Based on the new syllabus prescribed by
Maharashtra State Bureau of Textbook Production and Curriculum Research,
Pune effective from the Academic year 2017-18.

SCIENCE JOURNAL ACTIVITY AND PROJECT BOOK

FOR STANDARD VII

A Journal-cum-handbook

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(B.Sc., B.Ed.)

SPECIAL FEATURES OF THE JOURNAL

- Contains all the experiments and activities prescribed in the syllabus.
- Full details given about experiments with aim, apparatus, procedure, observation, conclusion and diagrams which will be useful at the time of examinations.
- Neat, clean and accurately labelled diagrams.
- Contains detailed instructions for the students.
- Useful guidelines for observation and conclusion.

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A NOTE TO TEACHERS

The major part of the teaching and learning process should be devoted to activities and hence activity units for students are provided in this journal.

The experiments are composed as per the new syllabus. It is also based on the guidelines provided by the Board's latest directives. These experiments should be explained and demonstrated and children should be guided to do them on their own. Method of experiments is given. Space is provided for the readings or observations.

The activities contains various applications and types of questions that are based on the prescribed syllabus. Students can be explained the various ways in which particular activity can be interpreted.

Author

GENERAL INSTRUCTIONS TO STUDENTS

1) Before starting the experiment read carefully the 'Procedure' for each experiment given in the journal.
2) Prepare the theory of each experiment and avoid mistakes by taking and analysing the observations properly.
3) You should keep with you your geometrical instruments, note-book and your journal.
4) Know the method of handling each item of the apparatus.
5) Take all observations systematically and patiently. You should not make haste or be careless in the laboratory.
6) Wherever possible, write the readings in a tabular form for greater clarity.
7) You should take as many observations as possible and then take the average result.
8) You should always get your results checked by your science teacher.
9) Don't smell or taste the chemicals, unless you are asked to do so.
10) As soon as the experiment is over, write the aim, apparatus, procedure, etc. in your journal at the same time. Clean the apparatus and the table. Put back everything in their proper place.

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CONTENTS

Exp. No.	Name of Experiments	Page No.
1.	To study adaptations (Chapter 1)	6
2.	Germination of seeds (Chapter 2)	7
3.	Structure of flower (Chapter 2)	8
4.	Mass and weight of air (Chapter 3)	9
5.	Concept of atmospheric pressure (Chapter 3)	10
6.	Properties of air (Chapter 3)	11
7.	Properties of water (Chapter 3)	11
8.	Types of soil (Chapter 3)	12
9.	The force of friction (Chapter 7)	13
10.	Standard units (Chapter 6)	13
11.	Interaction of charged objects (Chapter 8)	14
12.	To generate charge on objects (Chapter 8)	16
13.	Conduction of heat (Chapter 9)	16
14.	Convection of heat (Chapter 9)	17
15.	Expansion and contraction of solids (Chapter 9)	18
16.	Expansion and contraction of liquids (Chapter 9)	19
17.	Study of cell structure (Chapter 11)	20
18.	Plant cell and animal cell (Chapter 11)	21
19.	Microorganisms (Chapter 11)	22
20.	Properties of compounds (Chapter 14)	23
21.	Separation of two immiscible liquids (Chapter 14)	24
22.	Scattering of light (Chapter 17)	25
23.	Shadow formation by a point source (Chapter 17)	26
24.	Shadow formation by an extended source (Chapter 17)	26
25.	Study of a pendulum (Chapter 18)	27
26.	Temporary magnetism (Chapter 19)	29
27.	Study of magnetic field (Chapter 19)	30
28.	Attraction and repulsion properties of magnet (Chapter 19)	31

Act. No.	Name of Activities	Page No.
1.	Scientific names (Chapter 1)	32
2.	Parts of plants (Chapter 2)	32
3.	Greeting card from a leaf (Chapter 2)	32
4.	Pressure exerted by a liquid (Chapter 3)	32
5.	Study of speed of sound (Chapter 3)	33
6.	Survival of aquatic life in cold conditions (Chapter 3).	33
7.	Density (Chapter 3)	33
8.	Soil analysis (Chapter 3)	33
9.	Chemosynthesis (Chapter 4)	34

Act. No.	Name of Activities	Page No.
10.	Study of roots of leguminous plants (Chapter 4)	34
11.	Insectivorous plants (Chapter 4)	34
12.	Methods of ingestion of food (Chapter 4)	35
13.	Common adulterants (Chapter 5)	35
14.	Vector and scalars (Chapter 6)	35
15.	Speed and velocity (Chapter 7)	36
16.	Static electricity (Chapter 8)	36
17.	Radiation - Method of transmission of heat (Chapter 9)	37
18.	Disasters (Chapter 10)	37
19.	Antibiotics (Chapter 11)	38
20.	Muscles of Human body (Chapter 12)	38
21.	Changes in our surroundings (Chapter 13)	39
22.	Study of common compounds (Chapter 14)	39
23.	Preparation of soap (Chapter 15)	39
24.	Metals and prehistoric period (Chapter 16)	40
25.	Vibrations and sound (Chapter 18)	40
26.	Eclipses (Chapter 17)	41
27.	Electromagnet (Chapter 19)	41
28.	Occultation (Chapter 17)	41

Pro. No.	Name of Projects	Page No.
1.	Study of plants (Chapter 2)	42
2.	Work of Bernoulli (Chapter 3)	43
3.	Soil conservation (Chapter 3)	43
4.	Importance of minerals and vitamins (Chapter 4)	43
5.	Nutrition in living beings (Chapter 4)	44
6.	Methods of preservation of food stuffs (Chapter 5)	44
7.	Study of dams in Maharashtra (Chapter 6)	44
8.	Work of Sir Isaac Newton (Chapter 7)	44
9.	Conduction of charges (Chapter 8)	44
10.	Thermos flask (Chapter 9)	45
11.	Conservation of water (Chapter10)	45
12.	Swacha Bharat Abhiyaan (Chapter 11)	45
13.	Say 'No' to addiction (Chapter 12)	45
14.	Prevention of corrosion (Chapter 13)	46
15.	Study of elements (Chapter 14)	46
16.	Types of houses (Chapter 15)	46
17.	Conservation of forest (Chapter 16)	46
18.	Prevention of noise pollution (Chapter 18)	46
19.	Metal Detectors (Chapter 19)	47
20.	Eclipses and superstitions (Chapter 17)	47
21.	Study of celestial bodies (Chapter 20)	47

No.	Name of the Experiment/Activity	Date	Page No.	Remarks

EXPERIMENTS

EXPERIMENT NO. – 1 To Study Adaptations

Aim: **To study adaptations in different animals to adjust to their habitat.**

Materials: Specimen or pictures or models of Fish, Frog, Camel and pigeon.

Procedure:

1) Observe the specimen / picture / model of given animal.
2) Study their body structures.

Observations:

I) Fish

1) Where do you find fish?

2) How does streamlined body and fins help fish?

3) What is the function of gills?

II) Frog

1) Frog can live on land as well as water. What do we call such an animal?

2) How do webbed digits help frog?

3) Which organs help frog to respire in water and on land?

III) Camel

1) Where do we find camel?

2) Which body structures of a camel help it to survive in desert? How?

IV) Pigeon

1) Which body parts help a pigeon to fly in air?

2) What is the use of clawed digits?

3) What is this habitat known as?

Conclusion:

Every organism shows changes in their body structures to adapt to the habitat where they live. This is known as 'Adaptation.'

Fact: Some animals like monkeys and squirrels spend maximum time of their life on trees but they cannot fly. Such animals are known as 'Arboreal animals'.

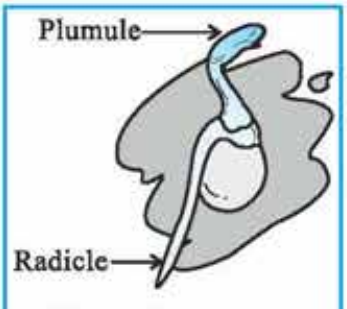
EXPERIMENT NO. – 2 Germination of Seeds

Aim: To study germination of seeds.

Materials: Beaker, Cotton, Bean or Pea seeds, Water, etc.

Procedure:

1) Place some cotton in a beaker.
2) Make it moist by sprinkling some water.
3) Place some bean or pea seeds on it.
4) Sprinkle little water every day for 7-8 days.
5) Observe the changes taking place in these seeds every day.



Formation of root

Observations:

1) What change do you observe after 2-3 days?

2) Name the part which grows towards the soil.

3) Name the part which grows above the land.

4) Describe the structure of this root.

Conclusion:

1) The type of root which grows from a bean or pea seed is known as _____.

2) Tap root is observed in _____ plants.

Fact: Tap root and adventitious root are two main types of root.

EXPERIMENT NO. – 3 Structure of a Flower

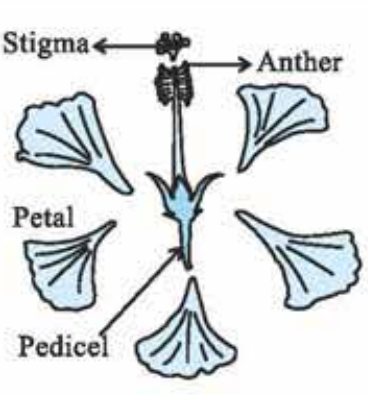
Aim: To study the structures of flowers such as Hibiscus or Datura.

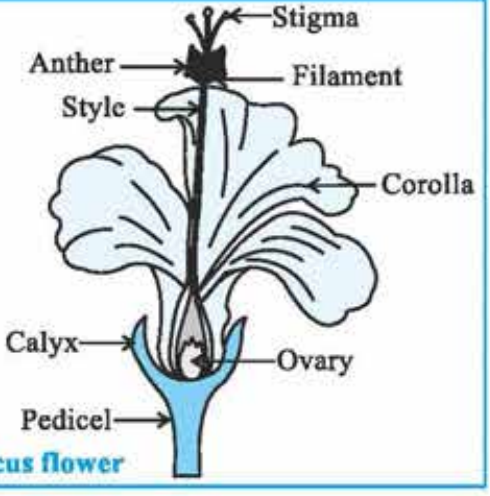
Materials: Flower of Datura or Hibiscus.

Procedure:

1) Collect the flowers of Datura or Hibiscus.

2) Observe the structures of flowers.





Vertical section of a hibiscus flower

Observations:

1) A flower has a long or short stalk which is known as _____.
2) The flat and swollen base of the flower is known as _____.
3) Green coloured structure, which is made up of _____ is known as Calyx.
4) _____ of a flower is made up of petals. Petals of some flowers have different _____ or may have _____.
5) The male part of the flower is known as _____, which is made up of stamens.
6) A stamen is made up of _____ and _____.
7) Gynoccium is made up of Carpels. A Carpel consists of _____, _____ and _____. It is the female part of a flower.

EXPERIMENT NO. – 4 Mass and Weight of Air

Aim: To prove that Air has definite mass and weight.

Requirements: A broom stick or a straw, string, rubber balloons, etc.

Procedure:

1. Tie a piece of string at the centre of a broom stick or straw and hang it in such a way that it remains steady in a horizontal position.
2. Now tie a rubber balloon, each on both the ends of a straw or stick.
3. The rubber balloons should be of the same size and they should be tied in such a way that the stick or straw remains in the horizontal position.
4. Now take out one of the balloon and inflate it. Tie this inflated balloon to its earlier position of the straw or stick. Observe what happens.

Observations and conclusion:

1) What happens when the inflated balloon is tied to the stick /straw?

_____

_____

_____

2) Why it happens so?

_____

_____

_____

EXPERIMENT NO. – 5 Concept of Atmospheric Pressure

Aim: To study the concept of atmospheric pressure.

Apparatus and materials - An injection syringe, etc.

Procedure:

1) Take one injection syringe without needle.
2) Now pull out its piston and observe it.
3) Remove your fingers from the piston and observe.
4) Bring it back to its original position.
5) Now close tightly the opening of this syringe with the help of a thumb. Repeat the actions 2 and 3. Observe and answer.

Observations:

1) Was it easy to pull the piston when the opening of the syringe was open?

2) What happened when the fingers on the piston were released?

3) Did you apply less or more force to pull the piston when the opening of the syringe was closed with thumb?

4) What happened when the fingers on the piston were released without removing the thumb from the opening?

Conclusion:

Molecules of air are in continuous motion. When they collide with any other object, they create pressure on the object. This pressure is known as 'atmospheric pressure.'

EXPERIMENT NO. – 6 Properties of Air

Aim: To study different properties of air.

Apparatus and materials - An empty bottle, a bucket full of water, rubber balloon, electronic weighing balance, a torch, etc.

Procedure:

1) Immerse an empty bottle in a bucket full of water in slanting position and observe.
2) Weigh a rubber balloon using an electronic balance.
3) Fill air in the balloon and observe.
4) Weigh the balloon with air again. Record your observations.
5) In a dark room light a torch and observe carefully the beam of light.

Observations:

1) When bottle is immersed in water, we see _____ coming out of the bottle while _____ entering in the bottle.
2) When we fill air in the balloon it occupies _____ inside the balloon and thus balloon gets _____.
3) The weight of the rubber balloon with air is _____ than the rubber balloon.
4) When we observe the beam of light we see many _____ Particles. Due to these _____ particles the light rays spread in all directions. This process is known as _____ of light.

Conclusion: Properties of air

1) Air occupies space and it has specific volume.
2) It has mass.
3) As air is a mixture of dust particles, smoke, water vapour and different gases, it scatters the light rays.

EXPERIMENT NO. – 7 Properties of Water

Aim: To study some properties of water.

Apparatus and materials - A transparent plastic bottle, a bucket, a spoon, an eraser, a piece of wood or pencil, some ice cubes, water, etc.

Procedure:

1) Fill a transparent plastic bottle half with water. Using a marker, mark the level of water in the bottle.
2) Now place this bottle erect in the freezer for 2-3 hours.
3) After 2-3 hours take out the bottle and observe. Mark the level of ice.
4) Fill water in a bucket and put different objects like a spoon, an eraser, a piece of wood /pencil, a sharpener etc. in it. Observe.
5) Take some water in a glass and add few ice cubes in it. See what happens.

Observations:

1) The level of the ice is _____ than the level of water in the bottle.
2) Hence when water freezes it _____ and its density _____.
3) Few objects _____ in water while some _____ on the surface of water.
4)

Objects that	Objects that .....

5) As density of ice is _____ than that of water it _____ on the surface of the water.
6) Water _____ when it freezes, this is known as _____ behaviour of water.

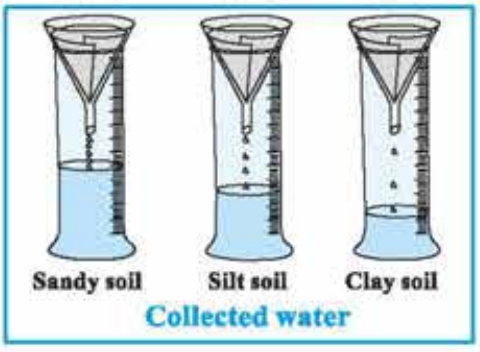
EXPERIMENT NO. – 8 Types of Soil

Aim: To study texture of different types of soil.

Apparatus and materials - Three measuring cylinders, three funnels, filter papers, water, fine soil, fine sand and coarse sand, etc.

Procedure:

1) Observe the three soil samples carefully.
2) Place a filter paper in each funnel.
3) Now place each funnel on a measuring cylinder (observe the diagram).
4) On one filter paper place sandy soil.
5) On other filter paper place silt soil.
6) On the third filter paper place clay soil. (taken from pot of potted plant). (See to it that same amount of soil is placed on each filter paper).
7) Now pour equal quantity of water slowly on soil in each filter paper.
8) Measure the quantity of water collected in the measuring cylinder.



Observations and Conclusion:

Complete the table.

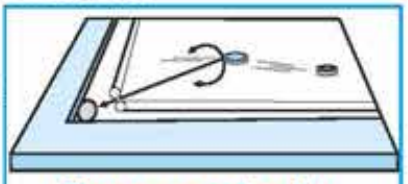
Type of soil	Size of particles	Percolation of water	Composition
Sandy soil (Coarse sand)		_____ *ml* (Minimum)	
Silt soil (Fine sand)		_____ *ml* (Moderate)	
Clay soil (Very fine soil)		_____ *ml* (Maximum)	

EXPERIMENT NO. – 9 The Force of Friction

Aim: **To study the frictional force.**

Materials: Carrom board, a used striker, a new striker, boric powder, etc.

Procedure:



Force an acceleration

1) Place a much used striker on a carrom board and push it in a straight direction. Observe.
2) Now on the same line place a new striker and push it in the same direction taking care that approximately same force is applied and observe.
3) Now sprinkle some boric powder on the surface of the carrom board and repeat the actions with used and new striker again. Observe.

Observations:

1) What happens when you push a striker?

_____

_____

2) Out of a new and a used striker which striker covers more distance before stopping?

_____

3) What do you observe after sprinkling boric powder on the board?

_____

_____

_____

Conclusion:

1) Force of _____ acts between the two surfaces which are in contact.
2) This force _____ the speed of the moving object.
3) Lesser the _____ , more is the distance covered by the object.

EXPERIMENT NO. – 10 Standard Units

Aim: **To study the need of standard measures or units.**

Materials: A bundle of string, a table or desk, etc.

Procedure:

1) In your class, form groups of five students.
2) Now each student in a group will measure four hand-spans of the string and cut it from the bundle.
3) In this manner you will get five pieces of string. Now compare their length holding together by one end.
4) Measure the length of a table of desk using span of your hand. Ask remaining four members of your group to repeat it. Record the measurements and compare.

Observations:

1) Are the five string pieces of the same length?

2) Are the five measurements of length of desk / table same?

3) What could be the reason for such observations?

Conclusion:

For accurate measurements we need standard units which remain constant irrespective of place, time and person.

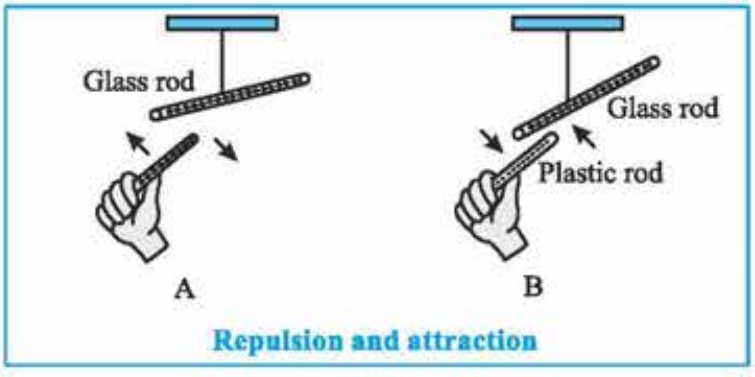
Fact : A standard of mass and length are kept at International Bureau of Weights and Measures at Paris.

EXPERIMENT NO. – 11 (A) (B) Interaction of Charged Objects

Aim: To study attraction and repulsion between the electrically charged objects.

11 (A)

Materials: Glass rods, plastic rod, silk cloth, woolen cloth, string, etc.



Repulsion and attraction

Procedure:

1) Rub one end of a glass rod against a silk cloth. It will get charged.
2) With the help of a piece of string, suspend it freely.
3) Now similarly charge one end of the other glass rod. Bring this end near the charged end of the freely suspended glass rod and observe.
4) Now rub one end of a plastic rod against a piece of woollen cloth and bring it near the charged end of the freely suspended glass rod. Observe.

Observations:

1) When the two ends of similarly charged glass rods are brought near each other they

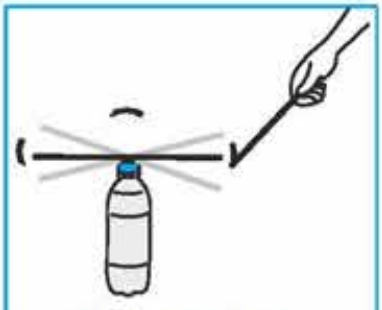
2) When the charged end of plastic rod is brought near the charged end of glass rod they

11 (B)

Materials: Some straws, woollen cloth, a glass bottle, etc.

Procedure:

1) Place a straw on a glass bottle as shown in the figure.
2) Now take another straw near it and observe.
3) Rub one end of the second straw on a piece of woollen cloth and take it near the first straw and observe.
4) Now take two straws and simultaneously rub them against the woollen cloth. Now place one of it on the glass bottle and take the other near it. See what happens.



Changes in straw

5) Now leave the straw on the bottle as it is and take the woollen cloth on which it was rubbed near it and observe. Record your observations in the given table.

Procedure	Repulsion / Attraction	Inference
A charged straw is taken near the uncharged straw.		
Two straws carrying similar charges are brought near each other.		
A charged straw and the oppositely charged cloth which was used for rubbing are brought near each other.		

Conclusion:

Fill in the blanks:

1) A charged object _____ the object which do not carry any charge.
2) Like charges _____ each other.
3) Unlike charges _____ each other.

Fact: Thomas Browne named this phenomenon as 'electricity' in 1646 AD.

EXPERIMENT NO. – 12 To Generate Charge on Objects

Aim: **To study the generation of charge on different objects.**

Materials: Different objects and Nylon cloth, Cotton cloth, Silk cloth.

Procedure:

1) Bring an object given in the table near small bits of paper and observe.
2) Now rub the object on various materials given in the list above and bring it near the bits of paper once again and observe.
3) Repeat the same procedure for each object and complete the table to draw a suitable conclusion.

Observations:

Object	Material used for friction	Bits of paper were attracted / were not attracted	The object developed / did not develop charge
1. Balloon	a) Nylon cloth		
	b) Cotton cloth		
	c) Silk cloth		
2. Wooden ruler	a) Nylon cloth		
	b) Cotton cloth		
	c) Silk cloth		
3. Copper strip	a) Nylon cloth		
	b) Cotton cloth		
	c) Silk cloth		
4. Eraser	a) Nylon cloth		
	b) Cotton cloth		
	c) Silk cloth		

Conclusion:

- Can you charge all the objects using the method of friction?

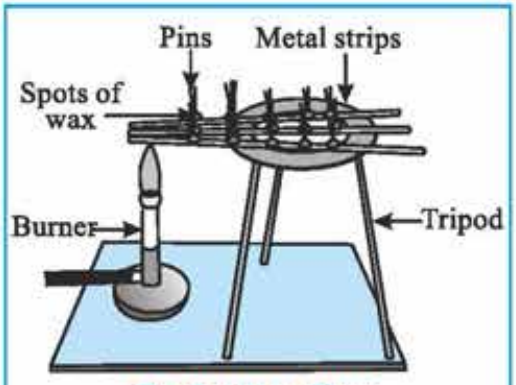
EXPERIMENT NO. – 13 Conduction of Heat

Aim: **To study conduction of heat through different metals.**

Materials: Bar of stainless steel, Aluminium and Copper, burner, tripod stand, candle, small nails or pins, etc.

Procedure:

1) Take approximately 30 cm long bars of Stainless steel or iron, Aluminium and Copper.
2) On each strip at a distance of 2-2 cm, apply the wax spots using candle. Now to each such drop stick a pin so that it is upright.
3) Now arrange the apparatus as shown in the figure and start heating one end of all three bars simultaneously using a burner. Observe what happens.



Conduction of heat

Observations:

Cancel the wrong word.

1) The temperature of flame is (higher / lower) than the metal rods, hence heat is transferred from the flame to the rods.
2) The end of rods near the burner gets heated (first / last) the pin (nearer to / far from) this end falls off first.
3) Slowly one by one the pins fall of in the order starting from the end (far / near) the burner.
4) The pins on the (Stainless steel/Aluminium / Copper) strip start falling first.

Conclusion:

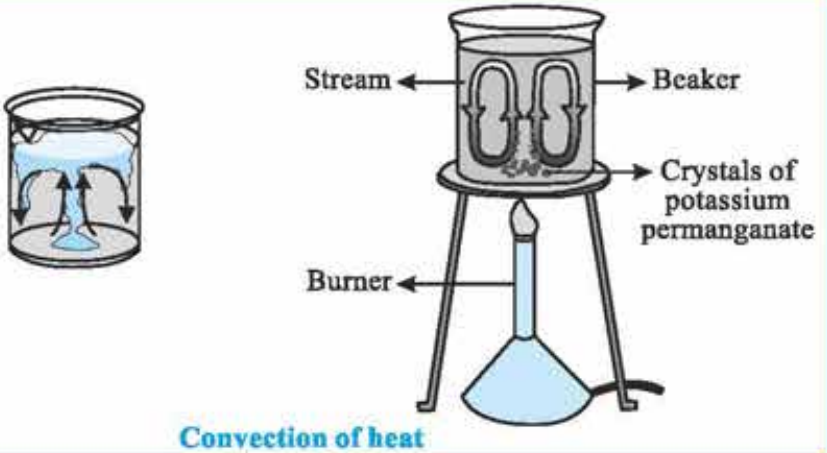
1) As the pins start falling from the end near the burner, the heat is transmitted from hotter end to the cooler one. Such transmission of heat is known as conduction of heat.
2) Pins on the copper strip fall off first while the ones on stainless steel strip take longest time to fall off. This means the transmission of heat is fastest in copper.

Fact : A medium is necessary for conduction of heat.

EXPERIMENT NO. – 14 Convection of Heat

Aim: To study transmission of heat in liquids.

Materials: A beaker, water, a tripod stand, wire gauge, potassium permanganate, etc.



Convection of heat

Procedure:

1) Take some water in a beaker. Arrange the apparatus as shown in the figure.
2) With the help of a glass tube carefully place some crystals of potassium permanganate at the bottom of the beaker containing water.
3) Heat the beaker and observe carefully.

Observations:

1) What is the purpose of adding potassium permanganate crystals?

_____

_____

2) State the direction of flow of water currents.

_____

_____

Conclusion:

Fill in the blanks:

a) As we heat the beaker the water at the _____ of the beaker becomes _____.

b) The density of hot water is _____, thus it moves upwards and it's place is occupied by cold water. This process continues to form water currents.

c) This mode of transmission of heat is known as _____ of heat.

Fact : Convection can occur in liquid and gaseous substances.

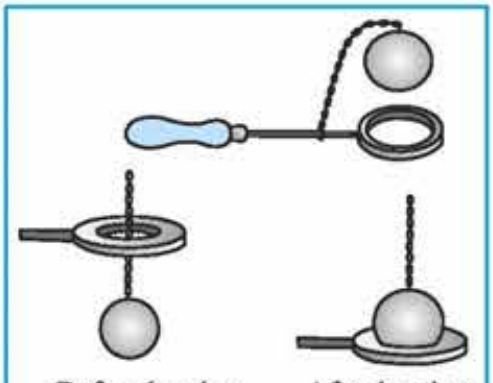
EXPERIMENT NO. – 15 Expansion and Contraction of Solids

Aim: To study expansion and contraction of solids on heating.

Materials: A metal ring, a metal ball, burner, etc.

Procedure:

1) Select a metal ring & a ball of such size that the ball just passes through the ring.
2) Now heat the metal ball using burner for few minutes.
3) Try to pass the hot ball through the ring. Observe what happens.
4) Now let it cool.
5) Check whether the ball passes through the ring. Record your observations.



Expansion and contraction of a solid substance

Observations:

As we heat the metal ball, it's temperature _____. The hot ball _____ pass through the ring. After cooling it once again it _____ through the ring.

Conclusion:

1. As the metal ball gets heated it _____, thus it _____ pass through the ring. On cooling it _____ hence once again it _____ through the ring.
2. Solids _____ on heating and _____ on cooling.

Fact : A gap at the joints of rails and cement concrete bridges is the space provided for the expansion of these solids.

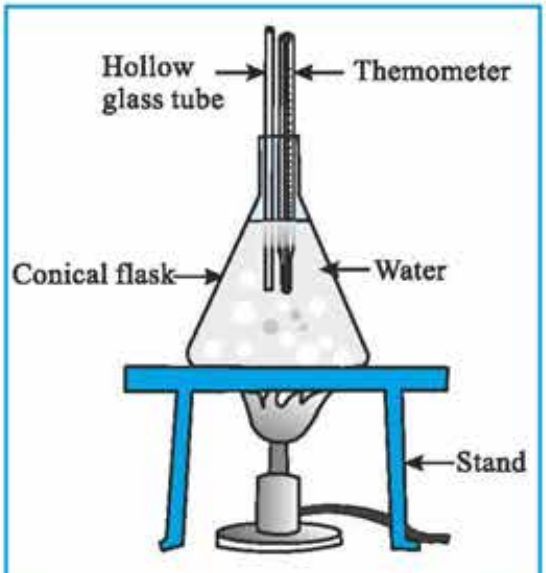
EXPERIMENT NO. – 16 Expansion and Contraction of Liquids

Aim: To study expansion and contraction of liquids.

Materials: 500 ml conical flask, a two holed rubber stopper, a glass tube, thermometer, tripod stand, wire gauge, burner, etc.

Procedure:

1) Fill water in the conical flask upto its brim.
2) In the rubber stopper fix a glass tube and a thermometer in two holes. Fix this stopper at the mouth of the flask.
3) Arrange the apparatus as shown in the figure and start heating it.
4) After every 2°C rise in temperature measure and note the level of water in the glass tube with the help of a ruler.
5) Take approximately 8-10 readings.
6) Now stop heating and let it cool slowly. Observe what happens.



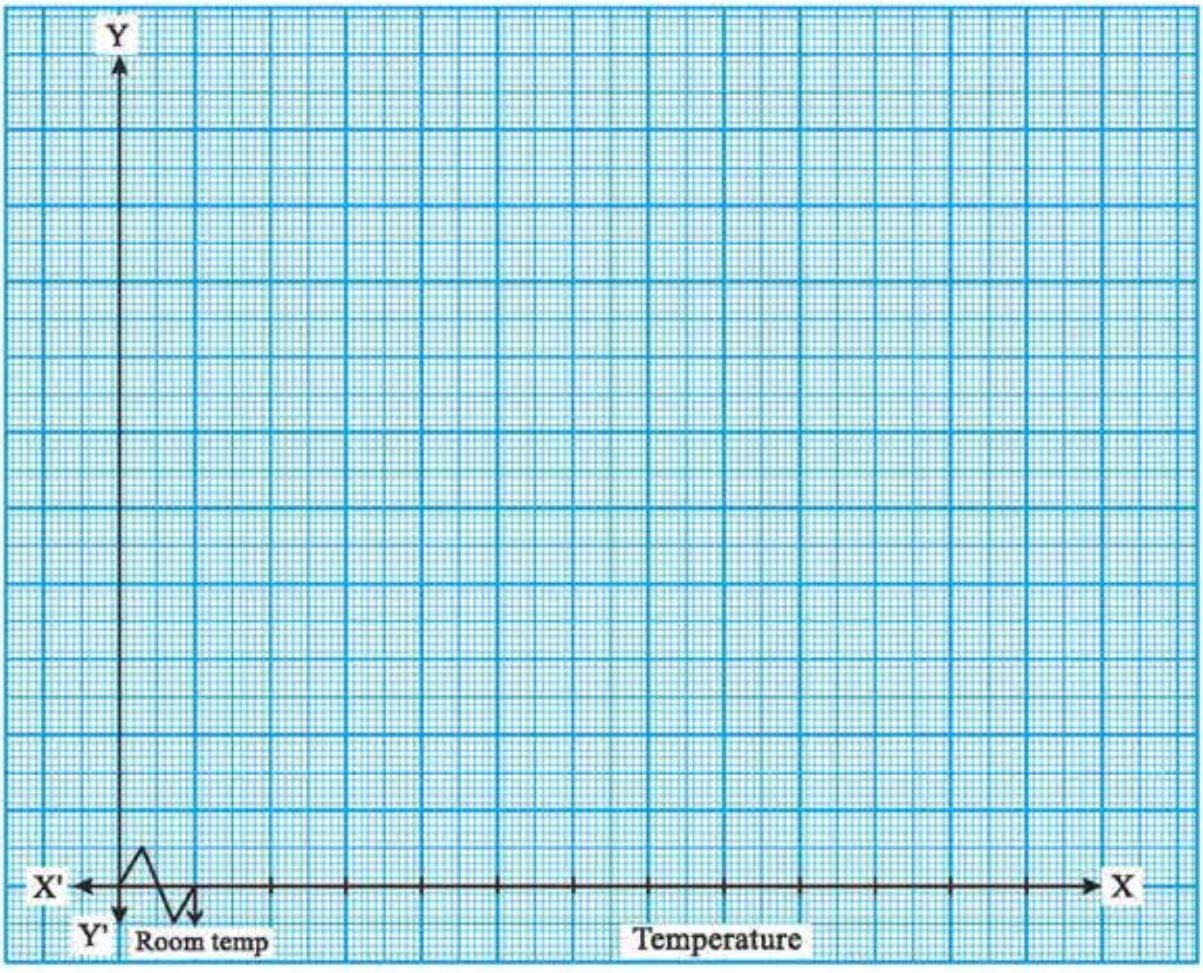
Expansion and contraction of a liquid

Observations:

As we heat the liquid, the level in the glass tube goes on increasing. As we cool it the level in the glass tube falls.

Temperature °C	Water level in capillary	Temperature °C	Water level in capillary
1)		6)	
2)		7)	
3)		8)	
4)		9)	
5)		10)	

- **Using the observations plot a graph.**



Conclusion:

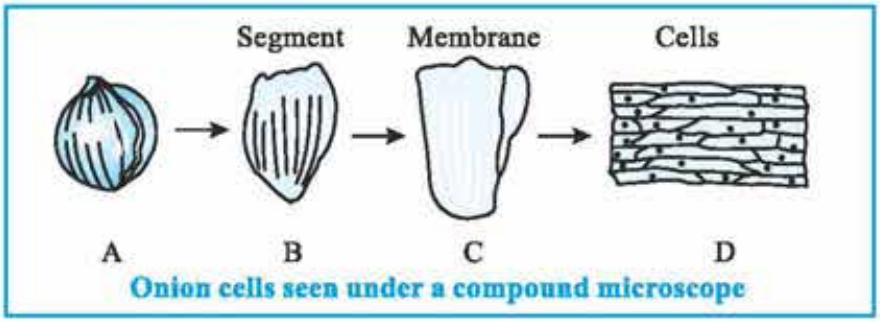
As we heat a liquid, the space between its particles _____ and its _____ increases. Thus the liquids _____ on heating. On cooling liquids _____.

Fact : Gases too expand and contract in similar manner.

EXPERIMENT NO. – 17 Study of Cell Structure

Aim: To prepare a temporary slide of onion peeling and study the cell structure.

Materials: Onion, glass slide, coverslip, compound microscope, forcep, dropper, etc.



Onion cells seen under a compound microscope

Procedure:

1) Take a piece of onion and seperate thin skin from its concave part, with the help of a forceps.
2) Place this membrane on a glass slide and spread it carefully. Take utmost care that the membrane should not fold or tear.
3) Now place a drop of water on the membrane and a drop of dilute Iodine or Eosine solution. Wait for 2-3 minutes.
4) Carefully place a cover slip on it. Wipe off excess of water using blotting paper.
5) Mount this slide on the stage of a compound microscope. Make the necessary adjustments and observe.

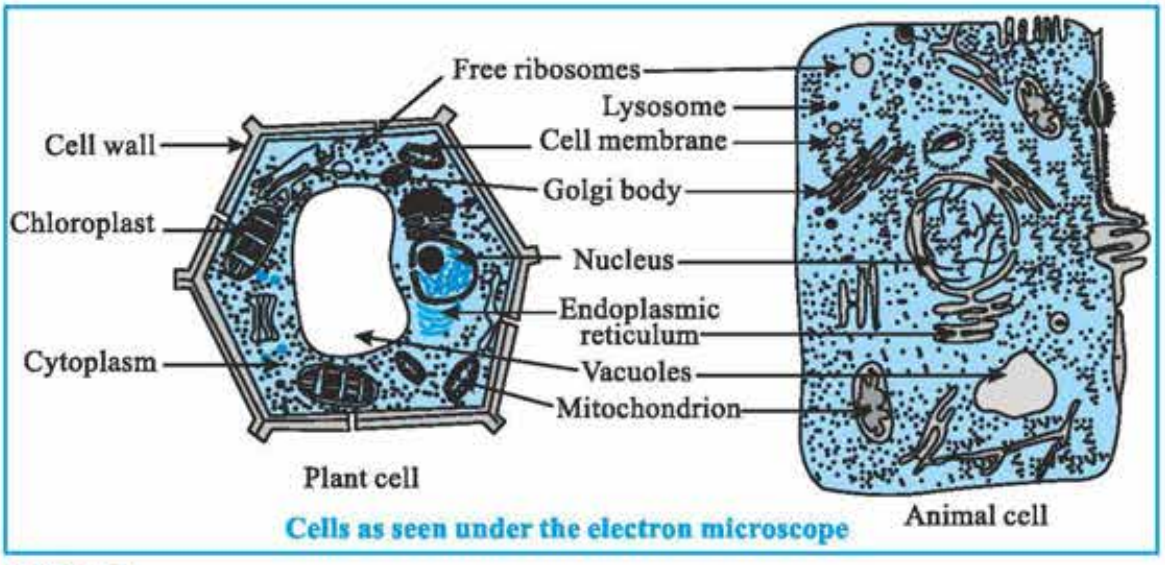
Observations:

1) Describe the cells and its parts, which you can observe.

EXPERIMENT NO. – 18 Plant Cell and Animal Cell

Aim: To study the structure of a plant cell and an animal cell using permanent slides.

Materials: Permanent slides of a plant cell and an animal cell, compound microscope, etc.



Cells as seen under the electron microscope

Procedure:

1) Mount the permanent slide of a plant cell on the stage of a compound microscope.
2) Observe the structure of the cell after adjusting the slide under the high power of the microscope.
3) Draw a neat and labelled diagram.
4) Repeat the same procedure for the permanent slide of an animal cell.
5) Complete the given observation table. (Describe the structure as you can observe it.)

Observations:

Cell organelle	Plant cell	Animal Cell
1) Cell wall		(Absent)
2) Plasma Membrane		
3) Cytoplasm		
4) Nucleus		
5) Vacuoles		
6) Chloroplasts		(Absent)

EXPERIMENT NO. – 19 Microorganisms

Aim: To observe various micro-organisms.

Materials: A piece of bread or chapati, a closed box, a magnifying glass, some water from a puddle, yoghurt/buttermilk, dropper, slide, a compound microscope, etc.

Procedure:

1) Sprinkle little water on a piece of bread or chapati. Keep it in a closed box for 3-4 days. After 3-4 days open the box and observe it with the help of a magnifying glass.
2) Take a drop of water from a puddle on a glass slide. Adjust the slide under a compound microscope. Observe.
3) Take a drop of yoghurt/buttermilk on a glass slide. Adjust the slide under a compound microscope and observe.
4) Draw diagrams of microbes which you have observed.

Observations:

1) What type of growth do you observe on a piece of bread/Chapati?

_____

_____

_____

2. What do you observe on the two temporary slides of the puddle water and yoghurt?

_____

_____

EXPERIMENT NO. – 20 Properties of Compounds

Aim: To study properties of Compounds.

Materials: An evaporating dish, a tripod stand, a wire gauge, burner, sugar, pair of tongs, magnesium ribbon, etc.

Procedure:

1) Take some sugar in a test tube and add little water to it. Shake and observe.
2) Now take some sugar in an evaporating dish observe it. Heat the evaporating dish using burner. Observe. Heat till a dark coloured substance is formed.
3) Take a piece of magnesium ribbon and observe it. Using a pair of tongs, hold it in the flame of the burner. Observe what happens.
4) Collect the substance formed on a watch glass and observe.

Observations:

Fill in the blanks.

1) Sugar _____ in water.
2) When heated, first sugar _____ and water _____ to leave behind a black substance.
3) When added to water, this black substance does not _____.
4) When a piece of magnesium ribbon is burnt, it burns with a bright _____ light and white coloured _____ is formed.
5) When observed carefully this white powder does not possess _____, like Aluminium metal.

Conclusion:

Fill in the blanks.

1) The black substance left in the evaporating dish is _____.
2) Thus, sugar is made up of _____, _____ and _____.
3) Properties of sugar are altogether different from the constituent _____.
4) When magnesium ribbon burns, magnesium combines with _____ to from white powder of _____.

5) The white powder differs in properties like luster, _____, etc. from those of Aluminium metal.

6) Hence, when two or more elements combine chemically a _____ is formed.

7) Properties of _____ are altogether _____ from the properties of its constituent elements.

EXPERIMENT NO. – 21 Separation of Two Immiscible Liquids

Aim: To study the method of separation of two immiscible liquids using a separating funnel.

Materials: Two immiscible liquids such as kerosene and Water or oil and water, separating funnel, beakers, stand, etc.

Procedure:

1) Pour a mixture of kerosene and water into a separating funnel with stopcock closed. Close the stopper.
2) Shake it slightly. Fix the separating funnel firmly on a stand. Leave the mixture in the funnel undisturbed for a while and observe.
3) Without shaking the funnel remove the stopper. Open the stopcock and collect the water in a beaker.
4) Close the stopcock when all the water is collected in the beaker.
5) Open the stopcock again to collect the kerosene / oil in an another beaker.

Observations:

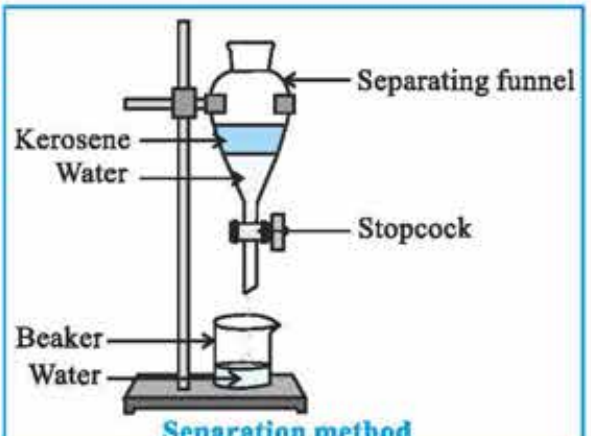
1) What do you observe when the mixture is left undisturbed for a while?

2) Which liquid forms lower layer while which one forms the upper layer?

3) What can be the reason for such separation of these liquids?

Conclusion:

We can separate two immiscible liquids from their mixtures by using the method of separating funnel.



Separation method

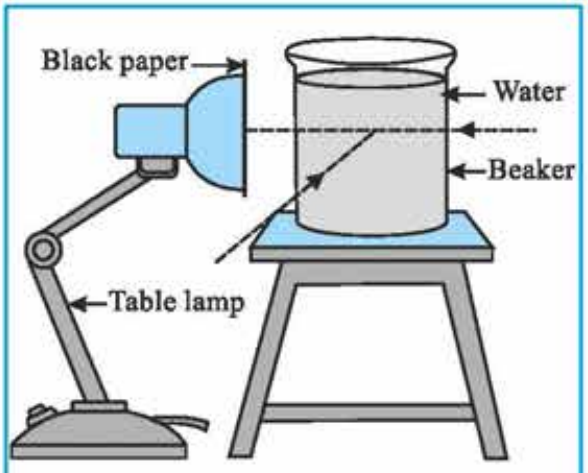
EXPERIMENT NO. – 22 Scattering of Light

Aim: To study scattering of light. [Note - Carry out this experiment in a dark room.]

Materials: A table lamp with a 60 W or 100 W milky bulb (No LED), thick black paper, sticking tape, a packing needle, 100/200 ml glass beaker, milk/milk powder, spoon, dropper, etc.

Procedure:

1) Cover the mouth of the lamp shade with the help of sticking tape and thick black paper.
2) Prick a hole of 1-2 mm diameter in the centre of the black paper to get a beam of light.
3) Take clear water in a beaker.
4) Arrange the apparatus as shown in the figure and light the bulb. Observe from the front and at an angle of 90°.
5) Add 2-3 drops of milk to the water. Stir well and observe again in the similar manner.



Scattering of light

6) Go on adding more drops of milk, so that the water becomes turbid.
7) Observe carefully again from the front and at an angle of 90°.

Observations:

1) What do you observe when the light passes through clear water?

2. Which coloured tinge is observed along the 90° angle, when water is turbid?

3. Which coloured light is observed from the front and at the hole?

Conclusion:

1) The particles of milk _____ light rays.
2) The fine particles scatter _____ light, thus we get _____ tinge along the 90° angle.
3) The _____ light gets scattered less, so the hole appears _____.

Fact : Our surroundings get illuminated due to the phenomenon of scattering of light.

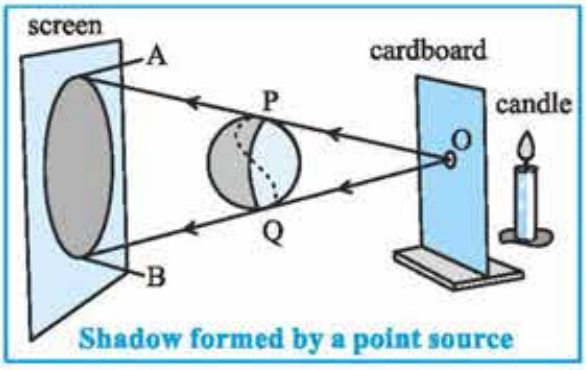
EXPERIMENT NO : 23 Shadow Formation by a Point Source

Aim: **To obtain a shadow from a point source.**

Materials: A candle, a bulb or a torch, a piece of card board, screen, a ball, a pin etc.

Procedure:

1) Take a piece of cardboard and with the help of a pin make a hole in its centre.
2) Take a candle, a bulb or a torch as a source of light and place the piece of card board with a hole in its centre, in the front of this source as shown in the figure. The light emerging from this hole will act as a point source.



Shadow formed by a point source

3) At a distance of about 1 m in front of the card board, place an upright screen.
4) Between the source (O) and the screen, suspend a ball PQ.
5) Now observe the shadow AB, of the ball PQ. Note your observations and conclusion.

Observations:

Fill in the blanks.

1) The rays OP and OQ from the point source pass the ball just touching it at ___ and ___ and fall on the screen at points ___ and ___ respectively.
2) No rays reach the part of the screen _____ A and B. Hence, this part of the screen remains dark. This is the dark shadow called the '_____'.

Conclusion: When rays of light from a point source of light are obstructed by an opaque object a dark shadow. i.e. 'umbra' is cast.

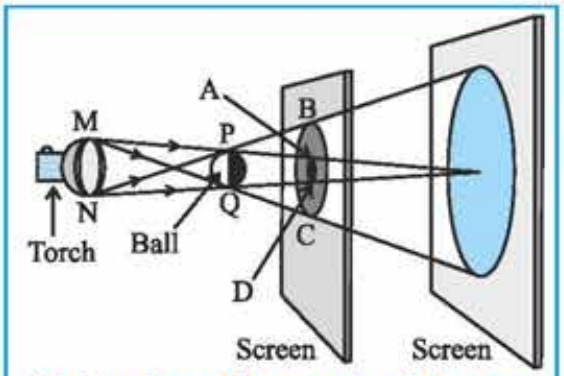
EXPERIMENT NO : 24 Shadow Formation by an Extended Source

Aim: **To obtain an umbra and penumbra using an extended source.**

Materials: A candle, a bulb or a torch, a ball, a screen etc.

Procedure:

1) Place a ball PQ in front of an extended source of light MN such as a candle, a bulb or a torch.
2) Place a screen in front of the ball at a distance of 1 m from the source.
3) Observe the shadow carefully.
4) Now keeping the distance between the extended source and the ball the same, move the screen further away from the ball.
5) Observe the shadow.
6) Record your observations and draw a suitable conclusion.



Shadow formed by an extended source

Observations:

Fill in the blanks.

1) As a result of the extended source we see a shadow which has _____ parts, a _____ part and a _____ part.
2) The part BC, which is fainter is called the _____, while the darker part AD, is called the _____.
3) As the screen is moved away from the ball the umbra becomes _____ till finally it completely _____.
4) At the same time the penumbra becomes _____ and _____.

Conclusion:

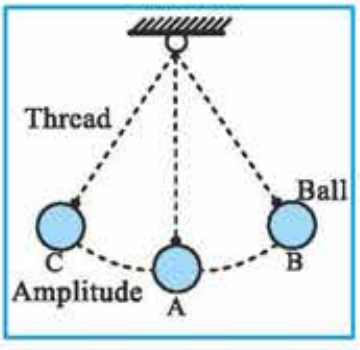
With the help of an extended source of light we get a shadow which has two parts, dark 'umbra' and fainter 'penumbra'.

Fact : Due to the large distance between earth's surface and sun, we do not see shadow of a bird or an aeroplane flying high in the sky.

EXPERIMENT NO. – 25 Study of a Pendulum

Aim: To study the relation between the length of the oscillator (pendulum), Time period of oscillation and frequency of oscillation.

Materials: A wooden or metal bob, thread, stopwatch, etc.



Procedure: (Part A)

1) Tie a wooden or metal bob to one end of a strong thread of a specific length and hang it from the support. [Measure the length of the thread and make a note of it]
2) Now swing the pendulum. With the help of a stop watch record the time required to complete 20 oscillations. One oscillation – (A- B – A – C-A)
3) Repeat this procedure 4-5 more times by decreasing the length of the thread by 10 cm each time.
4) Record your observations in the given table and draw a suitable conclusion.

Length of the string (in cm)	Time required for 20 oscillation (t) (in seconds)	Time period of oscillation T = t/20 (sec)	Frequency n (HZ) = 1/T
1)			
2)			
3)			
4)			
5)			

Conclusion:

1) What can we infer from above observations?

2) What is the relationship between the length of the pendulum and the frequency?

Procedure: (Part B)

1) Now keep the length of the pendulum fixed at 30 cm.
2) Vary the amplitude (i.e. maximum displacement from the position of rest) and measure the time required to complete 20 oscillation.
3) Calculate the time period of oscillation and frequency of oscillation.
4) Record your observations in the given table and draw a suitable conclusion.

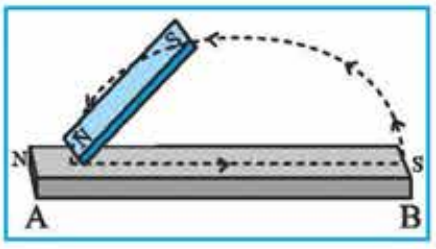
Length of pendulum (in cm)	Amplitude	Time for 20 oscillation (in sec)	Time period of oscillation T = t/20	Frequency (n) = 1/T (HZ)
1) 30 cm	small			
2) 30 cm	a little larger			
3) 30 cm	larger			
4) 30 cm	even larger			
5) 30 cm	very large			

Conclusion:

EXPERIMENT NO. – 26 Temporary Magnetism

Aim: To study 'Single touch method' and 'Double touch method' of magnetising a steel bar.

Materials: Steel bar, bar magnets, iron filings, thread, etc.



Procedure: (Part A)

1) Place a steel bar AB on a table.
2) Take a bar magnet and place its North pole on the 'A' end of the steel bar. Now drag it towards the 'B' end.
3) Lift the bar magnet and once again repeat the above procedure and drag the magnet from the 'A' end to the 'B' end.
4) Repeat this 15-20 times.
5) Now take the steel bar near the iron filings and observe.
6) Using a piece of thread hang it freely and observe.

Observations:

1) What happens when the bar is brought near iron filings?

_____

2. In which direction the freely suspended steel bar remains steady?

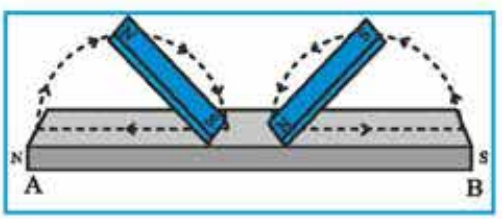
_____

_____

Conclusion:

1) The steel bar shows the properties of a _____.
2) This method of _____ is called the single touch method.
3) The magnetism created by this method is of _____ strength & lasts for a _____ time.

Procedure: (Part B)



1) Place a steel bar on a table.
2) Take two bar magnets & place two opposite poles of these magnets at the centre of the steel bar.
3) Now drag these poles apart, one to the 'A' end and other to the 'B' end.
4) Lift the magnets and once again place the opposite poles at the centre of the steel bar to repeat the same procedure for 15-20 times.
5) Bring the steel bar freely near iron filings and observe.
6) Hang the steel bar freely with the help of thread and observe.

Observations:

1) What happens when the bar is brought near iron filings?

2) In which direction the freely suspended steel bar remains steady?

Conclusion:

1) The steel bar has developed _____.
2) This method of magnetisation is called the _____ touch method.
3) The magnetism generated by this method lasts _____ compared to that generated by the single touch method.

EXPERIMENT NO. – 27 Study of Magnetic Field

Aim: To study the concept of 'magnetic field' and 'magnetic lines of force'.

Materials: A bar magnet, pins, cardboard, iron filings, etc.

Procedure: 1)Place a bar magnet and some pins at a distance from each other in such a way that they do not stick to each other.

2) Slowly move the magnet near the pins and observe what happens.
3) Place a bar magnet on a table. Above the magnet place a small cardboard.
4) Sprinkle some iron filings on the cardboard around the magnet and tap the cardboard gently. Observe what happens.

Observations:

1) What do you observe when the magnet is moved near the pins?

2) What happens when you tap the cardboard?

Conclusion:

1) The region around the magnet, where the magnetic force acts on an object is called a _____ field.
2) This _____ field can be shown by means of _____ lines of force. They are crowded at the _____ of the magnet, indicating that the strength of the magnet is _____ at its end.
3) The intensity of a magnetic field is low where the lines of force are _____ while the intensity is high where these lines are _____ .

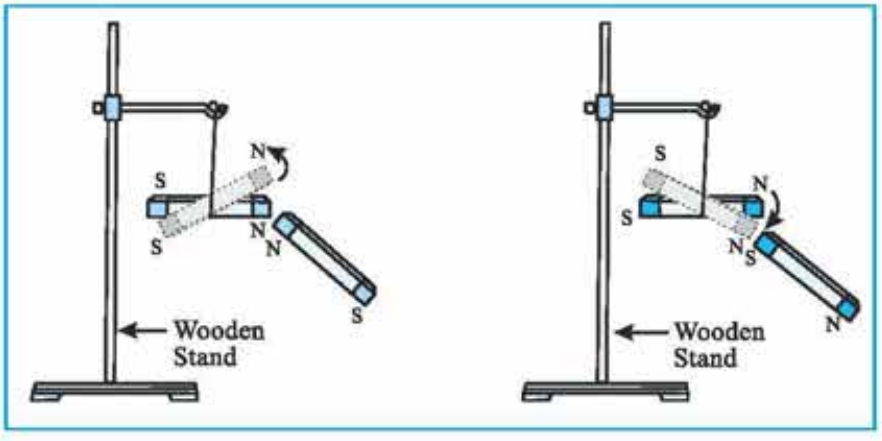
EXPERIMENT NO. – 28 Attraction and Repulsion Properties of Magnet

Aim: To study the attraction and repulsion between the poles of a magnet.

Apparatus and materials - Bar magnets, Stand, String etc.

Procedure:

1) Using a stand and a piece of string suspend a bar magnet as shown in the figure.
2) Let it rest bring north (N) pole of another magnet near the north pole of the suspended magnet and see what happens.
3) Now take the other magnet away from the suspended magnet and let it rest.
4) Now bring the South Pole of another magnet near the north pole of the suspended magnet and see what happens.



Observations:

1) What do you observe when like poles of two magnets are brought closer to each other?

_____

_____

_____

2) What happens when an like poles of two magnets are brought closer to each other?

_____

_____

_____

Conclusion:

Thus like poles of a magnet _____ each other, while unlike poles _____ each other.

ACTIVITIES

ACTIVITY NO. – 1 Scientific Names

- **Study Binomial naming system in some animals and plants. Find out the scientific names for the following animals and plants.**

Animal/Plants	Scientific Names	Animal / Plants	Scientific Names
1) Frog		4) Tulsi	
2) Tiger		5) Periwinkle	
3) Lion		6) Mango	

ACTIVITY NO. – 2 Parts of Plants

- **Find the plant parts.**

r	b	u	d	x	s	r	f
o	w	p	y	e	t	a	l
o	l	l	d	n	c	d	o
t	a	o	i	l	m	i	w
c	n	e	t	a	l	c	e
a	v	o	v	u	m	l	r
p	e	t	a	l	s	e	o
r	o	o	t	h	a	i	r

ACTIVITY NO. – 3 Greeting Card From a Leaf

- **Select a peepal leaf. Keep it in water for 15-20 days. Remove it and then clean it. You will be able to get a leaf with only network of veins. Study the vein pattern. Paint something on this leaf and prepare a greeting card.**

ACTIVITY NO. – 4 Pressure Exerted by a Liquid

- **Take a big rubber balloon and with the help of a pin or needle make many small holes on it. Now try to fill water in it. Write what you will observe and draw a suitable conclusion.**

ACTIVITY NO. – 5 Study of Speed of Sound

- **Study how sound is propagated through the medium "Air". Note down the effect of temperature and humidity on the speed of sound.**

ACTIVITY NO. – 6 Survival of Aquatic Life in Cold Conditions

- **Write a note on how aquatic life survives in extreme winter conditions in very cold regions.**

ACTIVITY NO. – 7 Density

- **Take 2 beakers or glasses and fill them half with water. In one of the beakers add 4-5 spoons of salt, stir and dissolve it completely.**

  Now take a small potato and drop it in the beaker containing plain water. Observe. Now remove the potato from it and drop it in the beaker containing salt water. Observe what happens. Write your observations and draw a suitable conclusion.

ACTIVITY NO. – 8 Soil Analysis

- **Visit a laboratory where soil analysis is carried out. Study the process and write it in your notebook.**

ACTIVITY NO. – 9 Chemosynthesis

- **Collect information about 'chemosynthesis'. Study which organisms derive nourishment through this process. Write about it.**

ACTIVITY NO. – 10 Study of Roots of Leguminous Plants

- **Sow some pea seeds in a pot and water it regularly. After a month when saplings are big enough uproot one of them. Wash the roots with water with utmost care. Using a magnifying glass observe the roots. What do you observe? State the use of specific structures.**

ACTIVITY NO. – 11 Insectivorous Plants

- **Collect some pictures of insectivorous plants. Where do these plants generally grow? Why do they trap insects?**



ACTIVITY NO. – 12 Methods of Ingestion of Food

- **Complete the table.**

Animal	Its food / type of food	Method of Ingestion
1) Cow		
2) Frog		
3) Pigeon		
4) Mosquito		
5) Cockroach		
6) Butterfly		

ACTIVITY NO. – 13 Common Adulterants

- **Complete the following table with common adulterant found in given food items.**

Food Item	Common Adulterant
1) Milk	
2) Chilli powder	
3)	Papaya seeds
4) Ice cream	
5) Tea powder	
6)	Fine iron particles
7) Turmeric powder	
8)	Sodium bicarbonate

ACTIVITY NO. – 14 Vector and Scalars

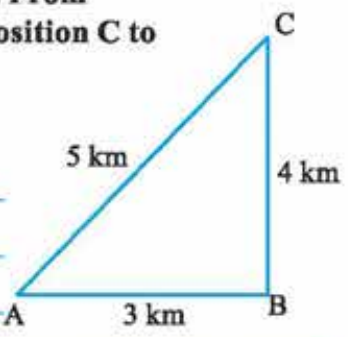
- **In the given table list scalar and vector quantities which you know. (At least 4 each)**

Scalar quantities	Vector quantities

ACTIVITY NO. – 15 Speed and Velocity

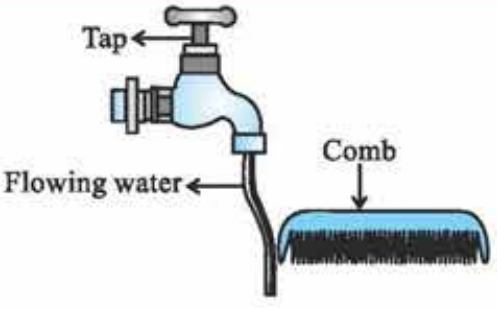
- **A car starts from position A and reaches B in 4 minutes. From position B it reaches to position C in 6 minutes. From position C to position A it reaches in 10 minutes.**

  Calculate speed and velocity for the car.



ACTIVITY NO. – 16 Static Electricity

- **Rub a comb or a balloon on your dry hair. Bring it near a thin trickle of water from a tap as shown in the figure. Take it away from the trickle and observe. Repeat this for 2-3 times and write your observations. Write explanation for the same.**



Generation of electric charge

Observations:

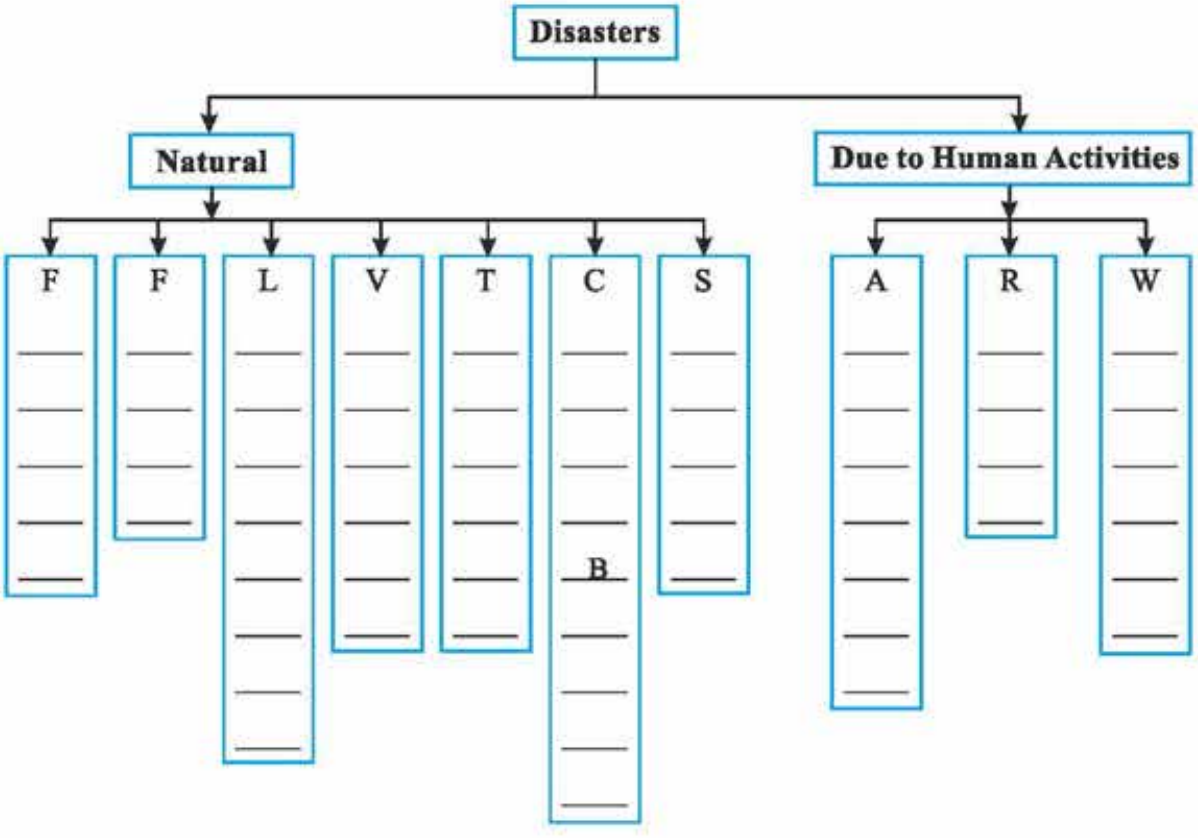
Explanation:

ACTIVITY NO. – 17 Radiation - Method of Transmission of Heat

- **Study how sun's heat reaches the earth. Which mode of transmission of heat is this? Give few more examples of such transmission of heat.**

ACTIVITY NO. – 18 Disasters

- **Complete the flow chart.**



ACTIVITY NO. – 19 Antibiotics

- **Find information - What are 'antibiotics'? Which was the very first antibiotic prepared by scientists? Who prepared it? Which are the commonly used antibiotics in today's time?**

ACTIVITY NO. – 20 Muscles of Human Body

- **Label the different types of muscles present at different places in our body. Also point out the longest muscle of our body.**



ACTIVITY NO. – 21 Changes in Our Surroundings

- **Observe and list various changes taking place in your surroundings every day. Classify them as physical or chemical change.**

Physical Change	Chemical change
1)	
2)	
3)	
4)	
5)	

ACTIVITY NO. – 22 Study of Common Compounds

- **Collect information and prepare a table in your note book.**

  Write constituent elements and molecular formulae of various compounds such as salt, alum, blue vitriol, ammonium chloride, baking soda, chalk, washing soda.

Compound	Constituent elements	Symbol and number of atoms	Molecular formula	Characteristics
Water			H_2O	

ACTIVITY NO. – 23 Preparation of Soap

- **With the help of your teacher prepare soap in your laboratory.**

Material: 15g sodium hydroxide, 60 ml coconut oil, 15 g salt, perfume a glass rod, beaker, tripod, wire gauze, burner, water, mould, etc.

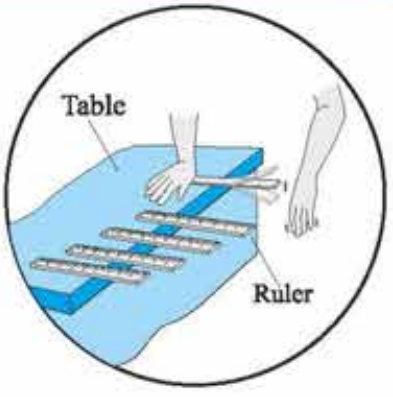
Procedure: Take 60 ml coconut oil in a beaker. Dissolve 15 g sodium hydroxide in 50 ml water. Mix the sodium hydroxide solution in the oil slowly while stirring it with a glass rod. Heat the mixture, and boil it for 10-12 minutes, stirring it all the while. Take care that the mixture does not boil over while heating. Dissolve 15 g salt in 200 ml water. Pour this solution into the above mixture and stir. The soap formed by the chemical reaction now floats on the water. After some time, it becomes thick. Now, separate the thick soap and add the perfume to it. Shape the bar of soap using the mould.

ACTIVITY NO. – 24 Metals and Prehistoric Period

- **Find out how did the various ages of the prehistoric period get their names on the basis of the use of metals.**

ACTIVITY NO. – 25 Vibrations and Sound

- **Take a plastic ruler and hold one of its ends pressed down on the table, as shown in the picture, so that a large portion of the ruler is off the table. Now ask your friend to press the free end of the ruler down and release it. Observe what happens. Now press the ruler with your finger at such a point that it stops making any sound. Now pull in 10 cm more of the ruler onto the table and repeat the action. Listen to the difference in the first and the second sound.**



Take note of the difference in the frequency and pitch of the sounds. Also take note of what happens by further decreasing the length of the free part of the ruler little by little.

ACTIVITY NO. – 26 Eclipses

- **Using internet find out and write about one solar and one lunar eclipse which occurred in last 2-3 years.**

ACTIVITY NO. – 27 Electromagnet

- **With the help of your teacher, prepare an electromagnet in your laboratory. Study how it works. Try to increase or decrease the strength of this electromagnet.**

ACTIVITY NO. – 28 Occultation

- **Draw a diagram of any one constellation in the space provided and write information about the same.**

PROJECTS

PROJECT NO. – 1 Study of Plants

- **Observe the plants in your surrounding and complete the table.**

S. No.	Name of plant	Types of leaf	Shape of leaf-blade	Venation	Shape of leaf margin	Shape of leaf apex	Petiole Yes/No	Stipule Yes/No	Arrangement on stem
1.	Maize								
2.	Canna								
3.	Neem								
4.	Peepal								
5.	Rose								
6.	Mango								

PROJECT NO. – 2 Work of Bernoulli

- **Collect information about the work of Swedish scientist 'Bernoulli'. Write about his work.**

PROJECT NO. – 3 Soil Conservation

- **Celebrate Soil Conservation Day in your school. Decorate your class corridors with posters, slogans, pictures related to this. Arrange a speech of a guest lecturer (if possible).**

PROJECT NO. – 4 Importance of Minerals and Vitamins

- **Make a chart of following completed table display and explain it to your classmates.**

Nutrient	Function	Deficiency disorders (in human body)
1) Iron		
2) Calcium & phosphorous		
3) Vitamin A		
4) Vitamin B (complex)		
5) Vitamin C		
6) Vitamin D		
7) Vitamin E		
8) Vitamin K		

PROJECT NO. – 5 Nutrition in Living Beings

- **Prepare a PowerPoint presentation on nutrition in living beings**

PROJECT NO. – 6 Methods of Preservation of Food Stuffs

- **For atleast 15 days, everyday visit your kitchen. Ask your mother or grandmother regarding the common methods used to preserve food. Check is there any food wastage or spillage. Find the causes for the same.**

  Note all your observations & information collected so and present it in your class.

PROJECT NO. – 7 Study of Dams in Maharashtra

- **My friends, newspapers**

  What is the capacity of the various dams in Maharashtra? Collect information about the discharge of water from various dams during the month of August, September and October and of the consequences of the discharge.

PROJECT NO. – 8 Work of Sir Isaac Newton

- **Find the information about the work related to velocity and acceleration by Sir Isaac Newton. Stick picture and write the information.**



PROJECT NO. – 9 Conduction of Charges

- **Collect information about Franklin's kite flying experiment. Also try to get some pictures of it. Explain this experiment and its conclusion to your classmates.**

PROJECT NO. – 10 Thermos Flask

- **Who prepared the very first thermos flask?**

  Study the construction of a thermos flask and its working.

  Draw a neat and labelled diagram in the space provided. Write the functions of different parts of the thermos flask and its working.



PROJECT NO. – 11 Conservation of Water

- **Find the information about the water cup movement promoted by Mr. Amir Khan. Explain how some villages are free from famine due to this movement. Explain it in your class.**

PROJECT NO. – 12 Swacha Bharat Abhiyaan

- **You all have heard about 'Swacha Bharat Abhiyaan'. Prepare posters / slogans related to this. Put up all these in your school corridoors. With the help of your school authorities organise a monthly competition of 'The most clean & well decorated class'!**

  (Decoration - In the form of informative charts, pictures related to your studies, slogans, etc.)

PROJECT NO. – 13 Say 'No' to Addiction

- **Prepare various charts, posters, slogans to condemn tobacco chewing, smoking and consumption of alcohol. Organise a small exhibition of such material in your school.**

  With the help of school authorities arrange some guest lectures for creating awareness about the drastic effects of these addictions on our body.

PROJECT NO. – 14 Prevention of Corrosion

- **Find information about 'corrosion' and various methods to prevent corrosion. Write information about any one such method and read it in the class.**

PROJECT NO. – 15 Study of Elements

- **From the Internet or reference books, obtain information about elements and prepare a table according to the format given below.**

Name of the element	Symbol	Discovery of the element	State	Information and uses

PROJECT NO. – 16 Types of Houses

- **Write a conversation based on cement houses, mud-houses and wattle and daub houses. With the help of your friends, present it in your class.**

PROJECT NO. – 17 Conservation of Forest

- **Prepare a skit with reference to following points -**

a) What is meant by forests?

b) What are protective functions of forests?

c) Reasons of deforestation?

d) It's effects.

e) As a student and future of our globe how you can help a forestation and conservation of forest.

(You may take help of your teacher, parents or any such authority.)

PROJECT NO. – 18 Prevention of Noise Pollution

- **Prepare some charts, pictures regarding prevention of noise pollution. With the help of your school authorities arrange a lecture to make everyone aware of effects of noise pollution not only on our body but also on other plants & animals.**

PROJECT NO. – 19 Metal Detectors

- **Obtain information about the function of metal detectors.**

PROJECT NO. – 20 Eclipses and Superstitions

- **Ask your grandparents, parents and other people and list various superstitions which are connected to eclipses. Try to find out the reasons to understand how these superstitions started. Also write few suggestions to get rid of such superstitions.**

PROJECT NO. – 21 Study of Celestial Bodies

- **Read any one book related to sky, celestial bodies and constellations. Discuss with your friends in your class.**

Certificate

This is to certify that the work entered in this journal is the bonafide work of

Master/Miss. _____

Std. _____ Div. _____ Roll no. _____

He/She has successfully performed all the experiments required, in the school laboratory during the academic year 20 ____ - 20 ____

_____
Science Teacher

_____
Head of the School

Dated: _____ School Stamp