

# Teacher Energized Resource Manual

**Class : 6<sup>th</sup>**  
**Subject : Science**



CENTRAL BOARD OF SECONDARY EDUCATION

## Preface

In consonance with the move towards outcome-based education where focus is on developing competencies in students, the Central Board of Secondary Education is delighted to share the *Teacher Energized Resource Manual* that will aid teachers in aligning their classroom transaction to a competency framework.

Each chapter of the Resource Manual corresponds to the respective chapters in the NCERT textbooks. The chapters have been chunked by concept; these concepts have been linked to the NCERT Learning Outcomes; and an attempt has been made to delineate Learning Objectives for each concept. Every chapter has a set of assessment items, where two items have been provided as examples for each Learning Objective. Teachers can use these to assess if the learner has acquired the related concept. Needless to say, the items are illustrative examples to demonstrate how competency-based items can be prepared to measure Learning Objectives and Outcomes. The variety in item forms is suggestive of the ways in which a particular concept can be assessed to identify if the learner has attained different competencies. We trust and hope that teachers would be able to generate many more similar test items for use in practice.

Your observations, insights and comments as you use this Resource Manual are welcome. Please encourage your students to voice their suggestions as well. These inputs would be helpful to improve this Manual as these are incorporated in the subsequent editions. All possible efforts have been made to remove technical errors and present the Manual in a form that the teachers would find it easy and comfortable to use.

# Acknowledgements

**Patrons:** Shri Ramesh Pokhriyal 'Nishank', Minister of Education,  
Government of India

Shri Sanjay Dhotre, Minister of State for Education,  
Government of India

Ms. Anita Karwal, IAS, Secretary, Department of School  
Education and Literacy, Ministry of Education, Government  
of India

**Advisory and  
Creative Inputs**

Our gratitude to Ms. Anita Karwal, IAS, for her advisory and  
creative inputs for this Resource Manual during her tenure  
as Chairperson, Central Board of Secondary Education.

**Guidance and  
Support:**

Shri Manoj Ahuja, IAS, Chairman, Central Board of Secondary  
Education

Dr. Joseph Emmanuel, Director (Academics), Central Board of  
Secondary Education

Dr. Biswajit Saha, Director (Skill Education & Training),  
Central Board of Secondary Education

**Writing Team**

Shri Saurabh Karn, CSF New Delhi

Shri Harsh Singh, CSF New Delhi

Ms. Deepshi Tripathi, CSF New Delhi

Ms. Dilsheen Kaur, CSF New Delhi

**Review Team**

Dr. Indrani Bhaduri, Prof and Head, Educational Survey Division, NCERT

Dr. Sweta Singh, Jt. Secretary, Central Board of Secondary Education

Shri. Al Hilal Ahmed, Jt. Secretary, Central Board of Secondary Education

Dr. Girish Choudhary, Retired Associate Professor, Lady Irwin College, Delhi

Dr. Sheela Rajeswari, Delhi

Dr. Arpan Krishna Deb, Teacher, Step by Step School, Noida

Ms. Vandana Gupta, Delhi

Ms. Hemalatha Srinivas Manchikanti, Teacher, Army Public School, Delhi Cantt

**Editorial Support**

Ms. Yukta Varma

Ms. Deah Bapuli

Ms. Kavya Singh

This Resource Manual utilizes a lot of quality content available in public domain. Citations have been provided at appropriate places within the text of this manual. The creators of these Manuals are appreciated for making it available to a wider audience through the internet. We would be happy to incorporate citations if any of the content used does not already have it.

## HOW TO USE THIS MANUAL

The goal of the Teacher Energized Resource Manual (TERM) is to provide teachers with competency-based education resources aligned to NCERT textbooks that would support them in the attainment of desired Learning Outcomes and development of requisite competencies of the learner. The TERM has equal number of corresponding chapters as NCERT Textbooks with listing of concepts, Learning Outcomes developed by NCERT and Learning Objectives. Competency based test items for each corresponding Learning Objective and sample activities for enrichment have been provided.

### **Learning Objectives:**

Each chapter begins has a *Learning Objectives* table. The table lists the concept covered in the chapter. Learning Objectives are broken down competencies that a learner would have acquired by the end of the chapter. They are a combination of skills and what the learner would use this skill for. For example, the first Learning Objective in the table below relates to the skill of *analysis* and the students will use this competency to identify ingredients in different food items. Teachers can use these specific Learning Objectives to identify if a student has acquired the associated skills and understands how that skill can be used.

Content area/ Concepts	Learning Objectives
Food variety	Analyse common food items in order to identify various ingredients for their preparation
Food material and sources	Identify the sources of ingredients used to prepare food items

### **Content Area/ Concepts:**

The important concepts and sub-concepts covered in a particular chapter are listed in the first section. Most often, they follow a logical order and present a sequence in which these are likely to be covered while teaching. In case, your teaching strategy is different and presents them in a different order, you need not worry. Teach the way, you consider the best. You only need to ensure their understanding and the attainment of desired Learning Objectives.

**Learning Outcomes (NCERT):**

NCERT Learning Outcomes are in each chapter along with delineated Learning Objectives. As shown below, each Learning Objective is mapped to NCERT Learning Outcomes and helps teachers to easily identify the larger outcome that a child must be able to demonstrate at the end of the class/chapter.

As the NCERT LOs are generic, they may relate to many content areas / concepts together. However in the mapped table, they have been reproduced ad verbatim for easy identification.

Learning Objectives	Learning Outcomes
Compare the advantages of three major tools used for tilling and ploughing to justify the variety of agricultural practices	Differentiates materials and organisms, such as, natural and human made fibres; contact and non-contact forces; liquids as electrical conductors and insulators; plant and animal cells; viviparous and oviparous animals, on the basis of their properties, structure and functions.
Analyse the quality of seeds with respect to their germinability	
Compare the advantages of two major tools used for sowing to justify the variety of agricultural practices used in the country	
Distinguish between manure and fertilisers to identify ways in which nutrients in soil is replenished	
Evaluate how weeds adversely affects the growth of the plants in order to justify their removal and control	

**Test items:**

For each Learning Objective, at least two competency-based test items have been provided. Although, the items in this resource manual are multiple choice questions, which assess developed competencies of a child rather than only knowledge, it must be kept in mind that there can be different kinds of test items that can easily align with competency-based education. Teachers can use these items to assess if a child has achieved a particular learning objective and can take necessary supportive actions. Teachers are also encouraged to form similar questions which assess skills of students.

**LOB:** Recall details/definitions specific to autotrophic mode of nutrition in plants/photosynthesis/detection of photosynthetic activity of plants/nutrients other than carbohydrates, in plants

- 1) Which option correctly lists the nutrients other than carbohydrates, in plants?
- (a) Water, fibres, minerals
  - (b) Fat, proteins, vitamins
  - (c) Fibres, vitamins, water
  - (d) Flavouring agents, water, vitamins

**Correct Answer:**(b)

### **Suggested Teacher Resources**

At the end of each chapter, certain activities have been suggested which can be carried out by the teachers with learners to explain a concept. These are only samples and teachers can use, adapt, as well as, create activities that align to a given concept.

## Table of Contents

1. Food: Where does it come from? .....	9
2. Components of food .....	17
3. Fibre to Fabric .....	24
4. Sorting materials into groups .....	33
5. Separation of substances .....	42
6. Changes around us.....	50
7. Getting to know plants.....	56
8. Body movements .....	73
9. The living organisms- Characteristics and Habitats .....	83
10. Motion and measurement of distances .....	110
11. Light, shadows and reflections .....	122
12. Electricity and Circuits .....	132
13. Fun with Magnets .....	143
14. Water .....	142
15. Air around us .....	152
16. Garbage in, Garbage out .....	163





# 1. Food: Where does it come from?

**QR Code:**



**Learning Objectives:**

Content area/ Concepts	Learning Objectives
Food variety	Analyse common food items in order to identify various ingredients for their preparation
Food material and sources	Identify the sources of ingredients used to prepare food items
Plant parts as food	Observe different food ingredients in order to recognise if their origin is from the part of the plant
Animal products as food	List edible animal products in order to understand how we depend on them for our food.
Animals and their food	Categorize organisms into herbivores, carnivores & omnivores based on their food habits or nutrition

**Learning Objectives and Learning Outcomes:**

Learning Objectives	Learning Outcomes
Analyse common food items in order to identify various ingredients for their preparation	identifies materials and organisms, such as, plant fibres, flowers, on the basis of observable features, i.e., appearance, texture, function, aroma, etc.
Identify the sources of ingredients used to prepare food items	
Observe different food ingredients in order to recognise if their origin is from the part of the plant	

List edible animal products in order to understand how we depend on them for our food.	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Categorize organisms into herbivores, carnivores & omnivores based on their food habits or nutrition	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Analyse common food items in order to identify various ingredients for their preparation	Makes efforts to apply to daily life the understanding of environment and steps to conserve it, in order to contribute to the protection of the environment: (such as, minimising wastage of food, water, electricity and generation of waste; spreading awareness to adopt rain water harvesting; care for plants, etc.)

## Test items



**LOB: Analyse common food items in order to identify various ingredients for their preparation**

- 1) Sita wants to make dal. What ingredients must she have to make this dish?
- (a) Atta, water, spices
  - (b) Rice, water and salt
  - (c) Mango, water and sugar
  - (d) Pulses, water and salt

**Correct Answer:** Option (d)

- 2) A lady prepared some food items as listed in the table.

- Dal
- Boiled rice
- Fish curry
- Chapatti
- Vegetable curry

Which of these ingredients is common in all these food items?

- (a) Flour
- (b) Rice
- (c) Spices
- (d) Water

**Correct Answer:** Option (d)

**LOB:** Identify the sources of ingredients used to prepare food items

1) The table shows some ingredients grouped into group 1 and group 2, on the basis of their sources.

Group 1	Group 2
<ul style="list-style-type: none"> <li>• Ghee</li> <li>• Cheese</li> <li>• Yogurt</li> </ul>	<ul style="list-style-type: none"> <li>• Dry fruits</li> <li>• Pulses</li> <li>• Rice</li> </ul>

Which option correctly lists other ingredients that can be included in group 1 and group 2?

- (a) Group 1- Honey; Group 2- Butter
- (b) Group 1- Milk; Group 2- Flour
- (c) Group 1- Salt; Group 2- Banana
- (d) Group 1- Spices; Group 2- Fish

**Correct Answer:** Option (b)

2) Ganesh wants to make Dal for his friends, but he does not know the ingredients that are used to make Dal. Help Ganesh to select correct set of ingredients and their source from the following.

(a)

<b>Ingredient</b>	Pulses	Salt	Spices	Ghee	Water
<b>Source</b>	Plant	Sea water	Plant	Animal	Well

(b)

<b>Ingredient</b>	Pulses	Sugar	Spices	Ghee	Water
<b>Source</b>	Plant	Animal	Sea water	Animal	Well

(c)

<b>Ingredient</b>	Rice	Sugar	Spices	Ghee	Water
<b>Source</b>	Plant	Animal	Plant	Animal	Well

(d)

<b>Ingredient</b>	Pulses	Salt	Spices	Flour	Water
<b>Source</b>	Plant	Sea water	Plant	Animal	Well

**Correct Answer:** Option (a)

**LOB: Observe different food ingredients in order to recognise if their origin is from the part of the plant.**

1) Sunflower oil is used by many people across the world for cooking. What part of the sunflower plant is used for the extraction of oil?

- (a) Flower
- (b) Leaf
- (c) Root
- (d) Seed

**Correct Answer:** Option (d)

2) Which of the following is the fruit of the plant?

- (a) Chilli
- (b) Mustard oil
- (c) Onion
- (d) Potato

**Correct Answer:** Option (a)

**LOB: List edible animal products in order to understand how we depend on them for our food.**

1) The table list some ingredients used by a baker to make a cake.

<ul style="list-style-type: none"> <li>• Flour</li> <li>• Egg</li> <li>• Cream</li> <li>• Milk</li> <li>• Butter</li> <li>• Sugar</li> <li>• Chocolate</li> </ul>
---

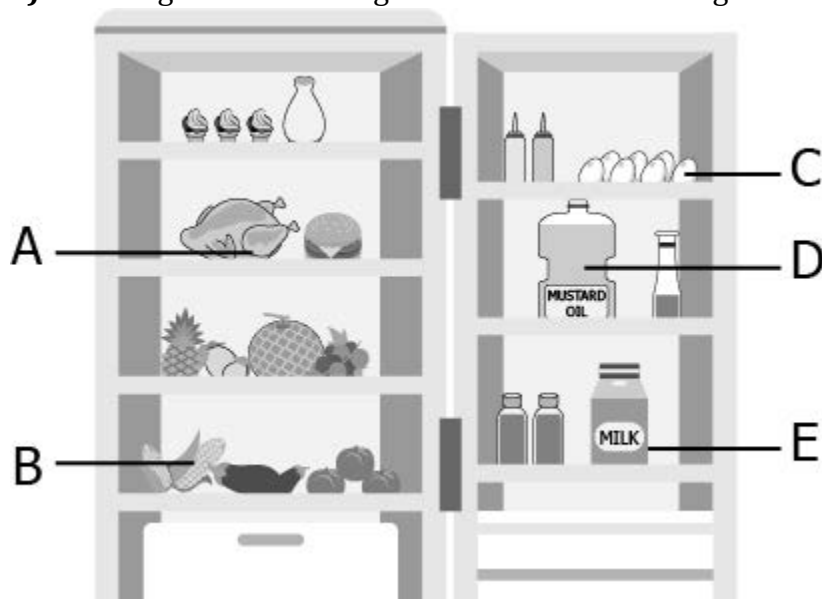
How many of these ingredients are animal-based products?

- (a) 3

- (b)4
- (c)5
- (d)6

**Correct Answer:** Option (b)

2) The image shows a refrigerator in which some ingredients are placed.



Which of the following correctly describes the source of ingredients that are labelled as A, B, C, D and E?

(a)

Label	A	B	C	D	E
Source	Plant	Animal	Animal	Plant	Animal

(b)

Label	A	B	C	D	E
Source	Plant	Animal	Plant	Plant	Animal

(c)

Label	A	B	C	D	E
Source	Animal	Plant	Animal	Plant	Animal

(d)

Label	A	B	C	D	E
Source	Animal	Plant	Animal	Animal	Animal

**Correct Answer:** Option c

**LOB: Categorize organisms into herbivores, carnivores & omnivores based on their food habits or nutrition**

1) The table shows some animals grouped in group A and group B based on the type of food that they eat.

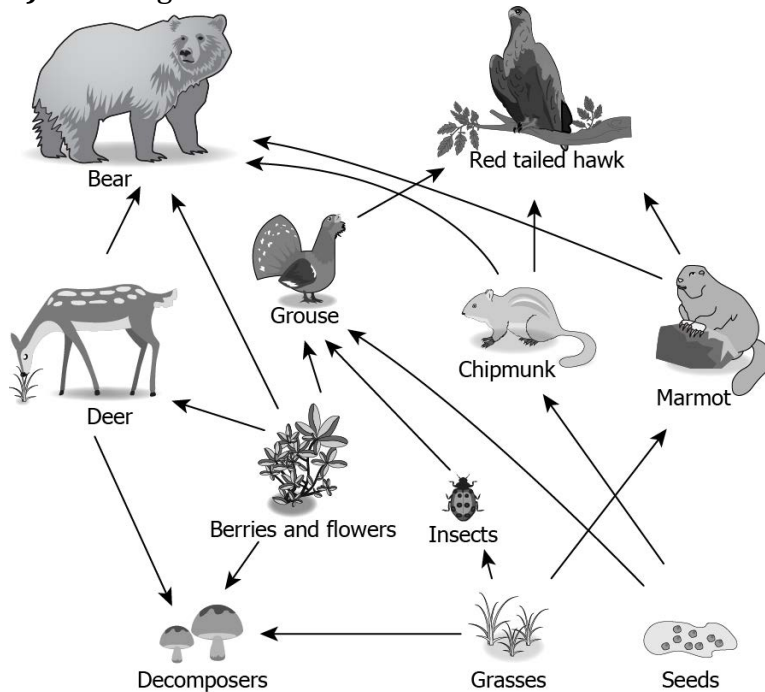
Group A	Group B
<ul style="list-style-type: none"> <li>• Lion</li> <li>• Tiger</li> <li>• Eagle</li> </ul>	<ul style="list-style-type: none"> <li>• Dog</li> <li>• Mice</li> <li>• Human</li> </ul>

Which option correctly lists other animals that can be included in group A and group B?

- (a) Group A-Cat; Group B-Monkey
- (b) Group A-Snake; Group B- Pigs
- (c) Group A-Deer; Group B-Elephant
- (d) Group A-Crocodile; Group B-Wolf

**Correct Answer:** Option (b)

2) The image shows a food web.



Which of the following pair correctly represents the Omnivores?

- (a) Bear and Grouse
- (b) Grouse and Deer
- (c) Marmot and insects
- (d) Bear and Red-tailed hawk

**Correct Answer:** Option (a)



## Activity

Activity 1	Seasonal veggies and fruits
Procedure	<p>Divide the class into six groups: Two groups for researching seasonal vegetables, two groups for researching seasonal fruits, two groups for researching seasonal nuts.</p> <p>Students should look for what type of vegetables, fruits and nuts are available during the season and interesting recipes on how to prepare them.</p> <p>Each group frames a question with the help of teacher regarding food. For example:</p> <ol style="list-style-type: none"> <li>1. How can we categorize vegetables based on their shape, size, taste and plant family?</li> <li>2. Can we grow crops without soil? (Hydroponic farming)</li> <li>3. Can we design crops to have certain qualities?</li> </ol> <p>Students present their findings as a structured writing piece clearly establishing the research question, plan for exploration or finding answer, information collected categorized and organised and concluding remarks or intuitions students gathered through the process.</p>
Let's think	<p>Students can reflect on the questions and share their response with classmates and teachers:</p> <ol style="list-style-type: none"> <li>1. Why was the question they conducted research on was of their interest?</li> <li>2. What did they learn in this process that can be used elsewhere?</li> <li>3. What is the next question they will research on?</li> </ol>

Activity 2	Celebrating family culture with food
Materials required	Ask your relatives or friends living in different states about their food habits and list the food items they use to make in breakfast lunch and dinner.
Procedure	<p>Ask students to put their dishes or lunch on the tables. Students will go around the room and everyone will share:</p> <ol style="list-style-type: none"> <li>1) What did they bring?</li> <li>2) How is it important to their family and/or culture?</li> <li>3) Students will sit together and enjoy the food.</li> </ol>
Let's think	<ol style="list-style-type: none"> <li>1. What are the similarities and differences between eating habits and preparing food in different cultures and families?</li> <li>2...What can be the possible reasons for unavailability of food for humans?</li> <li>3.What can we address the wastage of food in our country?</li> <li>4. How the processing of food is done?</li> </ol> <p>Students could reflect on the following questions:</p> <ol style="list-style-type: none"> <li>1. Why do you like certain food items more than others? Is there a link between where you stay and your culture with the food that you eat?</li> <li>2. Among the most commonly used ingredients at your home, do you think there are some ingredients more essential than others in day-to-day food preparation?</li> </ol>



## 2. Components of food

**QR Code:**



**Learning Objectives:**

Content area/ Concepts	Learning Objectives
Nutrients in our food	Understand simple food test to assess the nutrient present in the given food and examine their impact
Significance of various nutrients	Explain the function of each nutrients in order to discuss importance of nutrients for good health.
Balanced diet	Design a balanced diet plan in order to provide body sufficient nutrients it need to function properly.
Deficiency Disease	Hypothesize consequences of eliminating any one major nutrients in order to make a healthy food choice.

**Learning Objectives and Learning Outcomes:**

Learning Objectives	Learning Outcomes
Understand simple food test to assess the nutrient present in the given food and examine their impact	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction?)
Explain the function of each nutrients in order to discuss the importance of nutrients in good health.	Differentiates materials and organisms, such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators; on the basis of their properties, structure and functions
Hypothesize consequences of eliminating any one major	Applies learning of scientific concepts in daily life/real life situations in order to solve

nutrients in order to make a healthy food choice.	problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)
Design a balanced diet plan in order to provide body sufficient nutrients it need to function properly.	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)
Understand simple food test to assess the nutrient present in the given food and examine their impact	Makes efforts to apply to daily life the understanding of environment and steps to conserve it, in order to contribute to the protection of the environment: (such as, minimising wastage of food, water, electricity and generation of waste; spreading awareness to adopt rain water harvesting; care for plants, etc.)



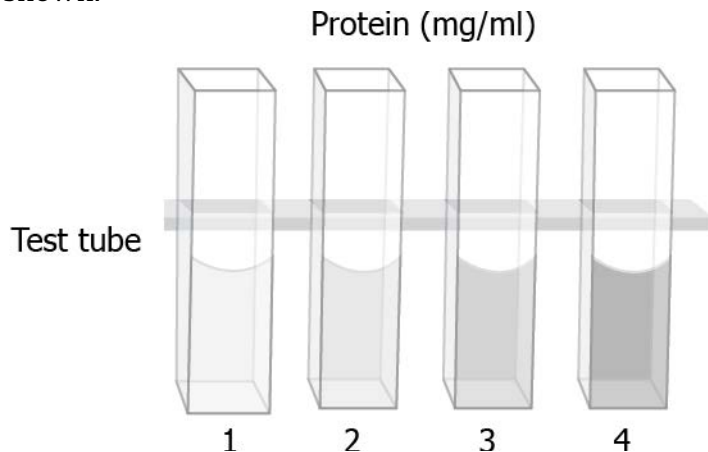
**LOB: Understand simple food test to assess the nutrient present in the given food and examine their impact**

1) A student performed a test for the presence of nutrients in banana. He placed a piece of banana in a test tube and added 2-3 drops of dilute iodine solution. He observed the appearance of blue-black colour. What can be concluded from this observation?

- (a) Presence of fat
- (b) Presence of protein
- (c) Presence of vitamins
- (d) Presence of carbohydrates

**Correct Answer: (d)**

2) A group of students conduct an experiment to study the amount of protein in four different food items. They placed the paste of each item in different test tube and added a few drops of copper sulphate and caustic soda solution to each of the test tubes. After shaking, the test tubes were allowed to stand for a few minutes. The appearance of violet colour indicates the presence of proteins. The observation from the experiment is as shown.



Based on the observations, which test tube has food item with maximum protein content?

- (a) Test tube 1
- (b) Test tube 2
- (c) Test tube 3
- (d) Test tube 4

**Correct Answer: (d)**

**LOB: Explain the function of each nutrient in order to discuss the importance of nutrients in good health.**

1) Why it is important to consume diet with adequate amount of vitamins?

- (a) They provide energy to the body.
- (b) They protect the body against diseases.
- (c) They promote proper growth of the body.
- (d) They help in eliminating waste from the body.

**Correct Answer: (b)**

2) An individual consumes a diet rich in fats, carbohydrates, and proteins but ignores to incorporate adequate amount of fluids. What will be the likely effect to the body if the individual continues with the same diet?

- (a) The body will show rapid growth and development.
- (b) The body will eliminate all the nutrients from body.
- (c) The body will reduce the output of sweat and urine.
- (d) The body will readily digest the consumed food.

**Correct Answer: (c)**

**LOB: Design a balanced diet plan in order to provide body sufficient nutrients it need to function properly.**

1) The table shows the list of some food items.



Fruits



Cake



Pizza



Ice-cream



Milk



Chocolate

Which of these food items is important to be included in a balanced diet?

- (a) Fruits, milk
- (b) Cake, fruits
- (c) Pizza, chocolate
- (d) Ice-cream, cake

**Correct Answer:(a)**

2) The table lists some food items.

Soyabean  
Sweets  
Spinach  
Poori  
Samosa  
Jaggery  
Banana  
Cold drinks

Which option correctly indicates a balanced diet?

- (a) *Samosa, poori, sweets, sweets*
- (b) *Poori, jaggery, banana, cold drinks*
- (c) *Soya bean, sweets, spinach, cold drinks*
- (d) *Spinach, jaggery, banana, soya bean*

**Correct Answer: (d)**

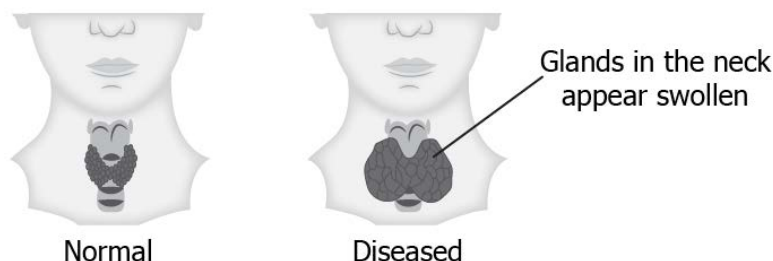
**LOB: Hypothesize consequences of eliminating any one major nutrients in order to make a healthy food choice.**

1) Which of the following conditions will occur if a person eliminates the food items that are rich in Vitamin D from his diet?

- (a) Beriberi
- (b) Goitre
- (c) Rickets
- (d) Scurvy

**Correct Answer: (c)**

2) The image shows a common symptom of a nutrient deficiency.




Deficiency of which nutrient is responsible for this bodily condition?

- (a) Iodine; it results in goitre
- (b) Iron; it results in anaemia
- (c) Vitamin C; it results in scurvy
- (d) Vitamin B1; it results in beriberi

**Correct Answer: (a)**



## Activity

Activity	Examining food labels
Materials required	Food labels of different food items
Procedure	<p>Students will make a list of healthy and unhealthy food. Write down what makes a food healthy or unhealthy. Distribute different packed food items to different groups. Ask Students to read the nutritional values in these food items in groups and record the observation.</p>
	
Food for thought	<p>Is this food healthy?          What information on the label makes you think so?          If it's unhealthy, what kind of disease can it cause?          Why should we not depend on too many nutritional supplements?</p>

## Activity

Activity	My food diary																																														
Procedure	<p>Provide this tracker to students to track their diet. Students will track their meal for 2-3 days. Students will write what they ate and tick the columns if their meal contains the following.</p> <table border="1"> <thead> <tr> <th>Meal</th> <th>What I ate (food and drink)</th> <th>Grain</th> <th>Vegetables</th> <th>Fruits</th> <th>Protein</th> <th>Dairy</th> <th>High fat/sugary food</th> </tr> </thead> <tbody> <tr> <td>Breakfast</td> <td>Bread Milk</td> <td>✓</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>Lunch</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Snack</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Dinner</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>							Meal	What I ate (food and drink)	Grain	Vegetables	Fruits	Protein	Dairy	High fat/sugary food	Breakfast	Bread Milk	✓				✓		Lunch								Snack								Dinner							
Meal	What I ate (food and drink)	Grain	Vegetables	Fruits	Protein	Dairy	High fat/sugary food																																								
Breakfast	Bread Milk	✓				✓																																									
Lunch																																															
Snack																																															
Dinner																																															
Let's think	<ol style="list-style-type: none"> <li>In your food, the intake of which component was more/less?</li> <li>Do you have a balanced diet? If not, what do you need to add/remove from your diet?</li> </ol>																																														

### 3. Fibre to Fabric

**QR Code:**



**Learning Objectives:**

Content area/ Concepts	Learning Objectives
Variety of fabrics	Examine various fabrics in order to predict what they are made up of.
Fibre	Classify the given fabrics as Natural or Synthetic, based on their source.
Some plant fibres and spinning	Describe the processing of cotton and jute fibres into yarn in order to conclude the required conditions to grow them.
Yarn to fabric	Explain various processes of making yarn from fibres in order to create the fabric.
History of clothing material	Outline the history of textile industry in our country

**Learning Objectives and Learning Outcomes:**

Learning Objectives	Learning Outcomes
Examine various fabrics in order to predict what they are made up of.	Differentiates materials and organisms, such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators; on the basis of their properties, structure and functions
Classify the given fabrics as Natural or Synthetic, based on their source.	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Describe the processing of cotton and jute fibres into yarn in order to conclude the required conditions to grow them.	



<p>Explain various processes of making yarn from fibres in order to create the fabric.</p>	<p>Explains processes and phenomenon, e.g., processing of plant fibres; movements in plants and animals; formation of shadows; reflection of light from plane mirror; variations in composition of air; preparation of vermicompost, etc.</p>
<p>Outline the history of textile industry in our country</p>	<p>Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/drought, etc.)</p>



**LOB: Examine various fabrics in order to predict what they are made up of**

1) Which of the following fabrics are made from chemically manufactured fibres?

- (a) Jute and silk
- (b) Cotton and wool
- (c) Nylon and acrylic
- (d) Wool and jute

**Correct Answer:** Option (c)

2) A student noted down the following traits of two kinds of fabric that he examined.

Fabric 1: Takes longer to dry; thin and soft but coarse texture; wrinkles easily

Fabric 2: Dries quickly; thick, soft and smooth texture; does not crease

Based on these, which of the following best fits the description of fabrics 1 and 2?

- (a) Fabric 1: Wool, Fabric 2: Jute
- (b) Fabric 1: Silk, Fabric 2: Cotton
- (c) Fabric 1: Cotton, Fabric 2: Nylon
- (d) Fabric 1: Acrylic, Fabric 2: Cotton

**Correct Answer:** Option (c)

**LOB: Classify the given fabrics as Natural or Synthetic, based on their source.**

1) Which of the following is a fabric that is obtained from a purely natural source?

- (a) Silk
- (b) Nylon
- (c) Rayon
- (d) Acrylic

**Correct Answer:** Option a.

2) Fibres can be either natural or man-made. Based on the source of the fibres, which of the following sets of fibres have different origin?

- (a) Jute and Cotton
- (b) Nylon and Silk
- (c) Jute and Flax
- (d) Wool and Silk

**Correct Answer:** Option (b)

**LOB: Describe the processing of cotton and jute fibres into yarn in order to conclude the required conditions to grow them.**

1) Cotton is grown in wide fields and handpicked when cotton pods burst and expose cotton fibres. It requires high moisture and mineral content in soil. Which of these conditions is most ideal for growing cotton?

- (a) Humid climate, alluvial soil, receiving heavy rainfall
- (b) Warm climate, black soil, receiving medium rainfall
- (d) Cold climate, sandy soil, receiving heavy snowfall
- (c) Arid climate, sandy soil, receiving low rainfall

**Correct Answer:** Option (b)

2) Jute fibres are to be handpicked from the stem of flowering jute plants after they have rot. These stems must be immersed in water for a few days to obtain fibres and such plants flower only during rains and require high soil moisture. Consider the following data:

Place	Rainfall received in a year (in mm)
New Delhi	800 mm
Assam	2800 mm
Rajasthan	500 mm
Gujarat	1000 mm

Based on this, which is a region where jute is more likely to be grown?

- (a) Assam
- (b) Gujarat
- (c) New Delhi
- (d) Rajasthan

**Correct Answer:** Option (a)

**LOB: Explain various processes of making yarn from fibres in order to create the fabric.**

1) In which step of cotton fibre processing, does the separation of seeds take place?

- (a) Hand-picking
- (b) Spinning
- (c) Weaving
- (d) Ginning

**Correct Answer:** Option (d)

2) During the processing of natural fabrics, two steps of conversion occur.

1. From fibre to yarn
2. From yarn to fabric

Which of the following processes occur in the first and which occur in the second step of conversion?

- (a) First stage: Rotting, Second stage: Spinning
- (b) First stage: Ginning, Second stage: Spinning
- (c) First stage: Weaving, Second stage: Knitting
- (d) First stage: Spinning, Second stage: Weaving

**Correct Answer:** Option (d)

**LOB: Outline the history of textile industry in our country**

1) Which of the following modern-day clothes, are entirely different from the kind of clothes worn by early Indian ancestors from the Gangetic plains?

- (a) Shawls
- (b) Sarees
- (c) Kurtas
- (d) Turbans

**Correct Answer:** Option (c)

2) What is the significance of “khadi”, in India’s freedom struggle?


- (a) It was cotton spun in Mahatma Gandhi’s ashram, exported to Britain.
- (b) It was promoted as hand-spun cotton yarn to shun imported textile.
- (c) It was the imported textile from Britain which became unpopular.
- (d) It was knitted wool from India that was exported, worldwide.

**Correct Answer:** Option (b)

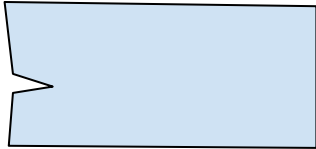
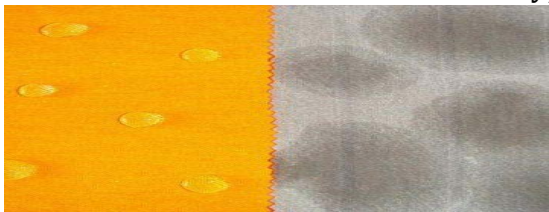


## I

## Activity

Activity 1	Compare fabric materials							
Materials required	Magnifying glass, 3 different pieces of fabric (4¼" x 11" each), such as nylon stocking, light-weight cotton, denim, sand paper, rubber band, small heavy ball.							
Procedure	<p>Divide the class into groups of two students each. Give each group one piece of each type of fabric. students use magnifying glasses to look closely at each fabric sample and draw weaving patterns in their notebook. Give each group a ball. each group wrap one piece of fabric tightly around the ball and secure with a rubber band. (Note: The tighter the fabric is, the faster the experiment progresses.) Within each group, one partner secure a piece of sandpaper (rough side up) on a table top, while the other partner drags the ball across it. DO NOT PRESS DOWN on the ball, just let the weight of the ball drag once across the sandpaper.</p>  <p>After each successive scrape, examine the area with the magnifying glass, counting each scrape until you notice some wear on the fabric and record the number of scrapes in the table. students continue scraping the fabric and counting each scrape until they notice a hole or breakthrough and record the number of scrapes in the table. Repeat steps 5-8 for each of the other two fabrics.</p> <table border="1"> <thead> <tr> <th>Fabric</th> <th>Number of scrapes (for first tear)</th> <th>Number of scrapes (for a hole or breakthrough)</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Fabric	Number of scrapes (for first tear)	Number of scrapes (for a hole or breakthrough)			
Fabric	Number of scrapes (for first tear)	Number of scrapes (for a hole or breakthrough)						

	<table border="1"><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table>									
Let's think	<ol style="list-style-type: none"><li>1. What makes fabrics different?</li><li>2. Which fabrics are the strongest?</li><li>3. Why do certain parts of your clothes, such as the knees of pants or the elbows of shirts, wear faster than other parts?</li><li>4. Which fabric lasted the longest between the first signs of wear and the breakthrough point?</li><li>5. Which fabric qualities do you think are the most important for the durability of the fabric? (For example, the type of fibre in the thread, strength of the thread, type or tightness of the weave.)</li></ol>									

Activity 2	Natural vs synthetic fibres
Materials required	Sample of cotton, linen, silk, polyester, nylon, rayon, balance, watch, scissors, water, teaspoon and beaker.
Procedure	<p><b>Strength</b>            Make a 1/2 inch cut on the edge of the fabric.            With fingers on the edge of the fabric, pull until the fabric tears.            Grade the strength of the fabric using a rubric (1 for tears easily and 5 for will not tear at all).            Do this for each type of fabric.</p>  <p><b>Permeability</b>            Lay one of the fabric sections on a piece of paper towel and put 1/2 teaspoon of water in the centre.            Time how long it takes for the water to permeate through the fabric.            Time until no 'bubble' of water remains on top of the fabric. · Rate the permeability of the fabric using a rubric (1 for very fast permeation and 5 for no permeation).            Do this on one fabric section for each type of fabric.</p>  <p><b>Absorbency</b>            Use the dry fabric samples for this test.            Weigh a section from each of the cloth samples used in this test and record your results.            Place the fabric in a beaker (~250 ml) of water for 30 seconds.            Take the fabric out of the water and hold it until it stops dripping.            Weight each of the cloth samples again and record your results.            Determine how many times its own weight a fabric can hold by dividing the weight when wet by the weight when dry.            Do this for each type of fabric.</p>

Let's think

What characteristics of fibres would you evaluate if you are shopping for summers? (Strength, permeability, absorbency)?

When would you prefer the characteristic strength over absorbency of a fabric?

What else would you like to know about the cloth you wear?



## 4. Sorting materials into groups

**QR Code:**



**Learning Objectives:**

Content area/ Concepts	Learning Objectives
Grouping the objects	List the objects around us in order to analyse the materials they are made up of.
	Plan and conduct an investigation in order to classify different kinds of materials by their observable properties.
Properties of materials	Observe the appearance of materials in order to differentiate them on the basis of lustre
	Examine materials by compressing or scratching them in order to categorize them as hard and soft material
	Observe the change in the shape of object added to water in order to categorize them as soluble and insoluble materials.
	Plan and conduct an investigation for various objects/materials if they sink or float in water
	Classify objects into opaque, transparent and translucent

**Learning Objectives and Learning Outcomes:**

Learning Objectives	Learning Outcomes
List the objects around us in order to analyse the materials they are made up of.	Identifies materials and organisms, such as, plant fibres, flowers, on the basis of observable features, i.e., appearance, texture, function, aroma, etc.
Observe the appearance of materials in order to differentiate them on the basis of lustre	Examines and explains properties, structure and functions of materials and organisms, (such as, fibre and yarn; tap and

	fibrous roots; electrical conductors and insulators), in order to differentiate them
Plan and conduct an investigation in order to classify different kinds of materials by their observable properties.	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Examine materials by compressing or scratching them in order to categorize them as hard and soft material	
Observe the appearance of materials in order to differentiate them on the basis of lustre	
Plan and conduct an investigation for various objects/materials if they sink or float in water	
Classify objects into opaque, transparent and translucent	
Plan and conduct an investigation in order to classify different kinds of materials by their observable properties.	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction?)
Plan and conduct an investigation for various objects to classify them based on whether the object sink or float in water	

## Test items



**LOB: List the objects around us in order to analyse the materials they are made up of**

1) From the given list, which pair of objects could be made of both, plastic and metal components?

A: Toothbrush

B: Saree

C: Spectacles

D: Buckets

E: Frying pan

(a) A and E

(b) B and C

- (c) D and E
- (d) A and D

**Correct Answer:** Option (c)

2) An ordinary chair requires a strong structure to support the weight of a person sitting on it. Which of the following materials should not be considered for building a chair?

- (a) Glass
- (b) Metal
- (c) Wood
- (d) Plastic

**Correct Answer:** Option (a)

**LOB: Plan and conduct an investigation in order to classify different kinds of materials by their observable properties.**

1) A student collected spoons made of plastic, metal, ceramic and wood. She then noted down conditions under which each of these would be ineffective. Which of the following observations should be in her notes?

- (a) Wooden spoon will let liquids pass through it
- (b) Metallic spoon can easily bend on applying pressure
- (c) Plastic spoon could deform in high temperature liquids
- (d) Ceramic spoon can withstand breaking if dropped on the floor

**Correct Answer:** Option (c)

2) A student collected a sample of soil with dried twigs, small pebbles and dead leaves. He then added a few scoops of the sample into a beaker filled with water and stirred vigorously. He left the beaker undisturbed and observed it after 2 hours. Which of the following would be a correct observation?

- (a) Soil dissolves in water and makes it muddy
- (b) Dried twigs sink to the bottom of the beaker
- (c) Soil and pebbles settle at the bottom of the beaker
- (d) Dead leaves and pebbles remain afloat in the water

**Correct Answer:** Option (c)

**LOB: Observe the appearance of materials in order to differentiate them on the basis of lustre.**

1) Which of the following objects would show lustre?

- (a) Earthen pot

- (b) Plastic bottle
- (c) Aluminium foil
- (d) Wooden plank

**Correct Answer:** Option (c)

2) Some materials are naturally lustrous while others are coated with compounds to make them appear lustrous. Over time, all materials tend to lose lustre due to their environment. Which of the following objects cannot regain their lustre upon being rubbed with sandpaper?

- (a) Rusted nails
- (b) Old silver cutlery
- (c) Dusty ceramic mug
- (d) Tarnished copper jug

**Correct Answer:** Option (c)

**LOB: Examine materials by compressing or scratching them in order to categorize them as hard and soft material**

1) Four baskets filled with different objects were placed in front of a classroom. Each student was asked to compress the objects to examine the hardness or softness and arrange them in order from hardest to softest. The contents of the four baskets were:

1. Styrofoam
2. Flour dough
3. Wooden blocks
4. A bunch of cotton

What would be the correct order?

- (a) 3,1,2,4
- (b) 3,1,4,2
- (c) 2,3,4,1
- (d) 2,3,1,4

**Correct Answer:** Option (a)

2) A person says that a kitchen sponge is harder than a lump of cotton and a plastic bottle is softer than a ceramic bottle. On examining these materials, what can be correctly said, about them?

- (a) It is easier to break plastic bottles than to break ceramic bottles
- (b) It is easier to compress cotton than to compress a kitchen sponge
- (c) It is easier to stretch ceramic bottles than to stretch plastic bottles
- (d) It is easier to tear up a kitchen sponge than to tear up a lump of cotton

**Correct Answer:** Option (b)

**LOB: Observe the change in the shape of object added to water in order to categorize them as soluble and insoluble materials.**

1) When a small amount of soil and pebbles are added to a beaker containing water and stirred well, it first forms a light brown liquid in which pebbles settle at the bottom. After half an hour, the soil is also observed to be settled at the bottom and the water above it appears clearer in the beaker. What conclusion can be made from this observation?

- (a) Both, soil and pebbles are soluble in water
- (b) Both, soil and pebbles are insoluble in water
- (c) Soil is insoluble in water, but pebbles are soluble
- (d) Pebbles are soluble in water and soil is insoluble

**Correct Answer:** Option (b)

2) A spoonful each, of sawdust, powdered sugar and salt were added to a glass containing water. Which of the following can be observed?

- (a) Salt and sawdust are soluble in water, but sugar is insoluble
- (b) Salt and sugar are soluble in water, but sawdust is insoluble
- (c) Sugar and sawdust are soluble in water, but salt is insoluble
- (d) Sugar, sawdust and salt are all soluble in water

**Correct Answer:** Option (b)

**LOB: Plan and conduct an investigation for various objects to classify them based on whether the object sink or float in water**

1) A stone, a small piece of wood and a metallic coin of the same weight were dropped in a bucket of water. Which of these would sink or float?

- (a) The stone would sink, while the wood and coin would float
- (b) The wood and stone would sink, while the coin would float
- (c) The stone and coin would sink, while wood would float
- (d) The stone, coin and wood, would all sink down

**Correct Answer:** Option (c)

2) An empty metallic bottle, glass bottle and plastic bottle, each of same size were lowered by applying similar force, into a bucket filled with water. What will happen when the force is removed?

- (a) Metal bottle will float upwards and the others will stay at the bottom
- (b) Plastic bottle will float upwards and the others will stay at the bottom
- (c) Glass bottle will float upwards and the others will stay at the bottom
- (d) All three kinds of bottles will slowly begin to float upwards

**Correct Answer:** Option (b)

**LOB: Classify objects into opaque, transparent and translucent**

1) Students were asked to examine different materials and substances. These were, butter paper, aluminium foil, cardboard, white cotton cloth, frosted glass and water. Which of the following is a correct observation?

- (a) Only cardboard is opaque
- (b) Only water is transparent
- (c) Butter paper and water are translucent
- (d) Aluminium foil, frosted glass and cotton cloth are opaque

**Correct Answer:** Option b.

2) A source of light was observed, through three sheets of paper. These were,  
Sheet 1: Butter paper  
Sheet 2: White tissue paper  
Sheet 3: Paper painted with black acrylic paint.

Which of the following is a correct statement regarding these sheets of paper?


- (a) 1 is translucent, 2 is transparent and 3 is opaque
- (b) 1 is transparent while 2 and 3 are translucent
- (c) 1 is translucent while 2 and 3 are opaque
- (d) 1 and 2 are translucent while 3 is opaque

**Correct Answer:** Option (d)

# Suggested Teacher Resources



## Activity

Activity	<a href="#">Make Your Own Thermometer</a>
Materials required	<p>Clear plastic drinking straw, ruler, permanent marker, small bottle with lid, 70 % rubbing alcohol, liquid food colouring, tissue papers, modelling clay, dropper, water, small bowl, ice cubes</p>  <p>(Source: <a href="http://www.sciencebuddies.org">www.sciencebuddies.org</a>)</p>
Procedure	<p>Make <math>\frac{1}{2}</math> cm markings on the straw.          Make a flattened ball of clay and push the straw through it. Remove any clay clogging the straw.          Pour alcohol in the bottle up to half its capacity. Add two drops of food colour and mix well.          Fill a dropper with this solution and set aside.          Place the clay on the mouth of the bottle and seal airtight such that the straw does not touch the bottom of the bottle.          Drop liquid in the dropper into the straw.          Take some ice in a small bowl and place the bottle in the bowl. What do you think will happen? Why?          Let the assembly stay for sometime and then mark the level of liquid in the straw as 0 degree Celsius.          Hold the bottom of the bottle to warm it up and notice the liquid in the straw rising.          Now place the bottle in liquids at different temperatures and note the level of liquid inside the straw change.</p>

Let's think	<ol style="list-style-type: none"> <li>1. What do you notice about the thermometer for the different water bowls?</li> <li>2. Based on your observations, can you rank these bowls from coldest to warmest just by looking at the liquid level in the thermometer(s)?</li> <li>3. Why does the liquid inside the tube fall when we put the thermometer in cold water and rise when we put it in warm water? Do you think we can also use this thermometer to measure temperature of air around us.? Why or why not?</li> </ol>
-------------	--

**2**

**Activity**

Activity 2	<p><u><a href="#">Investigate the Properties of Wool</a></u>  <u>Objective:</u> Investigate a raw wool fibre and draw out questions about how the physical (observable) features of greasy (raw) wool make it useful for a range of everyday products.</p>
Materials required	Laptop (or personal computer), projector, raw wool fibres, magnifying glass
Procedure	<ol style="list-style-type: none"> <li>1. Play the video, <a href="#">Sam the Lamb - What is Wool?</a> and ask students the following guiding questions:</li> <li>2. How does wool protect sheep from cold weather?</li> <li>3. How does wool protect sheep from wet weather?</li> <li>4. Get students in groups of 3-4 to make a list of properties that they think woollen clothes possess from watching the video.</li> <li>5. Give each group a strand of raw wool fibre and a magnifying glass to closely investigate how the wool fibre looks like and note down their observations and draw what they observe.</li> <li>6. Discuss how the features of wool they have been investigating in this activity might relate to the woollen clothes they have observed and used (for example, if wool helps to keep sheep warm when it is cold and cool when it is hot, wool clothing can do the same for people).</li> </ol>



Let's think	<ol style="list-style-type: none"><li data-bbox="521 212 1317 289">1. Discuss the possibility to make an object from a single material or many different type of materials?</li><li data-bbox="521 338 1382 457">2. Watch <a href="#">The Innovator</a> video and ask students to think about the types of weather conditions and activities in which they might choose to wear wool.</li></ol>
-------------	---

## 5. Separation of substances

**QR Code:**



**Learning Objectives:**

Concept	Learning Objectives
Methods of separation	Recalls the nature of substances seen around and various technical terms related to the concept- like mixtures, hand-picking, winnowing, sieving
	Outlines methods that can be adapted in everyday life situations such as separation of husk from grains, separation of fine sand from coarse sand
	Carries out some of the improvised procedures of separation of insoluble solids from liquids in a given situation
	Explains how multiple processes can be employed when the mixture has a soluble and insoluble component
	Arrives at logical conclusion that certain specific methods can be employed to separate solid mixtures based on the size, colour or weight of the components
Saturated and Unsaturated solution	Examine the solubility of salt in water in certain conditions in order differentiate the solution as saturated and unsaturated.

**Learning Objectives and Learning Outcomes:**

Learning Objectives	Learning Outcomes
Recalls the nature of substances seen around and various technical terms related to the concept- like mixtures, hand-picking, winnowing, sieving	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Arrives at logical conclusion that certain specific methods can be employed to separate solid mixtures based on the size, colour or weight of the components	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of

	habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Examine the solubility of salt in water in certain conditions in order to differentiate the solution as saturated and unsaturated.	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction?)
Outlines methods that can be adapted in everyday life situations such as separation of husk from grains, separation of fine sand from coarse sand	Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, processing of plant fibres; movements in plants and animals; formation of shadows; reflection of light from plane mirror; variations in composition of air; preparation of vermicompost, etc.)
Carries out some of the improvised procedures of separation of insoluble solids from liquids in a given situation	
Explains how multiple processes can be employed when the mixture has a soluble and insoluble component	
Outlines methods that can be adapted in everyday life situations such as separation of husk from grains, separation of fine sand from coarse sand	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)
Arrives at logical conclusion that certain specific methods can be employed to separate solid mixtures based on the size, colour or weight of the components	



**LOB: Identify properties of given items and select a property that would help them easily separate the items from each other.**

1) The image shows the process of winnowing.

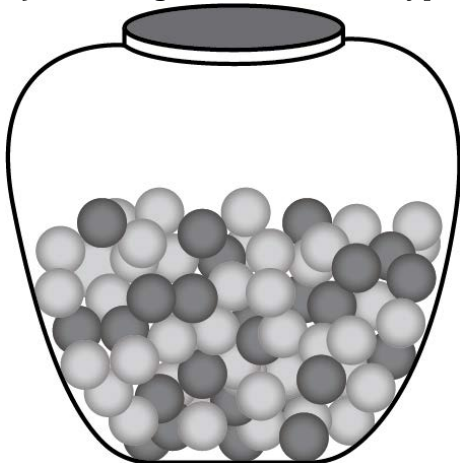


On the basis of what property, the mixture gets separated in winnowing?

- (a) Size
- (b) Shape
- (c) Colour
- (d) Weight

**Correct Answer:** Option (d)

2) The image shows the two types of marbles in the jar.



Based on what property, the marbles can be separated?

- (a) On the basis of size
- (b) On the basis of colour
- (c) On the basis of shape

(d) On the basis of weight

**Correct Answer:** Option (b)

**LOB: Outlines methods that can be adapted in everyday life situations such as separation of husk from grains, grain from stalks, separation of fine sand from coarse sand.**

1) A sample of flour has ungrounded wheat grains mixed in it. Which method can be used to separate the wheat grains from the flour?

- (a) Sieving
- (b) Filtration
- (c) Threshing
- (d) Sedimentation

**Correct Answer:** Option (a)

2) While making the tea, which method of separation is used to separate the tea leaves?

- (a) Filtration
- (b) Evaporation
- (c) Decantation
- (d) Sedimentation

**Correct Answer:** Option (a)

**LOB: Carries out some of the improvised procedures of separation of insoluble solids from liquids in a given situation**

1) A student has a solution of sand and water. What method can be used to separate sand from the water easily?

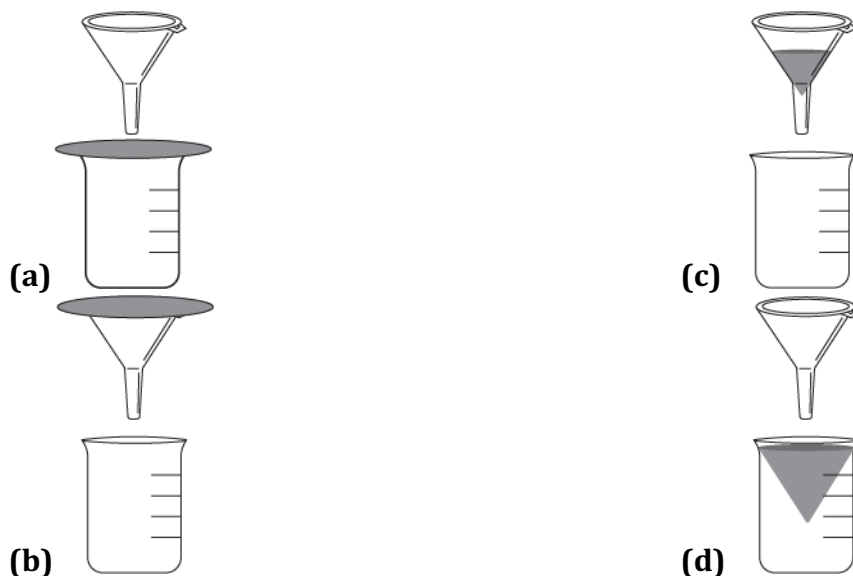
- (a) Mix a chemical in the solution
- (b) Place the solution in the sunlight
- (c) Stir the solution and leave the beaker undisturbed
- (d) Pour the solution into another beaker using a sieve

Correct answer : Option (d)

2) The table shows the materials required for a filtration process.

- |   |
|---|
| <ul style="list-style-type: none"><li>1. A beaker</li><li>2. A funnel</li><li>3. Filter paper</li></ul> |
|---|

How should these materials be arranged in order to separate the insoluble material from water?



**Correct Answer:** Option (c)

**LOB: Explains how multiple processes can be employed when the mixture has a soluble and insoluble component**

1) A student has a solution of salt, sand and water. Which option explains the processes required to separate the salt and sand from water?

- (a) Evaporation to remove sand, filtration to obtain salt
- (b) Filtration to remove sand, evaporation to obtain salt
- (c) Filtration to remove sand, sedimentation to obtain salt
- (d) Sedimentation to remove sand, filtration to obtain salt

**Correct Answer:** Option (b)

2) A student has a sample of raw rice in a container. The student added water in the container to wash it. After some time, the dust particles come at the surface while the rice grains settle down at the bottom. Which processes would help remove the dust particles?

- (a) Filtration and evaporation
- (b) Condensation and evaporation
- (c) Evaporation and sedimentation
- (d) Decantation and sedimentation

**Correct Answer:** Option (d)

**LOB: Arrives at logical conclusion that certain specific methods can be employed to separate different substances present in a mixture based on the size, colour, weight or solubility of the components.**

1) A bag has the limes and oranges. A student separates them by the method of handpicking without looking inside the bag directly. Why do you think the student uses the method of handpicking in this case?

- (a) Because both fruits have different size
- (b) Because both fruits have different colour
- (c) Because both fruits have different shape
- (d) Because both the fruits have different weight

**Correct Answer:** Option (a)

2) A student heated a salt water solution to obtain the salt from the solution. Why the student heated the salt water solution?

- (a) Because salt evaporates easily
- (b) Because salt is soluble in water
- (c) Because salt is lighter and comes at the surface
- (d) Because salt settles at bottom in water

**Correct Answer:** Option (b)

**LOB: Examine the solubility of salt in water in certain conditions in order differentiate the solution as saturated and unsaturated.**

1) A student takes some cold water in a beaker and dissolves two tablespoons of salt in it. When the student adds one more tablespoon of salt it gets settled at the bottom of the beaker. The student warms the water and observes that the salt disappears. What can be the reason for this observation?

- (a) Heat increases the solubility of water
- (b) Heat evaporates the excess salt in solution
- (c) After heating the solution become saturated
- (d) Two table spoon of salt makes the solution unsaturated

**Correct Answer:** Option (a)

2) A salt solution gets saturated when a student mixes 5 g of salt in 30 ml of water in a beaker. The student further added 5 g of salt in the solution that does not dissolve in water. The student adds 20 ml of water in the beaker and observes some of the salt is dissolved. How much water is needed to dissolve the remaining salt?

- (a) 5 ml
- (b) 10 ml
- (c) 20 ml
- (d) 30 ml

**Correct Answer:** Option (b)



## Activity

Activity	Wastewater to drinking water
Materials required	Waste water with impurities Vedio to show them purification of waste water
Procedure	<ol style="list-style-type: none"> <li>1) Ask students if they would drink wastewater, why or why not.</li> <li>2) Ask students make a list of impurities or substances present in sewage water.</li> <li>3) Ask students draw a flowchart showing the steps followed to separate the water from mixture.</li> <li>4) Read it for them:</li> </ol> <p><b>How Wastewater Gets Cleaned</b></p> <p>In most large cities around the globe, sewage and wastewater gets processed at a treatment plant.</p> <p>First, it passes through a filter to remove large materials like tree limbs, trash and leaves. Next up is the primary sedimentation tank, where sludge settles to the bottom and lighter liquids like grease, oil and soap rise to the top. !! Density the surface is skimmed off while the sludge is pumped away to a separate treatment facility. Then it's on to another tank, where oxygen is bubbled in, enabling bacteria to break down any organic matter in the wastewater. After that comes another filtration — sometimes through sand or carbon.</p> <p>During the final stage, the water is disinfected — by the addition of chlorine, hydrogen peroxide and other chemicals and by running it past ultraviolet lights. It's then drained into a nearby water supply, like a river, or pumped into the ground, where it is reintroduced into the below-ground water supply. Months to years later, water utilities extract the water, which has now mixed with the wider supply, from wells. After standard testing and treatment for drinking water, this reclaimed water ends up in houses</p>



Let's think	<ol style="list-style-type: none"> <li>1) What are different separation methods used while treating wastewater? Is it the same as you drew in your flowchart?</li> <li>2) We get most of the drinking water from our rivers and they are getting polluted . How can we save these rivers from getting polluted. Would you drink treated wastewater? Is it safe to drink?</li> <li>3) What are the other purposes this water can be used for?</li> </ol>
-------------	---

**2** **Activity**

Activity	Cookie mining
Materials required	Chocolate chip cookie, toothpicks (flat and round), paper clips, paper
Procedure	<ol style="list-style-type: none"> <li>1) Provide the materials to the students.</li> <li>2) Ask them to choose one of these tools (flat toothpick, round toothpick or paper clip).</li> <li>3) Ask students to separate Choco chips from cookies (Students are not allowed to touch the cooking with hands while mining) with the help of the chosen tool.</li> <li>4) Set the timer for 5 minutes.</li> </ol>
Let's think	<ol style="list-style-type: none"> <li>1) What did we learn about mining from our chocolate chip cookie experience?</li> <li>2) How did we separate the chocolate from the cookie?</li> <li>3) What were some problems with the separation?</li> <li>4) Would there be better ways of separating the chocolate from the cookie?</li> </ol>

# 6. Changes around us

**QR Code:**



**Learning Objectives:**

Content area/ Concepts	Learning Objectives
Reversible and irreversible changes	Classifies changes into reversible and irreversible changes
	Make generalizations about various types of changes
	Illustrate examples of changes to highlight the factors that can bring about specific changes
Ways to bring the changes	Check the effect of various factors on materials with the help of simple activities

**Learning Objectives and Learning Outcomes:**

Learning Objectives	Learning Outcomes
Classifies changes into reversible and irreversible changes	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Make generalizations about various types of changes	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction?)
Illustrate examples of changes to highlight the factors that can bring about specific changes	
Check the effect of various factors on materials with the help of simple activities	

# Test items



## LOB: Classifies changes into reversible and irreversible changes

1) Which option correctly classifies the changes as reversible and irreversible?

(a)

Reversible Change	Irreversible Change
Burning of Matchstick	Melting of ice

(b)

Reversible Change	Irreversible Change
Expansion of a Spring	Burning of coal

(c)

Reversible Change	Irreversible Change
Expansion of a Spring	Melting of ice

(d)

Reversible Change	Irreversible Change
Rusting of iron	Changing shape of clay

**Correct Answer:** Option (b)

2) The table shows some activities using the paper.

Paper rolled to form a cylinder
Paper cut into pieces
Paper folded into an aeroplane

Which option classify the activities as reversible and irreversible change?

(a)

Reversible Change	Irreversible Change
Paper folded into an aeroplane	Paper cut into pieces
	Paper rolled to form a cylinder

(b)

Reversible Change	Irreversible Change
Paper folded into an aeroplane	Paper rolled to form a cylinder
Paper cut into pieces	

(c)

Reversible Change	Irreversible Change
Paper folded into an aeroplane	Paper cut into pieces
Paper rolled to form a cylinder	

(d)

Reversible Change	Irreversible Change
Paper cut into pieces	Paper folded into an aeroplane
	Paper rolled to form a cylinder

**Correct Answer:** Option (c)

**LOB: Make generalizations about various types of changes**

1) A student learns that the bending of metallic wire is a reversible change. Why is it considered as a reversible change?

- (a) Because it can be changed back into its previous shape
- (b) Because the change caused to the metallic wire is permanent
- (c) Because the change in shape is always considered as a reversible change
- (d) Because metallic wire changes its shape more easily than other materials

**Correct Answer:** Option (a)

2) A girl is making *chapati*. She did the following steps:

Step 1: She added water, salt and flour to make a dough.

Step 2: She used a rolling pin to shape the dough.

Which of these options correctly explains the changes?

- (a) Both the steps represent a reversible change
- (b) Both the steps represent an irreversible change
- (c) Step 1 is a reversible change and step 2 is an irreversible change
- (d) Step 2 is a reversible change and step 1 is an irreversible change

**Correct Answer:** Option (d)

**LOB: Illustrate examples of changes to highlight the factors that can bring about specific changes**

1) Which factor is responsible for the expansion and contraction of a metallic rod?

- (a) Change in shape
- (b) Change in weight
- (c) Change in type of material
- (d) Change in temperature of rod

**Correct Answer:** Option (d)

2) An ice cube melts into the water and the change is considered as reversible change. Which factor would reverse the change?

- (a) Increase in weight of the water
- (b) Decrease in weight of the water
- (c) Increase in temperature of water
- (d) Decrease in temperature of water

**Correct Answer:** Option (d)

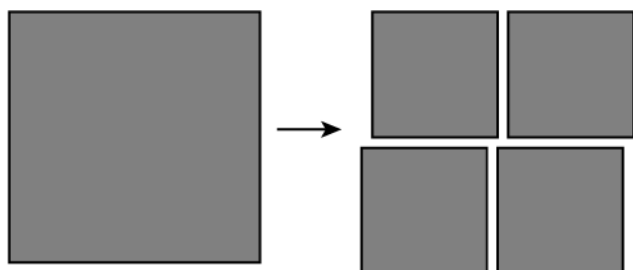
**LOB: Check the effect of various factors on materials with the help of simple activities**

1) A student placed an iron nail outside in the rain and allowed it remain there for a few days. What will happen to the nail?

- (a) The nail gets rusted
- (b) The nail gets shrink
- (c) The nail remains the same
- (d) The nail gets broken into pieces

**Correct Answer:** Option (a)

2) A student cuts a square piece of paper into 4 small square pieces as shown.



What makes this change an irreversible change?


- (a) Addition of heat
- (b) Change in shape
- (c) Reduction of size
- (d) Difference in colour

**Correct Answer:** Option (c)



**I**

**Activity**

Activity 1	Blowing up a balloon
Materials required	1.5 cup of vinegar, 1 spoon of baking soda, a plastic bottle, a balloon
Procedure	<ol style="list-style-type: none"> <li>1) Pour the vinegar into a bottle.</li> <li>2) Measure out 1 tea spoon of baking soda and drop it into a balloon.</li> <li>3) Stretch the balloon around the neck of the bottle (already filled with vinegar) and hold the top of the balloon over the side of the bottle so the baking soda remains in the balloon.</li> <li>4) Stand the balloon upright being sure to hold it around the neck of the bottom and allow the baking soda to drop into the bottle.</li> </ol> <div style="text-align: center;">  </div>
Let's think	<ol style="list-style-type: none"> <li>1) What are the changes happening during this experiment?</li> <li>2) Can you think of a reversible and an irreversible change which took place during this experiment?</li> <li>3) Think of some reversible and irreversible changes happening in our environment and discuss the reasons behind them.</li> </ol>

## 2

## Activity

Activity	Test it!
Materials required	Pan, burner, water, materials to test such as noodles, crayons, oil, milk
Procedure	<ol style="list-style-type: none"><li>1) Hand each student an uncooked noodle and ask them to write down the properties of noodles.</li><li>2) Boil water in the pan and add noodles in the boiling water.</li><li>3) Once the noodle cools down, ask students to observe it.</li><li>4) Repeat the same with other materials.</li></ol>
Let's think	<ol style="list-style-type: none"><li>1) When heat was added to the material, what phase was it liquid, solid or gas?</li><li>2) Which material can change back and forth between phases? What made you say that?</li><li>3) Can you give some more examples of reversible/irreversible change happening around you?</li></ol>

# 7. Getting to know plants

**QR Code:**



**Learning Objectives:**

Content area/ Concepts	Learning Objectives
Herbs, shrubs and trees	Compare the features of herbs, shrubs & trees, considering their physical features/ appearance.
	Analyse the parts of a plant and their function in order to classify them into root and shoot system
Creepers and climbers	List the characteristics of plants in order to classify them into creepers and climbers
Parts of plant	Apply knowledge of parts of a plants to decipher features of a different plant/ specimens
Stem	Examine stems of different plants and design activities to demonstrate water conduction through stem (from roots).
Leaf	Identify different parts of leaf
	Recognize patterns on leaves of different plants in order to classify them into reticulate and parallel venations
	Demonstrate the process of transpiration in order to describe the functions of the leaf.
Root	Explain the process of photosynthesis in order to describe the functions of the leaf.
	Outline/ list the functions of roots in plants with the help of activities
	Compare roots of different plants in order to classify them as tap roots and fibrous roots.
Flower	Deduce the relation between leaf venation and the types of roots in a plant in order to deduce the type of root
	Illustrate the structure of a (typical) flower with labelling at least 6 key parts and elaborate on each one



## **Learning Objectives and Learning Outcomes:**

<b>Learning Objectives</b>	<b>Learning Outcomes</b>
Compare the features of herbs, shrubs & trees, considering their physical features/ appearance.	Differentiates materials and organisms, such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators; on the basis of their properties, structure and functions
Compare the features of herbs, shrubs & trees, considering their physical features/ appearance.	
Analyse the parts of a plant and their function in order to classify them into root and shoot system	
List the characteristics of plants in order to classify them into creepers and climbers	
Recognize patterns on leaves of different plants in order to classify them into reticulate and parallel venations	
Compare roots of different plants in order to classify them as tap roots and fibrous roots.	
Examine stems of different plants and design activities to demonstrate water conduction through stem (from roots).	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Deduce the relation between leaf venation and the types of roots in a plant in order to deduce the type of root	
Examine stems of different plants and design activities to demonstrate water conduction through stem (from roots).	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction?)
Demonstrate the process of transpiration in order to describe the functions of the leaf.	
Explain the process of photosynthesis in order to describe the functions of the leaf.	
Outline/ list the functions of roots in plants with the help of activities	
	Conducts simple investigations to seek answers to queries, e.g., what are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction?

Apply knowledge of parts of a plants to decipher features of a different plant/ specimens	Draws labelled diagrams/flow charts of organisms and processes in order to demonstrate knowledge of structure/processes/relationships: (such as, parts of flowers; joints; filtration; water cycle, etc.)
Identify different parts of leaf	
Recognize patterns on leaves of different plants in order to classify them into reticulate and parallel venations	
Compare roots of different plants in order to classify them as tap roots and fibrous roots.	
Illustrate the structure of a (typical) flower with labelling at least 6 key parts and elaborate on each one	
Examine stems of different plants and design activities to demonstrate water conduction through stem (from roots).	Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, pinhole camera, periscope, electric torch, etc
Apply knowledge of parts of a plants to decipher features of a different plant/ specimens	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)
Outline/ list the functions of roots in plants with the help of activities	

## Test items



**LOB: Compare the features of herbs, shrubs & trees, considering their physical features/ appearance.**

1) A student wants to identify a shrub in a garden, but he is getting confused between an herb and a shrub. Which characteristics of the plant will help the student identify the shrub?

- (a) Green stems
- (b) Hard and thick stems
- (c) Branches developed at the base of the stem
- (d) Branches developed in the upper part of the stem

**Correct Answer:** Option (c)

2) The table shows classification of plants in various categories done by a student after reading their characteristics.

Plant	Height	Stem				Site of Branches Appeared		Category of Plant
		Green	Tender	Thick	Hard	At the Base of Stem	On the Stem	
1	Tall				Yes	Yes		Tree
2	Very short	Yes	Yes					Shrubs
3	Very tall			Yes	Yes		Yes	Tree
4	Short				Yes	Yes		Herbs

Which plant has been correctly classified by the student?

- (a) Plant 1
- (b) Plant 2
- (c) Plant 3
- (d) Plant 4

**Correct Answer:** Option (c)

**LOB: Analyse the parts of a plant and their function in order to classify them into root and shoot system**

1) The root system and the shoot system of a plant play different roles. Which of the following functions does NOT relate to the shoot system?

- (a) Transpiration
- (b) Flower development
- (c) Provide site for photosynthesis
- (d) Absorption of nutrients from the soil

**Correct Answer:** Option (d)

2) The table list some functions of different plant parts. Class . How many of these functions are performed by the parts involved in the shoot system?

Plant	Height	Stem				Site of Branches Appeared		Category of Plant
		Green	Tender	Thick	Hard	At the Base of Stem	On the Stem	
1	Tall				Yes	Yes		Tree
2	Very short	Yes	Yes					Shrubs
3	Very tall			Yes	Yes		Yes	Tree
4	Short				Yes	Yes		Herbs

- (a) 2
- (b) 3
- (c) 4
- (d) 5

**Correct Answer:** Option (b)

2) The table list some functions of different plant parts.

- Reproduction
- Prevent soil erosion
- Conduction of water
- Preparation of food
- Removal of excess water
- Absorption of nutrients from the soil

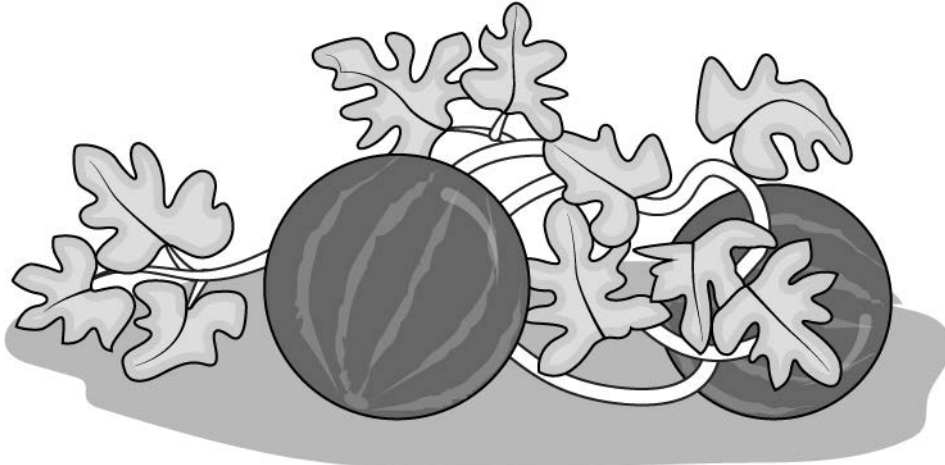
How many of these functions are performed by the parts involved in the shoot system?

- (a) 2
- (b) 3
- (c) 4
- (d) 5

**Correct Answer:** Option (c)

**LOB:** List the characteristics of plants in order to classify them into creepers and climbers

1) The image shows a watermelon plant.

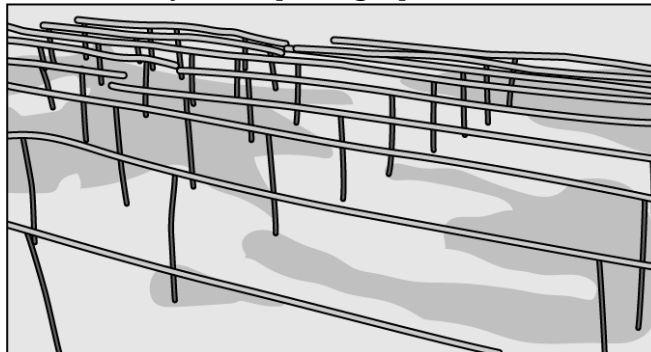


A student claimed that it an herb. Is the claim made by the student correct?

- (a) Yes. The plant has green stems, so it is an herb.
- (b) Yes. The plant has many branches, so it is an herb.
- (c) No. The plant has weak stems and spreads on the ground, so it is a creeper.
- (d) No. The plant has weak stems which are supporting the watermelon on the ground, so it is a climber.

**Correct Answer:** Option (c)

2) A farmer designed a home vineyard to plant grapevines, as shown in the image.



What could be the reason for the farmer to design it in this way?

- (a) To make the yard beautiful as grapes flowers will cover all these poles
- (b) To manage the space as some other plants can be grown on the ground
- (c) To provide equal space to each grapevine as these require lot of ground to grow
- (d) To get good productivity of grapes as grapes vines are climbers which need supports to climb upward

**Correct Answer:** Option (d)

**LOB: Apply knowledge of parts of a plants to decipher features of a different plant/ specimens**

1) A student pulled an herb out of the soil and observed that a plant part came out with it. Some hair-like structures were coming out from that part. What could be the plant part?

- (a) Flower
- (b) Leaf
- (c) Stem
- (d) Root

**Correct Answer:** Option (d)

2) Ramesh wants to collect that part of a plant which contains its reproductive parts. What features would be possessed by that plant part?

- (a) Presence of Midrib
- (b) Presence of stomata
- (c) Presence of root hairs
- (d) Presence of petals and sepals

**Correct Answer:** Option (d)

**LOB: Examine stems of different plants and design activities to demonstrate water conduction through stem (from roots).**

1) A student cuts a twig of a plant. After making the cut, the student observed a drop of water collected at its end. What could be the reason for the appearance of this drop of water?

- (a) Conduction of water through the stem
- (b) Transpiration of water through the stem
- (c) Formation of dew due to water condensation
- (d) Absorption of water by the stem from the surroundings

**Correct Answer:** Option (a)

2) Ravi conducted an experiment in which he filled a glass with one-third of the water. He added a drop of red ink into that glass and then stirred it for few minutes. After that he made an oblique cut at the base of the stem of a tender twig and then put it into the water as shown in the image.



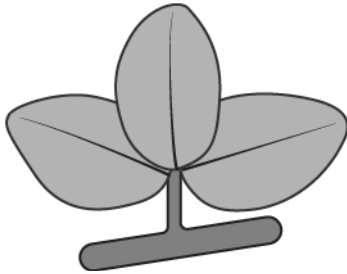
This setup was left by the student overnight. What can be observed by the student on the next day?

- (a) Shedding of leaves from the stem
- (b) Rise of the colour into the stems
- (c) Development of red coloured roots
- (d) Development of more branches at the stem

**Correct Answer:** Option (b)

**LOB: Identify different parts of leaf**

1) A student observed some leaves that were attached to a stem, as shown in the image.

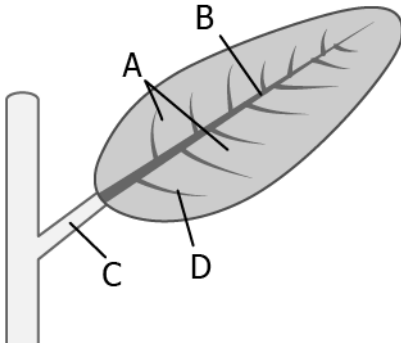


Which part of the leaf helps them to become attached to the stem?

- (a) Lamina
- (b) Midrib
- (c) Petiole
- (d) Veins

**Correct Answer:** Option (c)

2) The image shows an unlabelled diagram of leaf.



Which of the following options correctly names the labelled parts?

(a)

Part	A	B	C	D
Name	Midrib	Lamina	Petiole	Veins

(b)

<b>Part</b>	A	B	C	D
<b>Name</b>	Midrib	Petiole	Lamina	Veins

(c)

<b>Part</b>	A	B	C	D
<b>Name</b>	Lamina	Veins	Petiole	Midrib

(d)

<b>Part</b>	A	B	C	D
<b>Name</b>	Lamina	Midrib	Petiole	Veins

**Correct Answer:** Option (d)

**LOB: Recognize patterns on leaves of different plants in order to classify them into reticulate and parallel venations**

1) A student took a leaf from a mango plant and started to take its impression with the help of a pencil and paper. The image shows the impression of the mango leaf.



What likely can be concluded about the venation of the leaf?

- (a) Parallel venation; as the obtained design represents net-like veins.
- (b) Parallel venation; as the obtained design represents parallel veins.
- (c) Reticulate venation; as the obtained design represents net-like veins.
- (d) Reticulate venation; as the obtained design represents parallel veins.

**Correct Answer:** Option c.

2) A student observed the leaves of different plants listed in the table.

- |  |
|--|
| <ul style="list-style-type: none"> <li>• Peepal</li> <li>• Mango</li> <li>• Neem</li> <li>• Banana</li> <li>• Grasses</li> </ul> |
|--|



In which of these plants, the student might have observed parallel venation?

- (a) Banana and Peepal
- (b) Mango and Neem
- (c) Neem and Grasses
- (d) Banana and Grasses

**Correct Answer:** Option (d)

**LOB: Demonstrate the process of transpiration in order to describe the functions of the leaf.**

1) A student took a healthy, well-watered plant and enclosed a leafy branch of it in a polythene bag. After a few hours, the student observed some water drops on the inner side of the polythene bag. What likely can be concluded from this activity?

- (a) Leaves help in respiration.
- (b) Leaves help in transpiration.
- (c) Leaves help in photosynthesis.
- (d) Leaves help in the transportation of food.

**Correct Answer:** Option (b)

2) The air that surrounds a tree remains cooler in comparison with the air around an empty ground. How do trees help in making the surrounding air cooler?

- (a) Trees releases oxygen during the process of respiration that makes the surrounding cool.
- (b) Trees release water in gaseous form into the surrounding through a process called transpiration.
- (c) Trees utilizes the heat from the surrounding to make their food through a process called photosynthesis.
- (d) Trees gains the heat from the surrounding that helps in the translocation of food from the leaves to the roots.

**Correct Answer:** Option (b)

**LOB: Explain the process of photosynthesis in order to describe the functions of the leaf.**

1) The leaves of plants help it to make food by the process of photosynthesis. Plants perform photosynthesis in the presence of sunlight. What other components are needed by the plants to undergo photosynthesis?

- (a) Oxygen and water
- (b) Carbon dioxide and water
- (c) Carbon dioxide and oxygen
- (d) Oxygen and Carbon monoxide

**Correct Answer:** Option (b)

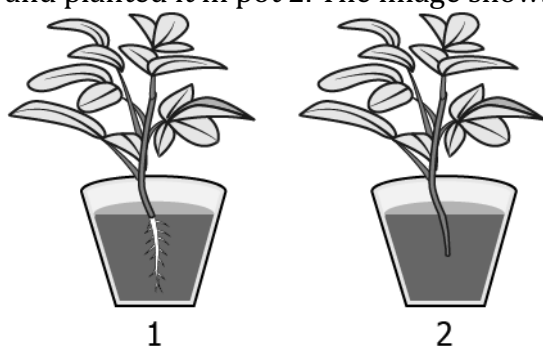
2) A student wants to perform an iodine test to determine the presence of starch in that part of the plant at which photosynthesis takes place. What part of the plant should be chosen by the student to perform the test?

- (a) Roots
- (b) Leaves
- (c) Branches
- (d) Petals of flower

**Correct Answer:** Option (b)

**LOB: Outline/ list the functions of roots in plants with the help of activities**

1) Two plants of the same kind were dug out with the roots from the soil by a student. The student planted one of these plants as is in pot 1, while cut off the roots of another plant and planted it in pot 2. The image shows plants in pot 1 and pot 2.



He watered both the plants for a week and then compared their growth. Which of the pot will have a healthy plant, and what could be the reason for this?

- (a) Pot 1; because roots of the plant will help it by making food through photosynthesis.
- (b) Pot 1; because roots of the plant will help it to absorb water and minerals from the soil.
- (c) Pot 2; because the removal of the roots will decrease the nutrient demand of the plant.
- (d) Pot 2; because removal of the root will not allow the plant to take toxic chemicals from the soil.

**Correct Answer:** Option (b)

2) A student performed an experiment with two pots to determine the role of roots in holding soil particles together. He planted grass in pot 1 but the pot 2 had only soil. Student watered both these pots for a week. After a week, the student placed these pots inclined under the tap water. What can likely to be observed by the student?

(a)

Pot	1	2
<b>Observation</b>	The soil will be washed out with the flow of water	The soil will be washed out with the flow of water

(b)

Pot	1	2
<b>Observation</b>	The soil will not be washed out with the flow of water	The soil will not be washed out with the flow of water

(c)

Pot	1	2
<b>Observation</b>	The soil will not be washed out with the flow of water	The soil will be washed out with the flow of water

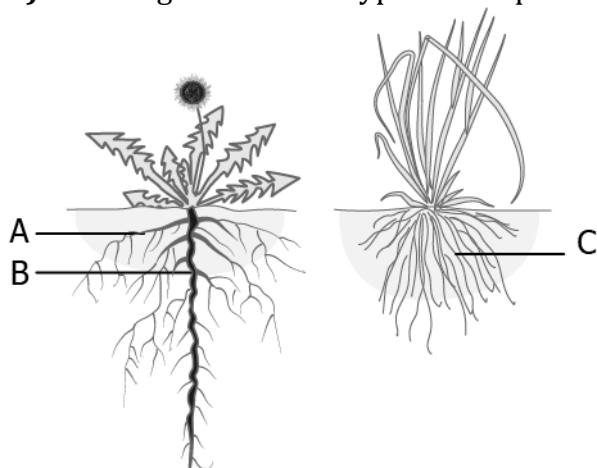
(d)

Pot	1	2
<b>Observation</b>	The soil will be washed out with the flow of water	The soil will not be washed out with the flow of water

**Correct Answer:** Option (c)

**LOB: Compare roots of different plants in order to classify them as tap roots and fibrous roots.**

1) The image shows two types of the plant with their root system.



Which of the following correctly describes the name of roots that are labelled as A, B, and C?

**(a)** A-lateral root, B-tap root, C-fibrous root

- (b) A-tap root, B-fibrous root, C-lateral root  
 (c) A-fibrous root, B-lateral root, C-tap root  
 (d) A-tap root, B-lateral root, C-fibrous root

**Correct Answer:** Option (a)

2) A student read out in his textbook that a pea plant possesses a tap root system and a wheat plant possesses a fibrous root system. To validate this, the student dug out a pea plant and a wheat plant from the soil. What features of the root would be observed by the student in both the plants?

(a)

Pot	Pea	Wheat
<b>Feature of Root</b>	Presence of a main root with smaller roots	Absence of main root and all roots seem similar.

(b)

Pot	Pea	Wheat
<b>Feature of Root</b>	Presence of so many main roots with smaller roots	Presence of a main root without any smaller roots

(c)

Pot	Pea	Wheat
<b>Feature of Root</b>	Absence of main root and all roots seems similar	Presence of a main root with smaller roots

(d)

Pot	Pea	Wheat
<b>Feature of Root</b>	Presence of a main root without any smaller roots	Presence of so many main roots with smaller roots

**Correct Answer:** Option (a)

**LOB: Deduce the relation between leaf venation and the types of roots in a plant in order to deduce the type of root**

1) Rishi has a small plant with him. He observed that the root of the plant was having a main root with some smaller roots. What type of the root is possessed by this plant and what type of venation will likely be observed in its leaves?

- (a) Tap root; Parallel venation  
 (b) Tap root; Reticulate venation  
 (c) Fibrous root; Parallel venation

(d) Fibrous root; Reticulate venation

**Correct Answer:** Option (b)

2) The table shows some blank cells that need to be filled with the type of root and leaf venation of the respective plants.

Name of the Plant	Type of Root	Type of Leaf Venation
Carrot	Taproot	A
Banana	B	Parallel
Maize	Fibrous	C
Mango	D	Reticulate

Which of the following correctly represents the labels A, B, C and D?

(a)

A	B	C	D
Parallel	Fibrous	Reticulate	Taproot

(b)

A	B	C	D
Reticulate	Taproot	Parallel	Fibrous

(c)

A	B	C	D
Reticulate	Fibrous	Parallel	Taproot

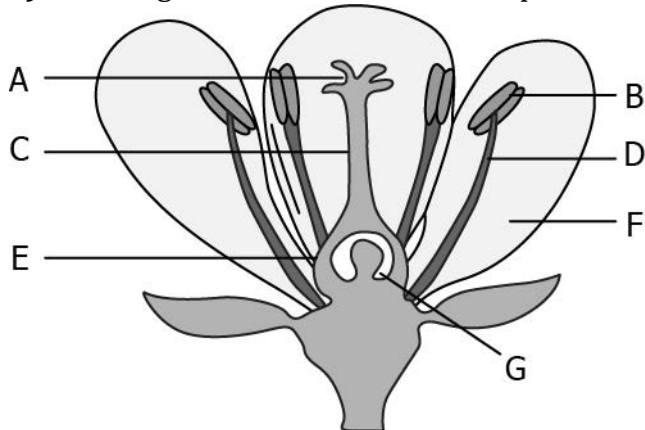
(d)

A	B	C	D
Parallel	Fibrous	Parallel	Fibrous

**Correct Answer:** Option (c)

**LOB:** Illustrate the structure of a (typical) flower with at least 6 labelling & elaborate on each

1) The image shows some unlabelled parts of a flower.

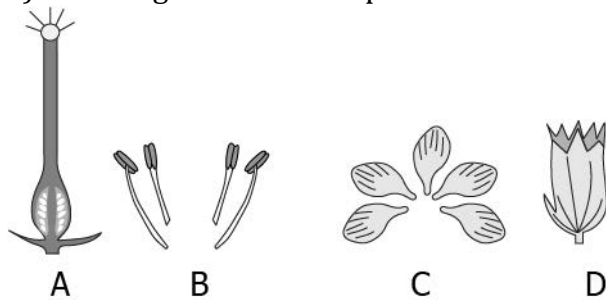


Identify the parts that form the pistil of a flower.

- (a) B, D, G
- (b) B, D, F
- (c) A, C, E
- (d) A, E, F

**Correct Answer:** Option (c)

2) The image shows some parts of a flower labelled as A, B, C and D.



Which of the following options correctly identifies the parts?

(a)

A	B	C	D
Pistil	Stamen	Petals	Sepals

(b)

A	B	C	D
Stamen	Pistil	Petals	Sepals

(c)

A	B	C	D
Pistil	Stamen	Sepals	Petals

(d)


A	B	C	D
Stamen	Pistil	Sepals	Petals

# Suggested Teacher Resources



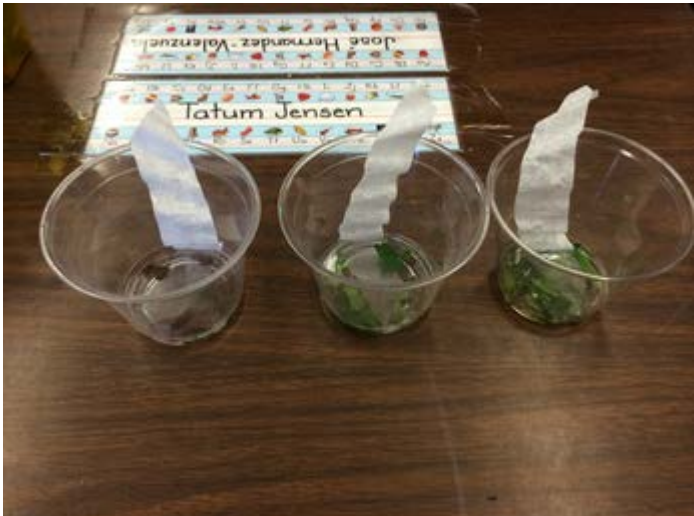
I

## Activity

Activity	Do plants breathe?
Materials required	Live leaf (Fresh one, do not pick it up off the ground), transparent glass or plastic bowl, water, small rock, magnifying glass (optional)
Procedure	<ol style="list-style-type: none"> <li>1) Fill the bowl with room temperature water.</li> <li>2) Ask your students to place the leaf in the bowl of water.</li> <li>3) Then ask them to place the small rock on top of the leaf to fully submerge the leaf under the water.</li> <li>4) Place the bowl in a sunny spot inside or outside.</li> <li>5) Wait for a few hours, then observe.</li> </ol> 
Let's think	<ol style="list-style-type: none"> <li>1) What do you see?</li> <li>2) Can you tell any instance when you saw bubbles in water?</li> <li>3) Why do bubbles form in the water?</li> <li>4) How can pollution in the air affect plant growth?</li> </ol>

## 2

## Activity

Activity	Why do leaves change colour?
Materials required	3 leaves of different types and colours, coffee filters cut into strips, rubbing alcohol, scissors, 3 glasses
Procedure	<ol style="list-style-type: none"> <li>1) Take the three different types of leaves and cut them a tiny bit into a glass. I have three helpers do this for me.</li> <li>2) Pour rubbing alcohol into each glass to cover the pieces of leaves.</li> <li>3) Cut coffee filters into strips and to place one strip into each glass.</li> <li>4) Let the glasses sit for about an hour and note down your observation.</li> </ol> 
Let's think	<ol style="list-style-type: none"> <li>1) How many colours can you see on paper?</li> <li>2) Why do we see only the green colour of leaves?</li> <li>3) What can be concluded from the above observation?</li> </ol>



## 8. Body movements

**QR Code:**



**Learning Objectives:**

Content area/ Concepts	Learning Objectives
Human body and its movement	Identify the type of joints in human body & the extent of their motion
	Compare and contrast between bones in different parts of human body
	Identify the structure and function of skeletal system.
	Demonstrate how muscles work in order to explain its functions,
Gait of animals	Predict the classes that different organisms belong based on their movement
	Compare the characteristics features of body movements of various organisms
	Predict the possible reasons for animals showing different gaits

**Learning Objectives and Learning Outcomes:**

Learning Objectives	Learning Outcomes
Identify the type of joints in human body & the extent of their motion	Identifies materials and organisms, such as, plant fibres, flowers, on the basis of observable features, i.e., appearance, texture, function, aroma, etc.
Predict the classes that different organisms belong based on their movement	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble,

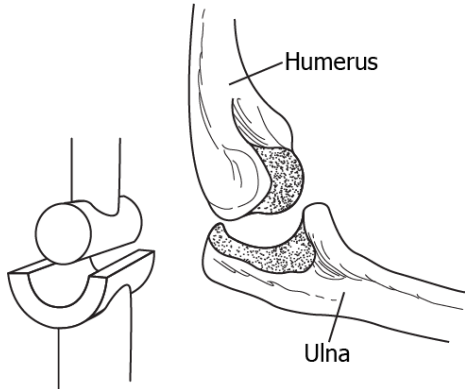
	insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Compare the characteristics features of body movements of various organisms	Differentiates materials and organisms, such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators; on the basis of their properties, structure and functions
Predict the possible reasons for animals showing different gaits	
Compare and contrast between bones in different parts of human body	Draws labelled diagrams/flow charts of organisms and processes in order to demonstrate knowledge of structure/processes/relationships: (such as, parts of flowers; joints; filtration; water cycle, etc.)
Identify the structure and function of skeletal system.	
Demonstrate how muscles work in order to explain its functions,	Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, pinhole camera, periscope, electric torch, etc

## Test items



### **LOB: Identify the type of joints in human body & the extent of their motion**

1) The image shows a joint found at the elbow.

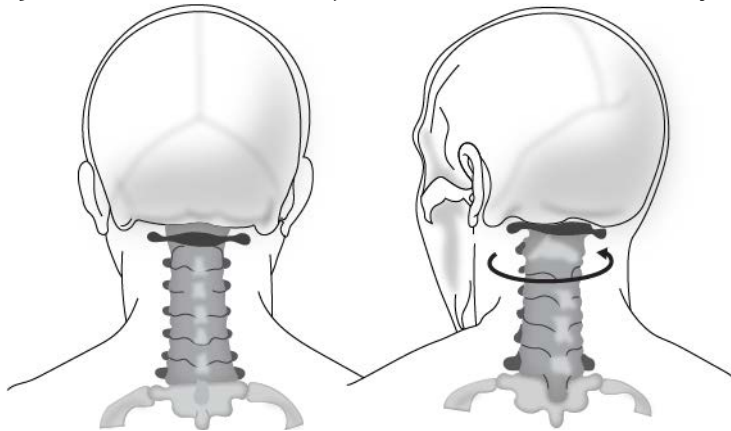


What is the type of joint present between the humerus and ulna?

- (a) Ball and socket
- (b) Fixed
- (c) Hinge
- (d) Pivot

**Correct Answer: (c)**

2) A student observed a joint in the head of the body.



The student claimed that the joint is a pivotal joint. Is the claim made by the student correct?

- (a) No, as hinge joints are present in the head area.
- (b) No, as pivotal joints are present in the jaw portion only.
- (c) Yes, as it allows the individual to move its head in all directions.
- (d) Yes, as it allows forward and backward bending and right or left turning.

**Correct Answer: (d)**

**LOB: Compare and contrast between bones in different parts of human body**

1) Backbone extends through most of the body. The image shows the human backbone.

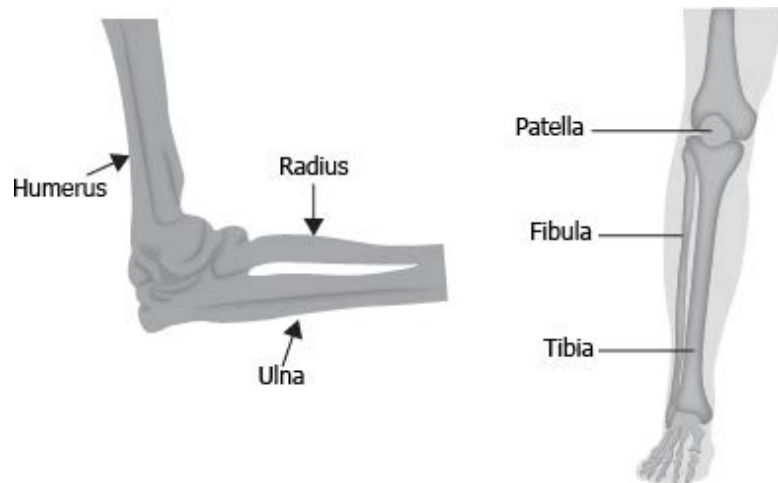


How does the backbone differ from the thigh bone, femur?

- (a) Backbone is made of many small bones, while the femur is a long bone.
- (b) Backbone is a long bone, while the femur is made of many small bones.
- (c) Backbone is the smallest bone of the body, while the femur is the longest bone.
- (d) Backbone is the longest bone of the body, while the femur is the smallest bone.

**Correct Answer: (a)**

2) The image shows the bones from the elbow and leg region.



What is the similarity in the bones of these regions?

- (a) The bones of both regions have the same length.
- (b) The bones of both regions can move in all directions.
- (c) The bones of both regions have the same types of joints.
- (d) The bones of both regions are attached to the pelvic girdle.

**Correct Answer: (c)**

**LOB: Identify the structure and function of skeletal system.**

1) How does the structure of the skeleton system support the body?

- (a) It protects the outer skin of the body from any injury.
- (b) It provides a framework that gives shape to the body.

- (c) It provides the site for storing all the nutrients in the body.
- (d) It allows free movement of all the bones during locomotion.

**Correct Answer: (b)**

2) The table lists the role of different systems of the body.

- A. It provides the space for the attachment of muscles.
- B. It helps in transport of nutrients to the different cells of body.
- C. It produces hormones that regulate the growth and development of the body.

Which of these roles is/are served by the skeleton system?

- (a) A only
- (b) B only
- (c) A and C
- (d) B and C

**Correct Answer: (a)**

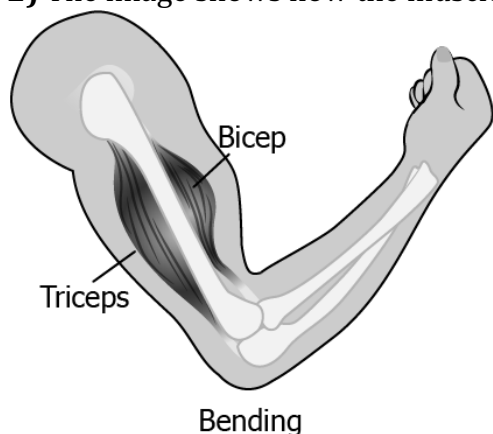
**LOB: Demonstrate how muscles work in order to explain its functions.**

1) Muscles work in pairs. They contract and relax simultaneously. How does this help an individual?

- (a) It assists in the formation of the bones.
- (b) It prevents any injury to the internal organs.
- (c) It allows the movement of bones at the joints.
- (d) It helps in the absorption of nutrients in the body.

**Correct Answer: (c)**

2) The image shows how the muscles help in the movement of the arm.



Based on the image, what will be the length of the muscles during bending?

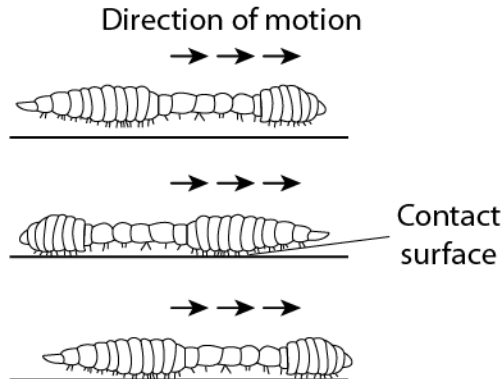
- (a) Both bicep and triceps relax
- (b) Both bicep and triceps contracts
- (c) The bicep contracts while triceps relax

(d)The bicep relaxes while triceps contracts

**Correct Answer: (c)**

**LOB: Predict the classes that different organisms belong based on their movement**

1) A student observe the movement of an organism that lacks bones.



Based on the manner of movement, which organism this can likely be?

- (a) Ant
- (b)Cockroach
- (c)Earthworm
- (d)Snake

**Correct Answer: (c)**

2) The table lists the characteristic features of body movements of various organisms.

- |   |
|---|
| <p>A. The foot of the organism is a thick structure that is made of strong muscles which helps in dragging the shell.</p> <p>B. The organism curves its body into loops that pushes the body forward.</p> |
|---|

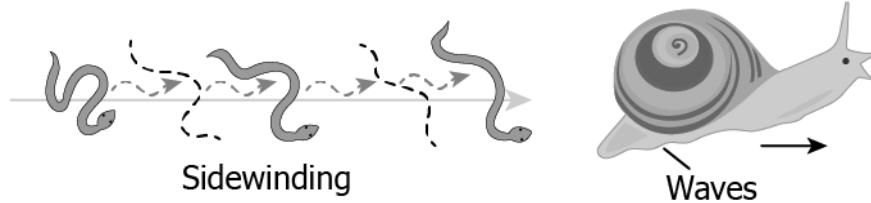
Which organisms show these movements?

- (a) A=fish, B=snail
- (b)A=snail, B=snake
- (c)A=bird, B=cockroach
- (d)A=snake, B=earthworm

**Correct Answer: (b)**

**LOB: Compare the characteristics features of body movements of various organisms**

1) The image shows the movement of snake and snail.



What is the likely reason that the movement in snake is side winding while snail moves in a wavy motion?

- (a) In snakes, bones are present that are absent in snails.
- (b) In snails, the thin muscles are more compared to snakes.
- (c) In snakes, thick muscles are present that are absent in snails.
- (d) In snails, the number of bones is more compared to snakes.

**Correct Answer: (a)**

2) Both cockroaches and birds have wings to fly in the air. However, only cockroaches can climb on the walls. What is the likely reason for this?

- (a) They lack muscles.
- (b) They have hollow bones.
- (c) They have strong and broad wings.
- (d) They have three pairs of modified legs.

**Correct Answer: (d)**

**LOB: Predict the possible reasons for animals showing different gaits**

1) How can fishes flow around easily in the water?

- (a) Due to small-sized body
- (b) Due to streamlined body
- (c) Due to the presence of thin skin
- (d) Due to the presence of scales on their body

**Correct Answer: (b)**

2) Which of these represents one of the reasons that enable birds and NOT humans to fly?

- (a) They have long bones.
- (b) They have extra forelimbs.
- (c) They have strong hind bones.
- (d) They have hollow and light bones.

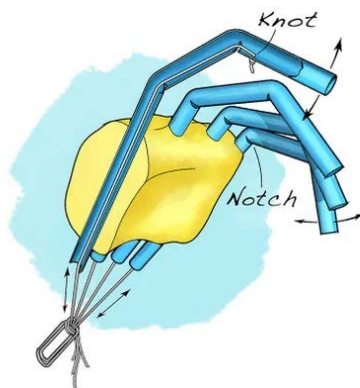
**Correct Answer: (d)**



## Activity

Activity	Build an artificial hand
Materials required	Plastic drinking straws, needle, string, paper clips, clay, assorted small objects to pick up, scissors
Procedure	<ol style="list-style-type: none"> <li>1) Use scissors to carefully cut a small triangular notch in the middle of a drinking straw. This notch is the "joint" in your finger.</li> <li>2) Tie one end of the string through the eye of the needle.</li> <li>3) Carefully puncture the straw with the needle, just above the notch you cut out. Make sure you puncture the straw on the same side that you cut out the notch, not on the "back" side. Push the needle all the way into the straw past the notch you cut out and thread it out the bottom of the straw.</li> <li>4) Keep pulling the needle through until about 10 centimetres of string comes out the bottom of the straw. This string will act like a "tendon" that helps the finger bend. Cut the other end of the string, leaving enough extra that you can tie off a knot. Make sure the knot is large enough that it cannot be pulled through the hole you punctured with the needle.</li> <li>5) Untie or cut off the string from the eye of the needle.</li> <li>6) Tie the bottom end of the string to a paper clip. You have just completed your first "finger."</li> <li>7) Now it's time to build more fingers! Repeat the above steps to make at least one more finger.</li> <li>8) Use modelling clay to form the base or "palm" of your hand by forming it around the base of the straws. Make sure you do not cover the bottom opening of the straws, so you can still pull on the string. Adjusting the modelling clay allows you to change the position and orientation of the fingers relative to one another.</li> <li>9) Now try using your hand to pick up some small objects. Keep in mind that your hand is made of straws so it is not very strong, so you should only use it to pick up lightweight objects (for example, empty plastic bottles, not ones full of liquid).</li> </ol>





Let's think	<ol style="list-style-type: none"> <li>1) Find out how prosthetic limbs helps people with disability.</li> <li>2) How can you strengthen your bones ? What changes do you think you can make to improve the performance of your hand?</li> <li>3) Is your hand better at picking up certain objects than others?</li> <li>4) Do you think it would be hard to design something as adaptive as the human hand, which can easily pick up things with very different shapes?</li> </ol>
-------------	--

**2**

## Activity

Activity	Broken Bones!
Materials required	Handouts of the article
Procedure	<p><b>Broken Bones!</b></p> <p>A broken bone, also called a fracture (say: FRAK-shur), is when a break goes through part or all of a bone. Most broken bones in kids happen from a fall. Kids also can break a bone in an accident or while playing sports. There are types of bone fractures include:</p> <p>a greenstick fracture: a break on one side of the bone only</p> <p>A buckle or torus fracture: an outward bend on one side of the bone without breaking the other side</p> <p>An avulsion fracture: when a tendon or ligament pulls off of a tiny piece of bone</p>

	<p>A growth plate fracture: a break in the area of a child or teen's growing bone A stress fracture: a tiny crack in the bone A comminuted fracture: a bone breaks into more than two pieces A compression fracture: a collapsing of the bone The signs of broken bone is it always hurts. There also might be swelling and bruising. The injured area may be hard to move and use. Sometimes the body part looks crooked or different than it did before the injury. When you go to the doctor, doctors order X-rays if they think a bone is broken. Most broken bones are treated with a cast, splint, or brace. This keeps the broken bone from moving while it heals. Even broken bones that don't line up (called <b>displaced</b>) often will heal straight over time.</p> <p>Sometimes the displaced bones need to be put back in place before the cast, splint, or brace is put on. This is done through a procedure called a <b>reduction</b>. This is also called "setting the bone."</p> <p>To help your bone heal well, eat a healthy diet that includes plenty of calcium and vitamin D, take care of the cast or splint and rest and/or do any exercises that your doctor recommended. With the right treatment, a broken bone usually heals well. After a few months, you will be back to doing all the things you did before the injury.</p>
Let's think	<ol style="list-style-type: none"><li>1) Can you name some foods which are rich in vitamin D?</li><li>2) Why should we take care of our bones?</li><li>3) Do you know any disease caused due to weak bones?</li></ol>

## 9. The living organisms- Characteristics and habitats

### QR Code:



### Learning Objectives:

Content area/ Concepts	Learning Objectives
Organisms and the surroundings where they live	Summarize the key features of living organisms that contribute to their survival in their habitats
Habitant and adaptation	Differentiate between terrestrial & aquatic habitats based on abiotic factors.
	Devise an experiment to show the importance of abiotic factors for the growth & sustenance of life on earth
	Identify the function of different physical feature that assist inhabitants to survive in harsh conditions
A journey through different habitats	Explore various adaptive features of different organisms in their habitats
	Examine the idea that the absence of any one feature or characteristic of a habitat might not affect to balance
Characteristics of organisms	Apply knowledge of life processes in studying a specimen for signs of life

### Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Differentiate between terrestrial & aquatic habitats based on abiotic factors.	Differentiates materials and organisms, such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators; on the basis of their properties, structure and functions

Summarize the key features of living organisms that contribute to their survival in their habitats	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Devise an experiment to show the importance of abiotic factors for the growth & sustenance of life on earth	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction?)
Summarize the key features of living organisms that contribute to their survival in their habitats	Differentiates materials and organisms, such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators; on the basis of their properties, structure and functions
Identify the function of different physical feature that assist inhabitants to survive in harsh conditions	
Examine the idea that the absence of any one feature or characteristic of a habitat might not affect to balance	
Explore various adaptive features of different organisms in their habitats	Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, processing of plant fibres; movements in plants and animals; formation of shadows; reflection of light from plane mirror; variations in composition of air; preparation of vermicompost, etc.)
Apply knowledge of life processes in studying a specimen for signs of life	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)



**LOB: Summarize the key features of living organisms that contribute to their survival in their habitats**

1) Animals like a camel can survive in a desert. Which of these features in the camel helps them to survive in the desert?

- (a) Hump of the camel produces food
- (b) Long neck help to store more water
- (c) Long legs protect them from heat of the sand
- (d) Thicker skin help in the transpiration of more water

**Correct Answer:** Option (c)

2) animals like polar bears living in cold regions have long hairs in their body. How do these hairs help an animal to survive in a cold region?

- (a) It keeps their body warm
- (b) It helps an animal to run faster
- (c) It helps the animal to swim in water
- (d) It absorbs water from the atmosphere

**Correct Answer:** Option (a)

**LOB: Differentiate between terrestrial & aquatic habitats based on abiotic factors.**

1) A list of few abiotic components are provided in the table.

- |          |
|----------|
| 1. Rock  |
| 2. Soil  |
| 3. Water |

Which of these options correctly differentiate the abundance component in each type of habitat?

(a)

Terrestrial Habitat	Aquatic Habitat
1. Water 2. Rock	1. Soil

(b)

Terrestrial Habitat	Aquatic Habitat
1. Water	1. Soil 2. Rock

(c)

Terrestrial Habitat	Aquatic Habitat
1. Soil 2. Rock	1. Water

(d)

Terrestrial Habitat	Aquatic Habitat
1. Water	1. Soil 2. Rock

**Correct Answer:** Option (c)

2) The table list a few abiotic components and its availability in different habitats.

	Terrestrial	Aquatic
Light	Decreases with depth	Readily available
Gasses	Ready available	Limited availability
Temperature	Less available	Large variation

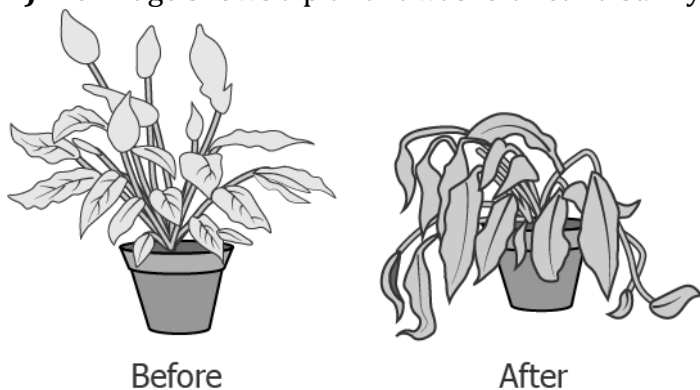
Which of these abiotic components availability is correctly explained in the table?

- (a) Only Light
- (b) Only Gasses
- (c) Both light and temperature
- (d) Both gasses and temperature

**Correct Answer:** Option (c)

**LOB: Devise an experiment to show the importance of abiotic factors for the growth & sustenance of life on earth**

1) The image shows a plant it was left near a sunny window un-attended for few weeks.



What can be concluded based on the observation?

- (a) Water is essential for plants to survive
- (b) Presence of water makes the leaf green
- (c) Plants grow stronger in the absence of water
- (d) Plants can absorb water from the atmosphere

**Correct Answer:** Option (a)

2) A student performs an experiment where he planted two similar plants on two different pots. He covered one of them with a carton and placed the other plant close to the window. He provide equal amount of water to both of them. After 10 days the result in the growth of the plants is shown in the image.



Which of these statements can be concluded based on the activity?

- (a) Plants produces its own food
- (b) Plants require sunlight to grow
- (c) Plants can survive without air and water
- (d) Growth of a plant depends only on water supply

**Correct Answer:** Option (b)

**LOB: Identify the function of different physical feature that assist inhabitants to survive in harsh conditions**

1) When a person from the plains visits the mountains for the first time, they experience shortness of breath. This changes over the next few days as a person gets adapted. What happens in this process of adaptation?

- (a) The body undergoes an allergic reaction which later subsides
- (b) The body adjusts its breathing according to the air of the new habitat
- (d) The person gets used to the different flora and fauna of mountain habitats
- (c) The person feels homesickness but later gets used to being away from home

**Correct Answer:** Option (b)

2) A cactus in a desert lacks leaf. Instead of leaves, it's thick stem is responsible for photosynthesis. Why are leaves absent in these plants?

- (a) Leaves would have wilted easily in the strong desert Sun
- (b) Leaves are absent in cactus plants to save them from predators
- (c) Leaves would have caused increased loss of water from the plant

(d) Leaves are reduced to spines to protect from cold nights in the desert

**Correct Answer:** Option (c)

**LOB: Explore various adaptive features of different organisms in their habitats**

1) Snakes do not have protective modifications like Camels and Coyotes, to survive under the hot desert Sun for a long time. How are they considered a part of a desert's biodiversity?

(a) They only reside in a desert wherever there is an oasis

(b) They have a slimy coating which makes it easier for them to slither

(c) They are nocturnal and mostly stay deep underground during the day

(d) They are less mobile in a desert and feed off whatever is available nearby

**Correct Answer:** Option (c)

2) In an aquatic habitat, fish have streamlined bodies and respire underwater through their gills. However, mammals such as dolphins and whales also live in such habitats, but they do not have gills. How can they survive in aquatic habitats alongside fish?

(a) They respire through their skin

(b) They absorb the gases dissolved in the water they consume

(c) They absorb gases through the membranes present in their fins

(d) They hold their breath underwater and come up to breathe air via nostrils

**Correct Answer:** Option (d)

**LOB: Examine the idea that the absence of any one feature or characteristic of a habitat might not affect to balance**

1) A small lake was present at one end of a forest. Over the years, the lake dried up. What effect would this have had on the habitat and diversity of the forest?

(a) The amphibians from the lake would start living on dry land

(b) Absence of the lake would slowly turn the forest habitat barren

(c) Terrestrial plants and animals would inhabit the land where the lake was

(d) Only small terrestrial mammals would occupy the marshland left by the lake

**Correct Answer:** Option (c)

2) In a grassland, if one species of herbivores were to be extinct over the years, what effect would it likely have on the habitat?

(a) Other herbivores would also slowly go extinct and only predators would remain

(b) Another herbivore's population would grow and be stabilized by predators

(c) Grasses would grow uncontrollably and spread into the adjacent habitat

(d) The predator population would also slowly become extinct

**Correct Answer:** Option (b)

**LOB: Apply knowledge of life processes in studying a specimen for signs of life**



**1)** A child has trouble in understanding that all plants are living organisms, just like humans. Since they cannot move around like humans, other animals, birds and fish, what can be told to the child, that would make him consider that plants are also living things, like humans?

- (a)** Plants can absorb water from the soil
- (b)** Plants are present in large numbers and variety
- (c)** Plants can reproduce and create other young plants
- (d)** Plants are found in both, terrestrial and aquatic habitats

**Correct Answer:** Option (c)

**2)** A grain of wheat cannot move, photosynthesise its food or grow without conditions like soil, sunlight, water, minerals, etc. Can a seed be considered a living thing?

- (a)** Yes, because it is a product obtained from plants
- (b)** No, because it cannot survive on its own
- (c)** Yes, because seeds can respire
- (d)** No, because a seed is dormant

**Correct Answer:** Option (c)




### Activity

Activity	Adaptation to heat waves
Materials required	Handouts of the case study
Procedure	<p>Here are three examples of how the major urban centres of Chicago and New York City, as well as Wangaratta (a city in southwest Australia with fewer than 30,000 people) are adapting to heat waves. Please read these examples:</p> <ol style="list-style-type: none"> <li>1. One of the components of Chicago's ongoing Climate Action Plan involves identifying which parts of the city are "urban hot spots," in other words, areas in the city that experience the greatest (top 10%) surface temperatures during the day and/or night. City studies of urban hot spots revealed that many of the urban hot spots corresponded to areas in the city that had the least tree cover. In 1989, Chicago Mayor Richard Daley piloted the Green Streets Initiative to increase the city's urban tree cover. Since 1991, Chicago has planted over 600,000 trees, with an additional 1,000,000 trees to be planted by 2020.</li> <li>2. "Cool roofs" are designed to reflect more sunlight than traditional roofs and can be made of a variety of materials including reflective tiles etc, reflective shingles called cool asphalt shingles, and spray polyurethane foam. In addition, existing roofs can be transformed into cool roofs by applying coatings of reflective paint, reflective marble chips, or a protective sheet. New York City's "CoolRoofs" program encourages building owners to coat the top of their flat roofs with cool roof coating, a white membrane. Nearby, the Long Island Power Authority offers rebates for certain buildings that install new cool roofs or upgrade an existing roof into a cool roof.</li> </ol>

	<p>3. The "Rural City of Wangaratta" in Australia developed a Heatwave Response Plan in 2009. While the plan includes long-term responses to heat waves similar to programs in Chicago and New York, it also includes a short-term response plan that is implemented during heat waves. This plan includes extending the hours of operation of areas in which people can seek relief, such as air-conditioned community centres and swimming pools; suspending utility shutoffs for non-payment during heat waves; and establishing a community register. A community register is a list of residents (names, contact information, next of kin, and medical information) who are vulnerable to heat-related illnesses and/or socially isolated. People on the community register may choose to receive phone calls from volunteers or the police to check on their well-being during heat waves.</p>
Let's think	<ol style="list-style-type: none"><li>1) Name one benefit of installing a cool roof.</li><li>2) Uncertainty related to climate change means that many cities may need to adapt to increased climate variability. How do projects like the Green Streets Initiative have the potential to help cities adapt to heat waves?</li><li>3) What are some of the differences between adapting to heat waves in a major metropolitan area like New York City vs. a smaller city like Wangaratta? In which type of settlement do you think that adaptation to heat waves would be more challenging? Why?</li><li>4) Which, if any, of these adaptations to heat waves would be feasible in your city?</li></ol>

## Activity

Activity	How we respond to stimuli
Materials required	7-8 books
Procedure	<ol style="list-style-type: none"> <li>1) Tie 5-6 books together with a string.</li> <li>2) Ask a student to close her eyes, hand over a bunch of books in one hand only and wait for 5 sec.</li> <li>3) Ask other students to observe the action of the student carefully while removing the books.</li> <li>4) Next let the student hold the book in one's left hand, wait for 5 sec and remove the books.</li> <li>5) Ask students to observe each action carefully, now increase the wait of the books and hold it with both the hands.</li> <li>6) Hand over the books to the student and observe the action.</li> </ol> 
Let's think	<ol style="list-style-type: none"> <li>1) What kind of reaction did you observe in each case?</li> <li>2) Share such instances when you reacted towards sudden changes?</li> <li>3) Do you see plants reacting to changes happening around them?</li> <li>4) What can you conclude from the above activity about living organisms?</li> </ol>

# 10. Motion and measurement of distances

## QR Code:



## Learning Objectives:

Content area/ Concepts	Learning Objectives
Story of transport	Sequence different modes of transport from earliest to the most recent in order to suggest possible modification occurring over the period of time
Measurements	Construct a device by choosing appropriate materials in-order to measure length of given objects
	Hypothesize reasons for utilisation/usage of Standard units of measurement
	Summarize the rules associated with the measurement of length.
	Identify to find any errors associated with finding measurements using standard measurement devices
	Compare the measurement of length for an object using a scientific instrument and an ascientific instrument in order to differentiate between standard and non-standard units of measurement
	Explain the distortion in the size of continents when represented on a world map in order to explain the effect of projection from a 3D shape to a 2D plane
	Apply scientific inquiry to measure the length of an object in order to approximate the length of a curved line
Motion	Distinguish between rest and motion in order to classify objects as in motion or at rest.
	Find out the similarities and differences between the two objects based on the types of motion

**Learning Objectives and Learning Outcomes:**

Learning Objectives	Learning Outcomes
Compare the measurement of length for an object using a scientific instrument and an ascientific instrument in order to differentiate between standard and non-standard units of measurement	Differentiates materials and organisms, such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators; on the basis of their properties, structure and functions
Distinguish between rest and motion in order to classify objects as in motion or at rest.	
Distinguish between rest and motion in order to classify objects as in motion or at rest.	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Identify to find any errors associated with finding measurements using standard measurement devices	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction?)
Hypothesize reasons for utilisation/usage of Standard units of measurement	Examines and explains processes and phenomenon in order to relate them with causes: (such as, deficiency diseases with diet; adaptations of animals and plants with their habitats; quality of air with pollutants, etc.)
Explain the distortion in the size of continents when represented on a world map in order to explain the effect of projection from a 3D shape to a 2D plane	
Find out the similarities and differences between the two objects based on the types of motion	
Construct a device by choosing appropriate materials in-order to measure length of given objects	Measures physical quantities in order to express the measurement in SI units, e.g., length
Summarize the rules associated with the measurement of length.	
Identify to find any errors associated with finding measurements using standard measurement devices	

Compare the measurement of length for an object using a scientific instrument and an ascientific instrument in order to differentiate between standard and non-standard units of measurement	
Apply scientific inquiry to measure the length of an object in order to approximate the length of a curved line	
Sequence different modes of transport from earliest to the most recent in order to suggest possible modification occurring over the period of time	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)
Sequence different modes of transport from earliest to the most recent in order to suggest possible modification occurring over the period of time	Makes efforts to apply to daily life the understanding of environment and steps to conserve it, in order to contribute to the protection of the environment: (such as, minimising wastage of food, water, electricity and generation of waste; spreading awareness to adopt rain water harvesting; care for plants, etc.)



**LOB: Sequence different modes of transport from earliest to the most recent in order to suggest possible modification occurring over the period of time**

1) The image shows the bullock cart used in villages to transport the material from one place to another.



What change in the cart would be best to increase the efficiency of the vehicle?

- (a) Use of engine instead of bulls
- (b) Use of a greater number of drivers
- (c) By increasing the number of wheels
- (d) Attaching a greater number of wheels to the cart

**Correct Answer:** Option (a)

2) The evolution of modes of transport is shown in the image.



What factor is largely responsible for evolution of transportation?

- (a) The size of the vehicle
- (b) Use of animals for pulling
- (c) Use of wheels in the vehicle
- (d) The number of people driving the vehicle

**Correct Answer:** Option (c)

**LOB: Construct a device by choosing appropriate materials in-order to measure length of given objects**

1) A student wants to measure the length of the room. The student has various materials shown in the table.

Long wooden rod A 15 cm ruler A pen Piece of thread
--



What object can be chosen to measure the length of the room ?

- (a) A pen
- (b) A 15 cm ruler
- (c) Piece of thread
- (d) Long wooden rod

**Correct Answer:** Option (a)

2) A student wants to measure the length of the fencing of a garden. The student has a long wooden rod and a 30 cm ruler. What can the student do to measure the length of the fencing easily?

- (a) Measure the length of the fencing using foot steps
- (b) Find the number of rod lengths required for the length of the fencing
- (c) Measure the length of the fencing using a hand span and then measure the length of a hand span using the 30 cm ruler
- (d) Measure the length of the rod using the 30 cm ruler then find the number of rod lengths required for the length of the fencing

**Correct Answer:** Option (d)

**LOB: Hypothesize reasons for utilisation/usage of Standard units of measurement**

1) The standard unit of length is meter. Why the distance between two cities or two different location is measured in kilometres?

- (a) Because meter gives larger value than kilometre
- (b) Because the kilometre is more accurate than meter
- (c) Because measurement in kilometre is easy to measure for larger distances
- (d) Because measurement in kilometre does not need any device

**Correct Answer:** Option (c)

2) In ancient India, people used to measure the length with fist and hand span. What is the advantage of using of the 'Standard units of measurement' for measurements?

- (a) It is easy to measure
- (b) It gives the uniform result
- (c) It does not require any device
- (d) It does not require any calculation

**Correct Answer:** Option (b)

**LOB: Summarize the rules associated with the measurement of length.**

1) A student wants to measure the length of a desk using a ruler. What should be the first step of the student to measure the length?

- (a) Measure the approximate length using hand span
- (b) Coincides the '0' of the ruler with the starting point of the desk
- (c) Mark the starting point and last point of the desk with a pen
- (d) Place the end point of the ruler on the starting point of the desk

**Correct Answer:** Option (b)

2) The table shows the various steps for the measurement of length using a ruler.

A	Place the zero mark of the ruler on the beginning point of the object.
B	Scale should be placed along the length of the table.
C	Observe the reading of the last mark on the ruler by maintaining correct eye position.

Which option shows the correct order of steps to measure the length?

- (a) A, B, C
- (b) A, C, B
- (c) B, A, C
- (d) B, C, A

**Correct Answer:** Option (c)

**LOB: Identify to find any errors associated with finding measurements using standard measurement devices**

1) Two students measure the length of a window using hand span. The table shows the length of the window as reported by each student.

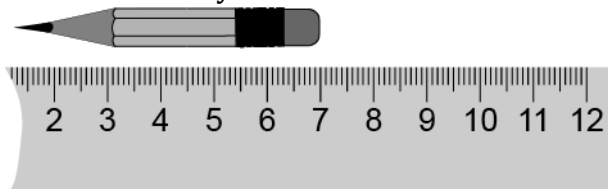
Student	Length of The Window (number of hand span)
B	4
C	3

Why is the length reported by the students different?

- (a) Because the length of hand span of A is greater than B
- (b) Because the length of hand span of B is greater than A
- (c) Because measuring with hand span requires an external device
- (d) Because the measurement with hand span needs further calculation

**Correct Answer:** Option (b)

2) A student measures the length of the pencil using a broken ruler. The image shows the measurement by the broken ruler.



The student made an error and records the length of the pencil as 7 cm. How can this error be removed?

- (a) By measuring with the hand span
- (b) By adding the initial and final reading
- (c) By measuring the length from the end of the ruler
- (d) By subtracting the initial reading from final reading

**Correct Answer:** Option (d)

**LOB: Compare the measurement of length for an object using a scientific instrument and an ascientific instrument in order to differentiate between standard and non-standard units of measurement**

1)Two students measured the length of a desk using hand span and a metre scale. The table shows the measurements reported by the students.

Student	Length Measured By Hand Span	Length Measured By Metre Scale (cm)
P	5	70
Q	6	70.1

Which option correctly compares the measurement by hand span and metre scale?

- (a) Measurement by hand span always gives uniform result
- (b) Measurement by hand span does not require any calculation
- (c) Measurement by scale gives accurate results than the hand span
- (d) Measurement by scale gives the less accurate results than the hand span

**Correct Answer:** Option (c)

2)Two students measure the length of a curved surface using a string. The students then measured the length of the string with different methods as shown.

Student	Method
P	A metre scale
Q	Hand span

Which option compares the accuracy of the used methods?

- (a) Both a meter scale and hand span give accurate result
- (b) Both a meter scale and hand span give inaccurate result
- (c) The meter scale gives more accurate results than hand span
- (d) Hand span gives more accurate results than the meter scale

**Correct Answer:** Option (c)

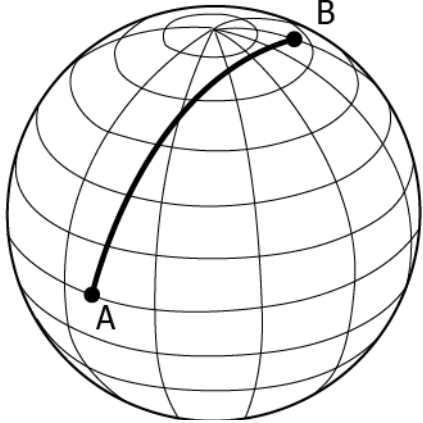
**LOB: Explain the distortion in the size of continents when represented on a world map in order to explain the effect of projection from a 3D shape to a 2D plane**

1)When a two- dimensional map of different continents is developed using a globe, what property of the continents on the globe is most likely to get affected?

- (a) The size of the continents
- (b) The shape of the continents
- (c) The location of the continents
- (d) The North and South Pole of Earth

**Correct Answer:** Option (a)

2) A student developed a two-dimensional map using a globe. Every 10 cm distance on the globe is represented by 5 cm distance on the map.



If the distance between the two points A and B on the globe is 30 cm, what would be the distance between A and B on map?

- (a) 5 cm
- (b) 15 cm
- (c) 30 cm
- (d) 60 cm

**Correct Answer:** Option (b)

**LOB: Apply scientific inquiry to measure the length of an object in order to approximate the length of a curved line**

1) A student wants to measure the length of a curved line. Which of the given methods the student should use to measure the length correctly?

- (a) using a thread
- (b) with foot steps
- (c) with hand span
- (d) using a metre scale

**Correct Answer:** Option (a)

2) A student measures the circumference of a circular table using a thread. How should the student get the circumference of table in standard units of measurement?

- (a) Measure the length of the thread using hand span
- (b) Measure the length of the thread using a metre scale
- (c) Measure the length of the thread using foot steps
- (d) Measure the length of the thread by placing between the chin and outstretching the arm

**Correct Answer:** Option (b)

**LOB: Distinguish between rest and motion in order to classify objects as in motion or at rest.**

1) The table lists four different objects/observations.

P	A wax statue
Q	Earth around the Sun
R	Pendulum of the clock
S	Marching of the Soldiers

Which option represents an object at rest and an object in motion?

- (a) P and Q
- (b) Q and R
- (c) R and S
- (d) Q and S

**Correct Answer:** Option (a)

2) The table shows the position two balls A and B at different times.

Time	Position				
1.00 PM	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">(A)</td> <td style="text-align: center;">(B)</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">Z</td> </tr> </table>	(A)	(B)	X	Z
(A)	(B)				
X	Z				
1.30 PM	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">(A)</td> <td style="text-align: center;">(B)</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">Z</td> </tr> </table>	(A)	(B)	X	Z
(A)	(B)				
X	Z				

According to the given observation, which option defines the motion of the two balls?

- (a) Both Ball A and B were in motion
- (b) Both Ball A and B remain at rest
- (c) Ball A was in motion and Ball B remains at rest
- (d) Ball B was in motion and Ball A remains at rest

**Correct Answer:** Option (d)

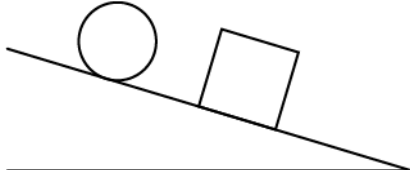
**LOB: Find out the similarities and differences between the two objects based on the types of motion**

1) What is the similarity between the motion of the pendulum and the rotation of Earth around the Sun?

- (a) Both moves in a straight line
- (b) Both show periodic motion
- (c) Both follow circular motion
- (d) Both rotate on their respective axis

**Correct Answer:** Option (b)

2) The image shows a sphere and cubical block on a ramp.



Both the objects slide down the ramp. What is the difference in the motion of the sphere and the block?

- (a) Sphere follows linear motion but block follows rotation
- (b) Sphere follows only rotation and block follows linear motion
- (c) Sphere follows a combination of motion but block follows linear motion
- (d) Sphere follows linear motion but block follows combination of motion

**Correct Answer:** Option (c)



### Activity

Activity	Designing our own transport
Materials required	Empty milk cartons/used plastic water bottles/Styrofoam bowls, for transportation system wheels, such as CDs, straws, etc., pencils/toothpicks/Popsicle sticks, etc, construction paper, rulers, tape, glue, string, scissors, small rocks or weights
Procedure	<ol style="list-style-type: none"> <li>1) Organize the students into pairs.</li> <li>2) Read the Introduction section to students, and explain that their goal is to design and build a transportation system to move heavy materials from one place to another. The catch is that they will be traveling back in time a few thousand years! They have been hired as a lead engineer in ancient times to arrange the transportation of stone for a huge project — the building of an amazing Taj mahal!</li> <li>3) Show students the available materials. Then give them sheets of paper and have them brainstorm and sketch designs.</li> <li>4) Inform students that they must check their designs with the instructor <i>before</i> they start building.</li> <li>5) Once sketches are approved, have them begin building.</li> <li>6) At the end, students can demonstrate their work.</li> </ol>
Let's think	<ol style="list-style-type: none"> <li>1) Is your design goal to transport many smaller stone blocks, or fewer large stone blocks?</li> <li>2) Is the speed or distance you must transport the stone blocks your primary concern? Why?</li> <li>3) What materials are you using in your design? Why did you choose these?</li> <li>4) Why do wheels make material transportation easier?</li> </ol>

Activity	Measure twice
Materials required	Ruler, meter stick
Procedure	<ol style="list-style-type: none"> <li>1) Give a list of objects students to measure: height/width of your desk, width of eraser, width of the hallway, thickness of book etc.</li> <li>2) Ask students to make guesses of the measurements of the given objects.</li> <li>3) Have students use meter sticks or rulers to give the correct measurements of the objects.</li> </ol>
Let's think	<ol style="list-style-type: none"> <li>1) For measuring width of eraser/book which unit did you use?</li> <li>2) Can you estimate how far from school you live in meters? Does this seem like a long way away?</li> <li>3) Why is it important for engineers to take accurate measurements?</li> </ol>



# 11. Light, shadows and reflections

**QR Code:**



**Learning Objectives:**

Content area/ Concepts	Learning Objectives
Transparent, opaque and translucent objects	Distinguishes objects based on the emission of light by them and visibility through them.
What exactly are shadows?	Concludes that there should be a source of light, opaque object and a surface for shadows to form.
	Evaluates criteria for formation of shadows and makes judgment about situations like, shadow of an airplane flying at a higher altitude and shadow of a bird flying nearer to the ground
A pinhole camera	Represents working of a pinhole camera diagrammatically
	Summarizes the characteristics of image formed by a pinhole camera
Mirrors and reflections	Makes conclusion about the nature of reflection shown by a plane mirror.
	Distinguish between shadows & reflections.

**Learning Objectives and Learning Outcomes:**

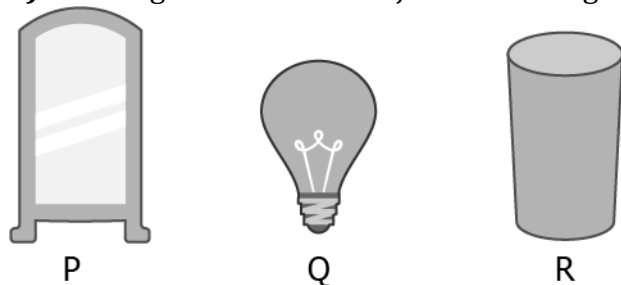
Learning Objectives	Learning Outcomes
Distinguishes objects based on the emission of light by them and visibility through them.	Differentiates materials and organisms, such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators; on the basis of their properties, structure and functions
Distinguish between shadows & reflections.	
Concludes that there should be a source of light, opaque object and a surface for shadows to form.	Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, processing of plant fibres; movements in
Summarizes the characteristics of image formed by a pinhole camera	

Makes conclusion about the nature of reflection shown by a plane mirror.	plants and animals; formation of shadows; reflection of light from plane mirror; variations in composition of air; preparation of vermicompost, etc.)
Represents working of a pinhole camera diagrammatically	Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, pinhole camera, periscope, electric torch, etc
Makes conclusion about the nature of reflection shown by a plane mirror	
Evaluates criteria for formation of shadows and makes judgment about situations like, shadow of an airplane flying at a higher altitude and shadow of a bird flying nearer to the ground	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)



**LOB: Distinguishes objects based on the emission of light by them and visibility through them.**

1) The image shows three objects made of glass.



Which object has the ability to emit light?

- (a) Only P
- (b) Only Q
- (c) Only P and Q
- (d) Only P and R

**Correct Answer:** Option (b)

2) A student is making a model of a garden. He wants to cover the model with a sheet that allows everyone to see through it. Which sheet should the student use?

- (a) paper
- (b) clear plastic wrap
- (c) aluminium foil
- (d) cotton cloth

**Correct Answer:** Option (b)

**LOB: Concludes that there should be a source of light, opaque object and a surface for shadows to form.**

1) A student stands in front of a lamp to produce the shadow of his body. The shadow of the boy is formed on the screen as shown.



What can be concluded from the observation regarding formation of the shadows?

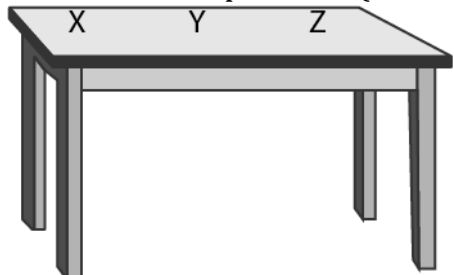
- (a) the screen must be placed in front of the opaque object
- (b) the opaque object must be placed behind the source of light
- (c) the opaque object must be placed between source of light and the screen
- (d) the source of light must be placed between the opaque object and the screen

**Correct Answer:** Option (c)

2) A student has the given objects for an experiment.

- A candle
- A white cardboard
- A ball
- A mirror

There are three positions (X, Y, and Z) marked on the table.



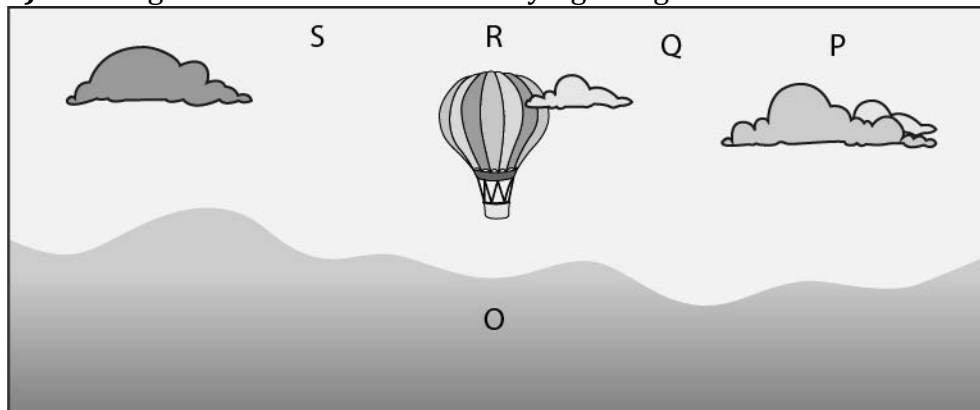
What should be placed at these positions to form an image on the white cardboard?

- (a) X: candle, Y: ball, Z: mirror
- (b) X: mirror, Y: ball, Z: cardboard
- (c) X: candle, Y: ball, Z: cardboard
- (d) X: ball, Y: candle, Z: cardboard

**Correct Answer:** Option (c)

**LOB: Evaluates criteria for formation of shadows and makes judgment about situations like, shadow of an airplane flying at a higher altitude and shadow of a bird flying nearer to the ground**

1) The image shows a hot air balloon flying at higher altitude.

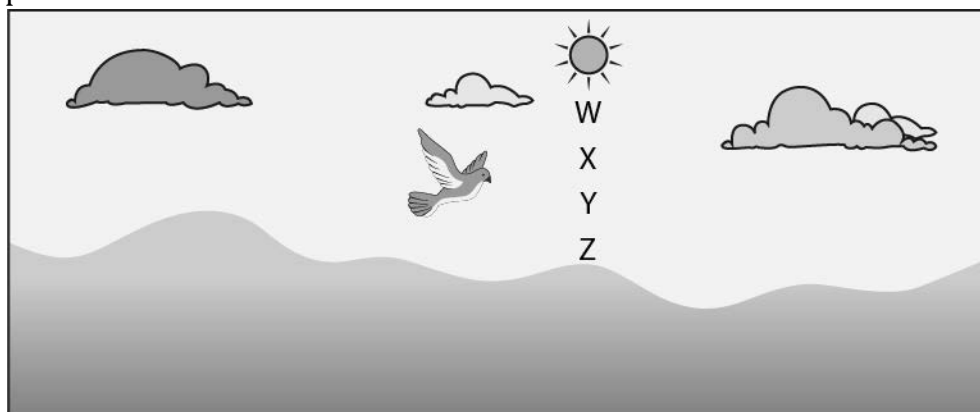


What should be the position of the Sun to get the shadow of the hot air balloon at O?

- (a) at P
- (b) at Q
- (c) at R
- (d) at S

**Correct Answer:** Option (c)

2) A student learns that the closer the object to the source of light, larger the shadow will be formed on the surface. The image shows the bird flying under the sun and four different positions.



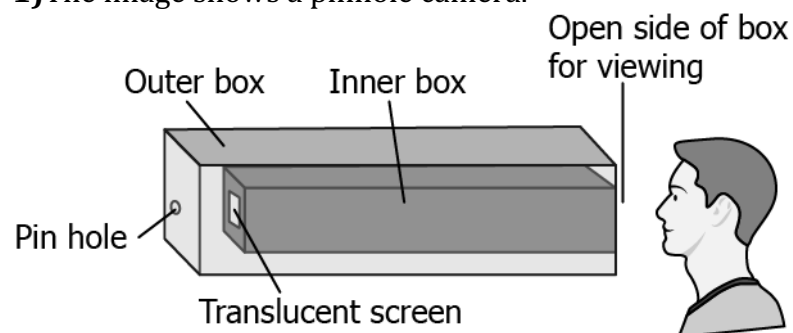
At which position the shadow of the bird will be larger?

- (a) at W
- (b) at X
- (c) at Y
- (d) at Z

**Correct Answer:** Option (a)

**LOB: Represents working of a pinhole camera diagrammatically**

1) The image shows a pinhole camera.

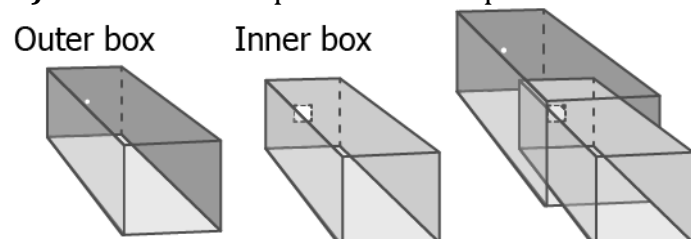


Where does the image of the object in the pinhole camera form?

- (a) at the pinhole
- (b) at the translucent screen
- (c) on the inner surface of the inner box
- (d) on the upper surface of the outer box

**Correct Answer:** Option (b)

2) A student develops a model of a pinhole camera using two boxes as shown.



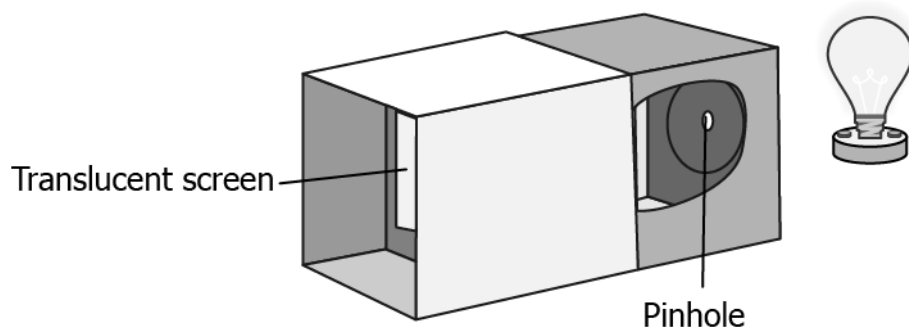
The student put the small box in the big box. He starts observing the object through the pinhole camera but does not get the clear image. What should the student do to get a clear image?

- (a) turn the sides of the inner box
- (b) make a pinhole in the inner box
- (c) paste a tracing paper on the outer box
- (d) move the inner box forward or back

**Correct Answer:** Option (d)

**LOB: Summarizes the characteristics of image formed by a pinhole camera**

1) A student observes the lighted bulb through the pinhole camera as shown.

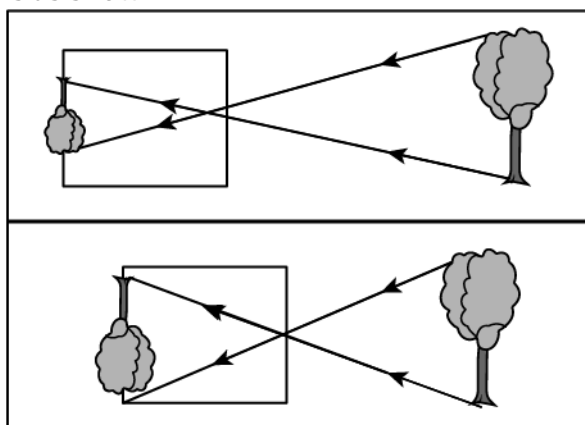


Which option shows the image formation of the bulb in the camera?

- (a) erect image at pinhole
- (b) upside down image at pinhole
- (c) erect image at translucent screen
- (d) upside down image at translucent screen

**Correct Answer:** Option (d)

2) A student observes a tree using a pinhole camera. She decreases the distance between the tree and the camera and looks at the tree through the camera again. The image formed is as shown.



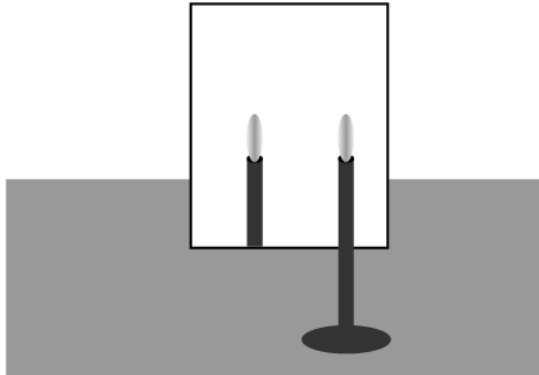
What can be concluded from the image?

- (a) farther the object, larger the erect image
- (b) farther the object, smaller the erect image
- (c) closer the object, larger the inverted image
- (d) closer the object, smaller the inverted image

**Correct Answer:** Option (c)

**LOB: Makes conclusion about the nature of reflection shown by a plane mirror**

1)The image shows the reflection of a candle.

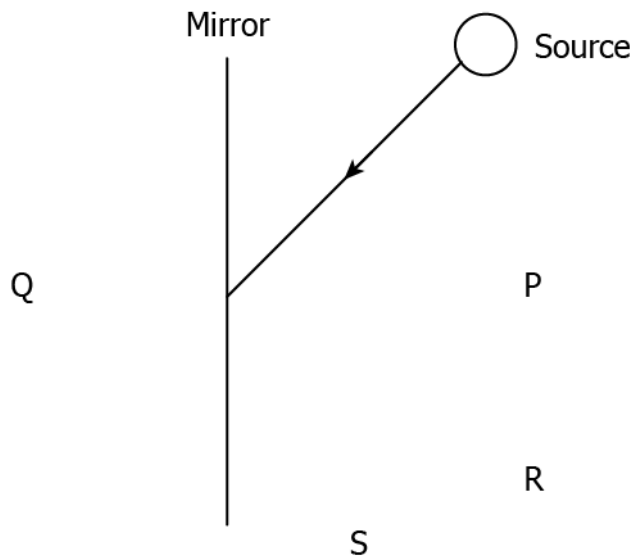


Which statement is correct based on the observation?

- (a) plane mirror produces an upright image of the same size
- (b) plane mirror produces an upright image of a smaller size
- (c) plane mirror produces an upside-down image of the same size
- (d) plane mirror produces an upside-down image of a smaller size

**Correct Answer:** Option (a)

2)A student flashed a light from source on a mirror, as shown



In which direction is the light likely to be reflected from the mirror?

- (a) towards P
- (b) towards Q
- (c) towards R
- (d) towards S

**Correct Answer:** Option (c)

**LOB: Distinguish between shadows & reflections.**

1) A student makes two setups using a torch and a ball to study (i) formation of shadows and (ii) Reflection of light. The table below shows some material that was used in creating two setups.

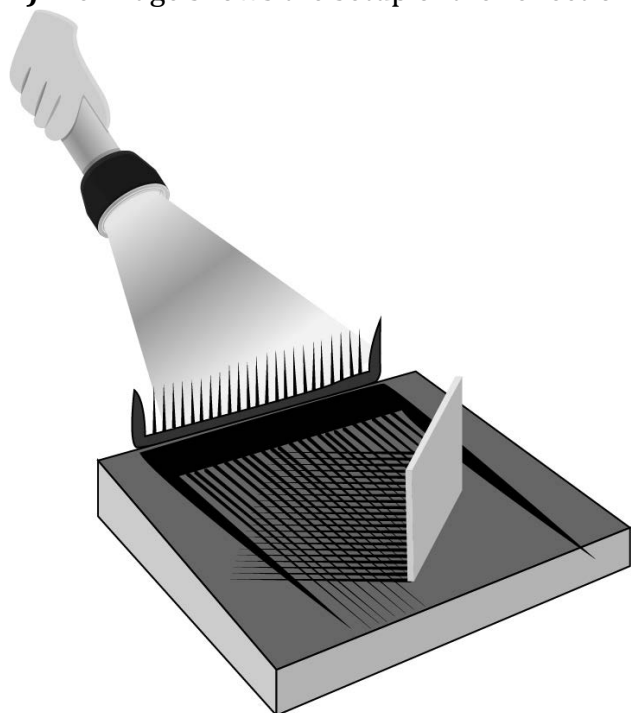
A mirror
A glass sheet
A cardboard sheet
A tracing paper

Which pair of the given material could be used in addition to the torch and the ball to demonstrate formation of shadow and reflection of light?

- (a) Shadow: glass sheet, Reflection: mirror
- (b) Shadow: cardboard sheet, Reflection: mirror
- (c) Shadow: tracing paper, Reflection: glass sheet
- (d) Shadow: cardboard sheet, Reflection: tracing paper

**Correct Answer:** Option (a)

2) The image shows the setup of the reflection and shadow formation.



What can be concluded by the observation?

- (a) shadow forms when light is blocked by an object, whereas reflection is bouncing of light
- (b) shadow forms when light passes through an object, whereas reflection is absorption of light
- (c) a shadow forms when the light is blocked by an object, whereas reflection is absorption of light
- (d) a shadow forms when the light passes through an object, whereas reflection is bouncing of light


**Correct Answer:** Option (a)





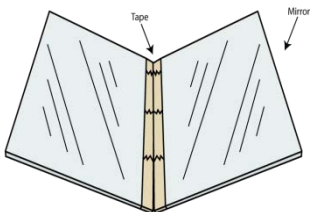
**I**

**Activity**

Activity	Sunlight your home
Materials required	Transparent bottle filled with water, cardboard box, tape, black plastic bottle (for cover).
Procedure	<ol style="list-style-type: none"> <li>1) Take a cardboard box and stick pictures inside the box.</li> <li>2) Seal all the joints with tape. Make a peep hole on one side. Make another hole on top to suspend a water bottle.</li> <li>3) Suspend a transparent bottle filled with water in the box. Half bottle will be out and half will be inside the box.</li> <li>4) Go out in the Sun. View through the peephole. You will see the Doll's House brightly lit.</li> <li>5) Cut a bottle in half and cover it with black paper.</li> <li>6) Camouflage the water bottle with the covered bottle. It will be pitch dark inside. Lift the cover to see bright light inside the box.</li> </ol> 
Let's think	<ol style="list-style-type: none"> <li>1) Can we use any other bottle in place of a transparent one? Why or why not?</li> <li>2) Discuss about the places where people use this technique to light their houses?</li> </ol>

## 2

## Activity

Activity	Plane mirror reflection
Materials required	Protractor, Two identical, small plane mirrors, Modelling clay, Small object (coin, small figure, etc.), Strip of paper, Pen, tape
Procedure	<ol style="list-style-type: none"> <li>1) Tape your mirrors together so that they can be opened and closed like a hinge as shown in picture.</li> <li>2) Mark angles of 30, 36, 45, 60, 90, 120 and 180 degrees on a piece of paper using your protractor.</li> <li>3) Place the hinge of your mirrors at the vertex of your marked angles.</li> <li>4) Embed the mirrors in clay to make it stand.</li> <li>5) Open the mirrors at the angle of 180 degrees.</li> <li>6) Place your object in the middle of the mirrors and look at the reflection. Note down your observation.</li> <li>7) Keeping the object equally between the two mirrors, move the mirrors together into the other angles you marked out with your protractor and note down your observations.</li> </ol> <div style="text-align: center;">  </div>
Let's think	<ol style="list-style-type: none"> <li>1) How many objects do you see at each angle?</li> <li>2) Is there something about the angle that can help you predict how many objects you will see?</li> <li>3) Is every reflected image has the same brightness?</li> </ol>

# 12. Electricity and circuits

## QR Code:



## Learning Objectives:

Content area/ Concepts	Learning Objectives
Electric cell	Describe the structure and function of the electric cell
A bulb connected to an electric cell	Analyse the flow of current in a simple electric circuit with battery, bulb and wires to identify necessary condition to ensure flow of current.
An electric circuit	Distinguish between complete and incomplete circuit with a well labelled figure
Electric switch	Make a simple working model of an electric switch with easily available materials
Electric conductors and insulators	Test items to classify them as conductor and insulator in order to examine the role of conductors and insulators in day-to-day life.
	Infer why metals like copper and aluminium are used for making wires for domestic & industrial purposes

## Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Distinguish between complete and incomplete circuit with a well labelled figure	Differentiates materials and organisms, such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators; on the basis of their properties, structure and functions
Test items to classify them as conductor and insulator in order to examine the role of conductors and insulators in day-to-day life.	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)

Analyse the flow of current in a simple electric circuit with battery, bulb and wires to identify necessary condition to ensure flow of current.	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction?)
Describe the structure and function of the electric cell	Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, processing of plant fibres; movements in plants and animals; formation of shadows; reflection of light from plane mirror; variations in composition of air; preparation of vermicompost, etc.)
Distinguish between complete and incomplete circuit with a well labelled figure	Draws labelled diagrams/flow charts of organisms and processes in order to demonstrate knowledge of structure/processes/relationships: (such as, parts of flowers; joints; filtration; water cycle, etc.)
Analyse the flow of current in a simple electric circuit with battery, bulb and wires to identify necessary condition to ensure flow of current.	Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, pinhole camera, periscope, electric torch, etc
Make a simple working model of an electric switch with easily available materials	
Infer why metals like copper and aluminium are used for making wires for domestic & industrial purposes	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)
Infer why metals like copper and aluminium are used for making wires for domestic & industrial purposes	Makes efforts to apply to daily life the understanding of environment and steps to conserve it, in order to contribute to the protection of the environment: (such as, minimising wastage of food, water, electricity and generation of waste; spreading awareness to adopt rain water harvesting; care for plants, etc.)



**LOB: Describe the structure and function of the electric cell**

1) The image represents an electric cell.

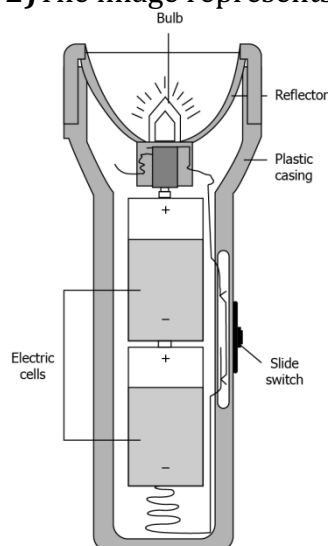


Which of these describes the structure of an electric cell?

- (a) Metal cap with a negative sign on both sides
- (b) Metal cap on top, metal disc on bottom and a positive sign on both ends
- (c) Metal disc on both ends with a positive on top and negative sign at bottom
- (d) Metal cap with a positive sign on top and a metal disc with negative sign at the bottom

**Correct Answer:** Option (d)

2) The image represents the parts of a torch light.



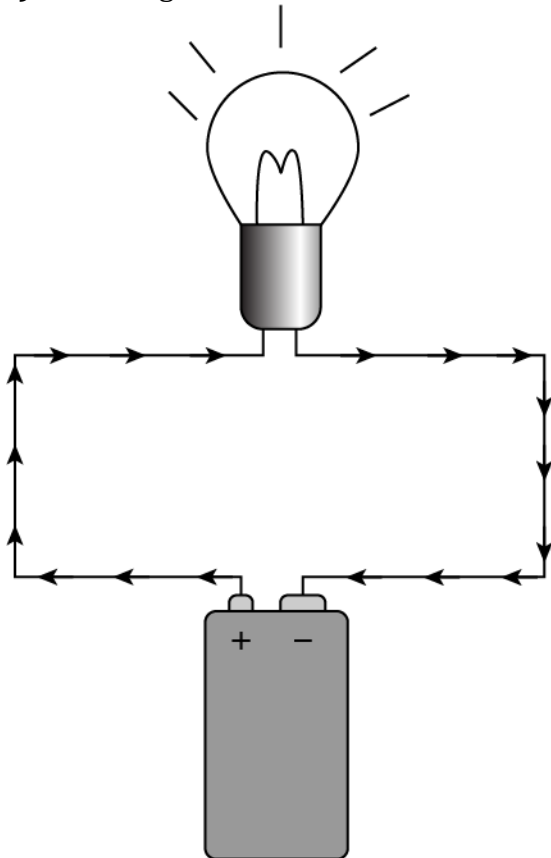
Which of these represents the function of the electric cell in the torch?

- (a) Spread the light to a larger area
- (b) Supply electricity to light the bulb
- (c) Protect internal parts from damage
- (d) Make it easy to open or close the circuit

**Correct Answer:** Option (b)

**LOB: Analyse the flow of current in a simple electric circuit with battery, bulb and wires to identify necessary condition to ensure flow of current.**

1) :The image shows a closed electric circuit.

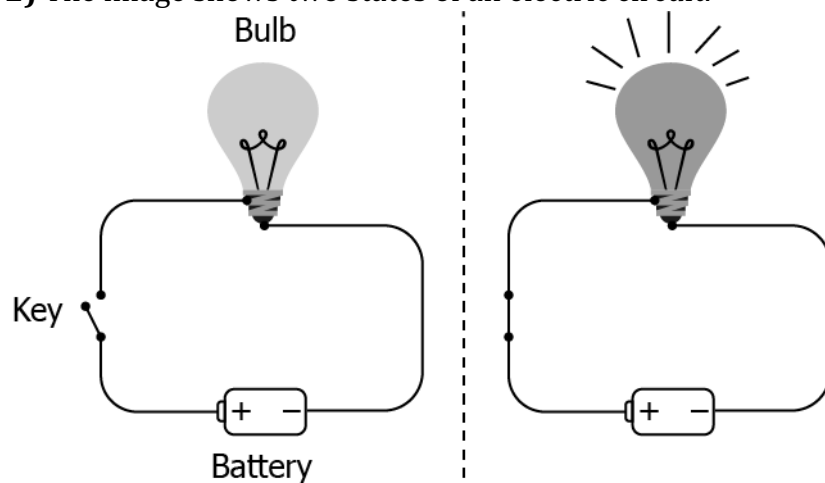


Which of these describes the correct flow of electricity in an electric circuit?

- (a) Negative terminal of the bulb through the battery and back to the positive terminal of the bulb
- (b) Positive terminal of the bulb through the battery and back to the negative terminal of the bulb
- (c) Negative terminal of the battery through the bulb and back to the positive terminal of the battery
- (d) Positive terminal of the battery through the bulb and back to the negative terminal of the battery

**Correct Answer:** Option (d)

2) The image shows two states of an electric circuit.



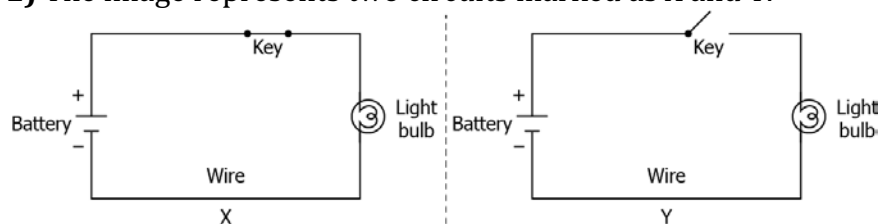
Which of these explains the necessary condition to continue the flow of current?

- (a) Presence of a key
- (b) Completion of the circuit
- (c) Wires of different length
- (d) Positive and negative sign on the cell

**Correct Answer:** Option (b)

**LOB: Distinguish between complete and incomplete circuit with a well labelled figure**

1) The image represents two circuits marked as X and Y.

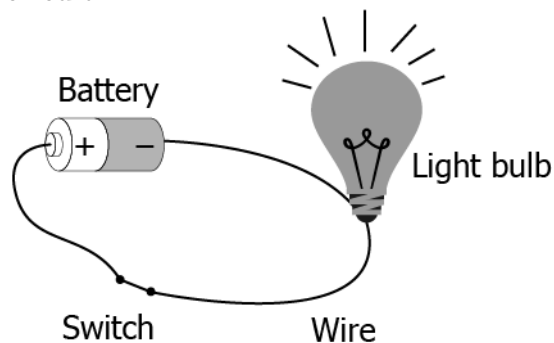


Which of these matches the correct type of circuit?

- (a) X → Complete, Y → Complete
- (b) X → Complete, Y → Incomplete
- (c) X → Incomplete, Y → Complete
- (d) X → Incomplete, Y → Incomplete

**Correct Answer:** Option (b)

2) A student observes the circuit shown in the image and concludes that it is a complete circuit.



Which of these evidences supports the argument of the student?

- (a) Presence of switch
- (b) Glowing of the bulb
- (c) Presence of light bulb
- (d) Unequal length of two wires

**Correct Answer:** Option (b)

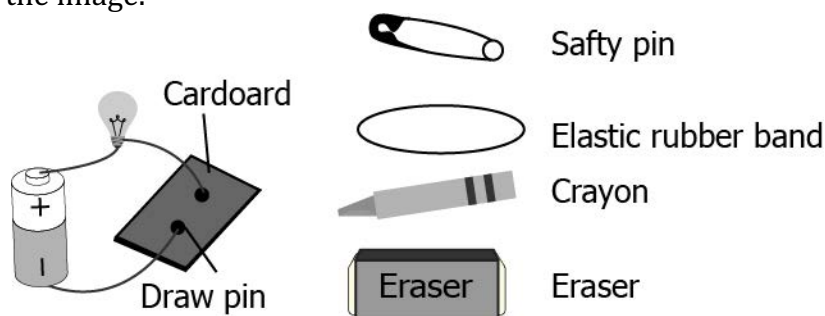
**LOB: Make a simple working model of an electric switch with easily available materials**

1) Which of these materials can be used to make a switch for an electric circuit?

- (a) Eraser
- (b) Straw
- (c) Paper clip
- (d) Pencil

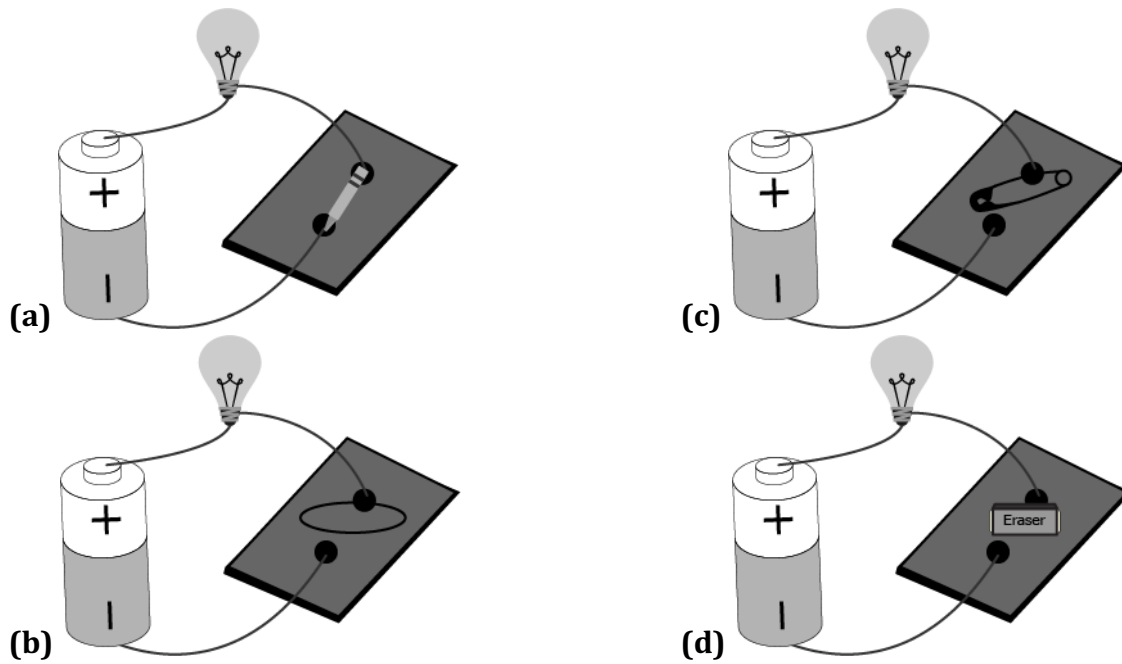
**Correct Answer:** Option (c)

2) A student wants to make a switch for an electric circuit using a few materials shown in the image.



Which of these arrangements represents a switch that can connect and break the flow of electricity in the circuit?

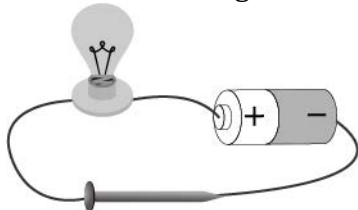




**Correct Answer:** Option (c)

**LOB: Test items to classify them as conductor and insulator in order to examine the role of conductors and insulators in day-to-day life.**

1) A student connects the open ends of an electric circuit to the opposite end of a nail as shown in the image. He observes that the light bulb glows.



Which other material if replaced with the nail would help the bulb glow?

- (a) Paper clip
- (b) Plastic pipe
- (c) Cotton string
- (d) Piece of cardboard

**Correct Answer:** Option (a)

2) A student studies that electric wires generally have a plastic or rubber coating around them. Which of these describes the role of the coating in a wire?

- (a) It ensures safe transfer of electricity
- (b) It reduces the wastage of electricity in the wires
- (c) It enables transfer of electricity to long distances
- (d) It helps electricity to move faster through the wires

**Correct Answer:** Option (a)

**LOB: Infer why metals like copper and aluminium are used for making wires for domestic & industrial purposes**

1) The table lists a few conducting materials. The materials are arranged in descending order of their conductivity.

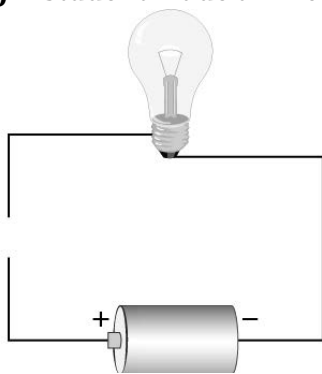
- |              |
|--------------|
| 1. Copper    |
| 2. Aluminium |
| 3. Tin       |
| 4. Lead      |
| 5. Bronze    |

Which of these materials would make the best wire for the transfer of electricity?

- (a) Aluminium
- (b) Bronze
- (c) Copper
- (d) Tin

**Correct Answer:** Option (c)

2) A student made an incomplete circuit with a small gap as shown in the image.



He placed a few different materials in the gap and noted the intensity of the light produced by the bulb.

Material	Intensity of Light
Glass	Lamp does not glow
Lead	Dim
Steel	Bright
Copper	Very bright

What can be concluded based on the activity?

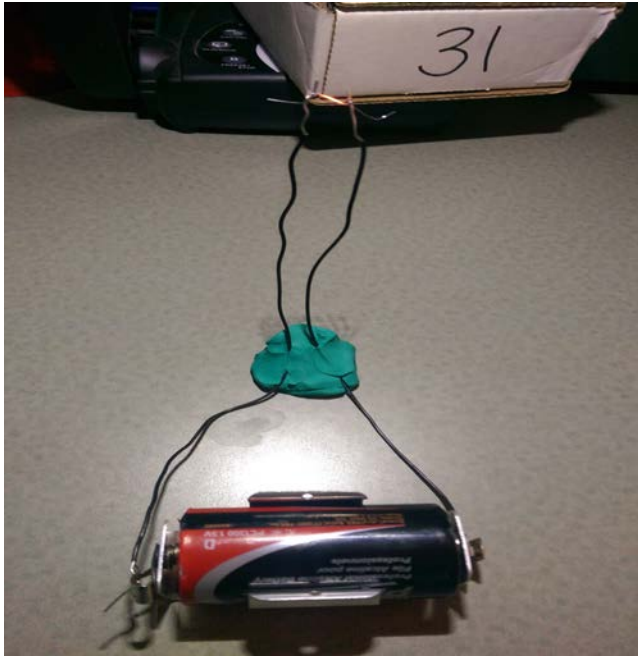
- (a) Steel should be used to make insulating cover for electric wires
- (b) Copper is the best materials to conduct electricity
- (c) Lead is the best material for making wires
- (d) Glass can be used to store electricity

**Correct Answer:** Option 2



# I

## Activity

Activity	Nichrome wire, clay, battery holder, D-cell battery, three wires
Materials required	Nichrome wire, clay, battery holder, D-cell battery, three wires
Procedure	<ol style="list-style-type: none"> <li>1) Put your ball of clay onto the desk.</li> <li>2) Put two wires into the clay so that the middle part of each wire is in the clay and both metal ends of the wire are sticking out.</li> <li>3) Carefully wrap the nichrome wire around the metal part each of the wires sticking out of the clay. Leave about <math>\frac{1}{2}</math> inch of nichrome wire between the metal wires.</li> <li>4) Connect the other end of each wire to a battery in a battery holder.</li> <li>5) Connect the batteries with another segment of the wire.</li> </ol>
	 <p><b>“ Be careful, when you connect the batteries the nichrome wire will get hot enough to burn your fingers. Do not touch it.”</b></p>

Let's think	<ol style="list-style-type: none"> <li>1) What kind of challenges occurred while making a bulb model?</li> <li>2) Draw the diagram to represent the direction of current in an electric circuit which you can observe in your home</li> </ol>
-------------	---

2

**Activity**

Activity	Case study: Life before and after electricity
Materials required	Copies of this article
Procedure	<p>Can we imagine life without electricity? In today's day and age of television, mobile phones and other gadgets, it seems impossible. But many people in rural India have never ever seen an electric bulb, leave alone benefited from its many other uses that we in the cities are lucky to enjoy every day.</p> <p>In many Indian villages, life comes to a standstill as soon as the sun sets – food has to be cooked before it gets dark and children have to finish their studies. The alternative is the dim light of kerosene lamps, and the oil for these lamps is not affordable for the poor. Farms without electricity cannot use tube wells and borewells to irrigate their fields, people cannot charge their phones to call family and friends, there are no fans to cool homes in the summer heat, and there is, of course, no television that brings in news of the outside world.</p> <p>Here are some stories from villages around the country that were recently electrified under the Deen Dayal Upadhyaya Gram Jyoti Yojana. The impact, expectedly, has been amazing.</p> <p><b>Udmari village, Nagaon district, Assam</b> The residents of Udmari village have seen electricity for the first time in 30-40 years. According to villagers Amina Begam and Aatur Rahman, earlier they used kerosene lamps for lighting at night time. However, since most families depended on cultivation and fisheries for subsistence, buying kerosene daily was not affordable for them. For agricultural purposes, they used diesel pumps, which were very costly to operate. With the provision of electricity after so many years, life has drastically changed for the better.</p> <p><b>Damdama Village, Jamui district, Bihar</b>“Our children also used to study under kerosene lamplight, which adversely affected their eyesight,” says Sikandar Kumar, one of the residents of Damdama village, adding that before access to electricity, the residents of the</p>

	<p>village had always been using kerosene for cooking and lighting purposes.</p> <p><b>Adaparaigondi habitation (9 households), Visakhapatnam district, Andhra Pradesh</b> “We lived in the dark for years. We didn’t have mobile phones for contacting our relatives living in other parts of the state,” says Vanthala Srinu. Now, he is using a fan and is also planning to purchase a television. He also has a mobile phone that can be charged at his home.</p>
Let’s think	<ol style="list-style-type: none"><li>1) What will happen if we don’t have electricity for a day?</li><li>2) Do you experience power cuts in the summer? What could be the reason for the power cut?</li><li>3) Why do we need to use electricity sensibly? If yes, suggest ways to save electricity.</li></ol>

# 13. Fun with magnets

## QR Code:



## Learning Objectives:

Content area/ Concepts	Learning Objectives
Magnetic and non-magnetic materials	Outline the events responsible for the discovery of natural magnets.
	Classify given substances as magnetic & non-magnetic based on their ability to be attracted by magnets
Poles of magnet	Suggest an activity to determine the poles of a magnet
Finding directions	Create a set up using magnet in order to find the direction.
Make your own magnet	Make a magnet in order to demonstrate how artificial magnets can be created.
Attraction and repulsion between magnets	Analyse what happens when two magnets are placed together in order to conclude the property of magnet.

## Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Classify given substances as magnetic & nonmagnetic based on their ability to be attracted by magnets	Uses observable properties, in order to classify materials, organisms and processes: (such as, materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular, periodic etc.)
Outline the events responsible for the discovery of natural magnets.	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the food nutrients present in animal fodder? Can all physical changes be
Suggest an activity to determine the poles of a magnet	

Analyse what happens when two magnets are placed together in order to conclude the property of magnet.	reversed? Does a freely suspended magnet align in a particular direction?)
Create a direction finder in order to find the direction.	Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, pinhole camera, periscope, electric torch, etc
Make a magnet in order to demonstrate how artificial magnets can be created.	
Create a set up using magnet in order to find the direction.	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/drought, etc.)

**LOB: Outline the events responsible for the discovery of natural magnets**

1) Which of these events is responsible for the discovery of natural magnets?

- (a) A lightning strike on land
- (b) Shaking of the Earth surface
- (c) Rocks attracting pieces of iron
- (d) Bigger rocks breaking into smaller pieces

**Correct Answer:** Option (c)

2) A shepherd takes his herd of sheep for grazing in a region with rocks, trees and long stretches of grassland. He used a stick that had a small iron piece attached at one end to control the herd. One day he noticed that the iron in the stick was attracted to a part of the rock. Which of these events explain the presence of a natural magnet?

- (a) The herd of a sheep grazing on grass
- (b) Using a stick to control the herd of sheep
- (c) The stick being attracted to a part of a rock
- (d) Attaching a piece of iron to one end of a stick

**Correct Answer:** Option (c)

**LOB: Classify given substances as magnetic & non-magnetic based on their ability to be attracted by magnets**

1) The table lists a few substances.

- |                  |
|------------------|
| 1. Eraser        |
| 2. Nail          |
| 3. Pencil        |
| 4. Safety pin    |
| 5. Plastic Ruler |

Which of these substances are likely to be attracted to a magnet?

- (a) Nail and Pencil
- (b) Eraser and Pencil
- (c) Nail and Safety pin
- (d) Plastic Ruler and Pencil

**Correct Answer:** Option (c)



2) A student performs an activity to separate some objects without handpicking them. The mixture contains a few substances listed in the table.

- |  |
|--|
| 1. Coins<br>2. Pencils<br>3. Rubber ball<br>4. Drawing pins<br>5. Pieces of papers |
|--|

He brought a large piece of magnet close to the mixture. He noticed that drawing pins and coins stuck to it the magnet. Which option correctly classifies the objects based on their property?

(a)

Magnetic	Non-Magnetic
1. Coin 2. Drawing pins 3. Rubber ball	1. Pencils 2. Pieces of paper

(b)

Magnetic	Non-Magnetic
1. Rubber ball 2. Pencils 3. Pieces of paper	1. Coin 2. Drawing pins

(c)

Magnetic	Non-Magnetic
1. Coin 2. Drawing pins	1. Rubber ball 2. Pencils 3. Pieces of paper

(d)

Magnetic	Non-Magnetic
1. Pencils 2. Pieces of paper	1. Coin 2. Drawing pins 3. Rubber ball

**Correct Answer:** Option (c)

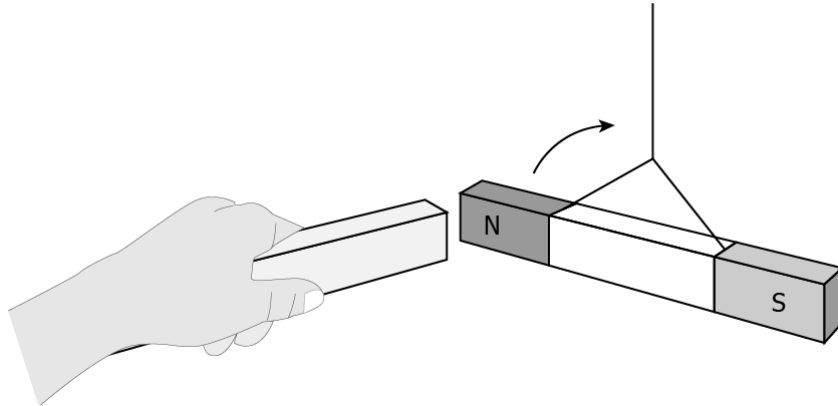
**LOB: Suggest an activity to determine the poles of a magnet**

1) A student has a bar magnet where the poles are not labelled. He wants to determine the poles of the magnet. Which option would help in identifying the poles of the magnet?

- (a) Heating the piece of magnet
- (b) Rubbing it against a piece of iron
- (c) Taking it close to a magnetic compass
- (d) Placing it horizontally above a piece of paper

**Correct Answer:** Option (c)

2) A student performs an activity where a labelled bar magnet is suspended using a thread. He brought another bar magnet where the poles are not marked. As he took it near the north pole of the suspended bar magnet, he noticed that it moved away.



Which pole of the magnet was held closer to the suspended magnet?

- (a) North pole as like pole always repels
- (b) South pole as unlike pole always repel
- (c) North pole as like pole always attract each other
- (d) South pole as unlike poles always attract each other

**Correct Answer:** Option (a)

**LOB: Create a set up using magnet in order to find the direction.**

1) The image shows a magnetic compass with its needle pointing in a certain direction.

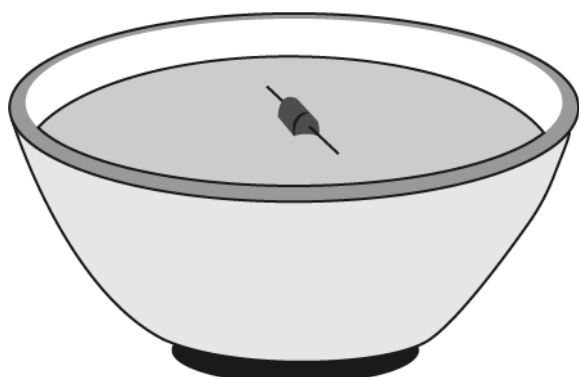


Which direction is generally indicated by the compass of a magnetic needle?

- (a) East-West
- (b) North-South
- (c) Northwest-Southeast
- (d) Southwest-Northeast

**Correct Answer:** Option (b)

2) A group of students on a trekking trip understands that they must continue travelling east to reach the destination. To understand the direction, they used a magnetic needle inserted in cork and placed in on a bowl of water. After sometime, the needle settled in a certain direction as shown in the image.



Which direction should the group of students travel to reach their destination?

- (a) Towards the pointed direction
- (b) Opposite to the pointed direction
- (c) To the left of the pointed direction
- (d) To the right of the pointed direction

**Correct Answer:** Option (d)

**LOB: Make a magnet in order to demonstrate how artificial magnets can be created.**

1) Which of these materials can be used to create an artificial magnet?

- (a) Eraser
- (b) Needle
- (c) Paper
- (d) Pencil

**Correct Answer:** Option (b)

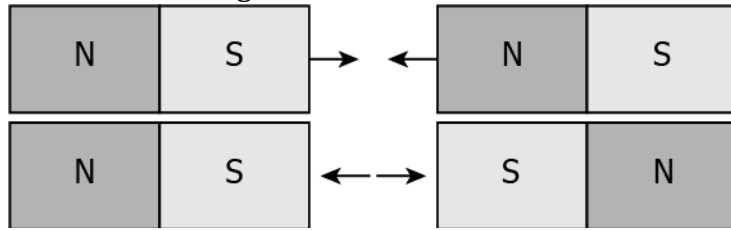
2) A student requires two magnetic substances for a science project. He could find only one magnet and thus he decided to make another magnet from it. Which of these processes could be followed to create an additional magnet?

- (a) Placing a piece of cardboard above the magnet
- (b) Placing the nail close to a magnet without touching it
- (c) Take a piece of iron nail and rub it repeatedly on the magnet
- (d) Wrapping a piece of plastic around the magnet for a few hours

**Correct Answer:** Option (c)

**LOB: Analyse what happens when two magnets are placed together in order to conclude the property of magnet**

1) A student conducts an experiment where he places some magnets in a different order as shown in the image.

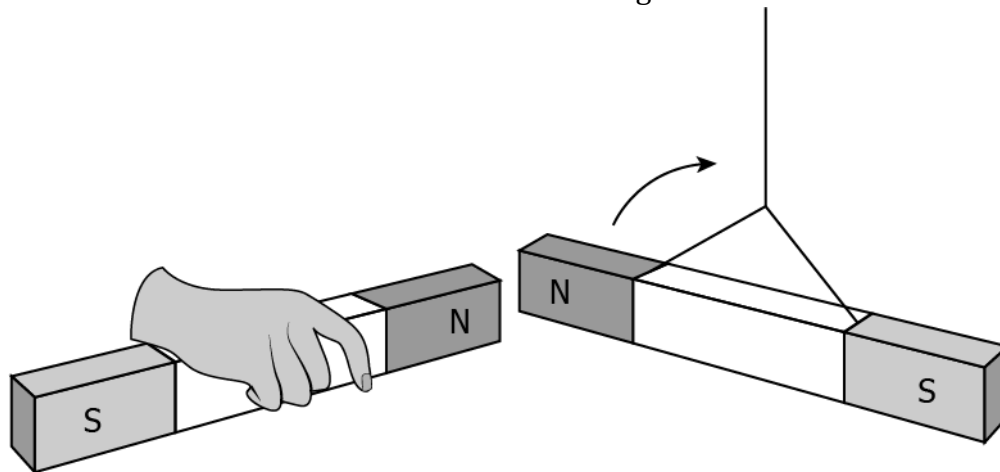


Which of these can be concluded based on the observation?

- (a) All poles repel
- (b) All poles attract
- (c) Opposite poles attract
- (d) Opposite poles repel

**Correct Answer:** Option 3

2) A student performs an activity where a bar magnet is suspended. Another bar magnet is held and moved close to it as shown in the image.



Which of these statements can be concluded based on the activity?

- (a) A magnet always repels other magnets
- (b) Like poles of magnet always repel each other
- (c) A bar magnet repels all other substances except iron
- (d) North poles of a magnet always repels the south pole

**Correct Answer:** Option (b)



**I**

**Activity**

Activity	Magnetic needle
Materials required	Magnet, Styrofoam ball, long needle, a bowl filled with water
Procedure	<ol style="list-style-type: none"> <li>1) Rub magnet on the needle several times from left to right, lifting every time when you reach the tip.</li> <li>2) Insert needle in Styrofoam balls.</li> <li>3) Place the needle in a bowl of water.</li> <li>4) Observe the direction in which the magnetised needle will point.</li> </ol> <div data-bbox="570 980 933 1560" style="text-align: center;"> <p>Place Needle in Bowl of Water</p> <p>TOP VIEW</p> <p>Side view</p> <p>Magnetised Needle will point in N-S direction</p> </div>
Let's think	<ol style="list-style-type: none"> <li>1) In which direction, does the needle point?</li> <li>2) Using it, find the direction in which windows and entrance to your classroom open.</li> </ol>

**Activity**

Activity	Does the magnet lose its magnetic property when it is heated?
Materials required	Magnet, iron fillings or pins, iron nail, candle, matchstick box, tongs
Procedure	<ol style="list-style-type: none"><li>1) Take the iron nail.</li><li>2) Rub magnet on iron nail several times from left to right, lifting every time when you reach the tip.</li><li>3) Case 1: Bring it near iron filings and write your observation.</li><li>4) Light the candle, hold the iron nail with a pair of tongs and heat it over the flame for some time.</li><li>5) Case 2: Now, bring this heated iron nail near iron filling and write your observation.</li></ol>
Let's think	<ol style="list-style-type: none"><li>1) Compare the magnetic property of the iron nail in both the cases.</li><li>2) What can you conclude from your observation?</li></ol>

# 14. Water

## QR Code:



## Learning Objectives:

Content area/ Concepts	Learning Objectives
How much water do we use?	Compute the annually amount of water required per person of their family
Where do we get water from?	List various sources of water in order to conclude the importance of oceans as a major source of water.
Water cycle	Create a concept map of the water cycle in order to explain the processes that take place during water cycle.
	Establish the important role played by trees/plants in water cycle
	Attribute natural calamities like drought & floods to the disturbance in water cycle
Significance of rain	Infer the problems that may arise due to heavy rainfall in order to suggest possible measures that can be taken.
	Predict what will happen if rain doesn't happen in order to explain the significance of rain.
Conservation of water	Evaluate the consequences of mismanagement of water or excessive usage of ground water.
Rainwater harvesting	Devise the possible strategies for individual/ community level Rain water harvesting techniques.

## Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
List various sources of water in order to conclude the importance of oceans as a major source of water.	Identifies materials and organisms, such as, plant fibres, flowers, on the basis of

	observable features, i.e., appearance, texture, function, aroma, etc.
Attribute the natural calamities like drought & floods to disturbance in water cycle	Examines and explains processes and phenomenon in order to relate them with causes: (such as, deficiency diseases with diet; adaptations of animals and plants with their habitats; quality of air with pollutants, etc.)
Predict what will happen if rain doesn't happen in order to explain the significance of rain.	
Establish the important role played by trees/plants in water cycle	Explains processes and phenomenon, e.g., processing of plant fibres; movements in plants and animals; formation of shadows; reflection of light from plane mirror; variations in composition of air; preparation of vermicompost, etc.
Create a concept map of the water cycle in order to explain the processes that take place during water cycle.	Draws labelled diagrams/flow charts of organisms and processes in order to demonstrate knowledge of structure/processes/relationships: (such as, parts of flowers; joints; filtration; water cycle, etc.)
Create a concept map of the water cycle in order to explain the processes that take place during water cycle.	Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, pinhole camera, periscope, electric torch, etc)
Compute the annually amount of water required per person of their family	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)
Attribute natural calamities like drought & floods to the disturbance in water cycle	
Infer the problems that may arise due to heavy rainfall in order to suggest possible measures that can be taken.	
Predict what will happen if rain doesn't happen in order to explain the significance of rain.	
Evaluate the consequences of mismanagement of water or excessive usage of ground water.	
Infer the problems that may arise due to heavy rainfall in order to suggest possible measures that can be taken.	Makes efforts to apply to daily life the understanding of environment and steps to conserve it, in order to contribute to the protection of the environment: (such as, minimising wastage of food, water, electricity and generation of waste;
Evaluate the consequences of mismanagement of water or excessive usage of ground water.	



Devise the possible strategies for

spreading awareness to adopt rain water

## Test items



### **LOB: Compute the annually amount of water required per person of their family**

1) Which activities should NOT be considered, if consumption of water by a person for daily activities needs to be calculated?

- (a) cooking and drinking
- (b) bathing and in toilets
- (c) washing of utensils and clothes
- (d) growing of fruits and vegetables

**Correct Answer:** Option (d)

2) A child makes a list of the amount of water used in daily activities by his family of four, as shown.

Number of Activities	Activity	Amount of Water Used (litres) Per Day
1	Bathing	1200
2	Drinking	35
3	Washing clothes	80
4	Washing utensils	30
5	Cleaning floor	25
<b>Total water used in a day by the family</b>		<b>1,370</b>

What should the child do to calculate the amount of water used by one member of his family in a year?

- (a) Divide the total water used in a day by 4
- (b) Multiply the total water used in a day by 365
- (c) Divide the total amount of water used in a day by 4 and then multiply by 30
- (d) Multiply the total amount of water used in a day by 365 and then divide by 4

**Correct Answer:** Option (d)

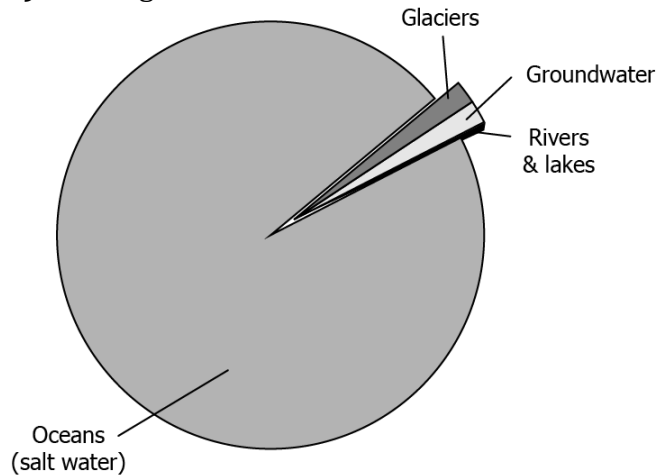
**LOB: List various sources of water in order to conclude the importance of oceans as a major source of water**

1) Which of these is a major source of water?

- (a) Lake
- (b) Pond
- (c) River
- (d) Spring

**Correct Answer:** Option (c)

2) The diagram shows the amount of water held by different sources of water on Earth.



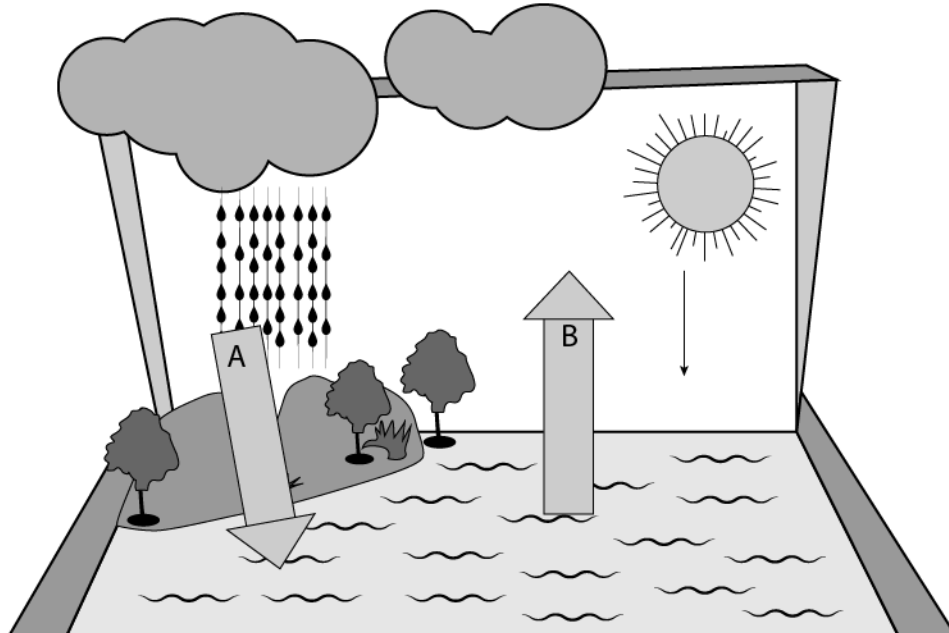
Based on the diagram, which water body has the maximum amount of water on Earth?

- (a) Oceans
- (b) Glaciers
- (c) Groundwater
- (d) Rivers and lakes

**Correct Answer:** Option (a)

**LOB: Create a concept map of the water cycle in order to explain the processes that take place during water cycle.**

1) A student makes a model to show water cycle and labels two processes as A and B, as shown. Class . Which option correctly identifies the processes A and B?

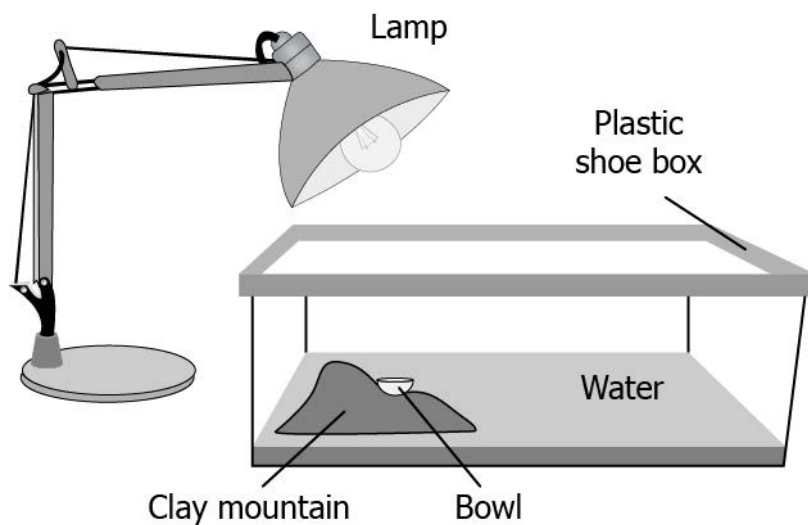


Which option correctly identifies the processes A and B?

- (a) A: Evaporation; B: Precipitation
- (b) A: Evaporation; B: Condensation
- (c) A: Precipitation; B: Evaporation
- (d) A: Condensation; B: Precipitation

**Correct Answer:** Option (c)

2) A student makes a model to show the processes of water cycle, as shown. Class . In what way would the lamp affect the processes of water cycle shown in the model?



In what way would the lamp affect the processes of water cycle shown in the model?

- (a) By lighting the lid of the box

- (b) By evaporating the water in the box
- (c) By forming droplets of water on the lid
- (d) By precipitating the water droplets onto the clay mountain

**Correct Answer:** Option (b)

**LOB: Establish the important role played by trees/plants in water cycle**

1) The landscape of region X was mostly covered with concrete, which was later modified to have more trees and plants. What would be the effect of modification of the landscape on the groundwater level of region X?

- (a) The groundwater level would increase.
- (b) The groundwater level would decrease.
- (c) The groundwater level would remain the same.
- (d) The groundwater level would first increase and then decrease.

**Correct Answer:** Option (a)

2) Trees use a part of the water absorbed by their roots to prepare their food, the rest of it is evaporated by the process called transpiration. Which argument correctly describes the role of trees in water cycle?

- (a) They add water to the atmosphere.
- (b) They speed up the process of condensation.
- (c) They increase the heat required for evaporation.
- (d) They reduce the seepage of rainwater into the ground.

**Correct Answer:** Option (a)

**LOB: Attribute natural calamities like drought & floods to the disturbance in water cycle**

1) A student studies that a few factors affect the processes of water cycle. The water cycle in region A and B is disturbed such that the amount of precipitation increased sharply in region B, whereas it decreased considerably in region A. Which option correctly identifies the likely calamity to strike in both the regions?

(a)

Region A	Region B
Flood	Flood

(c)

Region A	Region B
Drought	Drought

(b)

Region A	Region B
Drought	Flood

(d)

Region A	Region B
Flood	Drought

**Correct Answer:** Option (b)

2) Different processes together circulate water in water cycle. A disturbance in any of them could bring natural calamities. Which disturbance in water cycle would cause a drought?

- (a) Decreased precipitation
- (b) Increased heat for evaporation
- (c) Increased rate of condensation
- (d) Decreased rate of transpiration

**Correct Answer:** Option a

**LOB: Infer the problems that may arise due to heavy rainfall in order to suggest possible measures that can be taken.**

1) Which of these would most likely happen if it rains heavily for a long period?

- (a) Crops would get damaged
- (b) Fishes would increase in number
- (c) Water level in rivers would go down
- (d) Organisms present in soil would grow faster

**Correct Answer:** Option (a)

2) Region Q receives rainfall continuously for a week. The weather department issues an alert to the people in region Q that problems may arise due to overflow of excessive water from rivers and lakes. What measure should the people of region Q take to ensure safety?

- (a) Move to open grounds without trees
- (b) Open drain holes so that water seeps down
- (c) Shift the cattle to shelters near a water source
- (d) Evacuate areas at or below the ground level

**Correct Answer:** Option (d)

**LOB: Predict what will happen if rain doesn't happen in order to explain the significance of rain**

1) Which of these would most likely happen if it does NOT rain for a long period?

- (a) The dryness of soil would decrease.
- (b) The availability of fodder would increase.
- (c) The level of water underground would decrease.
- (d) The water would overflow from rivers and lakes.

**Correct Answer:** Option (c)

2) Region P did not get any rain for 1.5 years. The table lists the possible consequences, region P would most likely experience because of no rain.

- |   |
|---|
| <ol style="list-style-type: none"><li>1. Loss of water would continue through evaporation.</li><li>2. Transpiration would stop.</li><li>3. The soil would become dry.</li><li>4. Level of water in different water sources would go down.</li></ol> |
|---|

Which of the consequences are correctly listed in the table?

- (a) 1 and 2
- (b) 2 and 3
- (c) 3, 2, and 1
- (d) 4, 3, and 1

**Correct Answer:** Option (d)

**LOB: Evaluate the consequences of mismanagement of water or excessive usage of ground water**

1) Which of these would most likely happen if ground water is overused?

- (a) Sea level would rise
- (b) Only saltwater would be available for use
- (c) Only wells would be able to supply water
- (d) Supply of water to rivers connected to groundwater would decrease

**Correct Answer:** Option (d)

2) A bucket takes 20 Litres of water to wash the car as compared to a hose, which uses 350 litres in 10 minutes. What would be the consequences if a hose is used to wash the car in place of a bucket?

- (a) It would seep-down and purify the ground water.
- (b) It would lead to shortage of water for other activities.
- (c) It would recharge the ground water with freshwater.
- (d) It would allow water to be reused for other household chores.

**Correct Answer:** Option (b)

**LOB: Devise the possible strategies for individual/ community level Rain water harvesting techniques**

1) Which is the most appropriate method of rainwater harvesting at household level?

- (a) Cover the roof with grass
- (b) Dig open pits in lawn area
- (c) Construct drains directed to rivers
- (d) Connect rooftop with pipes to a pit in the ground

**Correct Answer:** Option (d)


2) Which of these would help to recharge the groundwater through rainwater harvesting?

- (a) Directing rainwater to rivers
- (b) Collecting rainwater in storage tanks
- (c) Allowing rainwater to move as runoff on concrete roads
- (d) Allowing rainwater to move in roadside drains that go into the ground

**Correct Answer:** Option (d)



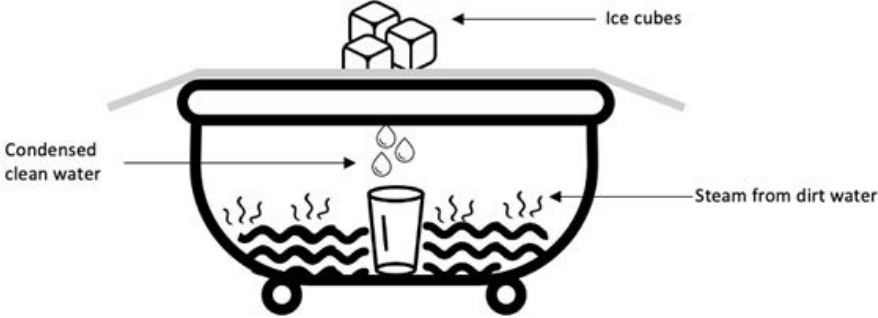
## Activity

Activity	Rain Gauge
Materials required	1L Plastic bottle, scissors, ruler
Procedure	<ol style="list-style-type: none"> <li>1) Take a 1-litre plastic water bottle. With a sharp knife cut its neck on the cylindrical part.</li> <li>2) The top end will act like a funnel.</li> <li>3) Invert the top to make a funnel.</li> <li>4) This funnel will prevent evaporation of water.</li> <li>5) An empty plastic bottle, being light, will fall down or fly away in the slightest breeze. So, dig a hole and bury the lower end of the bottle in the ground. This foundation will anchor the bottle in place.</li> <li>6) You can also place the bottle between four bricks as shown. This will keep the bottle in place and prevent it from toppling.</li> <li>7) You can periodically measure the rainfall with the help of a ruler.</li> </ol>
	
Let's think	<ol style="list-style-type: none"> <li>1) What kind of problem arises due to heavy rainfall?</li> <li>2) What happens if it doesn't rain for a long time?</li> <li>3) What areas in India face drought every year? What measures are taken to deal with it?</li> <li>4) Can you list down various human activities responsible for disturbed rainfalls in different part of country ?</li> </ol>

5) Did you ever think how much drinking water is left for us in the planet ?

**2**

**Activity**

Activity	How are clouds formed?
Materials required	Tub, water, ice cubes, glass, plastic wrap, vinegar, salt, and dirt
Procedure	<ol style="list-style-type: none"> <li>1) Pour hot water in a tub and mix salt, dirt and vinegar to create dirty water.</li> <li>2) Place a clean empty glass at the centre of the tub.</li> <li>3) Cover the tub with dirty water using a plastic wrap.</li> <li>4) Place the ice cubes right above the empty glass to represent the clouds as shown in the figure below</li> </ol> 
Let's think	<ol style="list-style-type: none"> <li>1) Why does steam coming in contact with ice form water droplets?</li> <li>2) Are rain drops always clean water droplets? If not, why?</li> </ol>



# 15. Air around us

## QR Code:



## Learning Objectives:

Content area/ Concepts	Learning Objectives
Air	Conduct activities in order to examine the presence of air around us.
	Execute an improvised plan to test the presence of CO <sub>2</sub> , oxygen, water vapour, nitrogen, dust and smoke in air.
	Depict the composition of air using pie chart
	Outline the causes & effects of Air pollution
Availability of oxygen to animals and plants	Design and inquiry to prove the presence of air in water and soil in order to explain how oxygen becomes available to animals and plants.
How is the oxygen in the atmosphere replaced?	Illustrate the Oxygen cycle using well labelled figure
Use of air	Evaluate the importance of air for the sustenance of life on earth

## Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Conduct activities in order to examine the presence of air around us	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction?)
Execute an improvised plan to test the presence of CO <sub>2</sub> , oxygen, water vapour, nitrogen, dust and smoke in air	
Design and inquiry to prove the presence of air in water and soil in order to explain how oxygen becomes available to animals and plants	

Outline the causes & effects of Air pollution	Relates processes and phenomenon with causes, e.g., deficiency diseases with diet; adaptations of animals and plants with their habitats; quality of air with pollutants, etc.
Design and inquiry to prove the presence of air in water and soil in order to explain how oxygen becomes available to animals and plants	Explains processes and phenomenon, e.g., processing of plant fibres; movements in plants and animals; formation of shadows; reflection of light from plane mirror; variations in composition of air; preparation of vermicompost, etc.
Depict the composition of air using pie chart	Draws labelled diagrams/flow charts of organisms and processes in order to demonstrate knowledge of structure/processes/relationships: (such as, parts of flowers; joints; filtration; water cycle, etc.)
Illustrate the Oxygen cycle using well labelled figure	
Evaluate the importance of air for the sustenance of life on earth	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)
Evaluate the importance of air for the sustenance of life on earth	Makes efforts to apply to daily life the understanding of environment and steps to conserve it, in order to contribute to the protection of the environment: (such as, minimising wastage of food, water, electricity and generation of waste; spreading awareness to adopt rain water harvesting; care for plants, etc.)

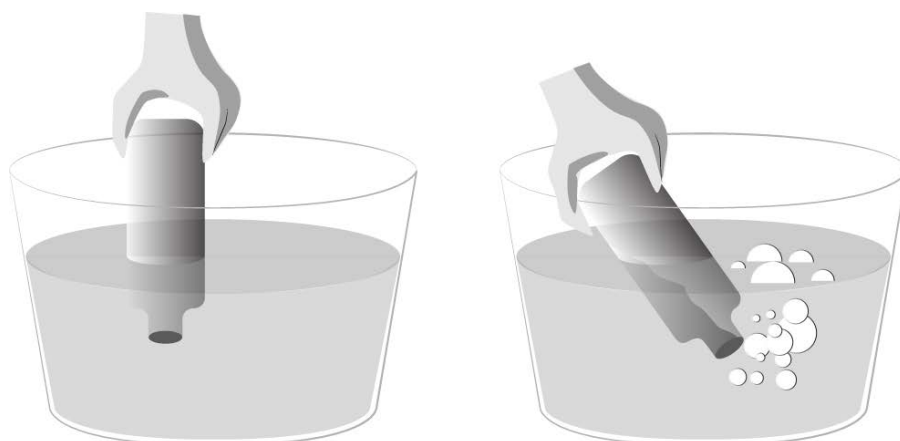
**LOB: Conduct activities in order to examine the presence of air around us.**

1) Which of these would best experiment to show the presence of air around us?

- (a) Keeping a bowl of water in sunlight for one hour
- (b) Keeping a glass of water in freezer for half an hour
- (c) Placing a weather cock on an open roof away from any obstacle
- (d) Placing bricks one upon another to make a small stack in an open lawn

**Correct Answer:** Option (c)

2) A student performs an experiment to show the presence of air. He takes an empty bottle and dips in a bucket of water in two different positions, one by one, as shown.



Based on the experiment, what can be concluded?

- (a) An empty bottle does not hold air.
- (b) Bottles can only be filled with water if they occupy air.
- (c) Air escapes from bottles if they are turned upside down.
- (d) Air escapes in form of bubbles when the bottle is tilted in water.

**Correct Answer:** Option (d)

**LOB: Execute an improvised plan to test the presence of CO<sub>2</sub>, oxygen, water vapour, nitrogen, dust and smoke in air.**

1) Raheem performs an experiment in a dark room, where all curtains are pulled down. He then opens a small slit from the window such that a beam of sunlight could enter the room. He observes tiny shining particles moving in the beam of sunlight. What does the presence of these shining particles show?

- (a) Air has oxygen.
- (b) Air has nitrogen.
- (c) Air has water vapour.
- (d) Air has dust particles.

**Correct Answer:** Option (d)

2) The table lists the steps of an experiment to test the presence of oxygen in air.

1. Take two candles.
2. Place them on a table such that they are at least 30 cm away from one another.
3. Light both the candles.

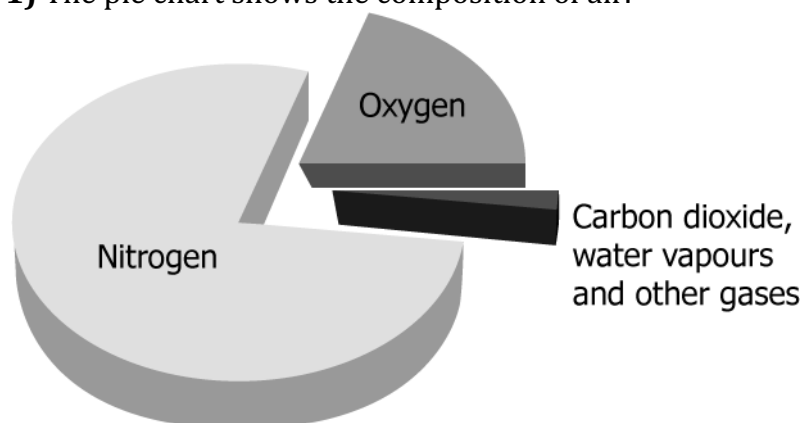
What should be the next step to show the presence of oxygen in air?

- (a) Blow one candle by your mouth
- (b) Put some sand over one candle
- (c) Cover one candle with a glass tumbler
- (d) Put water over one candle with a pitcher

**Correct Answer:** Option (c)

**LOB: Depict the composition of air using pie chart**

1) The pie chart shows the composition of air.



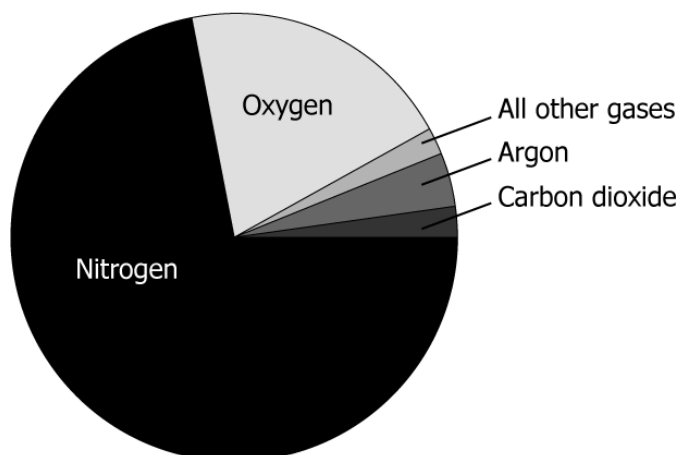
Which is the most abundant component of air?

- (a) Oxygen
- (b) Nitrogen
- (c) Water vapour
- (d) Carbon dioxide

**Correct Answer:** Option (b)

2) The graph shows the composition of air.

### Gases in the Atmosphere



How much approximately do nitrogen and oxygen together make up air?

- (a) 20% of the air
- (b) 50% of the air
- (c) 65% of the air
- (d) 99% of the air

**Correct Answer:** Option (d)

### LOB: Outline the causes & effects of Air pollution

1) Which of these gases is associated with human activities that involve the burning of fuels and becomes a major source of air pollution?

- (a) Oxygen
- (b) Nitrogen
- (c) Water vapour
- (d) Carbon dioxide

**Correct Answer:** Option (d)

2) The table lists a few activities.

- |  |
|--|
| 1. Processing of products in factories |
| 2. Farmers burning crop residue        |
| 3. Vehicles moving on road             |
| 4. Cattle grazing in fields            |

Which of these activities would cause air pollution?

- (a) 1 and 4
- (b) 2 and 4
- (c) 3, 2, and 1
- (d) 4, 1, and 3

**Correct Answer:** Option (c)

**LOB: Design and inquiry to prove the presence of air in water and soil in order to explain how oxygen becomes available to animals and plants**

1) A student wants to prove that air is present in water, which is why animals living underwater can breathe. Which of these would help him prove the presence of air in water?

- (a) By boiling water
- (b) By freezing water
- (c) By mixing water with oil
- (d) By pouring water in an empty jar

**Correct Answer:** Option (a)

2) A lump of soil is taken in a jar and water is poured on it. It is observed that when the water was poured, bubbles came out from the soil, the water moved deeper into the lump, and the soil became loose and wet.

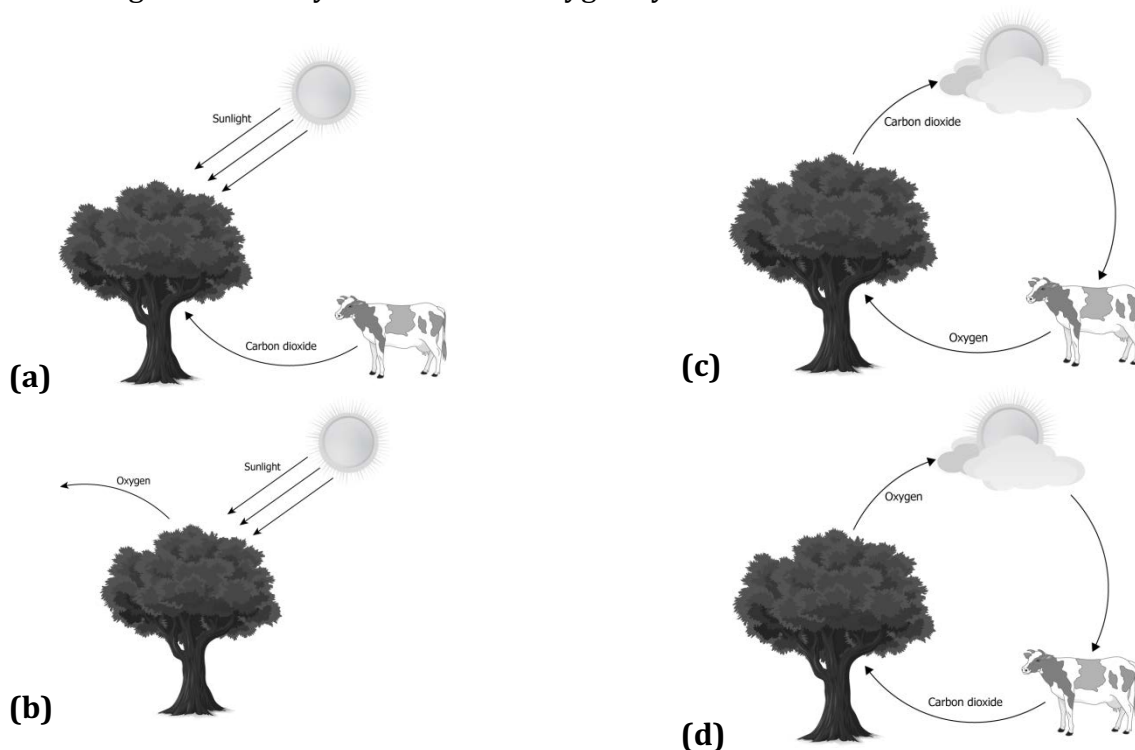
Which observation from the experiment proves the presence of air in soil?

- (a) The soil got wet
- (b) The soil became loose
- (c) Bubbles came out
- (d) Water seeped into the lump

**Correct Answer:** Option (c)

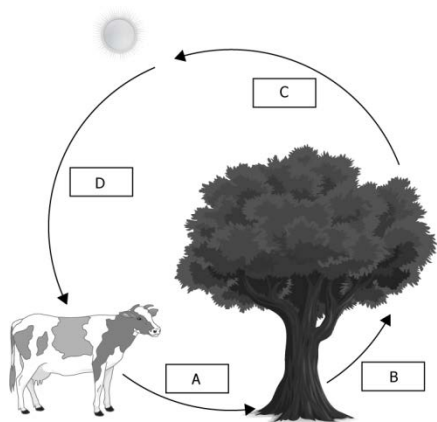
**LOB: Illustrate the Oxygen cycle using well labelled figure**

1) Which diagram correctly illustrates the oxygen cycle?



**Correct Answer:** Option (d)

2) The diagram shows the oxygen cycle.



Which option correctly labels the diagram?

(a)

A	B	C	D
Respiration releases carbon dioxide	Oxygen is released during photosynthesis	Oxygen is used for respiration	Photosynthesis uses carbon dioxide

(b)

A	B	C	D
Oxygen is released during photosynthesis	Oxygen is used for respiration	Photosynthesis uses carbon dioxide	Respiration releases carbon dioxide

(c)

A	B	C	D
Respiration releases carbon dioxide	Photosynthesis uses carbon dioxide	Oxygen is released during photosynthesis	Oxygen is used for respiration

(d)

A	B	C	D
Oxygen is released during photosynthesis	Photosynthesis uses carbon dioxide	Oxygen is used for respiration	Respiration releases carbon dioxide

**Correct Answer:** Option (c)

**LOB: Evaluate the importance of air for the sustenance of life on earth**

1) What would most likely happen if there is no air on Earth?

- (a) Birds and bats would fly faster
- (b) The earth would become lifeless
- (c) Only aquatic animals would survive
- (d) Only animals living in soil would survive

**Correct Answer:** Option (b)

2) The table lists some activities.

- |  |
|--|
| <ol style="list-style-type: none"><li>1. Flowing water move turbines</li><li>2. Windmills generate electricity</li><li>3. Parachutes and gliders sail</li><li>4. Seeds and pollen grains are dispersed</li></ol> |
|--|

Which of these would not be possible without the help of air?

- (a) Only 1
- (b) Only 2
- (c) 3, 2, and 1
- (d) 4, 3, and 2



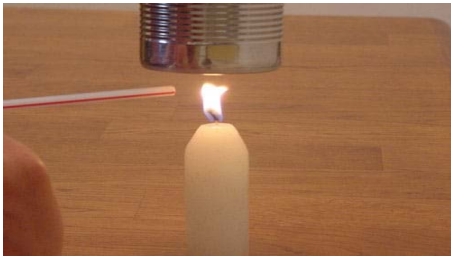
**Correct Answer:** Option (d)





**I**

**Activity**

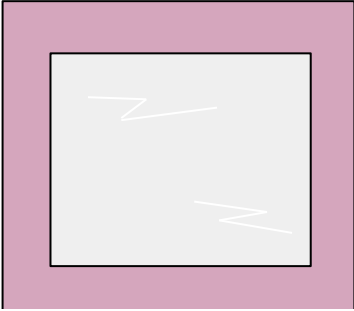
Activity	Incomplete Combustion Demonstration
Materials required	1 candle, 1 tin can, matchstick, 1 straw, paper towel or rag.
Procedure	<ol style="list-style-type: none"> <li>1) Light the candle.</li> <li>2) Case 1: Place the bottom of the can directly over the flame for a few seconds (see Figure 2). The top of the flame should be almost touching the can.</li> <li>3) Look at the bottom of the can. Have the students record their observations in their journals?</li> <li>4) Clean off the bottom of the can with a paper as shown. Have students also observe the pollution on them.</li> <li>5) Case 2: Repeat the procedure, but use the straw to gently blow air on the bottom of the can (see Figure 3). Be careful not to blow the flame out.</li> <li>6) Look at the bottom of the can and record the observation.</li> </ol> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="display: flex; justify-content: center; align-items: center; margin-top: 10px;">  </div>

Let's think	<ol style="list-style-type: none"> <li>1) What do you see at the bottom of the can in case 1? Do you think this is evidence of pollution?</li> <li>2) What do you see in case 2? Do you see any pollutants? (Answer: Nothing or perhaps some water vapor condensing on the bottom of the can. No.)</li> <li>3) How the additional air affected the combustion of the candle. (Answer: Complete combustion takes place, producing only carbon dioxide and water vapor. Other types of pollutants are avoided.)</li> <li>4) What can be done to reduce air pollution in your city ?.</li> </ol>
-------------	---

**2**

**Activity**

Activity	Pollution detector
Materials required	One 5" x 5" card, transparent tape, one pair of scissors, piece of string (30cm), magnifying glass, a piece of graph paper
Procedure	<ol style="list-style-type: none"> <li>1) Make a square hole in the card of 4" x 4" as shown below.</li> <li>2) Punch a hole in the index card near one end.</li> <li>3) Tie the string through the hole.</li> <li>4) Put tape over the larger of the holes cut in the card. (The sticky side of the tape will collect airborne particles, so students should be careful not to touch the sticky side or to stick the tape to their desk, paper, or anything else.)</li> <li>5) Hang the pollution detector at a location that you would like to investigate.</li> <li>6) Leave the pollution detectors hanging for at least 24 hours, preferably longer.</li> <li>7) Cut a square piece of graph paper 5 squares by 5 squares and place the pollution detector on top of the graph paper.</li> <li>8) Choose a square at a time, count the particles using magnifying glass and record the number.</li> </ol>

	
Let's think	<ol style="list-style-type: none"><li>1) Write a description of each particle, including the approximate size, colour and texture.</li><li>2) Where are these particles coming from?</li><li>3) Which particles are the result of human activity?</li><li>4) How can we prevent and clean air pollution?</li></ol>

# 16. Garbage in, Garbage out

**QR Code:**



**Learning Objectives:**

	Learning Objective
Dealing with garbage	Discuss the waste management system in the community in order to explain the process of garbage disposal .by 'Safai Karamcharis.
	Evaluate the reasons for layering the composting pit with different types of materials
	Compare distinguishing features between compostable waste and non-compostable waste, in connection with properties of the end product
Vermicomposting	Infer reasons for success or failure of vermicomposting, considering steps involved and resultant products, etc.
Think and throw	Investigate their trash consumption in order to formulate alternatives to offset trash production in their household.
Recycling of paper	Design a method to ensure effective disposal of garbage, in the context of different types of wastes, their properties, etc.
Plastics- boon or a curse	Outline possible means of dealing with a specific type of waste (Plastics), in connection with composting, reuse, recycle, reduce etc

**Learning Objectives and Learning Outcomes:**

Learning Objectives	Learning Outcomes
Compare distinguishing features between compostable waste and non-compostable waste, in connection with properties of the end product	Examines and explains properties, structure and functions of materials and organisms, (such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators), in order to differentiate them

Evaluate the reasons for layering the composting pit with different types of materials	Relates processes and phenomenon with causes, e.g., deficiency diseases with diet; adaptations of animals and plants with their habitats; quality of air with pollutants, etc.
Infer reasons for success or failure of vermicomposting, considering steps involved and resultant products, etc.	
Infer reasons for success or failure of vermicomposting, considering steps involved and resultant products, etc.	Explains processes and phenomenon, e.g., processing of plant fibres; movements in plants and animals; formation of shadows; reflection of light from plane mirror; variations in composition of air; preparation of vermicompost, etc.
Discuss the waste management system in the community in order to explain the process of garbage disposal .by 'Safai Karamcharis.	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.)
Investigate their trash consumption in order to formulate alternatives to offset trash production in their household.	Makes efforts to apply to daily life the understanding of environment and steps to conserve it, in order to contribute to the protection of the environment: (such as, minimising wastage of food, water, electricity and generation of waste; spreading awareness to adopt rain water harvesting; care for plants, etc.)
Design a method to ensure effective disposal of garbage, in the context of different types of wastes, their properties, etc.	
Outline possible means of dealing with a specific type of waste (Plastics), in connection with composting, reuse, recycle, reduce etc	



**LOB: Discuss the waste management system in the community in order to explain the process of garbage disposal .by 'Safai Karamcharis.**

1) What type of garbage after segregation is spread in the landfill?

- (a) The one that can only be reused.
- (b) The one that can only be composted.
- (c) The one that can either be reused or composted.
- (d) The one that can neither be reused nor composted.

**Correct Answer:** Option (d)

2) The table lists various steps involved in garbage disposal

1. Useful and non useful components in the garbage are separated.
2. A layer of soil is used to cover the landfill.
3. Garbage is collected and transported through trucks.
4. Garbage is spread over the landfill.

Which option correctly arranges the steps such that the process of waste disposal is explained from beginning to end?

- (a) 2, 3, 1, 4
- (b) 3, 1, 4, 2
- (c) 1, 3, 2, 4
- (d) 3, 4, 1, 2

**Correct Answer:** Option (b)

**LOB: Evaluate the reasons for layering the composting pit with different types of materials**

1) Why plastic bottles are NOT used for layering the composting pit?

- (a) They do not rot.
- (b) They occupy space.
- (c) They rot very quickly.
- (d) They produce foul smell.

**Correct Answer:** Option (a)

2) The table lists two groups of garbage.

Group 1	Group 2
Broken toys, nails, polythene bags, aluminium wrappers, old shoes and pieces of clothes	Egg shells, dead leaves, fruit peels, paper bags, tea leaves

Which group has appropriate materials for layering a composting pit?

- (a) Group 1, because they cannot be reused.
- (b) Group 1, because they are heavy by weight.
- (c) Group 2, because they are available in larger quantities.
- (d) Group 2, because they can be converted into useful manure.

**Correct Answer:** Option (d)

**LOB: Compare distinguishing features between compostable waste and non-compostable waste, in connection with properties of the end product**

1) Which of these if put in a composting pit would rot completely?

- (a) Batteries
- (b) Glass bottles
- (c) Newspapers
- (d) Polythene bags

**Correct Answer:** Option 3

2) Two heaps of garbage, heap A with kitchen waste and heap B with plastic waste were kept in two different pits and covered by soil. The pits were left for a week, and after that soil was removed to check the changes in the garbage. It was observed that garbage in heap A turned black and did not smell, whereas garbage in heap B remained as is. Based on the activity, which statement correctly describes the feature of compostable and non-compostable waste?

- (a) Compostable waste remains the same as it does not rot.
- (b) Non compostable waste turns black once it rots completely.
- (c) Non compostable waste does not smell after it rots completely.
- (d) Compostable waste turns black and does not smell after it rots completely.

**Correct Answer:** Option (d)

**LOB: Infer reasons for success or failure of vermicomposting, considering steps involved and resultant products, etc.**

1) Which of these steps would most likely lead to failure of vermicomposting?

- (a) Covering the sand with dried animal dung
- (b) Covering the sand with plastic coated paper
- (c) Covering the sand with dried stalks of plants
- (d) Covering the sand with pieces of newspaper

**Correct Answer:** Option (b)

2) A wooden box is taken and a layer of sand of thickness 2 cm is spread at its base over which some vegetable waste was kept. After that some water is sprinkled on it and the layer of waste was pressed and red worms were put in the box. It is claimed that pressing the layer would not make the vermicomposting a success. The table lists the possible reasons for the failure.

1. The layer does not have sufficient air.
2. The layer does not have moisture.
3. The layer does not have space for red worms.
4. The layer does not have the food for worms.

Which reasons are correctly listed?

- (a) 1 and 2
- (b) 2 and 3
- (c) 3, 2, and 1
- (d) 4, 2, and 1

**Correct Answer:** Option (a)

**LOB: Investigate their trash consumption in order to formulate alternatives to offset trash production in their household**

1) Question : A household X finds that it produces a lot of trash. Which of these practices should they adopt such that the amount of trash from household X can be reduced?

- (a) Use non rechargeable batteries
- (b) Switch over to single use plastic
- (c) Prefer fresh juices over canned juices
- (d) Prefer disposable crockery over steel utensils

**Correct Answer:** Option (c)

2) The table lists some activities that can help to minimise wastage.

1. Reusing paper to make files and invitation cards
2. Creating small polythene bags from big polythene sheets
3. Making compost from kitchen waste
4. Using old plastic bottles for growing plants

Which of the activities would help to reduce the load of wastage?

- (a) Only 1
- (b) Only 2
- (c) 1, 2, and 3
- (d) 4, 1 and 3

**Correct Answer:** Option (d)



**LOB: Design a method to ensure effective disposal of garbage, in the context of different types of wastes, their properties, etc.**

1) Which property of paper ensures its effective disposal?

- (a) Paper is compostable.
- (b) Paper is light in weight.
- (c) Paper has got a variety of colours.
- (d) Paper can be moulded in different shapes.

**Correct Answer:** Option (a)

2) A child notices that lot of newspapers are collected as trash and decides to use them effectively. Several pieces of newspapers were taken and submerged in water for a day. A thick paste of paper was created by pounding it. The wet paste was spread on wire mesh fixed to an old frame. Once the water drained out, the layer of paste from the frame was removed and kept in the Sun until it dried like a paper.

In what ways did the process ensure effective disposal of garbage?

- (a) The process did recycle to make a new object.
- (b) The process did recycle to make the same object.
- (c) The process decreased the wastage of items that do not rot.
- (d) The process converted non compostable waste into compostable waste.

**Correct Answer:** Option (b)

**LOB: Outline possible means of dealing with a specific type of waste (Plastics), in connection with composting, reuse, recycle, reduce etc**

1) Which of these is the best way to deal with the waste of plastic bags?

- (a) They can be burned.
- (b) They can be recycled.
- (c) They can be disposed into drains.
- (d) They can be buried into the soil.

**Correct Answer:** Option (b)

2) The table lists some possible ways to minimise the over use of plastics.

- |  |
|--|
| <ol style="list-style-type: none"><li>1. We should reuse plastic containers.</li><li>2. We should carry plastic bags while going out for shopping.</li><li>3. We should always burn plastic bottles after their use.</li><li>4. We should segregate plastic waste so that it can be directly send to recycling plants.</li></ol> |
|--|




Which of these ways, if followed will help reduce the over use of plastics?


- (a) 1 and 4
- (b) 2 and 4
- (c) 3, 2, and 1
- (d) 4, 1, and 2

**Correct Answer:** Option (a)



## Activity


Activity	Design, build and test your own landfill
Materials required	Clear plastic tub with about 1 inch of sand in the bottom, clay or silty soil from your backyard, sand, gravel, 15 cotton balls, water colour, one bowl, strips of plastic garbage bags (to simulate geosynthetics used in landfills), toothpicks, straws, popsicle sticks, water bottle.
Procedure	<ol style="list-style-type: none"> <li>1) Prepare a tub with a bottom sand layer to serve as a landscape upon which to build a landfill (see Figure 1). Set up a town using small houses (or other materials) to represent a population using the groundwater (for drinking, cooking, cleaning, gardening, recreation, etc.).</li> <li>2) Prepare the "garbage" by mixing cotton balls, watercolour and water.(see Figure 1).</li> </ol> <div style="display: flex; justify-content: space-around;">   </div> <ol style="list-style-type: none"> <li>3) Create a model of a landfill that can hold more garbage.</li> </ol> <div style="text-align: center;"> <p style="font-size: small; color: purple;">Design and create your own model of a landfill that can hold the most garbage in the class</p>  </div> <ol style="list-style-type: none"> <li>4) Prepare landfill with a bottom gravel layer to serve as a strong base structure.</li> <li>5) Add a plastic liner to prevent contamination.</li> <li>6) Fill the landfill with garbage ( which you prepared).</li> </ol>

	<p>7) Build a top cap for the landfill with clay to cover it.              8) Now, create "rainstorms" by pouring water on the model landfills, shake the box to test landfill against earthquake erosion etc and check for any seepage or leakage of garbage.</p> 
<p>Let's think</p>	<ol style="list-style-type: none"> <li>1) Did your landfill keep the town safe? Why or why not?</li> <li>2) How might we decrease the amount of trash that gets put in landfills?</li> <li>3) What kind of challenges are faced by people who live near landfills?</li> </ol>

**2**

**Activity**

<p>Activity</p>	<p>Best out of waste: Cool Bottle</p>
<p>Materials required</p>	<p>2 Plastic bottles ( 1L and 1.5L), old newspaper, tape, aluminium foil, scissors, flat string or ribbon</p>
<p>Procedure</p>	<ol style="list-style-type: none"> <li>1) Wrap foil on a 1-liter bottle.</li> <li>2) Wrap it in six layers of newspaper for insulation.</li> <li>3) Cut a 1.5-liter bottle as shown</li> <li>4) Place the 1-liter bottle in the big bottle.</li> <li>5) Join the two halves of the big bottle with tape. attach a string to complete the thermos.</li> </ol>

	 <p>7 CUT 1.5-L BOTTLE</p> <p>8 1-L BOTTLE IN 1.5-L BOTTLE</p> <p>9</p> <p>11 FILL THERMOS WITH COLD WATER</p>
Let's think	<ol style="list-style-type: none"><li>1) What are other ways to reuse plastic bottles?</li><li>2) What can we do to minimise over use of plastics to deal with garbage?</li></ol>

