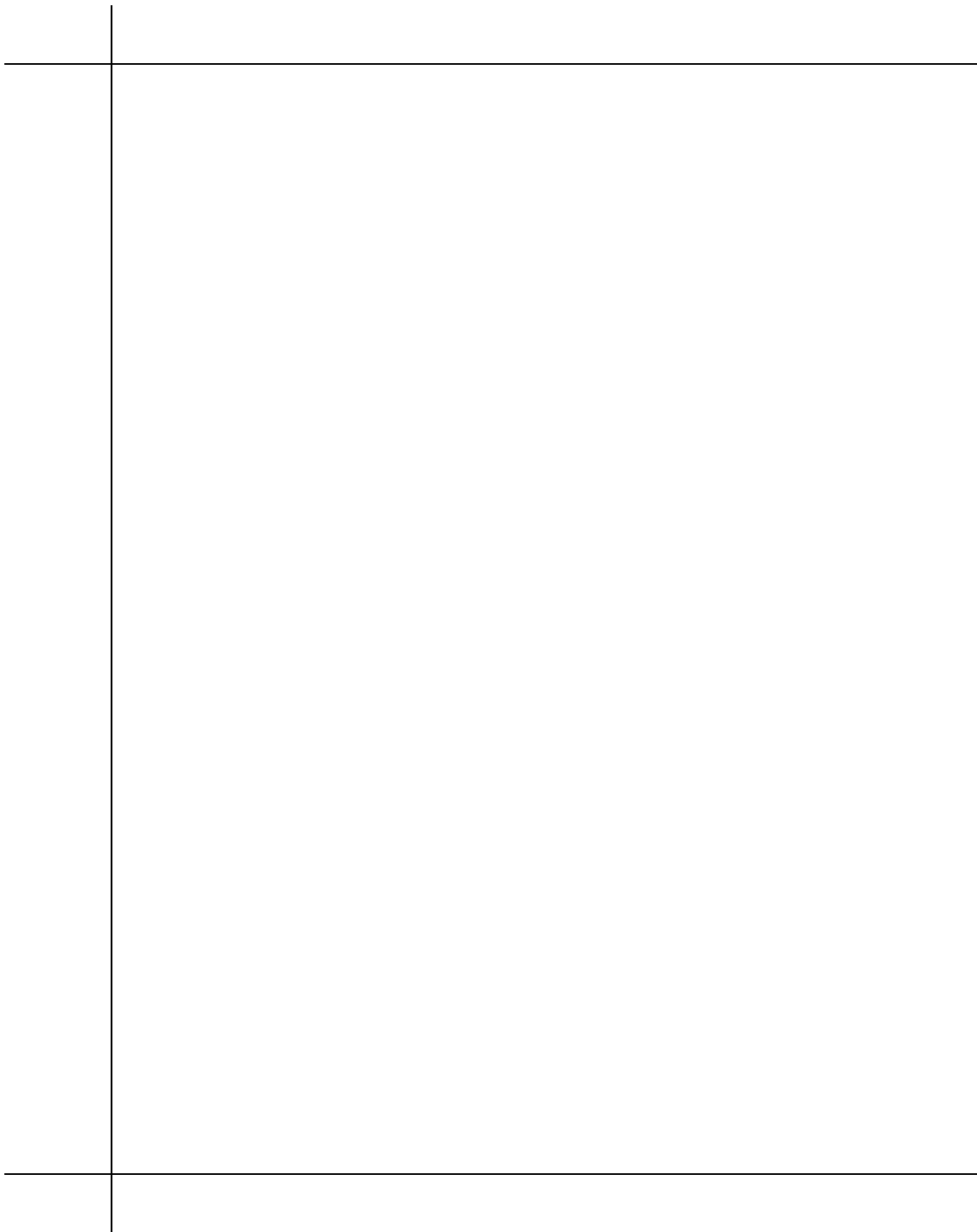


## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



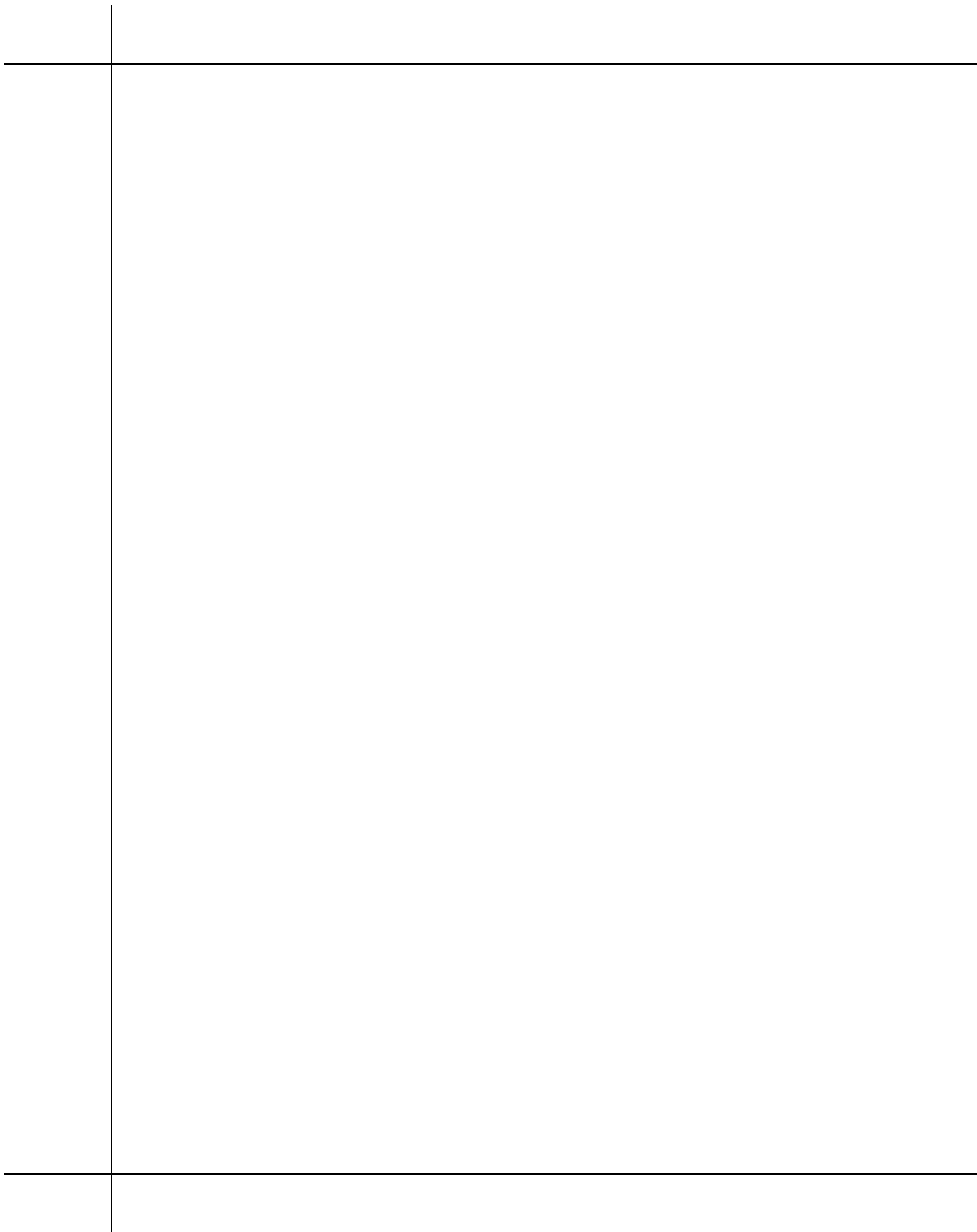
## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



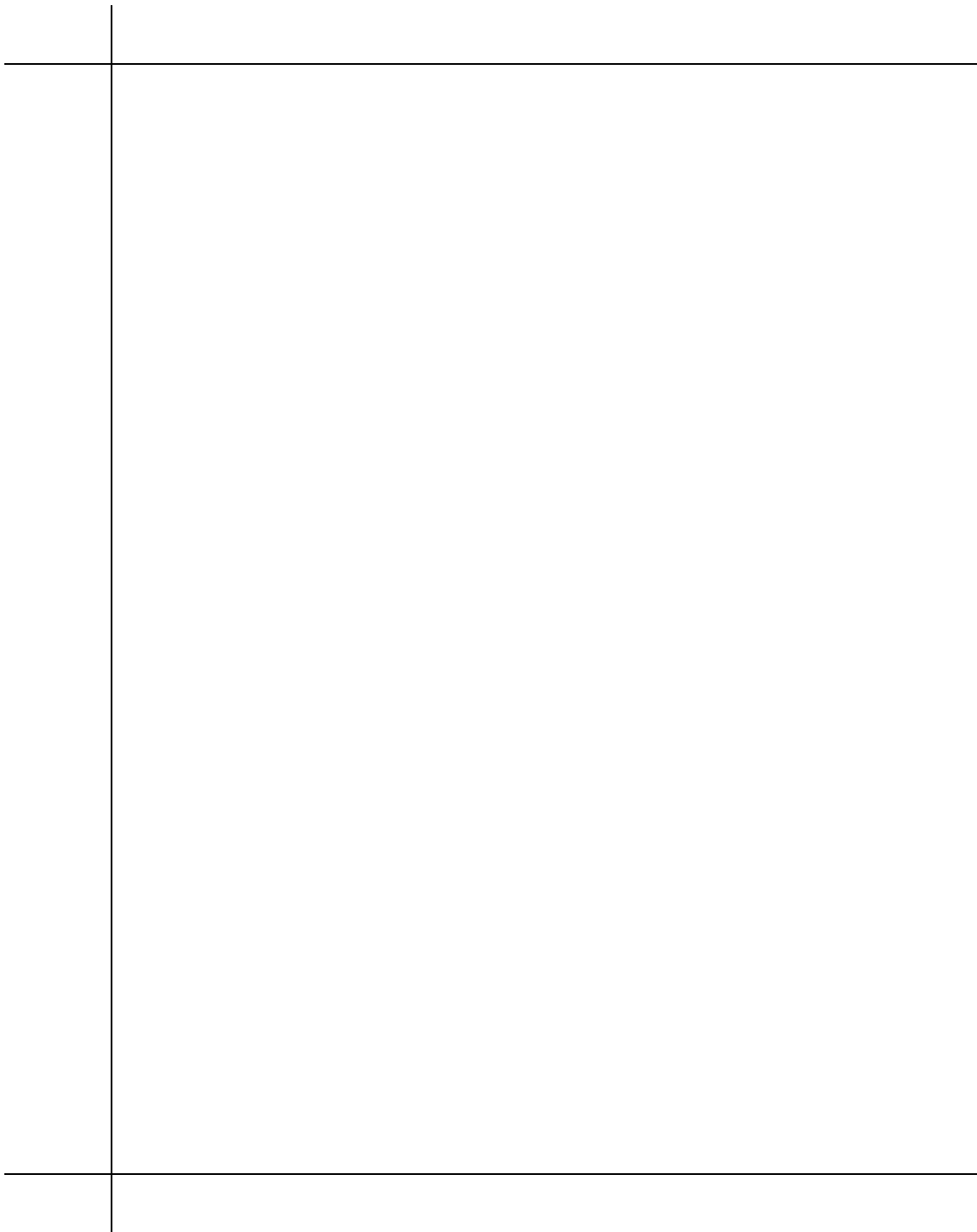


## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



# Experimental Sheet

Experiment No.:

Date:.....

[illegible]

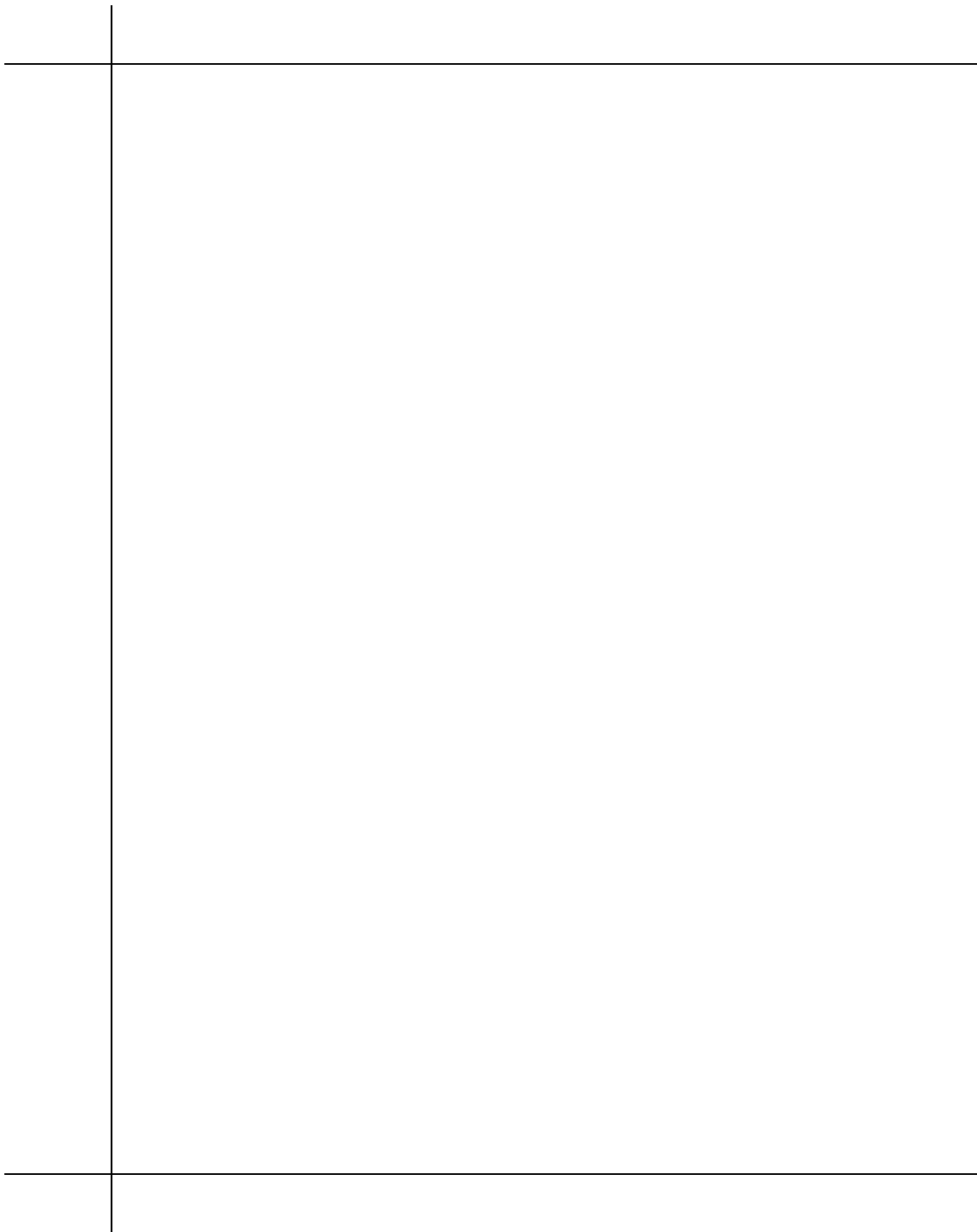


## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]





## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]





## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

**Experiment No.:**

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]





## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]





## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



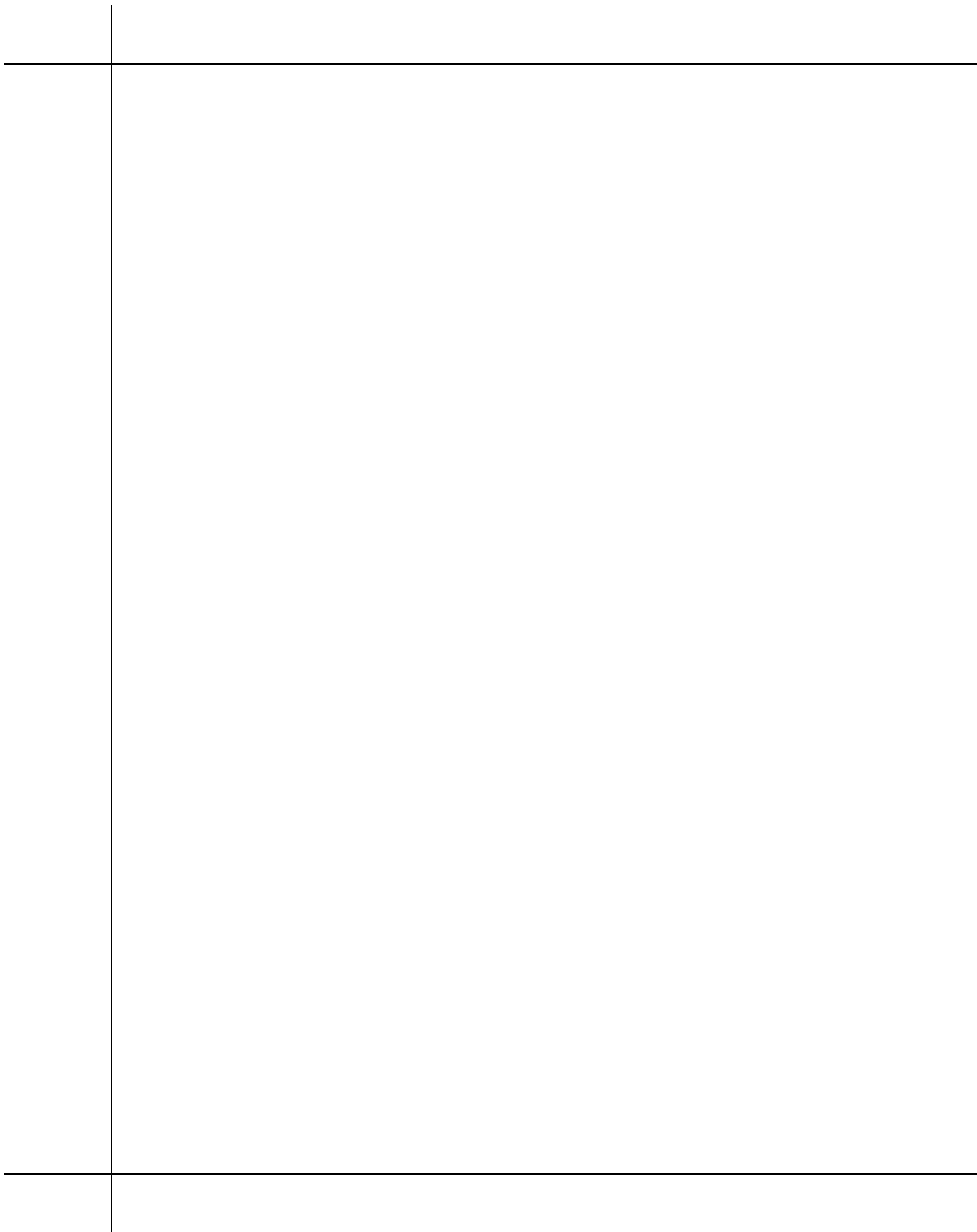
## Experimental Sheet

Experiment No.:

Date:.....

[illegible]





## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]





## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]





## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]





## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]





## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

**Experiment No.:**

Date:.....

[illegible]



## Experimental Sheet

**Experiment No.:**

Date:.....

[illegible]





## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]



## Experimental Sheet

**Experiment No.:**

Date:.....

[illegible]





## Experimental Sheet

**Experiment No.:**

Date:.....

[illegible]



## Experimental Sheet

**Experiment No.:**

Date:.....

[illegible]



## Experimental Sheet

**Experiment No.:**

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]





## Experimental Sheet

**Experiment No.:**

Date:.....

[illegible]



## Experimental Sheet

Experiment No.:

Date:.....

[illegible]

Notes:

**Note:** Combination of different areas and different items can make sets of different practical question paper: viz

Physics	A	D	D	B	C
Chemistry	C	C	A	D	B
Biology	B	B	B	C	A
Geology & astronomy	D	A	C	A	C

Each item can be chosen from different units of different areas (Phy, Chem, Bio, Geo& Astro) Viva/class record is compulsory for all different type of set.

**Hints:**

1. For drawing and labeling: the students should be made to draw or copy diagram or they should be asked to label any five parts in a given diagram.
2. For spotting: Only five objects should be given for spotting like models, charts, specimen or diagrams. The student should be asked to write the names and two characteristics of the given objects. In case of Biological specimens, the student should be told to classify the given specimens with their names and one characteristic each.
3. The student should be made to identify the given object/activity/experiment and told to write a brief description of it and to draw a conclusion from the given activity or experiment or to write a use of it.
4. Project/Activities/Report should be made on the following headings. (About one page)
  - Topic
  - Diagram
  - Procedure/Method
  - Conclusion
5. Viva/class Record:
  - To ask 5 oral questions to the students on the basis of given points above or on the basis of the given activities/experiment.
  - To ask questions on the basis on the activities done by the student individually or in a group during that academic session.

### Evaluation Scheme

1. Drawing or copying of diagrams	Marks	Labeling of diagrams	Marks
a. If complete and correct	5	a) Complete and correct	5
b. Complete but small	4	b) Complete and more than 75% correct	4
c. Complete but big	3	c) Complete and less than 75 % correct	3
d. Satisfactory drawing with some mistakes	2	d) Complete and less than 25% correct	2

### 2. Spotting

- Correct name and identification + two correct characteristics. 5 marks
- Correct name and identification + one correct characteristic. 4 marks
- Two correct characteristics only. 3 marks
- One correct characteristic feature only. 2 marks
- Only some words relative to the characteristics. 1 mark

### 3. Exhibited materials ( models / chart / materials / pictures) :

- Complete and correctly written or described. 5 marks
- Complete with corrects interpretation. 4 marks
- Some description with some interpretation. 3 marks
- Only interpretation but no description. 2 marks
- Incomplete and unsatisfactory interpretation. 1 mark

### 4. Field Visit / Activity / Report:

- Complete correctly written. 5 marks
- Complete but incorrectly written. 4 marks
- Incomplete but correctly written. 3 marks
- Incomplete and some incorrectly written. 2 marks
- Unsatisfactory work. 1 mark

### 5. Viva/class records.

- Correct and spontaneous answers.
- Correct answer after the help of some hints.
- Correct answer after the help of lot of hints.
- Some correct answer after the help of lot of hints.
- Very little correct answer even after the help of lot of hints.

OR

### Class Record:

- 100% correctly kept class records. 5 marks
- 75% correctly kept class records. 4 marks
- 50% correctly kept class records. 3 marks
- 25% correctly kept class records. 2 marks
- Only some class records kept in a systematic way. 1 mark

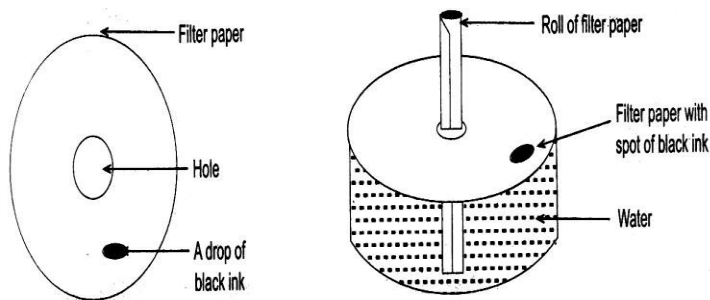
### Model Question

1. Draw a neat diagram to show the activity to be conducted with the help of given objects.  
Glass tumbler, postcard, and water
2. Classify the following organisms with one diagnostic characteristic. A) Mustard  
B) Danfe

OR

Draw the structure of alimentary canal of human beings (from the given fig. or model) and label its parts.

3. Observe the given activity and answer the following question.



- a. What does this activity represent?
  - b. Write the names of the materials required for this activity?
  - c. What is the conclusion of this experiment?
4. **Field visit:**  
Visit the school garden or a nearby location and make a report on the basis of the following points.
    - a. Title
    - b. Diagram
    - c. Procedure
    - d. Conclusion
- Or
- Project work:**
- a. Project
  - b. Activity
  - c. Materials Required
  - d. Procedure
  - e. Conclusion
5. **Oral Test/Class Record:**  
Questions are to be asked to the students or their class records are to be evaluated for this section.

