Teacher Energized Resource Manual

Class : 8th
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

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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. Crop Production & Management

QR Code:

Learning Objectives:

Topic	Learning Objectives
Agricultural practices	Classify the major crops based on the time they are sown in the field to explain the months in which Kharif and Rabi crops are cultivated
Basic practices of crop production	Sequence the tasks involved in cultivating the crop to list major steps of agricultural practices
Preparation of soil	Explain why it is important to loosen the soil before sowing in order to elaborate the effect of loose soil in plant's growth
	Compare the advantages of three major tools used for tilling and ploughing to **justify** the variety of agricultural practices
Process of sowing	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
Adding manure and fertilisers	Distinguish between manure and fertilisers to **identify** ways in which nutrients in soil are replenished
	Describe the process of crop rotation to explain ways in which nutrients in soil is replenished
Irrigation	Compare and analyse the traditional and modern methods of irrigation based on cost and efficiency in order to predict suitable irrigation method in real life situations.
Protection from weeds	Evaluate how weeds adversely affects the growth of the plants in order to justify their removal and control
Harvesting	Elaborate the process of harvesting to justify the reasons for employing combine and winnowing machine in the process of agriculture.
Storage	Distinguish between the practices of large scale and small scale storage of food in order to conclude that stored grains need protection from pests and microorganisms.
Animal husbandry	Identify commonly known food items based on their sources to define animal husbandry.

Learning Objectives and Learning Outcomes:

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	
Identify commonly known food items based on their sources to define animal husbandry	
Classify the major crops based on the time they are sown in the field to explain the months Kharif and Rabi crops are cultivated	Classifies materials and organisms based on properties / characteristics, e.g., metals and non-metals; *kharif* and *rabi* crops; useful and harmful microorganisms; sexual and asexual reproduction; celestial objects; exhaustible and inexhaustible natural resources, etc.
Sequence the tasks involved in cultivating the crop to list major steps of agricultural practices	
Describe the process of crop rotation to explain ways in which nutrients in soil is replenished	
Explain why it is important to loosen the soil before sowing in order to elaborate the effect of loose soil in plant's growth	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)
Elaborate the process of harvesting to justify the reasons for employing combine and winnowing machine in the process of agriculture	
Distinguish between the practices of large scale and small-scale storage of food in order to conclude that stored grains need protection from pests and microorganisms	
Compare and analyse the traditional and modern methods of irrigation based on cost and efficiency in order to predict suitable irrigation method in real life situations	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: (e.g., using resources judiciously; making controlled use of fertilisers and pesticides; suggesting ways to cope with environmental hazards, etc).
Describe the process of crop rotation to explain ways in which nutrients in soil is replenished	

Test items

LOB : Classify the major crops based on the time they are sown in the field to explain the months in which Kharif and Rabi crop are cultivated

1) A group of students went on two school trips to a field in the same year. They observed the different crops on each trip as shown.

Field Trip	Season	Crops
I	June	Soya bean, groundnut
II	November	Mustard, pea

Why did they observe different crops?

(a) Soyabean and groundnut are kharif crops which are sown in rainy season while mustard and pea are rabi crops that are sown in winter season.
(b) Soyabean and groundnut are kharif crops which are sown in winter season while mustard and pea are rabi crops that are sown in rainy season.
(c) Soyabean and groundnut are rabi crops which are sown in rainy season while mustard and pea are kharif crops that are sown in winter season.
(d) Soyabean and groundnut are rabi crops which are sown in winter season while mustard and pea are kharif crops that are sown in rainy season.

Correct Answer: Option (a)

2) The table lists some climatic data of an area

- heavy rainfall
- high humidity
- high average temperature

Which crop can be sown in such conditions?

(a) Gram
(b) Maize
(c) Wheat
(d) Mustard

Correct Answer: Option (b)

LOB : Sequence the tasks involved in cultivating the crop to list major steps of agricultural practices

1) The table lists some practices for cultivation of crops.

A. Protection from weeds
B. Sowing
C. Harvesting
D. Preparation of soil
E. Irrigation
F. Storage
G. Adding manure and fertilisers

What is the correct sequence of these agricultural practices?

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

Correct Answer: Option (c)

2) A farmer after sowing the seeds adds manure to his field. What should be the immediate next agricultural practice after addition of manure and fertilisers?

(a) Irrigation of soil
(b) Storage of crops
(c) Preparation of soil
(d) Harvesting of crops

Correct Answer: Option (a)

LOB : Explain why it is important to loosen the soil before sowing in order to elaborate the effect of loose soil in plant's growth

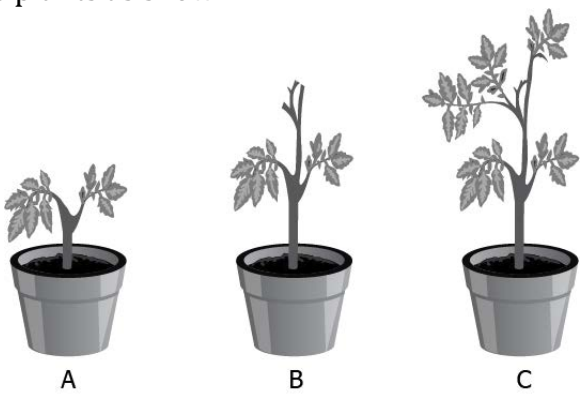
1) A farmer was turning the soil in the field constantly to loosen it. What is the likely reason for this agricultural practice?

(a) This prevent growth of weeds in the soil
(b) This increases the amount of soil in the field
(c) This allows penetration of roots in soil easily
(d) This allows water to stay in soil for longer duration

Correct Answer: Option (c)

2) A student setup an experiment to study the growth of plants using three different soil type.

The student plants a bean seed in each of the three pots. After 2 months, the student observes the growth of the plants as shown.



What can be student conclude from this experiment?

(a) Earthworm increases the fertility of the soil
(b) Compact soil increases the amount of nutrients in the soil
(c) Earthworm restrict the growth of the plant by consuming them

(d) Loosed soil with no earthworm allows maximum growth of the plant

Correct Answer: Option (a)

LOB : Compare the advantages of three major tools used for tilling and ploughing to justify the variety of agricultural practices

1) Ravi and Sunil both grew same crop in their fields. Ravi used plough while Sunil used hoe to increase the productivity. After few months, it was observed that both the fields had same productivity despite using different tools. What is the likely reason for this?

(a) both the tools are made of wood

(b) both the tools are used to harvest crops

(c) both the tools are helpful for tilling the soil

(d) both the tools are useful in removing weeds

Correct Answer: Option (c)

2) A farmer uses three different types of tools for tilling the soil in three different fields. The farmer records the time it took to complete the tilling in each field using different tools.

Field Trip	Season	Crops
A	Plough	5 hours
B	Hoe	4 hours 20 minutes
C	Cultivator	1 hour 30 minutes

Which tool the farmer should use to till his fields?

(a) Hoe as it is more efficient.

(b) Plough as it takes least time.

(c) Cultivator as it is saves time.

(d) Hoe as it is more efficient than plough and cultivator

Correct Answer: Option (c)

LOB : Analyse the quality of seeds with respect to their germinability

1) A farmer bought some maize seeds from the market. Before sowing the seeds, the farmer added seeds in the water and stirred the water. After few minutes, the farmer only

collected the seeds that settled down in the bottom for sowing. What is the likely reason choosing the drowned seeds for sowing?

(a) Seeds at the bottom are heavy which will result in plants with good growth.

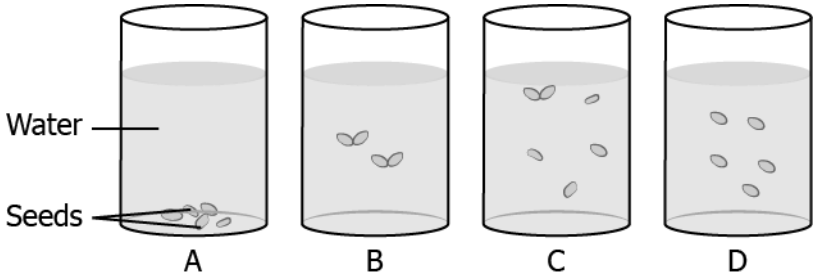
(b) Seeds at the bottom are not damaged which will result in plants that are healthy.

(c) Seeds at the bottom are light weight which will result in plants that grow taller.

(d) Seeds at the bottom absorbed more water which will result in plants with high water absorption capacity.

Correct Answer: Option (b)

2) A student does an experiment with wheat seeds. For the experiment, few seeds of wheat were kept in each of the four glasses that were filled with 200 mL of water and stirred well. After 10 minutes, the student measures the level at which seeds were found in all the glasses as shown.



What can be concluded from the experiment?

(a) Seeds that sinks are healthy and clean

(b) Floating seeds are damaged with holes

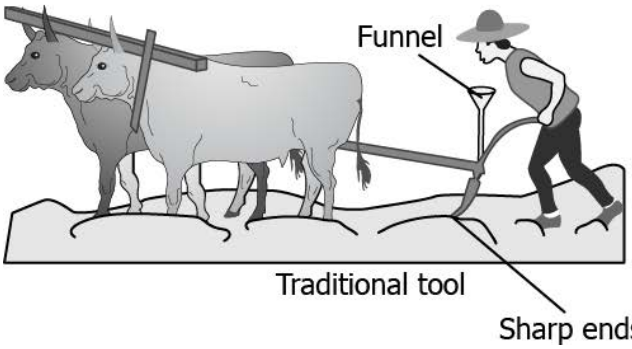
(c) Bottom seeds are heavy as they absorbed more water

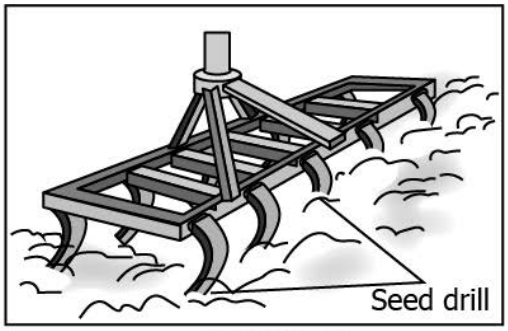
(d) Seeds at the middle have small air bubbles thus lighter in weight

Correct Answer: Option (a)

LOB : Compare the advantages of two major tools used for sowing to justify the variety of agricultural practices used in the country

1) The image shows the two tools for sowing seed.





Modern tool

What is the likely advantage of using seed drill over a traditional tool?

(a) It adds nutrients in the seed.

(b) It protects the seeds from physical damage.

(c) It separates healthy seeds from damaged seeds.

(d) It sow seeds at equal distance from each other.

Correct Answer: Option (d)

2) A farmer wishes to use a tool for sowing seeds that protects the seed from being consumed by animals. Which type of tool should the farmer choose?

(a) seed drill as it coats a chemical above the seeds

(b) traditional tool as many seeds are sown together

(c) seed drill as it covers the seeds with soil after sowing

(d) traditional tool as seeds passes through a funnel-shape tube

Correct Answer: Option (c)

LOB : Distinguish between manure and fertilisers to identify ways in which nutrients in soil is replenished

1) A farmer uses fertilizers on his land for long period of time plans to start using manure. What will be the likely benefit of this change?

(a) It will improve the texture and water retention.

(b) It will decrease the number of earthworms in the soil.

(c) It will make the soil more compact to hold more water in roots.

(d) It will increase particular chemicals in the soil to increase the yield.

Correct Answer: Option (a)

2) A student setup an experiment to study the growth of plants. The student used three potted plants with same amount of soil and additionally added manure in pot A, fertiliser in pot B and left the pot C undisturbed. After 3 months, the student measured the growth of each plant.

Pot	Initial Growth (cm)	Final Growth (cm)
A	10	25
B	10	35
C	10	18

The student again experimented and used the same soil for planting new plant. The table shows the growth of each plant after 3 months.

Pot	Initial Growth (cm)	Final Growth (cm)
A	10	28
B	10	20
C	10	18

What can the student analyse from the experiment?

(a) Manure is less effective than fertilisers

(b) Fertilisers and manure both decrease the soil's fertility

(c) Use of fertilisers repetitively reduces the soil fertility

(d) Growth of the plant is better when fertilizers are used instead of manure

Correct Answer: Option (c)

LOB : Describe the process of crop rotation to explain ways in which nutrients in soil is replenished

1) Ramesh wishes to restore the nutrients in the soil of his field without spending money on chemical fertilizers. Which natural method he should likely adopt for replenishment of soil nutrients?

(a) sowing seeds that are healthy

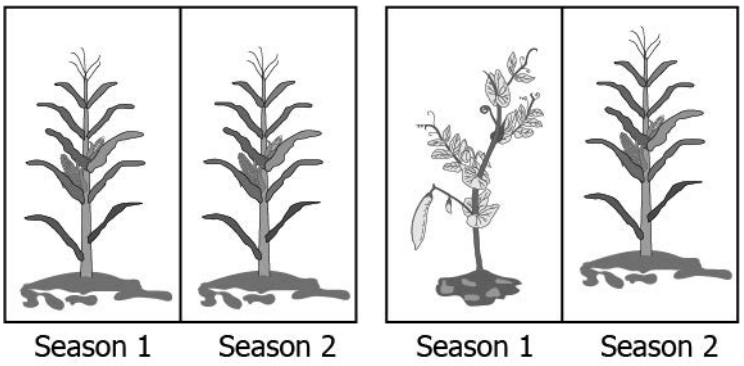
(b) growing the same crops every year

(c) growing different crops alternatively

(d) supplying water to crops at regular interval

Correct Answer: Option (c)

2) A farmer grows maize plants in two consecutive seasons in his field 1. Another farmer at the same time grows bean plants in one season and maize plant in the next season in field 2 as shown.



Which field will likely have soil with high nutrients for growth of new plants in the third season?

(a) field 1 as cultivating same crops every season increases productivity of the crops

(b) field 2 as cultivating different crops reduces the water requirement of crops

(c) field 1 as cultivating the same crops requires only same type of nutrients

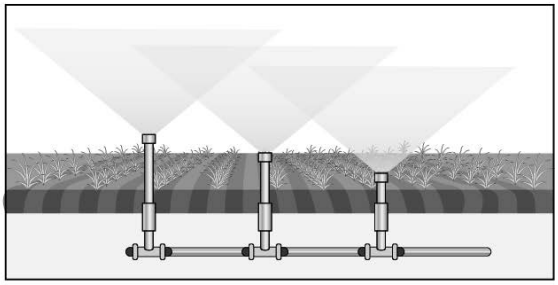
(d) field 2 as cultivating different crops restore the nutrients in the field

Correct Answer: Option (d)

LOB : Compare and analyse the traditional and modern methods of irrigation based on cost and efficiency in order to predict suitable irrigation method in real life situations

1) The image shows the two common methods of irrigation.

Pulley system



Sprinkler system

Why a farmer should adopt sprinkler system than pulley system?

(a) Sprinkler system reduces wastage of water.

(b) Sprinkler system decreases water requirement of the crops.

(c) Sprinkler system increases water absorption capacity of the crops.

(d) Sprinkler system provides excess water to the crops for high productivity.

Correct Answer: Option (a)

2) Kamlesh grows crop in a region of Rajasthan where there are no lakes and very little rainfall. During summers, the low availability of water limits the crop production. Which irrigation method Kamlesh should adopt to use water economically?

(a) drip system

(b) lever system

(c) pulley system

(d) sprinkler system

Correct Answer: Option (a)

LOB : Evaluate how weeds adversely affects the growth of the plants in order to justify their removal and control

1) Which statement supports the activity of removal of weeds by the farmers from their fields?

(a) weeds decreases the life span of the crops

(b) weeds increases the chances of pests on the crops

(c) weeds increases water retention making plant roots to rot

(d) weeds absorb nutrients from the soil reducing nutrient availability to crops

Correct Answer: Option (d)

2) A farmer notices that weeds in the field reduced the crop yield. What can the farmer do to prevent the growth of weeds without investing money on weedicides?

(a) irrigate the field more

(b) do tilling before sowing the seeds

(c) reduce the amount of manure added to the soil

(d) add fertilisers in the soil for increasing the crop yield

Correct Answer: Option (b)

LOB : Elaborate the process of harvesting to justify the reasons for employing combine and winnowing machine in the process of agriculture

1) Kalyan is a small-scale farmer who grows wheat in his small area of land. At the time of harvesting, which method should he use to separate wheat grains from chaff without spending huge amount of money on machines?

(a) Combining

(b) Harvesting

(c) Threshing

(d) Winnowing

Correct Answer: Option (d)

2) Kumari is a farmer who owns large area of a land. Every year she invests large amount of time by harvesting crop manually using sickle. Some farmers advise her to take the help of machine called combine. What is the likely reason for suggesting combine machine to Kumari?

(a) The machine includes large sickles that increase harvesting time.

(b) The machine is a harvester as well as a thresher which save time and energy.

(c) The machine is a harvester as well as a weed remover which reduces weeds in the field.

(d) The machine includes sowing process that sows new seeds to replace the harvested crop.

Correct Answer: Option (b)

LOB : Distinguish between the practices of large scale and small-scale storage of food in order to conclude that stored grains need protection from pests and microorganisms

1) Ritika observes that her father before storing the grains always dries them under the Sun. What is the likely reason for this activity?

(a) to keep the grains warm

(b) to increase the size of the grains

(c) to prepare the grains for germination

(d) to reduce the moisture content of the grains

Correct Answer: Option (d)

2) A farmer brings six jute bags of wheat at home for storing till they are soil in the market. What method should be employed to store the bags safely?

(a) use of silos to protect grains from pests

(b) use of pesticide to protect grains from dust particles

(c) use of mint leaves to absorb extra water of the wheat grains

(d) use of neem leaves as they prevent growth of fungus and bacteria

Correct Answer: Option (d)

LOB : Identify commonly known food items based on their sources to define animal husbandry

1) The table lists some commonly found food items.

A. milk
B. eggs
C. meat

How these food items can be produced on a large scale?

(a) by doing animal husbandry

(b) by performing plant harvesting

(c) by providing food to the animals

(d) by storing grains in big godowns

Correct Answer: Option (a)

2) The table lists some food items.

honey
wheat
sunflower oil
eggs
fish oil
beans
pulses
cheese
milk
apple

Which option correctly classifies sources of the food items?

(a)

Animal Source	sunflower oil, fish oil, eggs, rice, milk
Plant Source	beans, pulses, apple, honey, cheese

(b)

Animal Source	honey, fish oil, eggs, cheese, milk
Plant Source	rice, beans, pulses, sunflower oil, apple

(c)

Animal Source	eggs, pulses, fish oil, honey, sunflower oil
Plant Source	rice, cheese, milk, apple, beans

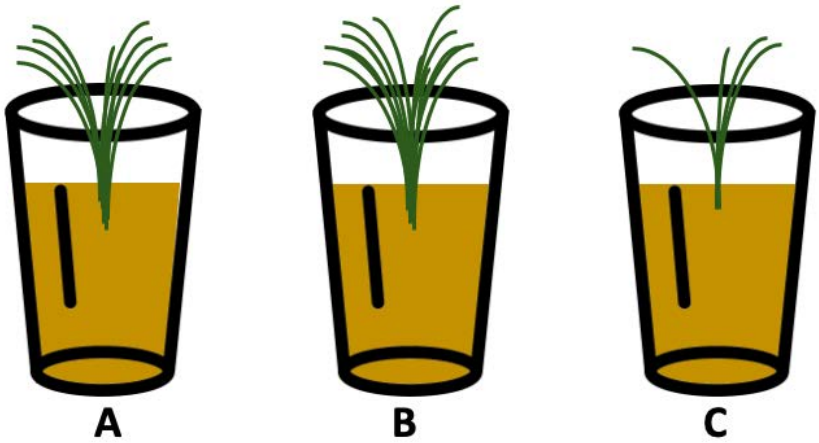
(d)

Animal Source	rice, beans, pulses, sunflower oil, apple
Plant Source	honey, fish oil, eggs, cheese, milk

Correct Answer: Option (b)

Suggested Teacher Resources

1 Activity

Activity	Show the effect of manure and fertilizers on the growth of seedlings
Prerequisite	NA
Material Required	3 empty glass vessels, germinated moong or gram seeds, small amount of urea, little cow dung manure
Vocabulary	Germination
Procedure	1. Take moong or gram seeds and germinate them by soaking in water overnight 2. Take three empty glasses or similar vessels marked as A, B and C. 3. Add little amount of soil mixed with a little cow dung manure in **glass A** 4. Add same amount of soil mixed with a little urea in **glass B** 5. Take the same amount of soil in **glass C** without adding anything 6. Keep them in a safe place and water it them daily. 7. Note down the observation after 7-10 days 
Let's think	1. Which glass shows the highest growth? What were the original contents of the glass showing highest growth? 2. Can you name elements and compounds which may have caused this growth?
Beyond the classroom	1. Talk to a local farmer and identify what kind of manure and fertilizer is used by him? 2. Does it change with season and crop?

2 Activity

Activity	Separation of wheat seeds
Material required	Handful of wheat seeds, a glass vessel, water
Procedure	1. Take a glass vessel and fill it with water 2. Put a handful of wheat seeds and stir it well and wait for sometime 3. What do you observe? 
Let's think	1. Why do some seeds float while others sink down? 2. Which seeds should be chosen for crop production? Why?

2. Microorganisms- Friend and Foe

QR Code:

Learning Objectives:

Topic	Learning Objectives
Microorganism	Recall four major categories of microorganisms (bacteria, fungi, protozoa, algae)
	Differentiate between microorganisms and viruses to establish that viruses reproduce only inthe host body
Useful microorganisms	Elucidate the reason for increasing volume when yeast is added to dough in baking industry to explain fermentation.
	Explain the role of antibiotics in order to demonstrate the medicinal uses of microorganisms
Methods for separating mixtures of solids and solids	Explain the role of vaccinations in fighting with diseases in order to appreciate the medicinal uses of microorganisms
	Explain how microorganism help in increasing the nitrogen in soil to the agricultural uses of microorganisms
	Explain microorganisms role in decomposing to describe importance
Harmful microorganisms Food preservation Nitrogen fixation Microorganism Useful microorganisms	Define pathogens to list the class of harmful microorganisms
	Describe how mosquitoes spread malaria and dengue to explain the role of carriers in spreading communicable disease
	List examples of diseases in humans, plants and animal caused by microorganisms in order to explain the harmful effects of microorganisms
	List various methods of preserving food in order to demonstrate the restriction of growth of microorganism
	Illustrate the process of fixing the nitrogen back in the soil to explain the role of microorganisms in increasing the fertility of soil

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Differentiate between microorganisms and viruses to establish that viruses reproduce only in the host body	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.
Recall four major categories of microorganisms (bacteria, fungi, protozoa, algae)	Classifies materials and organisms based on properties / characteristics, e.g., metals and

<table>
<tr><td>Define pathogens to list the class of harmful microorganisms</td><td>non-metals; kharif and rabi crops; useful and harmful microorganisms; sexual and asexual reproduction; celestial objects; exhaustible and inexhaustible natural resources, etc.</td></tr>
<tr><td>Elucidate the reason for increasing volume when yeast is added to dough in baking industry to explain fermentation</td><td rowspan="2">Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the conditions required for combustion? Why do we add salt and sugar in pickles and murabbas? Do liquids exert equal pressure at the same depth?)</td></tr>
<tr><td>Describe how mosquitoes spread malaria and dengue to explain the role of carriers in spreading communicable disease</td></tr>
<tr><td>List examples of diseases in humans, plants and animal caused by microorganisms in order to explain the harmful effects of microorganisms</td><td>Explains processes and phenomenon, e.g., reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.</td></tr>
<tr><td>Explain the role of antibiotics in order to demonstrate the medicinal uses of microorganisms</td><td rowspan="3">Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.)</td></tr>
<tr><td>Explain the role of vaccinations in fighting with diseases in order to appreciate the medicinal uses of microorganisms</td></tr>
<tr><td>Explain microorganisms role in decomposing to describe importance</td></tr>
<tr><td>Explain how microorganism help in increasing the nitrogen in soil to the agricultural uses of microorganisms</td><td rowspan="2">Draws labelled diagram / flow charts, e.g., structure of cell, eye, human reproductive organs; experimental set ups, etc.</td></tr>
<tr><td>Illustrate the process of fixing the nitrogen back in the soil to explain the role of microorganisms in increasing the fertility of soil</td></tr>
<tr><td>List various methods of preserving food in order to demonstrate the restriction of growth of microorganism</td><td>Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)</td></tr>
</table>

Test items

LOB : Recall four major categories of microorganisms (bacteria, fungi, protozoa, algae)

1) Microorganisms are classified into:
   (a) four groups-bacteria, algae, fungi, protozoa
   (b) four groups- bacteria, algae, virus, fungi
   (c) three groups- algae, protozoa, virus
   (d) three groups- algae, virus, bacteria

Correct Answer: Option (a)

2) Padma saw some colored cottony growth on the bread she kept open in her kitchen. She uses magnifying glass to observe the microorganisms. Which group of microorganism will she likely observe?
   (a) Fungi
   (b) Algae
   (c) Bacteria
   (d) Protozoa

Correct Answer: Option (a)

LOB : Differentiate between microorganisms and viruses to establish that viruses reproduce only inthe host body

1) What makes viruses different from the bacteria?
   (a) microscopic size
   (b) dependency on living cells
   (c) requirement of moist conditions
   (d) requirement of food

Correct Answer: Option (b)

2) Viruses can infect plant cells causing a viral disease. How do the plant cells benefit the viruses?
   (a) They help virus have a place to live.
   (b) They help virus increase their number.
   (c) They allow virus to make their own food.
   (d) They keep virus safe from the surroundings.

Correct Answer: Option (b)

LOB : Elucidate the reason for increasing volume when yeast is added to dough in baking industry to explain fermentation

1) Rahul mixes some maida flour with water and sugar. He also adds small amount of yeast powder in the mixture. After two hours, he see saw that the dough rises. What made the dough to rise?
   (a) The division of yeast cells and production of gas.
   (b) The reaction of maida flour with sugar.

(c) The release of energy by yeast cell after consumption of Maida flour.

(d) The release of heat due to enlargement of yeast cells.

Correct Answer: Option (a)

2) The dough increases in size when yeast is added into it. Which gas is produced by yeast cells and its effect on the dough?

(a) Oxygen gas produced during respiration that increases the volume of the dough.

(c) Oxygen gas produced during reproduction that increases the volume of the dough.

(b) Carbon dioxide gas produced during reproduction that increases the volume of the dough.

(d) Carbon dioxide gas produced during respiration that increases the volume of the dough.

Correct Answer: Option (d)

LOB : Explain the role of antibiotics in order to demonstrate the medicinal uses of microorganisms

1) Alina has cold and viralflu for the past 5 days. Her mother gave her antibiotics but she is not recovering. What can be a likely reason for the same?

(a) Antibiotics are used against viral infections.

(c) Antibiotics takes time to cure the infection.

(b) Antibiotics are used against bacterial infections.

(d) Antibiotics are to prevent infection rather than to cure them.

Correct Answer: Option (b)

2) Alexander Flaming discovered penicillin while working on a disease-causing bacteria in the lab. He observed spores called little green mould on the bacterial culture plate that prevented the growth of bacteria. Who can be treated by the penicillin and how?

(a) A person with bacterial infection as penicillin stops the growth of disease causing bacteria.

(c) A person with bacterial infection as penicillin promotes growth of mould over the bacteria causing infection.

(b) A person with mould infection as penicillin restricts the growth of moulds.

(d) A person with mould infection as penicillin promotes the growth of bacteria over the disease causing mould.

Correct Answer: Option (a)

LOB : Explain the role of vaccinations in fighting with diseases in order to appreciate the medicinal uses of microorganisms

1) In polio vaccination, the dead microbes are introduced into the children's body. How does this vaccination protect the children from polio?

(a) by producing suitable antibodies that remain in the body

(b) by killing the disease-causing microbes directly

(c) by increasing the interaction of dead microbes with the live ones

(d) by increasing the number of beneficial bacteria

Correct Answer: Option (a)

2) Antibodies are produced in the body to fight the microbes when they entered the body. How does the human body react when these microbes attack again?

(a) The human body remembers the microbes and quickly forms antibodies against it

(b) The human body becomes weak and is unable to form antibodies against the microbes.

(c) The human body eliminates the microbes without even producing antibodies against them.

(d) The human body produces antibodies but takes a longer time to overcome the microbial infection.

Correct Answer: Option (a)

LOB : Explain how microorganism help in increasing the nitrogen in soil to the agricultural uses of microorganisms

1) Cyanobacteria and blue green algae are commonly called as nitrogen fixers. They increase the fertility of soil. How do these nitrogen fixers increase the soil fertility?

(a) The produce nitrogen gas that is released into the surrounding.

(b) They convert nitrogen gas present in the surrounding into compost.

(c) The fix atmospheric nitrogen to make nitrogen compounds in the soil.

(d) They decompose remains of plants and animals to produce nitrogen compounds.

Correct Answer: Option (c)

2) Some nitrogen fixing bacteria help increase the fertility. This makes the soil more productive. What activity of bacteria helps make soil more productive?

(a) Supplying compounds of nitrogen to the plant roots.

(b) Breaking down nitrogen rich waste into nitrogen gas.

(c) Breaking down compounds of nitrogen to release nitrogen gas.

(d) Taking up nitrogen from the air and converting it into compounds of nitrogen.

Correct Answer: Option (d)

LOB : Explain microorganisms role in decomposing to describe importance

1) A student takes 2 pots M and N. He puts plant waste in pot M and plastic products in pot N. He places both the pots in an open area for 3- 4 weeks and observes that the content in the Pot M is converted into manure while the content in the Pot N remains the same. What can be a likely reason for the production of manure in pot M?
   (a) Microorganisms decompose plant waste faster than plastic
   (b) Microorganisms degrade plastic slowly compared to plant waste
   (c) Microorganisms only degrade plastic waste to produce manure
   (d) Microorganisms only decompose plant waste into manure

Correct Answer: Option (d)

2) The decaying leaves and plant waste in our surroundings disappears after some time because of microorganisms. How do these microorganisms help clean our surroundings?
   (a) They convert dead organic waste into complex substances.
   (b) They convert dead inorganic waste into complex substances.
   (c) They convert dead organic waste into simple substances.
   (d) They convert dead inorganic waste into simple substances.

Correct Answer: Option (c)

LOB : Define pathogens to list the class of harmful microorganisms

1) What are pathogens?
   (a) disease causing agents
   (b) carriers of harmful microorganisms
   (c) diseased microorganisms
   (d) carriers of beneficial microorganisms

Correct Answer: Option (a)

2) What characteristic likely defines a pathogen?
   (a) They can spoil food and plastic.
   (b) They make soil fertile.
   (c) They can infect a human body.
   (d) They breakdown remains of dead organisms.

Correct Answer: Option (c)

LOB : Describe how mosquitoes spread malaria and dengue to explain the role of carriers in spreading communicable disease

1) Which statement associated with mosquito helps understand that malaria is a communicable disease?

(a) The causative agent of malaria is a protozoan.

(b) The mosquito carriers the parasite Plasmodium that causes malaria.

(c) The mosquito lays its eggs in water collected in tyres, coolers, and open pits.

(d) The parasite is transferred inside the body of a health person along with the mosquito bite.

Correct Answer: Option (d)

2) What is true about the communicable disease 'dengue'?

(a) It occurs due to female *Aedes* mosquitos that act as carrier of dengue virus.

(b) It occurs due to male *Aedes* mosquitos that act as carrier of dengue virus.

(c) It occurs due to male *Anopheles* mosquitos that act as carrier of dengue virus.

(d) It occurs due to female *Anopheles* mosquitos that act as carrier of dengue virus.

Correct Answer: Option (a)

LOB : List examples of diseases in humans, plants and animal caused by microorganisms in order to explain the harmful effects of microorganisms

1) Which option shows the correct example of diseases in plants or animals and their corresponding harmful agents?

(a)

Disease	Affects	Caused by
Anthrax	Plants	Bacterium

(b)

Disease	Affects	Caused by
Cholera	Animals	Fungus

(c)

Disease	Affects	Caused by
Citrus canker	Animals	Bacterium

(d)

Disease	Affects	Caused by
Rust of wheat	Plants	Fungus

Correct Answer: Option (d)

2) A student is making a list of diseases caused by different microorganisms in plants and in humans. Which table correctly shows the diseases listed by the student?

a)

Human	Plant
Chicken pox - bacteria Typhoid - bacteria	Yellow vein mosaic of okra - fungi Rust of wheat - virus

b)

Human	Plant
Chicken pox - virus Typhoid - bacteria	Yellow vein mosaic of okra - virus Rust of wheat - fungi

c)

Human	Plant
Chicken pox - bacteria Typhoid - bacteria	Yellow vein mosaic of okra - fungi Rust of wheat - fungi

d)

Human	Plant
Chicken pox - virus Typhoid - bacteria	Yellow vein mosaic of okra - bacteria Rust of wheat - virus

Correct Answer: Option (b)

LOB : List various methods of preserving food in order to demonstrate the restriction of growth of microorganism

1) Which option shows the name and function of preservatives used in jam and squashes?

(a) Sodium benzoate that prevents the action of microorganisms.

(b) Salt that stops the activity of microorganisms.

(c) Sodium sulphate that prevents the action of microorganism.

(d) Oil that makes the environment unsuitable for the survival of microorganisms.

Correct Answer: Option (a)

2) Ridha observed that fishes were coated with salt and kept in tray in the fish market. What is the likely use ofcoating fish with salt?

(a) It increases the moisture content of the fish allowing it to survive longer.

(b) It stops the growth of bacteria by reducing the moisture content.

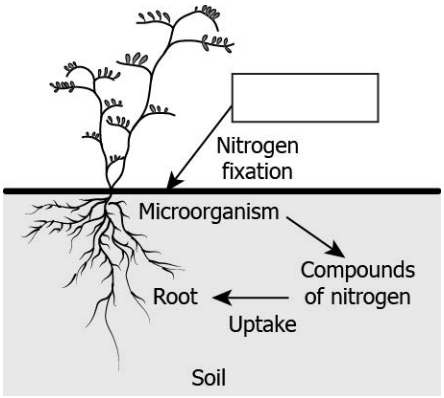
(c) It increases the salt content of the fish that enhances its taste.

(d) It reduces the weight of the fish making the transport easier.

Correct Answer: Option (b)

LOB : Illustrate the process of fixing the nitrogen back in the soil to explain the role of microorganisms in increasing the fertility of soil

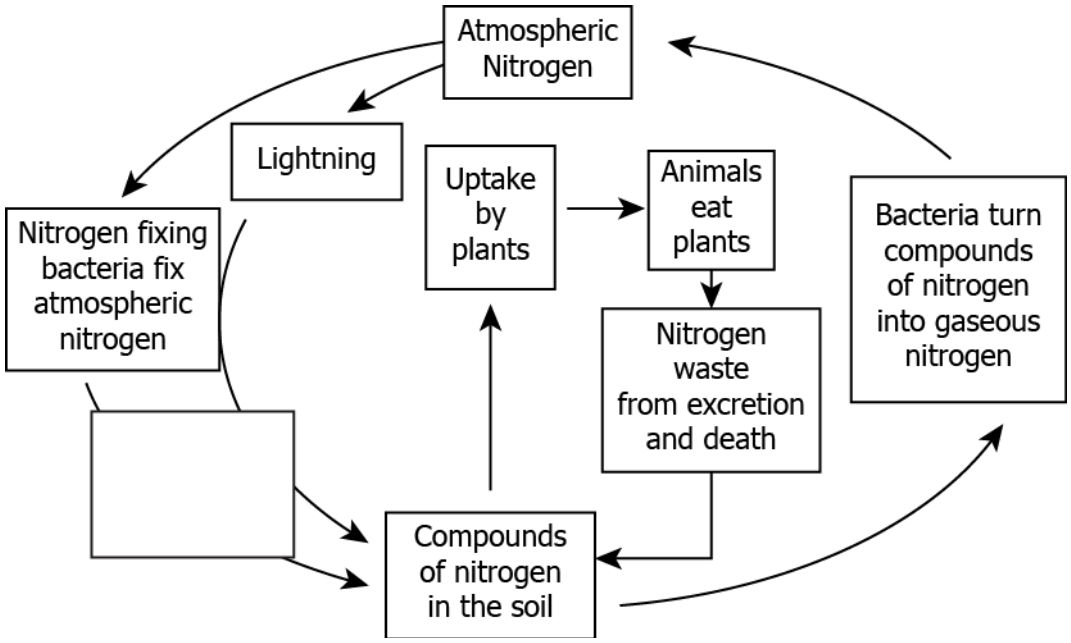
1) A student is making an image to show the process of nitrogen fixation. What will be added to the empty box to complete the image?



a) Nitrogen molecules in the soil
b) Nitrogenous compounds
c) Atmospheric nitrogen
d) Nitrogen gas in the soil

Correct Answer: Option (c)

2) The image explains a nitrogen cycle.



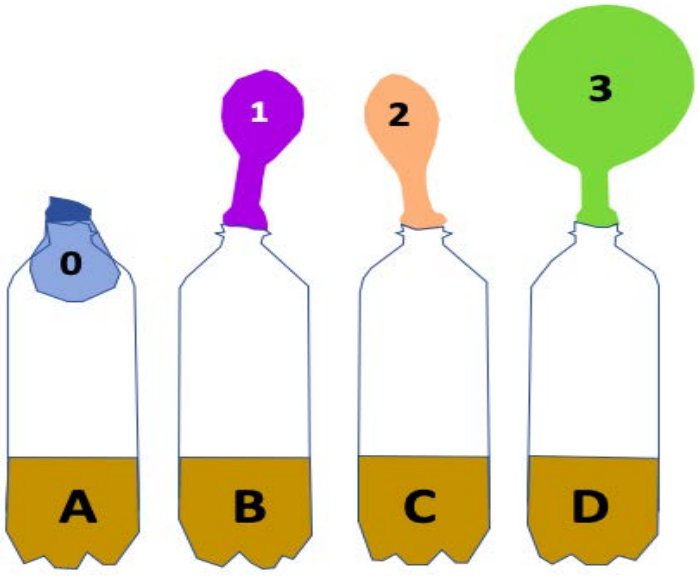
What should be added to the blank box to complete the cycle?

(a) Bacteria turn fixed nitrogen into nitrogenous compounds.
(b) Bacteria fixed nitrogen into soil.
(c) Bacteria convert the nitrogenous compounds into nitrogen gas.
(d) Bacteria mix nitrogen gas with the soil.

Correct Answer: Option (a)

Suggested Teacher Resources

1 Activity

Activity	Observe the growth of microorganisms
Material Required	4 plastic bottles with caps, sugar, warm water, a small amount of yeast, balloons
Vocabulary	Microorganisms, Yeast
Procedure	1. Take each bottle and label them as A,B,C and D 2. Pour warm water in each of the plastic bottles 3. Add small amounts of yeast in all four of them 4. Add one, two, three and four tablespoons of sugar in each one of them 5. Shake the bottle gently 6. Replace the cap of the bottle and cover it with a balloon. 7. Note your observations 
Let's think	1. Is the size of balloon same or different? Can you identify the original contents of the bottle with the biggest balloon? 2. What is causing the balloon to inflate?
Beyond the classroom	Where else do you see microorganisms release gases? Is the released gas useful? Where is it used?

3. Synthetic Fibres and Plastics

QR Code:

Learning Outcomes

Topic	Learning Objectives
Synthetic fibres	Distinguish between Synthetic & Natural fibres based on their properties.
	Enlist different types of synthetic fibres and their characteristics in order to explain their specific uses
Characteristics of synthetic fibres	List characteristics of plastic's ability to bend to differentiate between thermoplastics and thermosetting plastics
Plastics as a material of choice	Examine suggest the characteristics of plastic to explain its suitability in a variety of applications.
Plastics and environment	Differentiate between plastics based on their ability to decompose in order to explain why plastics are a threat to the environment.

Learning Outcomes and Learning Objectives:

Learning Objectives	Learning Outcomes
Distinguish between Synthetic & Natural fibres based on their properties	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.
List characteristics of plastic's ability to bend to differentiate between thermoplastics and thermosetting plastics	
Differentiate between plastics based on their ability to decompose in order to explain why plastics are a threat to the environment.	
Enlist different types of synthetic fibres and their characteristics in order to explain their specific uses	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)
Examine suggest the characteristics of plastic to explain its suitability in a variety of applications.	
Distinguish between Synthetic & Natural fibres based on their properties	Discusses and appreciates stories of scientific discoveries

Enlist different types of synthetic fibres and their characteristics in order to explain their specific uses	
Differentiate between plastics based on their ability to decompose in order to explain why plastics are a threat to the environment	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: (e.g., using resources judiciously; making controlled use of fertilisers and pesticides; suggesting ways to cope with environmental hazards, etc).

Test items

LOB : Distinguish between Synthetic & Natural fibres based on their properties

1. The table lists characteristics of some fibres

P	Q
It is obtained from the chemical treatment of wood pulp. It is also known as man-made fibre.	It is obtained from plant and is made up of large number of cellulose units. It is known as natural fibre.

Based on the table, which option correctly lists the name of these fibres?

(a) P-rayon, Q- nylon
(b) P-nylon, Q- rayon
(c) P- rayon, Q- cotton
(d) P- cotton, Q- rayon

Correct Answer: Option (c)

2. Seema has red curtains in her house that are soft and looked like silk. Her mother tell her that it is a synthetic material called rayon rather than silk. In which category can the material of the curtain be classified into?

(a) natural fibre, man-made
(b) synthetic fibre, plant based
(c) synthetic fibre, man-made
(d) natural fibre, plant based

Correct Answer: Option (b)

LOB : Enlist different types of synthetic fibres and their characteristics in order to explain their specific uses

1) Neena noticed that the label on her sweater read that it was made of acrylic, a synthetic fibre. Neena felt that acrylic resembled wool. Which characteristics did acrylic has that makes it to use in place of wool?

(a) It is warmer than wool.
(b) It is available in more colours than wool.
(c) It is less shiny that wool.
(d) It is cheaper than wool.

Correct Answer: Option (d)

2) Ram wears a shirt that does not get wrinkled easily. It remains crisp and is easy to wash while Shyam wears a shirt that gets wrinkled very soon. Which fibre is probably used in Ram's shirt?

(a) polyester
(b) cotton
(c) wool
(d) acrylic

Correct Answer: Option (a)

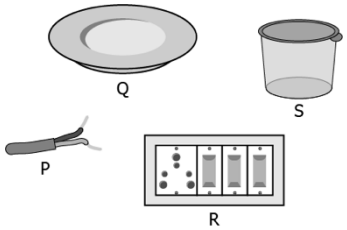
LOB : List characteristics of plastic's ability to bend to differentiate between thermoplastics and thermosetting plastics

1) Shikhar puts some hot water in an empty plastic bottle and in a plastic bowl used in the kitchen. He observes that the bottle gets deformed while the plastic bowl remains the same. Based on the observation, what can be said about the bottle or the bowl?

(a) Both plastic bowl and plastic bottle are thermoplastic.
(b) Both plastic bowl and plastic bottle are thermosetting plastic.
(c) Plastic bowl is a thermoplastic while plastic bottle is a thermosetting plastic.
(d) Plastic bowl is a thermosetting plastic while plastic bottle is a thermoplastic.

Correct Answer: Option (d)

2) The image shows some products that are made up of different type of plastics.



Which products are correctly matched with the type of plastic?

(a) Q and R- thermosetting plastic
(b) P and Q- Thermosetting plastic
(c) R and S- Thermoplastic
(d) S and P- Thermoplastic

Correct Answer: Option (a)

LOB : Examine suggest the characteristics of plastic to explain its suitability in a variety of applications.

1) The uniform of firemen are made up of synthetic fibres and have coating of melamine plastic. What is the likely characteristic that melamine plastic has that makes it ideal to make uniform for firemen?

(a) It is a poor conductor of heat.
(b) It is a good conductor of heat.
(c) It absorbs all the heat.
(d) It reflects all the heat.

Correct Answer: Option (a)

2) In chemical laboratories, many salts like ammonium nitrate are stored in plastic containers instead of metals. What can be a likely reason for the same?
   (a) Plastic does not react with other substances.
   (b) Plastic is less expensive than metal.
   (c) Plastic is easier to handle than metal.
   (d) Plastic gets rusted in the presence of air.

Correct Answer: Option (a)

LOB : Differentiate between plastics based on their ability to decompose in order to explain why plastics are a threat to the environment

1) Which option correctly differentiates the biodegradable material from non-biodegradable material?

(a)

Biodegradable Material	Non-biodegradable Material
They take some days to degrade naturally.	They may take more than 100 years to degrade.

(c)

Biodegradable Material	Non-biodegradable Material
Disposal of these materials is a problem.	These materials can be easily disposed off by decomposition process.

(b)

Biodegradable Material	Non-biodegradable Material
They are degraded naturally by bacteria.	They are degraded by the action of fungi.

(d)

Biodegradable Material	Non-biodegradable Material
They accumulate in the environment leading to pollution.	They do not get accumulated in the environment.

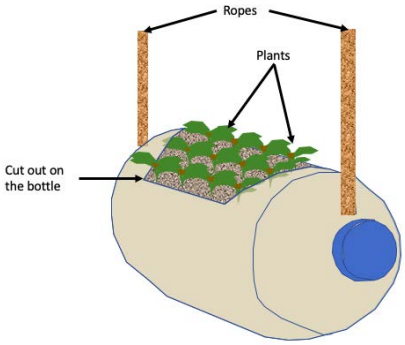
Correct Answer: Option (a)

2) Government has banned use of plastic carry bags. Shopkeepers and malls are advised to promote theuse of reusable paper and cloth bags. What is a likely reason for the ban of plastic?
   (a) They burn slowly and release poisonous fumes into the environment.
   (b) They get completely burnt and removed from the environment.
   (c) They get degrade naturally in the soil to release harmful substances.
   (d) They require a large number of bacteria for their degradation.

Correct Answer: Option (a)

Suggested Teacher Resources

1 Activity

Activity	Reuse plastic to make useful objects
Material Required	Waste plastic bottles, small plants, soil and cow dung manure, scissors to cut the plastic
Procedure	1. Take a plastic bottle and cut it from the side ways 2. Put some soil mixed with cow dung manure 3. Place the plant inside the bottle with soil mixed with cow dung manure (Fig 1) 4. You can make multiple bottles to make a garden wall (Fig 2)  Fig 1  Fig 2
Let's think	1. What are the most common source of waste plastic? 2. Can you think of other useful things you could make using existing plastic?
Beyond the classroom	1. The government recently banned the use of certain kinds of plastic. Ask the shopkeeper near you about the ban and discuss with your friends the effect of banning the use of such plastic.

4. Materials : Metals and Non-metals

QR Code:

Learning Objectives:

Topic	Learning Objectives
Physical properties of metals and no-metals	Differentiate between the commonly known materials based on their ability to be bent and formed into sheets, be drawn into wires, ability to produce ringing sound, ability to conduct electricity, ability to conduct heat in order to define various properties of metal
	Categorize the commonly known materials as Metals & Non-metals in order to explain their physical properties.
	Elaborate the chemical reactions of metals and non-metals with oxygen, water, acids and bases in order to distinguish between them.
	Apply the concept of reactivity of a metal to predict if a given metal will displace another metal in a displacement reaction
Uses of metals and non-metals	Predict the utility of a given material for a specific task to reinforce the physical and chemical properties of metals and non-metals

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Elaborate the chemical reactions of metals and non-metals with oxygen, water, acids and bases in order to distinguish between them.	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.
Differentiate between the commonly known materials based on their ability to be bent and formed into sheets, be drawn into wires, ability to produce ringing sound, ability to conduct electricity, ability to conduct heat in order to define various properties of metal	
Categorize the commonly known materials as Metals & Non-metals in order to explain their physical properties.	Explains properties / characteristics of materials and organisms in order to classify them: (Such as, metals and non-metals; kharif and rabi crops; useful and harmful microorganisms; sexual and asexual reproduction; celestial objects; exhaustible and inexhaustible natural resources, etc.)

Apply the concept of reactivity of a metal to predict if a given metal will displace other metal or not in a displacement reaction	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the conditions required for combustion? Why do we add salt and sugar in pickles and murabbas? Do liquids exert equal pressure at the same depth?)
Elaborate the chemical reactions of metals and non-metals with oxygen, water, acids and bases in order to distinguish between them.	Writes word equation in order to express chemical reactions: (such as, reactions of metals and non-metals with air, water and acids, etc.)
Apply the concept of reactivity of a metal to predict if a given metal will displace other metal or not in a displacement reaction	
Apply the concept of reactivity of a metal to predict if a given metal will displace another metal in a displacement reaction	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)
Predict the utility of a given material for a specific task to reinforce the physical and chemical properties of metals and non-metals	

Test items

LOB : Differentiate between the commonly known materials based on their ability to be bent and formed into sheets, be drawn into wires, ability to produce ringing sound, ability to conduct electricity, ability to conduct heat in order to define various properties of metal

1. Which of the following materials can be classified as malleable?

   (a) sand, because it has the ability to flow
   (b) air, because it can move from one place to another
   (c) metals, because they can beaten into thin sheets
   (d) water, because it can change its shape when put in different containers

   Correct Answer: Option (c)

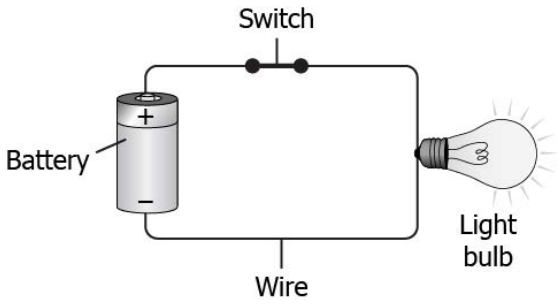
2. A student wants to make a model. She needs a hard material than can bend and can be made into a thin sheet. Which material should she pick?
   (a) Aluminium
   (b) chalk
   (c) paper
   (d) rubber

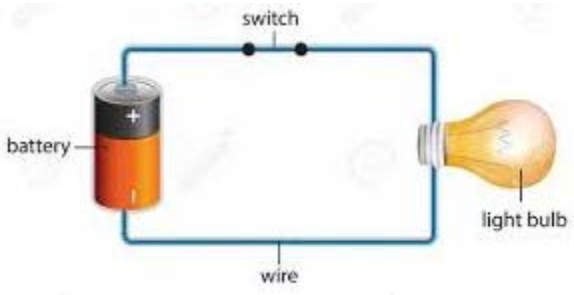
   Correct Answer: Option (a)

3. Which material is used to make wires to conduct electricity?
   (a) Copper
   (b) Cotton
   (c) Rubber
   (d) Glass

   Correct Answer: Option (a)

4. A student is making an electric circuit to light a bulb. He needs a battery, connecting wires, switch, and a bulb, as shown.





He used different materials to connect the battery, switch, and the bulb. He noted when the bulb goes on.

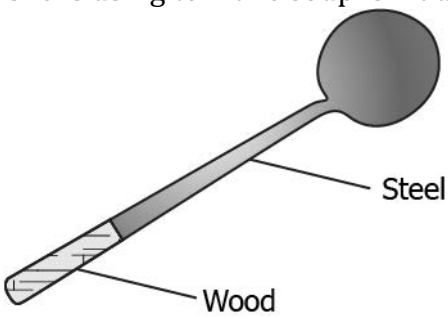
Material	Does the Bulb Light Up?
Wool	No
Copper	Yes
Rubber	No
Plastic	No

Which material is a good conductor of electricity?

(a) Wool
(b) Copper
(c) Rubber
(d) plastic

Correct Answer: Option (b)

5. Mehak notices that the ladle she is using to make soup is made of two materials.

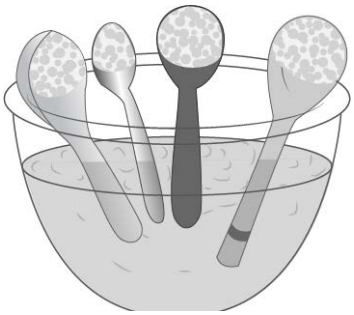


She observes that the handle of the ladle is cool, but the other end is hot. How can the two materials be classified based on conduction of heat?

(a) wood and steel are good conductors of heat
(b) steel and wood are bad conductors of heat
(c) wood is a good conductor of heat, but steel is not
(d) steel is a good conductor of heat, but wood is not

Correct Answer: Option (d)

6. A student put butter at the tip of four spoons. He put the other end of spoons in a tub of hot water.



After some time, the student noticed the amount of butter that melted on the spoons.

Spoon	Observation
Spoon 1	Butter did not melt
Spoon 2	Butter did not melt
Spoon 3	Butter melted completely
Spoon 4	Some of the butter starts to melt

Which spoon is made of material that is a good conductor of heat?

(a) spoon 1
(b) spoon 2
(c) spoon 3
(d) spoon 4

Correct Answer: Option (c)

LOB : Categorize the commonly known materials as Metals & Non-metals in order to explain their physical properties

1) The table lists properties of a substance X.

1. Can be drawn into thin sheets
2. Can bend into different shapes
3. Can be made into thin wires
4. Makes sound when hit with a hammer
5. Good conductor of heat
6. Conducts electricity but to not that well

What can substance X be classified as?

(a) metal, because metals change shape on their own

(b) non-metal, because non-metals can be made into wires

(c) non-metals, because non-metals are weak conductors of electricity

(d) metal, because metals are malleable and conductors of heat and electricity

Correct Answer: Option (d)

2) The table compares the properties of four materials. Which material is a metal?

Material	Malleable	Ductile	Sonorous	Conducts Electricity
Iron	✓	✓	✓	✓
Plastic	✗	✗	✗	✗
Wood	✗	✗	✗	✗
Glass	✗	✗	✓	✗

(a) Iron

(b) Glass

(c) Plastic

(d) Wood

Correct Answer: Option (a)

3) Which substance can be drawn into thin wires?

(a) Cardboard

(b) Copper

(c) Paper

(d) Plastic

Correct Answer: Option (b)

4) A student classifies chromium as ductile but not carbon. What explains the classification?

(a) Chromium can be drawn into thin wires, but carbon cannot.

(b) Chromium can be made into thin sheets, but carbon cannot.

(c) Chromium can be beaten to make sound, but carbon cannot.

(d) Chromium can be plated over other metals, but carbon cannot.

Correct Answer: Option (a)

5) The image shows four objects.

Which object when hit would produce a ringing sound?

(a) object 1
(b) object 2
(c) object 3
(d) object 4

Correct Answer: Option (b)

6) Which objects are sonorous?

(a) steel bottle
(b) hardcover book
(c) Plastic bat
(d) Porcelain plate

Correct Answer: Option (a)

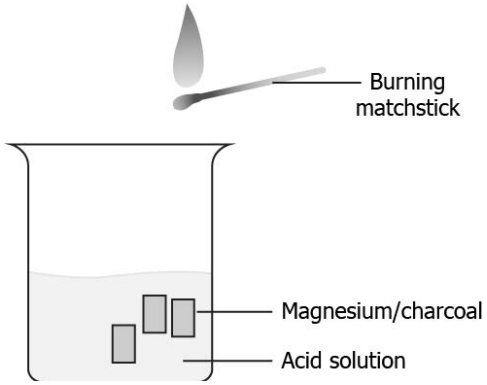
LOB : Elaborate the chemical reactions of metals and non-metals with oxygen, water, acids and bases in order to distinguish between them

1) Two elements X and Y are reacted with oxygen to form their respective oxides. They are then dissolved in water. Element X forms a hydroxide which is basic in nature. Element Y forms an acid. What can element X and Y be classified as?

(a) X – metal; Y – non-metal
(b) X – non-metal; Y – metal
(c) X – metal; Y –metal
(d) X – non-metal; Y – non-metal

Correct Answer: Option (a)

2) A piece of magnesium and a piece of charcoal is put in two separate beakers. To each beaker 5 mL of hydrochloric acid is added. A lit matchstick was brought close to the mouth of the beakers.



The burning matchstick extinguishes with a pop sound when placed over the beaker with magnesium and acid but not when placed over the beaker with charcoal and acid.

What comparison can be drawn between magnesium and charcoal?

(a) magnesium is a non-metal, while charcoal is a metal

(b) magnesium is a metal, while charcoal is a non-metal

(c) magnesium reacts with fire, but charcoal does not

(d) magnesium reacts with oxygen, but charcoal does not

Correct Answer: Option (b)

LOB : Apply the concept of reactivity of a metal to predict if a given metal will displace another metal in a displacement reaction

1) Which element can displace copper from the copper sulphate solution?
   (a) Iron
   (b) Platinum
   (c) Gold
   (d) Silver

   Correct Answer: Option (a)

2) A student filled three beakers with solutions. Metals were added to each solution.

Beaker	Solution	Metal Added
1	$ZnSO_4$	Fe
2	$FeSO_4$	Cu
3	$CuSO_4$	Ag
4	$CuSO_4$	Zn

   In which beaker would a displacement reaction take place?
   (a) beaker 1
   (b) beaker 2
   (c) beaker 3
   (d) beaker 4

   Correct Answer: Option (d)

LOB : Predict the utility of a given material for a specific task to reinforce the physical and chemical properties of metals and non-metals

1) Which of the following describes why metals are essential to humans?
   (a) They are used in purification of water.
   (b) They are used to make machinery and automobiles.
   (c) They are major components of fertilizers for plants to grow.
   (d) They form gases in the atmosphere that are required by humans to breathe.

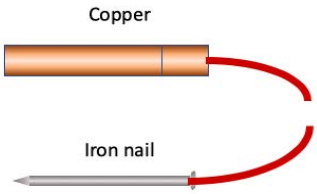
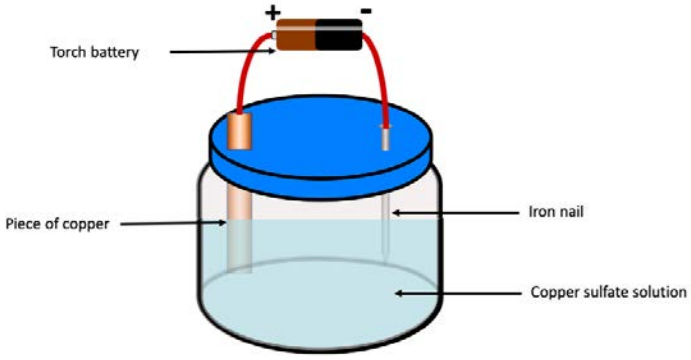
   Correct Answer: Option (b)

2) Where would the given set of elements i.e. Sodium and phosphorous be used?
   (a) Machinery
   (b) Electric wires
   (c) Fertilizers
   (d) Fuel

   Correct Answer: Option (c)

Suggested Teacher Resources

1 Activity

Activity	Observe the chemical effect of electricity during copper electroplating of an iron nail
Material Required	Piece of copper, copper sulphate, an iron nail, some wire, torch battery
Vocabulary	Electron, metal, chemical reaction
Procedure	1. Take the piece of copper and iron nail, and attach one conducting wire to each such that one end is open  Fig 1 2. Take a clean beaker and put 100 g of copper sulphate 3. Pour 4 cups of hot water into the solution 4. Dip the piece of copper and iron nail into the solution. 5. Now connect the open ends of the wire connected to the piece of copper and iron nail with a torch battery. 6. Note down your observations of what happened to the iron nail.  Fig 2  Fig 3

Let's think	1. Has the colour of the iron nail changed? What is the color now? 2. Why has the colour changed? 3. Which all natural laws of physics can be observed through this experiment?
Beyond the classroom	1. Find a shop near your house that sells utensils and ask the shopkeeper about the process of electroplating.

5. Coal and Petroleum

QR Code:

Learning Objectives:

Topic	Learning Objectives
Types of natural resources	Classify natural resources based on their ability to replenish in order to distinguish between inexhaustible and exhaustible natural resources
Coal	Discuss the process of formation of coal to explain why coal is an exhaustible natural resource
	List the useful by products after processing coal to explain that natural resources can be used to obtain useful products other than fuel
Petroleum	Infer why gas, oil and water found in this particular sequence in location where petroleum is found in order to explain that gas, oil their densities and ability to mix with each other
	Classify different constituents of petroleum according to their use in daily life in order to deserve various by products besides fuel of petroleum that there is a large number of products obtained from petroleum other than fuel

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Classify natural resources based on their ability to replenish in order to distinguish between inexhaustible and exhaustible natural resources	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.
Classify natural resources based on their ability to replenish in order to distinguish between inexhaustible and exhaustible natural resources	Classifies materials and organisms based on properties / characteristics, e.g., metals and non-metals; *kharif* and *rabi* crops; useful and harmful microorganisms; sexual and asexual reproduction; celestial objects; exhaustible and inexhaustible natural resources, etc.
Classify different constituents of petroleum according to their use in daily life in order to deserve various by products besides fuel of petroleum that there is a large number of products obtained from petroleum other than fuel	

Infer why gas, oil and water found in this particular sequence in location where petroleum is found in order to explain that gas, oil their densities and ability to mix with each other	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the conditions required for combustion? Why do we add salt and sugar in pickles and murabbas? Do liquids exert equal pressure at the same depth?)
Discuss the process of formation of coal to explain why coal is an exhaustible natural resource	Explains processes and phenomenon, e.g., reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.
List the useful by products after processing coal to explain that natural resources can be used to obtain useful products other than fuel	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: (e.g., using resources judiciously; making controlled use of fertilisers and pesticides; suggesting ways to cope with environmental hazards, etc).

Test items

LOB : Classify natural resources based on their ability to replenish in order to distinguish between inexhaustible and exhaustible natural resources

1) Which resource is an inexhaustible natural resource?
   (a) Coal
   (b) Natural gas
   (c) Petroleum
   (d) Solar energy

   Correct Answer: Option (d)

2) Electricity is produced using many natural resources. Which inexhaustible resource should be used to produce electricity?
   (a) Coal
   (b) Natural gas
   (c) Petroleum
   (d) Water

   Correct Answer: Option (d)

LOB : Discuss the process of formation of coal to explain why coal is an exhaustible natural resource

1) Coal is exhaustible in nature because it is made of
   (a) different minerals fused together.
   (b) natural gas processed over millions of years.
   (c) wood obtained from forests that takes years to grow.
   (d) dead and decayed animals and plants sedimented over millions of years.

Correct Answer: Option (d)

2) Under which conditions does coal formation take place from plant and animal remains?
   (a) high temperature and high pressure
   (b) high pressure and cold surroundings
   (c) low pressure and high temperature
   (d) low pressure and cold surroundings

Correct Answer: Option (a)

LOB : List the useful by products after processing coal to explain that natural resources can be used to obtain useful products other than fuel

1) Which byproduct is obtained after processing coal?
   (a) diesel
   (b) petrol
   (c) coke
   (d) paraffin wax

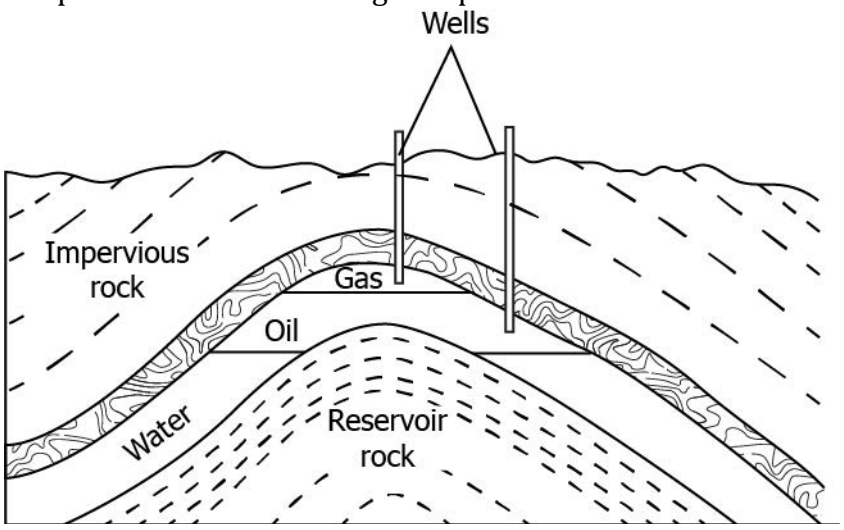
Correct Answer: Option (c)

2) A byproduct obtained after processing coal is useful in manufacturing plastics, synthetic dyes, naphthalene balls etc. The byproduct is _____
   (a) coal gas
   (b) coal tar
   (c) coke
   (d) paraffin wax

Correct Answer: Option (b)

LOB : Infer why gas, oil and water found in this particular sequence in location where petroleum is found in order to explain that gas, oil their densities and ability to mix with each other

1) The image shows petroleum and natural gas deposits.



Why is the layer of oil formed between natural gas and water?
   (a) because reservoir rocks allow only water to pass through it

(b) because different rock layers separate the three substances
(c) because oil releases natural gas that forms a new layer over oil
(d) because gas and oil are lighter than water and the three substances do not mix

Correct Answer: Option (d)

2) When petroleum and natural gas are extracted through the rock layers, natural gas is found to be present above the oil. What explains the observation?
(a) They have different mass.
(b) They have different densities.
(c) They have different physical state.
(d) They have different amount of impurities.

Correct Answer: Option (b)

LOB : Classify different constituents of petroleum according to their use in daily life in order to deserve various by products besides fuel of petroleum that there is a large number of products obtained from petroleum other than fuel

1) Which petroleum product is used to run heavy motor vehicles?
(a) Petrol
(b) Diesel
(c) Natural gas
(d) Bitumen

Correct Answer: Option (c)

2) The table lists petroleum products.

1. Petrol
2. Diesel
3. LPG
4. Lubricating oil
5. Paraffin wax
6. Bitumen

Which petroleum product is used as a fuel?
(a) 1, 2, and 3
(b) 2, 4, and 5
(c) 1, 3, and 4
(d) 3, 5, and 6

Correct Answer: Option (a)

Suggested Teacher Resources

1 Activity

Activity	Observe the physical properties of kerosene
Material Required	Two transparent plastic bottles with bottle caps, one plastic straws, Scissors, glue, cello tape
Vocabulary	Density
Procedure	1. Take the bottle caps and stick the close end with glue and wrap the sides with cello tape (Fig 1) 2. Make two holes in the twin lids as shown in fig 2 3. Press fit stiff straw in holes Fig 3 4. Pour kerosene in the bottle Fig 4 5. Fix the bottle cap on kerosene bottle and close the bottle. Now carefully place the bottle with water on top of kerosene bottle. 6. Place the bottles with kerosene bottle at the bottom and water bottle on the top and note down your observations.

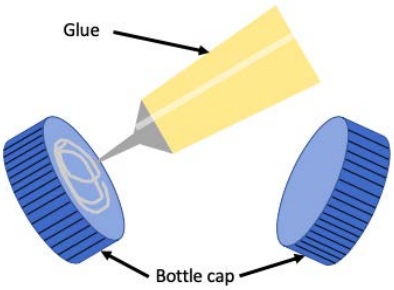


Fig 1

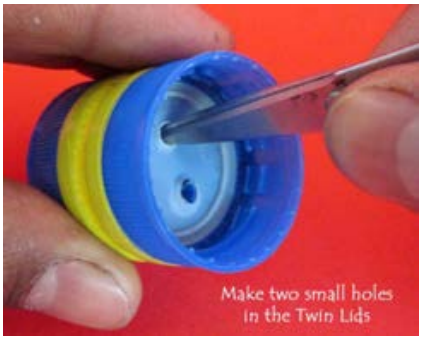
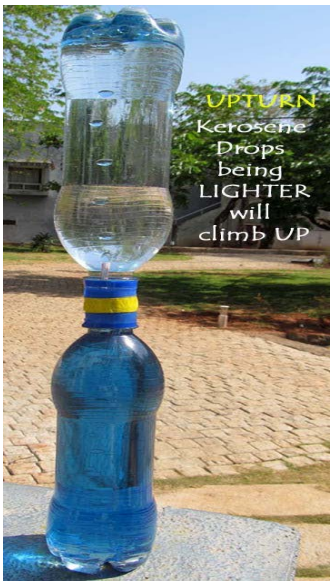


Fig 2

Fig 3

Fig 4

	 Fig 5  Fig 6
Let's think	1. Why do we find kerosene drops climbing up? 2. What can we infer from this about kerosene? 3. Can we conclude that kerosene is lighter than water?
Beyond the classroom	Can you sight examples where one object floats on the other one? Why do we see this phenomenon?

6. Combustion and Flame

QR Code:

Learning Objectives:

Topic	Learning Objectives
What is combustion	Explain the process of combustion in order to describe the role of fuel and oxygen in the process as necessary conditions for combustion to take place
Ignition temperature	Define ignition temperature to explain why minimum temperature is required for a substance to catch fire.
How to control fire	Compile and list the commonly known inflammable substances to explain that certain substance catch fire than others.
	List the conditions necessary for producing fire to discover how combustible materials can be prevented from catching the fire.
Types of combustion	Differentiate between the type of combustion taking place in gas stove, burning of phosphorus and bursting of firecrackers to assess rapid combustion, spontaneous combustion and explosion
	Explain the different parts of flame in order to explain why goldsmiths blow the outermost zone of a flame to melt gold and silver
	Compare the calorific value of commonly used fuel to examine fuel efficiency
Harmful effects of burning fuel	List harmful by-products of burning fuel to be aware of its harmful effects on individuals and environment such as global warming and acid rains

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Differentiate between the type of combustion taking place in gas stove, burning of phosphorus and bursting of firecrackers to assess rapid combustion, spontaneous combustion and explosion	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.
Compile and list the commonly known inflammable substances to explain that certain substance catch fire than others.	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the conditions required for combustion? Why do we add salt and sugar in pickles and murabbas? Do liquids exert equal pressure at the same depth?)
Explain the process of combustion in order to describe the role of fuel and oxygen in the process as necessary conditions for combustion to take place	
List harmful by-products of burning fuel to be aware of its harmful effects on individuals and	Explains processes and phenomenon, e.g., reproduction in human and animals; production and propagation of sound; chemical effects of electric

<table>
<tr><td>environment such as global warming and acid rains</td><td rowspan="2">current; formation of multiple images; structure of flame, etc.</td></tr>
<tr><td>Compare the calorific value of commonly used fuel to examine fuel efficiency</td></tr>
<tr><td>Define ignition temperature to explain why minimum temperature is required for a substance to catch fire.</td><td rowspan="2">Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.)</td></tr>
<tr><td>Explain the different parts of flame in order to explain why goldsmiths blow the outermost zone of a flame to melt gold and silver</td></tr>
<tr><td>List the conditions necessary for producing fire to discover how combustible materials can be prevented from catching the fire.</td><td>Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, ektara, electroscope, fire extinguisher, etc.)</td></tr>
</table>

Test items

LOB : Explain the process of combustion in order to describe the role of fuel and oxygen in the process as necessary conditions for combustion to take place

1. A student lights a candle and keeps a glass over it. He notices that the candle puts off after some time. What is the reason for his observation?
   (a) formation of heat in the glass
   (b) the absence of oxygen in the glass
   (c) the absence of carbon dioxide in the glass
   (d) glass puts off the fire when kept over anything

   Correct Answer: Option (b)

2. A group of students is learning about combustion. They researched that fuel and gas are needed to start a fire. Which option shows the things that the students need?
   (a) fuel - grass, gas – oxygen
   (b) fuel - wood, gas – oxygen
   (c) fuel - wood, gas – carbon dioxide
   (d) fuel - matchstick, gas – carbon dioxide

   Correct Answer: Option (c)

LOB : Define ignition temperature to explain why minimum temperature is required for a substance to catch fire.

1. Fuels like kerosene are required to burn a piece of wood. Why a wood cannot start burning with a matchstick in normal conditions?
   (a) matchstick is a bad conductor of heat
   (b) kerosene is a liquid and liquids easily start a fire
   (c) matchstick cannot heat the wood to its ignition temperature
   (d) kerosene heats the wood where it starts melting and catches fire

   Correct Answer: Option (c)

2. A student tries to burn a piece of wood with a matchstick. He notices that every time he brings the matchstick closer to coal, the coal turns red, but it does not catch fire. Why does this happen?
   (a) Because the matchstick and coal are both made of wood and do not burn in normal conditions.
   (b) Because matchsticks are made in a way to burn only smaller things like paper and plastic sheets.
   (c) Because the matchstick cannot heat the coal to a very high temperature where it starts burning.
   (d) Because matchstick being smaller burns quickly and could not provide enough heat for coal to start burning.

   Correct Answer: Option (c)

LOB : Compile and list the commonly known inflammable substances to explain that certain substance catch fire than others.

1. The table lists some substances.

Wood
Glass
Alcohol
Granite

Which substance has a very low ignition temperature and can easily catch fire with a flame?

(a) glass because it is luminous
(b) wood because it is explosive
(c) alcohol because it is inflammable
(d) granite because it is non-combustible

Correct Answer: Option (c)

2. The table shows the ignition temperature of four substances.

Substance	Ignition Temperature (°C)
A	80
B	39
C	110
D	25

Which substance will catch fire easily when heated at 50°C?

(a) A and C
(b) B and D
(c) C and D
(d) A and D

Correct Answer: Option (b)

LOB : List the conditions necessary for producing fire to discover how combustible materials can be prevented from catching the fire.

1. The table lists some conditions that can prevent fire.

A. No supply of oxygen
B. Temperature above combustion
C. Presence of combustible material
D. Absence of supporter of combustion

Which statement/s is/are false for preventing fire?

(a) B and C
(b) A and C
(c) A and D
(d) B and D

Correct Answer: Option (c)

2. A student lists some conditions that promote fire.

A. Fuel B. Air C. Heat

What step can be taken to prevent materials from catching fire?

(a) Use oxygen cylinders to put off the fire.
(b) Put cotton clothes over the combustible material.
(c) Pour liquids such as kerosene over the combustible materials.
(d) Use water to lower the ignition temperature of the combustible materials.

Correct Answer: Option (d)

LOB : Differentiate between the type of combustion taking place in gas stove, burning of phosphorus and bursting of firecrackers to assess rapid combustion, spontaneous combustion and explosion

1. Which of the following is an example of rapid combustion?

(a) phosphorous in water

(b) burning of a matchstick

(c) reaction of methane and oxygen in the air

(d) reaction of methane and oxygen in insufficient air

Correct Answer: Option (b)

2. A student burns three substances M, N, and O and records the observation in a table.

Substance	Observation
P	Burns quickly producing heat and light
Q	Burns at room temperature on its own
R	Burns with evolution of heat, light and sound

Which option correctly categorises the given substances?

(a) All the substances are undergoing rapid combustion.
(b) Substances P and Q are undergoing spontaneous combustion whereas substance R is undergoing rapid combustion.
(c) Substance P is undergoing rapid combustion; substance Q is undergoing spontaneous combustion whereas substance R is undergoing explosion combustion.
(d) Substance R is undergoing rapid combustion; substance Q is undergoing spontaneous combustion whereas substance P is undergoing explosion combustion.

Correct Answer: Option (c)

LOB : Explain the different parts of flame in order to explain why goldsmiths blow the outermost zone of a flame to melt gold and silver

1. Why goldsmiths blow the outermost zone of a flame to melt gold and silver?

   (a) because it is the least hot
   (b) because it has unburnt wax vapours
   (c) because supports partial combustion
   (d) because it supports complete combustion

   Correct Answer: Option (d)

2. A student lists the characteristics of the outermost zone of the flame as shown.

   1. It gives flame its blue colour.
   2. It the least hot zone of the flame.
   3. It is the zone of complete combustion.

   Which of these statement/s explain/s the reason why goldsmiths blow air in this zone of a flame?

   (a) only 1
   (b) only 3
   (c) both 1 and 3
   (d) both 2 and 3

   Correct Answer: Option (c)

LOB : Compare the calorific value of commonly used fuel to examine fuel efficiency

1. The table lists the amount of heat energy produced on the burning of four fuels.

Fuel	Heat Energy Produced (kJ)	Amount Taken (kg)
P	20000	1
Q	30000	2
R	10000	1
S	20000	2

   Which fuel has the maximum calorific value?

   (a) fuel P
   (b) fuel Q
   (c) fuel R

(d) fuel S

Correct Answer: Option (a)

2. The calorific value of wood and coal is 20000 kJ/kg and 30000 kJ/kg respectively. Which will produce the most heat?

(a) 500 grams of coal
(b) 1 kilogram of coal
(c) 500 grams of wood
(d) 2 kilograms of wood

Correct Answer: Option (d)

LOB : List harmful by-products of burning fuel to be aware of its harmful effects on individuals and environment such as global warming and acid rains

1. The table lists harmful by-products that are released by burning petrol, coal and diesel.

Nitrogen oxide
Sulphur dioxide
Carbon dioxide
Carbon monoxide

Which fuel/s release/s oxides of sulphur that mix in rainwater to form acid rain?

(a) only coal
(b) only petrol
(c) both coal and diesel
(d) both petrol and diesel

Correct Answer: Option (c)

2. A student learns that power plants burn fossil fuels to produce energy. The combustion of these fuels produces several harmful gases such as

Carbon monoxide
Sulphur dioxide
Carbon dioxide
Nitrogen oxide

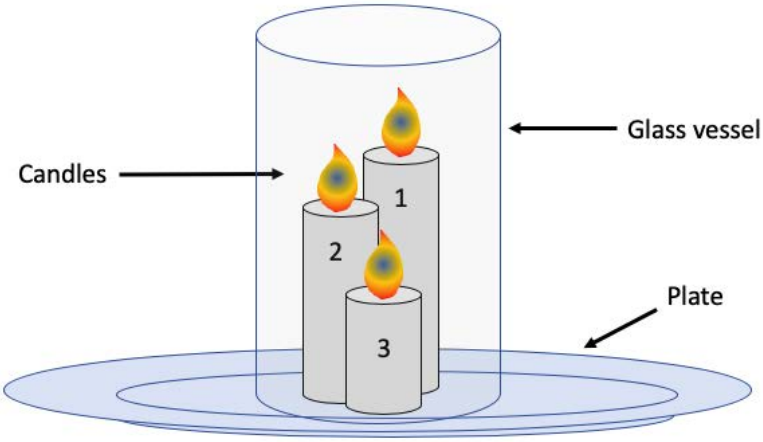
Which gas produced by the incomplete combustion of fuels at power plants and can harm a person sleeping in a room?

(a) nitrogen oxide
(b) carbon dioxide
(c) sulphur dioxide
(d) carbon monoxide

Correct Answer: Option (d)

Suggested Teacher Resources

1 Activity

Activity	Observe the necessary conditions for combustion
Material Required	A plate, water, 3 candles of different height, mathbox, a clean glass vessel
Vocabulary	
Procedure	Stick three candles close to each other at the center of the plate Light all three candles and ask students to guess (i) What will happen to the water and (ii) which candle's flame will die first if covered with glass vessel? Cover the candles with glass vessel and not down the observation 
Let's think	Why did all the candles die off? Which candle dies off first? Why did the tallest candle die off first? Did all the oxygen get consumed in this combustion process?
Beyond the classroom	Go to a nearby fire department and understand how firefighters extinguish fire.

7. Conservation of Plants and Animals

QR Code:

Learning Objectives:

Topic	Learning Objectives
Deforestation and its cause	List causes of deforestation to reflect on its rampant existence despite forest being essential to life
Consequence of deforestation	Describe how droughts are caused to elaborate the consequence of deforestation
	Describe the process of desertification to explain the consequence of deforestation
Conservation of forest and wildlife	List some famous biosphere and wildlife sanctuaries to describe different mechanisms through which governments protect and conserve forest and wildlife
	List the flora and fauna in surroundings to establish the term used for locally found plants and animals
Endemic species	List the flora and fauna exclusive to a particular region to describe the term endemic species
	List famous animal reserve e.g. Satpura Tiger Reserve to describe measures taken by government in protecting endangered animals
Red data book	Describe the importance of Red Data Book to determine the need of tracking endangered species
Recycling and reforestation	Explain recycling to describe ways to reduce deforestation
	Explain reforestation to describe ways to reduce it

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
List causes of deforestation to reflect on its rampant existence despite forest being essential to life	Explains processes and phenomenon, e.g., reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.
Describe how droughts are caused to elaborate the consequence of deforestation	
Describe the process of desertification to explain the consequence of deforestation	

<table>
<tr><td>Interpret the importance of Red Data Book to explain why keeping a track of endangered species is important</td><td></td></tr>
<tr><td>List the flora and fauna in surroundings to establish the term used for locally found plants and animals</td><td rowspan="2">Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)</td></tr>
<tr><td>List the flora and fauna exclusive to a particular region to describe the term endemic species</td></tr>
<tr><td>List some famous biosphere and wildlife sanctuaries to describe different mechanisms through which governments protect and conserve forest and wildlife</td><td rowspan="3">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: (e.g., using resources judiciously; making controlled use of fertilisers and pesticides; suggesting ways to cope with environmental hazards, etc).</td></tr>
<tr><td>List famous animal reserve e.g. Satpura Tiger Reserve to describe measures taken by government in protecting endangered animals</td></tr>
<tr><td>Explain reforestation to describe ways to reduce it</td></tr>
<tr><td>Explain recycling to describe ways to reduce deforestation</td><td>Designs, plans, makes use of available resources, etc.in order to exhibit creativity.</td></tr>
</table>

Test items

LOB : List causes of deforestation to reflect on its rampant existence despite forest being essential to life

1. The table lists some events.

A. Tilting of soil for sowing seeds on a deserted land.
B. Cutting of trees for making table and chairs.
C. Establishing forest on a land that had no tress before.
D. Clearing forest for building houses.

Which of these events will lead to deforestation?

(a) A and B
(b) C and A
(c) D and B
(d) B and C

Correct Answer: Option (c)

2. Many factories are built by cutting trees and clearing forests. What will be its likely effect on the nature?
   (a) decrease in the number of wildlife
   (b) sudden boost in the plant growth
   (c) availability of more food for wildlife
   (d) increase in the percentage of land occupied with trees

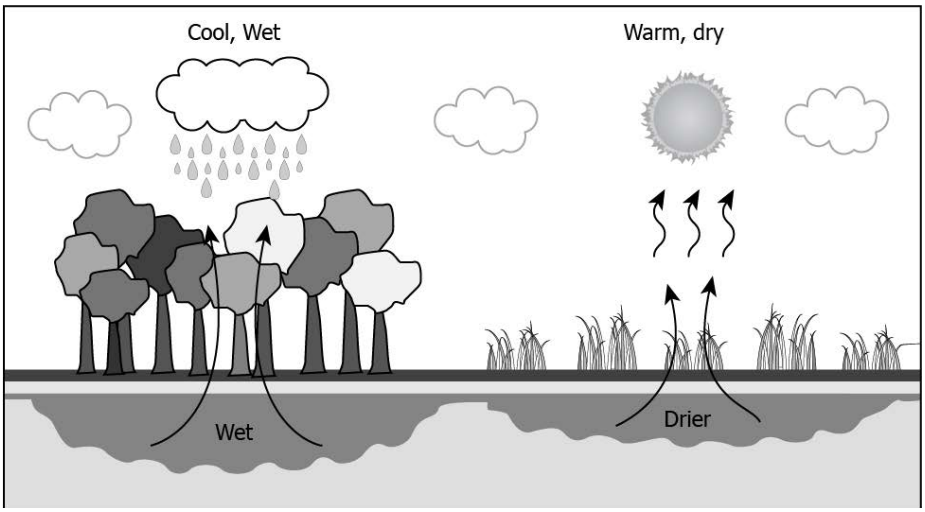
Correct Answer: Option (a)

LOB : Describe how droughts are caused to elaborate the consequence of deforestation

1) How decrease in the number of trees linked with shortage of water?
   (a) Deforestation increases Earth's temperature resulting in less rainfall.
   (b) Deforestation decreases Earth's temperature which reduces the moisture content of air.
   (c) Deforestation disturbs the soil composition leading to high water retention by the soil.
   (d) Deforestation prevents the absorption of water by the plants reducing groundwater level.

Correct Answer: Option (a)

2) The image shows the effect of deforestation on water cycle.



What will likely happen if deforestation continues?

(a) increase in oxygen level
(b) decrease in temperature
(c) increase in annual rainfall
(d) decrease in the level of groundwater

Correct Answer: Option (d)

LOB : Describe the process of desertification to explain the consequence of deforestation

1) Regions with more trees experience less soil erosion. How do the tress reduce soil erosion?

(a) The roots of the trees hold the top layer of the soil firmly.
(b) The trees absorb more sunrays which increases soil density.
(c) The trees store extra food in the soil which increases the soil content.
(d) The trees add dead leaves into the soil which increases the soil quantity.

Correct Answer: Option (a)

2) A student setup an experiment to study the effect of deforestation. The student took soil from a forested region and a barren land with no trees. The student added soil from the forested region with trees in Pot 1 and soil from barren land in Pot 2. In both the pots, a hibiscus plant was grown. After 1month, the student observes that the plant in pot A shows growth while the plant in pot B shows minimal growth. What is the likely reason for this observation?

(a) Soil from barren land is less fertile.
(b) Soil from forested land is poor in nutrients.
(c) Soil from the barren land contains more manure.
(d) Soil from forested land contains stored food for better plant growth.

Correct Answer: Option (a)

LOB : List some famous biosphere and wildlife sanctuaries to describe different mechanisms through which governments protect and conserve forest and wildlife

1) Bori Sanctuary and Satpura National Park are present in the Pachmarhi Biosphere Reserve. How do these three areas help in protecting the plants and animals?
   (a) These large areas provide artificial habitat to wild life.
   (b) These large areas conserve organisms and their habitats.
   (c) These large areas control the number of wildlife by preventing natural breeding.
   (d) These large areas prevent the interaction of organisms with wildlife to keep them safe.

   Correct Answer: Option (b)

2) A student went on a trip to a biosphere reserve called Panna in Madhya Pradesh and Keoladeo National Park in Rajasthan. Which common activity is likely to be observed in both the protective areas?
   (a) both the areas provide protective environment to fauna only
   (b) both the areas provide shelter to humans as well as wild life
   (c) both the areas allow human activities for interaction with wild animals
   (d) both the areas do not interfere with the natural environment of the wildlife

   Correct Answer: Option (d)

LOB : List the flora and fauna in surroundings to establish the term used for locally found plants and animals

1) The image shows some plants of a particular area.

Which term can be commonly used for all these plants?
   (a) Flora
   (b) Fauna
   (c) wild trees
   (d) aquatic plants

   Correct Answer: Option (a)

2) The table lists some organisms.

Star fish
Cheetah
Fern
Shrub
Cactus
Sea anemone

Which option correctly classifies the flora and fauna?

(a)

Flora	star fish, cheetah, fern
Fauna	shrub, cactus, sea anemone

(b)

Flora	shrub, cactus, fern
Fauna	star fish, cheetah, sea anemone

(c)

Flora	star fish, sea anemone, fern
Fauna	shrub, cactus, cheetah

(d)

Flora	star fish, cheetah, sea anemone
Fauna	shrub, cactus, fern

Correct Answer: Option (b)

LOB : List the flora and fauna exclusive to a particular region to describe the term endemic species

1) Species of deer are commonly distributed in the states of northern and central India. However, brow-antlered deer also called Sangai is only found in Keibul Lamjao Natural Park situated in Manipur. What is the likely reason for this?
   (a) Sangai is a native species.
   (b) Sangai is an exotic species.
   (c) Sangai is an endemic species.
   (d) Sangai is a diverse species.

Correct Answer: Option (c)

2) In a school, class 7 students went to a trip to Arunachal Pradesh while class 8 student went on a trip to Meghalaya. They observed different plants on these trips as shown.

Trip	Region	Plants
1	Arunachal Pradesh	*Sapria himalayana* (root parasite plant)
2	Khasi Hills of Meghalaya	*Nepenthes khasiana* (pitcher plant)

What is the likely reason that class 7 and class 8 students did not observed the same plants on different locations?

(a) because both the plant species show migration
(b) because both the plant species are exclusively found in a particular habitat
(c) because both the plant species depend on different types of herbivore animals
(d) because both the plant species depend on different components for preparing food

Correct Answer: Option (b)

LOB : List famous animal reserve e.g. Satpura Tiger Reserve to describe measures taken by government in protecting endangered animals

1) Jim Corbett National Park of India protects the endangered Bengal tiger. What likely measure they have adopted to protect this species of tiger?

(a) controlled hunting of Bengal tiger
(b) capturing tiger in small area for better observation
(c) increase the count of tigers by different methods of breeding
(d) bring prey animal from neighbouring regions to increase the tiger count

Correct Answer: Option (c)

2) The table lists the measures taken by government for "Satpura Tiger Reserve".

- reducing tiger-human interactions
- promotion of tiger friendly policies
- monitoring number of tigers
- plan conservation strategies

What will be the likely effect of these measures on the tigers?

(a) It will increase the habitat of tiger in the country.
(b) It will maintain the tiger count of other reserves.
(c) It will increase the number of tiger's prey in reserve.
(d) It will maintain the population of tiger in the country.

Correct Answer: Option (d)

LOB : Describe the importance of Red Data Book to determine the need of tracking endangered species

1) What information can be likely obtained from the Red book data?
   (a) record of all endangered species
   (b) information of all endemic species
   (c) categorisation of plants and animals according to species
   (d) information of all plant and animal species of the country

   Correct Answer: Option (a)

2) The table lists some endangered species.

A. Sea turtles
B. Tiger
C. Vaquita
D. Gorillas
E. Orangutan
F. Amur Leopard

   From which source, the student can obtain the information of these animals?
   (a) Endemic areas
   (b) Red Book data
   (c) Wildlife sanctuaries
   (d) Biosphere reserves

   Correct Answer: Option (b)

LOB : Explain recycling to describe ways to reduce deforestation

1) A student collects plant waste, animal waste and some old newspaper from the home. Later, the student adds all the material in a container and mixes all the materials. The material was then added to soil as compost to observe the plant growth. What can be concluded from this activity?
   (a) Reusing newspaper can eliminate the risk of herbivores that consume plants.
   (b) Reusing newspaper in compost can eliminate the waste from the environment.
   (c) Reusing newspaper in compost can convert harmful chemicals in soil into useful substances.
   (d) Reusing newspaper in compost adds nutrient to the soil and contributes to afforestation.

   Correct Answer: Option (d)

2) What is the likely method that one should adopt to reduce deforestation?
   (a) limiting the use of paper
   (b) using only fine quality paper for work
   (c) throwing old newspapers in dustbins
   (d) bury used and waste paper instead of burning it

Correct Answer: Option (a)

LOB 0: Explain the term reforestation to describe ways to reduce deforestation

1) What can be likely achieved from planting trees in the forest?
   (a) conservation of forest and animals
   (b) increase in the number of extinct species
   (c) decrease in the number of predator species
   (d) availability of more information for red book data

Correct Answer: Option (a)

2) A group of students observes a barren land. The students add new plants along with manure to the soil and water the plants daily. After 3 months, the students observe the following changes:

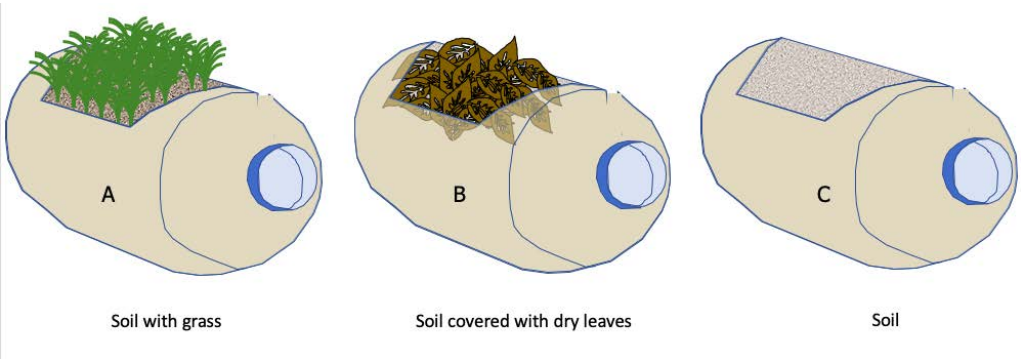
A. increase in the height of the plants
B. growth of new plants
C. no loss of top layer of the soil

What can be concluded from these observations?
   (a) reforestation promotes soil erosion
   (b) reforestation allows growth of the plants
   (c) reforestation increase the amount of soil
   (d) reforestation helps reduce the impact of deforestation

Correct Answer: Option (d)

Suggested Teacher Resources

1 Activity

Activity	Observe the harmful effects of deforestation leading to soil erosion
Material Required	3 plastic bottle, soil, grass, dry leaves, water, a cup
Vocabulary	Soil erosion, Deforestation
Procedure	1. Take a pet bottle and cut it from one side and mark them as A,B and C 2. Put soil with some grass in bottle A, soil covered with dry leaves in bottle B and just soil in bottle C 3. Pour water from the top and collect the spill over water in a cup 4. Note down the observation on the water collected 
Let's think	1. What difference do you notice in the water collected? 2. Why does water collected from bottle C have high amount of soil in it?
Beyond the classroom	With your friends discuss the harmful effects of soil erosion and think about innovative solutions to reduce its effects. Present your ideas to your class.

8. Cell - Structure and Functions

QR Code:

Learning Objectives:

Topic	Learning Objectives
Cell number, shape and size	Classify animals based on their cell number, shape and size in order to describe unicellular and multicellular animals
Cell structure and function	List the different parts and functions of a typical cell in order to appreciate the unit structure in an organism
Parts of the cell	Distinguish between plant and animal cells to explain the function of cell wall

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Classify animals based on their cell number, shape and size in order to describe unicellular and multicellular animals	Classifies materials and organisms based on properties / characteristics, e.g., metals and non-metals; *kharif* and *rabi* crops; useful and harmful microorganisms; sexual and asexual reproduction; celestial objects; exhaustible and inexhaustible natural resources, etc.
List the different parts and functions of a typical cell in order to appreciate the unit structure in an organism	Prepares slides of microorganisms and describes their microscopic features: (such as, onion peel, human cheek cells, etc.),
Distinguish between plant and animal cells to explain the function of cell wall	
List the different parts and functions of a typical cell in order to appreciate the unit structure in an organism	Draws labelled diagram / flow charts, e.g., structure of cell, eye, human reproductive organs; experimental set ups, etc.
Distinguish between plant and animal cells to explain the function of cell wall	

Test items

1 Activity

LOB : Classify animals based on their cell number, shape and size in order to describe unicellular and multicellular animals

1) What table shows the classification of animals into unicellular and multicellular animals?

(a)

Unicellular Animals	Multicellular Animals
Amoeba Paramecium	Onion Fly

(b)

Unicellular Animals	Multicellular Animals
Cheek cell RBC	Paramecium Amoeba

(c)

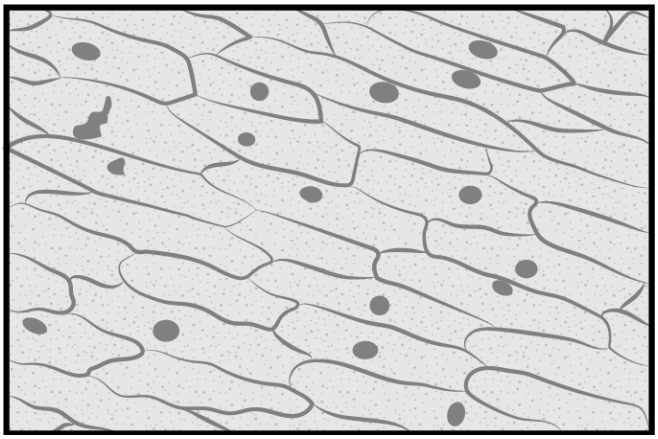
Unicellular Animals	Multicellular Animals
Fly RBC	Paramecium Amoeba

(d)

Unicellular Animals	Multicellular Animals
Algae Nerve cell	Paramecium Amoeba

Correct Answer: Option (a)

2) The image shows cells of an onion peel.



What are these cells classified into?

(a) Multicellular cells, because they all look identical.
(b) Multicellular cells, because they form a part of the plant.
(c) Unicellular cells, because they have simple cell structure.
(d) Unicellular cells, because they perform all the necessary functions of an animal.

Correct Answer: Option (b)

LOB : List the different parts and functions of a typical cell in order to appreciate the unit structure in an organism

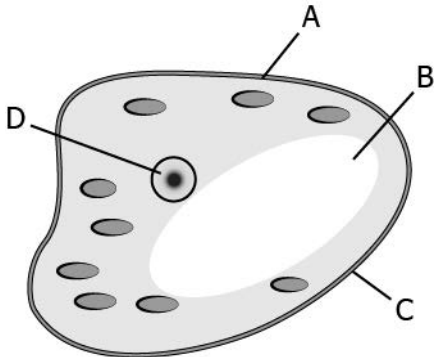
1) The table lists two parts of a plant cell with their function

A	B
It provides structural strength to the plant cell.	It controls the activity of the cell.

Which parts of the plant cell are A and B?
(a) A is nucleus and B is cell wall.
(b) A is cell wall and B is nucleus.
(c) A is chromosome and B is gene.
(d) A is chromosome and B is protoplasm.

Correct Answer: Option (b)

2) The image shows a rubber diaphragm kept near a vibrating tuning fork.



Which labelled part of the cell plays a vital role in the transfer of cellular characteristics to its offspring?
(a) A
(b) B
(c) C
(d) D

Correct Answer: Option (d)

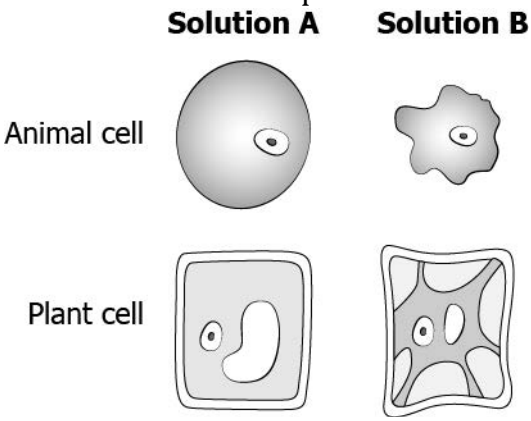
LOB : Distinguish between plant and animal cells to explain the function of cell wall

3) The cells of plants have a rigid shape unlike those of animals. The absence or presence of which part of the cell causes this difference?

(a) cell wall
(b) vacuoles
(c) chloroplast
(d) nuclear membrane

Correct Answer: Option (a)

4) The image shows a plant cell and animal cell kept in two different solutions.



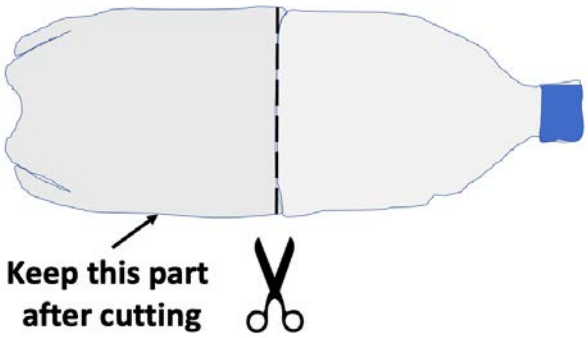
Based on the image, what can be inferred about the function of the cell wall?
(a) Cell wall retains the shape of plant cell.
(b) Cell wall helps change the shape of animal cell.
(c) Cell wall regulates the size of the vacuole in the plant cell.
(d) Cell wall manages the amount of cytoplasm in the animal cell.

Correct Answer: Option (a)

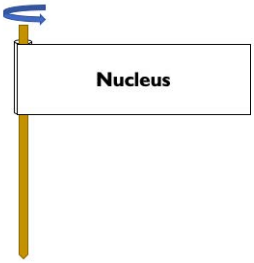
Suggested Teacher Resources

1 Activity

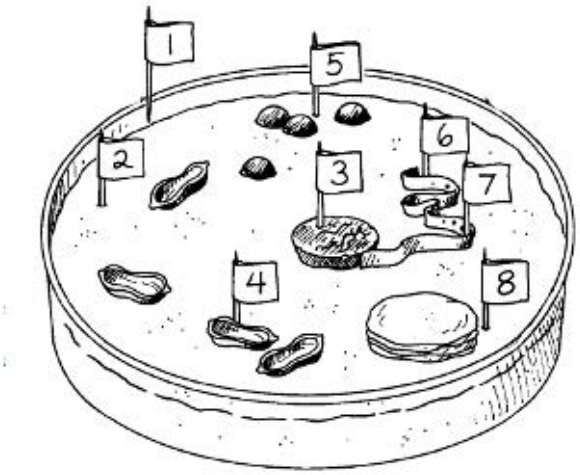
Activity	Create a basic cell model for animals or plants
Material Required	4 sticky labels, 8 toothpicks, some ground nut shells, a used small size ball, soil, small tub or (half-cut 1 lit cold drink plastic bottle fig 1), glue, small cut-outs of paper
Vocabulary	(1) Cell membrane,(2) Cytoplasm, (3) Nucleus, (4) Mitochondria, (5) Lysosome, (6) Endoplasmic Reticulum (RER), (7) Ribosomes, (8) Golgi bodies
Procedure	1. Use a small tub if available or make a small tub by cutting the 1 litre cold drink plastic bottle in half



2. Take some soil and put it in the tub. Level the surface of the soil to make it smooth.
3. Fold the paper and stick it on the toothpick or small wooden sticks as shown below and label them. Similarly create labels for different parts of the cell



4. Place the half cut tennis ball on the surface to represent nucleus and stick the toothpick to mark it. Similarly place other material in the tub and label them. (Correct labels are given in vocabulary)



Let's think	1. Which organelles would you find in a plant cell but not in animal cells? 2. What is the differentiating characteristic of cell wall in animal cell and plant cell?
Beyond the classroom	1. Observe different parts of plant and discuss their functions. 2. Do different parts of plants comprise of the same kinds of cells? Explain.

9. Reproduction in Animals

QR Code:

Learning Objectives:

Topic	Learning Objectives
Sexual reproduction	Differentiate between asexual and sexual reproduction in order to list two modes of reproduction
Fertilization	Differentiate between sex cells corresponding to parent in order to explain male and female gamete
	Describe the process of fertilization in order to explain zygote formation
Development of embryo	Differentiate between internal and external fertilization in order to describe two modes of fertilization in animals
	Describe the process of embryo and foetus formation to explain how an individual is formed inside mother's womb
Reproduction in animals	Classify animals based on their ability to give birth or lay eggs to differentiate between viviparous and oviparous animals
	Describe the life cycle of frogs from eggs to adult frogs in order to explain metamorphosis
	Describe the process of reproduction in hydra in order to explain the process of asexual reproduction

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Differentiate between asexual and sexual reproduction in order to list two modes of reproduction	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.
Differentiate between sex cells corresponding to parent in order to explain male and female gamete	
Differentiate between internal and external fertilization in order to describe two modes of fertilization in animals	
Classify animals based on their ability to give birth or lay eggs to differentiate between viviparous and oviparous animals	

Classify animals based on their ability to give birth or lay eggs to differentiate between viviparous and oviparous animals	Classifies materials and organisms based on properties / characteristics, e.g., metals and non-metals; *kharif* and *rabi* crops; useful and harmful microorganisms; sexual and asexual reproduction; celestial objects; exhaustible and inexhaustible natural resources, etc.
Describe the process of fertilization in order to explain zygote formation	Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.)
Describe the process of embryo and foetus formation to explain how an individual is formed inside mother's womb	
Describe the life cycle of frogs from eggs to adult frogs in order to explain metamorphosis	
Describe the process of reproduction in hydra in order to explain the process of asexual reproduction	
Differentiate between asexual and sexual reproduction in order to describe two modes of reproduction in animals	Draws labelled diagram / flow charts, e.g., structure of cell, eye, human reproductive organs; experimental set ups, etc.

Test items

LOB : Differentiate between asexual and sexual reproduction in order to list two modes of reproduction

1) What is true for asexual and sexual modes of reproduction in animals?
   (a) Sexual reproduction requires an interaction between two different animals, while asexual reproduction requires an interaction between animals of the same kind.
   (b) Sexual reproduction requires an interaction between the opposite sexes of animals of the same kind, while in asexual reproduction such an interaction is not required.
   (c) Sexual reproduction requires an interaction between opposite sexes of two different animals, while in asexual reproduction sexes of the animals of the same kind interact.

(d) Sexual reproduction requires an interaction between the gametes of two different animals, while in asexual reproduction gametes of the animals of the same kind interact.

Correct Answer: Option (b)

2) What is a suitable example for sexual reproduction?

(a) Fragmentation of algae into smaller fragments, each developing into new algae.
(b) Growth of a potato plant from a piece of potato with eye sown into wet and loamy soil.
(c) Transfer of pollen grains from one flower to the stigma of another flower of the same kind.
(d) Formation of a bud in yeast, which develops and separates from the body of the parent yeast.

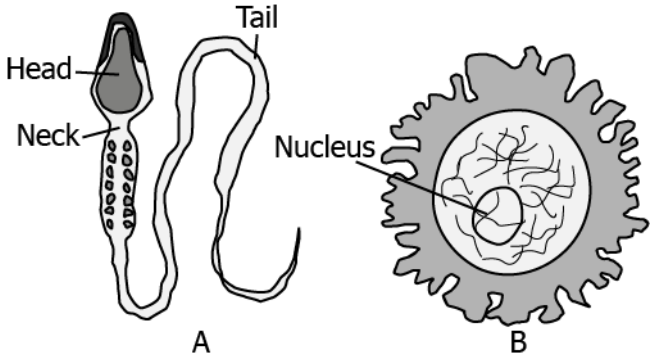
Correct Answer: Option (b)

LOB : Differentiate between sex cells corresponding to parent in order to explain male and female gamete

1) What is a the difference between the sperm cells and ova of an animal?
(a) Sperm cells are male gametes while ova are female gametes.
(b) Sperm cells are female gametes while ova are male gametes.
(c) Sperm cells are transferred from a female to the reproductive organs of a male.
(d) Sperm cells are produced in females while both sperm cells and ova are produced in males.

Correct Answer: Option (a)

2) The image shows two different gametes.



Based on the image, which statement explains how the two cells are functionally different?
(a) A is an ovum which can swim, while B is a sperm which is found inside the reproductive organs of a female.
(b) A is a sperm which can swim, while B is an ovum which is found inside the reproductive organs of a female.
(c) A is a sperm which differentiates into female gametes, while B is an ovum which differentiates into male gametes.
(d) A is an ovum which differentiates into female gametes, while B is a sperm which differentiates into male gametes.

Correct Answer: Option (b)

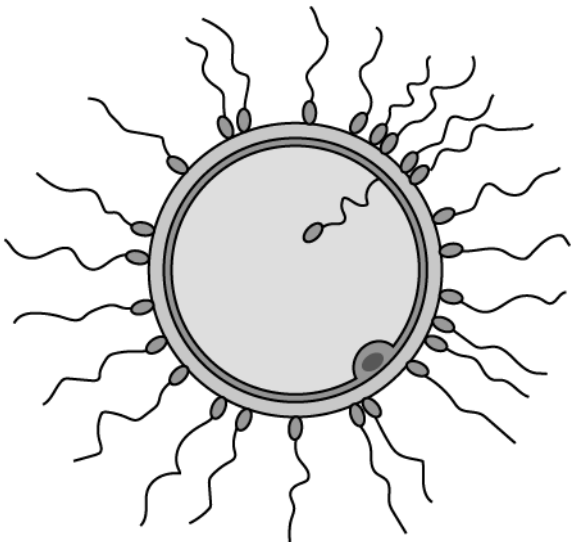
LOB : Describe the process of fertilization in order to explain zygote formation

1) What is characteristic to the process of fertilisation?

(a) Process of ovulation occurs.
(b) Egg is attached to the walls of uterus.
(c) Fusion of sperm and ovum takes place.
(d) Transfer of ovum through oviducts occurs.

Correct Answer: Option (c)

2) A reproductive process is as shown.



Which statement describes the process shown in the image?
(a) Several ova penetrate the egg cell and fertilize it to form a zygote.
(b) Several sperms penetrate the egg cell and fertilize it form a zygote.
(c) A single ova penetrates the egg cell and fertilizes it to form a zygote.
(d) A single sperm penetrates the egg cell and fertilizes it to form a zygote.

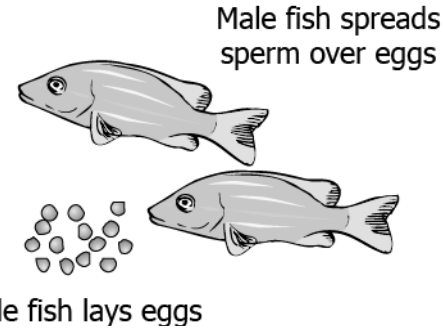
Correct Answer: Option (d)

LOB : Differentiate between internal and external fertilization in order to describe two modes of fertilization in animals

1) How is the process of internal fertilization different from external fertilization?
(a) Fusion of sperm and ovum takes place in the uterus.
(b) Fusion of sperm and ovum takes place in the ovaries.
(c) Gametes are produced inside the bodies of the parents.
(d) Either of the gametes is released outside the body of the parents.

Correct Answer: Option (a)

2) The image shows a mode of reproduction in fishes.



Based on the image, what is the mode of reproduction and the type of fertilization shown?

(a) sexual reproduction and internal fertilization
(b) sexual reproduction and external fertilization
(c) asexual reproduction and internal fertilization
(d) asexual reproduction and external fertilization

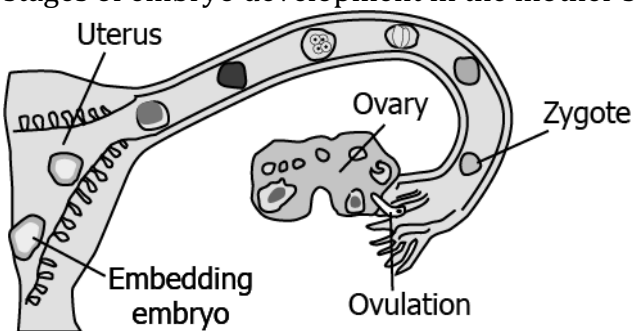
Correct Answer: Option (b)

LOB : Describe the process of embryo and foetus formation to explain how an individual is formed inside mother's womb

1) How does zygote develop into an embryo inside the mother's womb?
   (a) The cells in zygote fuse with gametes to form embryo.
   (b) The cells in zygote multiply in number to form embryo.
   (c) The cells in zygote fuse with each other to form embryo.
   (d) The cells in zygote reorganize themselves to form embryo.

   Correct Answer: Option (b)

2) The image shows the stages of embryo development in the mother's womb.



Based on the image, what can be inferred about the process of foetus formation?

(a) The development of embryo into foetus requires the attachment of embryo to the wall of the uterus.
(b) The development of embryo into foetus starts with the embryo anchoring itself to the walls of the oviduct.
(c) The development of embryo into foetus involves several stages of cell differentiation and fusion in the zygote.
(d) The development of embryo into foetus begins with the process of ovulation where a zygote is released from the ovary.

Correct Answer: Option (a)

LOB : Classify animals based on their ability to give birth or lay eggs to differentiate between vivaparous and oviparous animals

1) Which example can be used to differentiate between a viviparous and an oviparous animal?
   (a) Hens lay eggs, while cats directly give birth to a young one.
   (b) Frogs lay soft shelled eggs, while birds lay hard-shelled eggs.
   (c) Frogs lay unfertilized eggs in the water, while hens lay fertilized eggs.
   (d) Dogs give birth to many puppies, while elephants give birth to just one calf.

Correct Answer: Option (a)

2) The image shows five animals

Ostrich Crocodile Hen Dog Cow

Which table shows the classification of the animals into viviparous and oviparous animals?

(a)

Viviparous Animals	Oviparous Animals
Crocodile, hen	Ostrich, dog, cow

(b)

Viviparous Animals	Oviparous Animals
Crocodile, hen, cow	Dog, ostrich

(c)

Viviparous Animals	Oviparous Animals
Dog, hen, ostrich	Cow, crocodile

(d)

Viviparous Animals	Oviparous Animals
Hen, ostrich	Dog, cow, crocodile

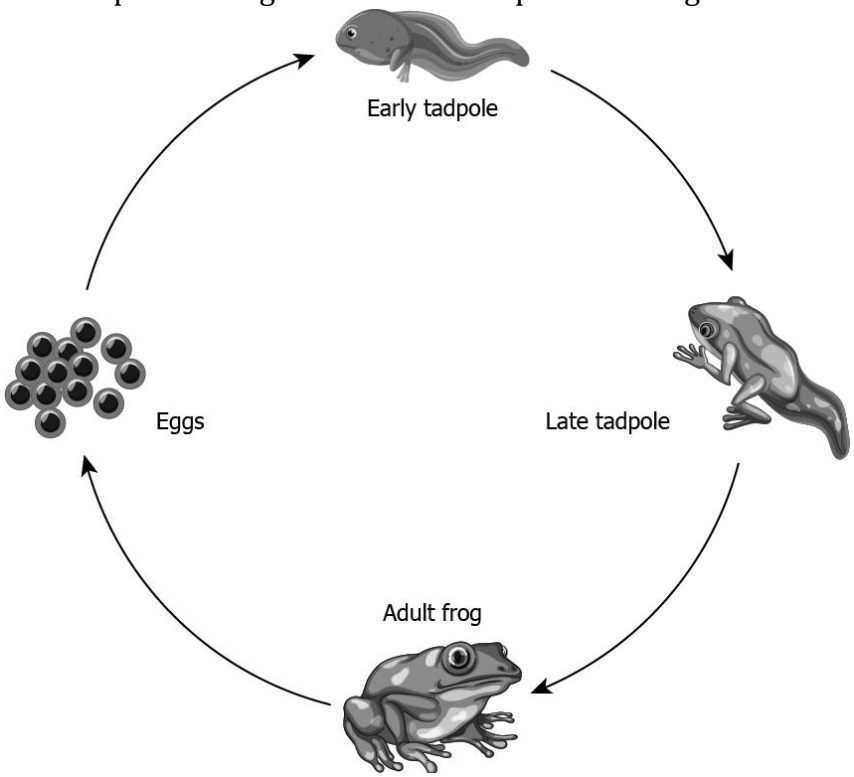
Correct Answer: Option (d)

LOB : Describe the life cycle of frogs from eggs to adult frogs in order to explain metamorphosis

1) What is the correct order of the developmental stages of a frog by its age in the descending order?
   (a) egg, tadpole, adult
   (b) adult, pupa, tadpole
   (c) pupa, tadpole, egg
   (d) adult, tadpole, egg

   Correct Answer: Option (d)

2) The image shows the process of growth and development in frogs.



What can be inferred about how frogs develop and grow?
   (a) Tadpoles grow fish-like features as they age into adult frogs.
   (b) Tadpoles retain the body structure but grow in size as they age into adult frogs.
   (c) Tadpoles have short forelimbs, which develop into longer forelimbs in adult frogs.
   (d) Tadpoles have fish-like features, which are lost during development into adult frogs.

   Correct Answer: Option (d)

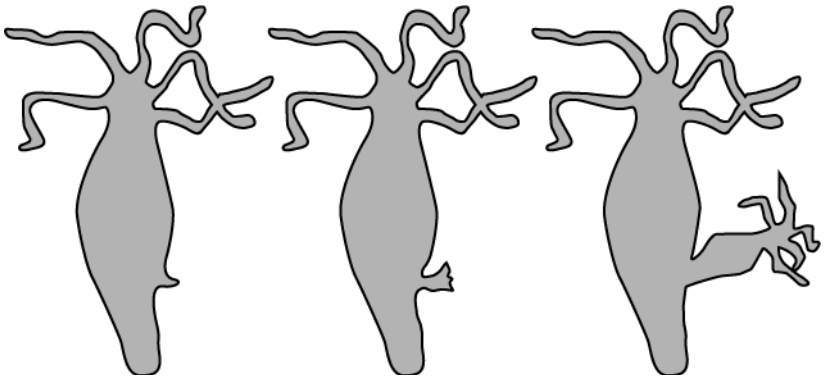
LOB : Describe the process of reproduction in hydra in order to explain the process of asexual reproduction

1) Why does is the process by which hydra reproduces is considered as an asexual mode of reproduction?
   (a) The process gives rise to a young hydra similar to its parent.
   (b) The process involves the separation of young hydra from its parents.
   (c) The process requires opposite sexes of hydra to interact with each other.

(d) The process requires just one parent hydra to give birth to a young hydra.

Correct Answer: Option (d)

2) The image shows reproduction in hydra.



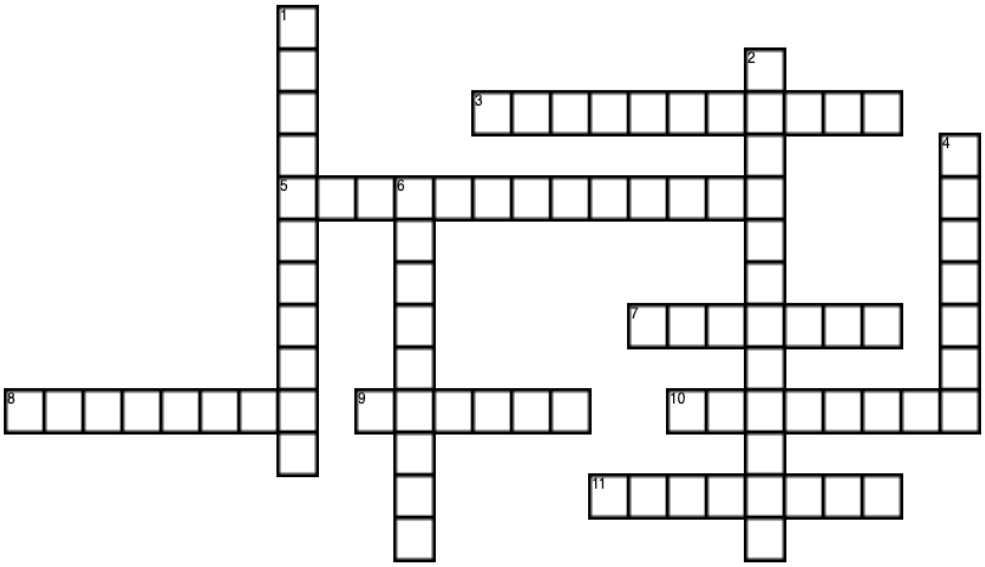
What can be inferred about the type of reproduction in hydra?

(a) It reproduces through fission, which is a sexual mode of reproduction.
(b) It reproduces through budding, which is a sexual mode of reproduction.
(c) It reproduces through fission, which is an asexual mode of reproduction.
(d) It reproduces through budding, which is an asexual mode of reproduction.

Correct Answer: Option (d)

Suggested Teacher Resources

1 Activity

Activity	Classify commonly known animals and plants based on how they reproduce
Material Required	Blackboard and a chalk
Procedure	This is a closing activity and could be taken up for revision. 1. Draw the following crossword on the blackboard and ask students to write the answer to given clues in their notebooks. 2. Ask the students for responses. If a student provides a correct response ask him/her to write it on the board in the crossword.  **ACROSS** 3 - The period of life, when the body undergoes changes, leading to reproductive maturity 5 - The process of transformation of tadpole from larva to adult is called 7 - Pancreas stops forming this hormone which causes 'diabetes' 8 - The first menstrual flow in women is called 9 - Part of human body which grows in size at puberty, also known as Adams apple 10 – The Endocrine gland responsible to secrete hormones which controls release of other hormones 11 - A chemical substance released by endocrine glands which causes changes in human body at puberty e.g. growth of facial hair **DOWN** 1 - Thread like structures that carry instructions in fertilized eggs which determine the gender of the baby 2 - The process through which unfertilized eggs and the thickened lining of the uterus along with its blood vessels is shed off ___ 4 - This marks the onset of several changes that human body undergoes during adolescence 6 - Hormones responsible for maintaining the correct balance of salt in the blood

10. Reaching the Age of Adolescence

QR Code:

Learning Objectives:

Topic	Learning Objectives
Changes at puberty	Define adolescence and adolescent age in order to explain changes at puberty
	Enumerate different variations that take place in body at puberty to explain the effect of adolescence on changing human body
Effects of hormones	Explain the effects of hormones in the development of secondary sexual characteristics in order to illustrate growth during puberty
	Elaborate the functions of hormones secreted by endocrine glands in order to explain the growth in male and female body at puberty
	Summarize the functions of sex and other hormones to establish their role secondary sexual characteristics
Reproductive cycle	Describe mensuration , menarche and menopause to explain the reproductive phases of life in humans
	Illustrate the procedure for the determining the sex of a baby in order to establish that the gender of the child is decided by the chromosome from male sperm
Balanced diet and issue of drugs in adolescent	Elucidate the need for a balanced diet in order to explain the nutritional needs of adolescents
	Identify the harmful consequences of taking drugs in order to explain why drugs are not solution to confused and insecure feeling during adolescence

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Identify the consequences of taking drugs in order to explain why drugs are not a solution to confused and insecure feeling during adolescent	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the conditions required for combustion? Why do we add salt and sugar in pickles and murabbas? Do liquids exert equal pressure at the same depth?)
Enumerate different variations that take place in body at puberty to explain the effect of adolescence on changing human body	Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.)
Summarize the functions of sex and other hormones to establish their role secondary sexual characteristics	

Define adolescence and adolescent age in order to explain changes at puberty	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)
Enumerate different variations that take place in body at puberty to explain the effect of adolescence on changing human body	
Explain the effects of hormones in the development of secondary sexual characteristics in order to illustrate growth during puberty	
Elaborate the functions of hormones secreted by endocrine glands in order to explain the growth in male and female body at puberty	
Describe mensuration , menarche and menopause to explain the reproductive phases of life in humans	
Illustrate the procedure for the determining the sex of a baby in order to establish that the gender of the child is decided by the chromosome from male sperm	
Elucidate the need for a balanced diet in order to explain the nutritional needs of adolescents	
Identify the harmful consequences of taking drugs in order to explain why drugs are not solution to confused and insecure feeling during adolescence	

Test items

LOB : Define adolescence and adolescent age in order to explain changes at puberty

1) When does adolescence begin and end respectively?
   (a) begins at the age of 9 and ends at the age of 14
   (b) begins at the age of 11 and ends at the age of 18
   (c) begins at the age of 15 and ends at the age of 11
   (d) begins at the age of 18 and ends at the age of 13

   Correct Answer: Option (b)

2) Which option correctly defines adolescence in girls?
   (a) They attain reproductive maturity 2 or 3 year earlier than boys.
   (b) They attain reproductive maturity 11 or 13 year earlier than boys.

(c) They attain intellectual maturity 5 or 10 year earlier than boys
(d) They attain intellectual maturity 13 or 18 year earlier than boys

Correct Answer: Option (a)

LOB : Enumerate different variations that take place in body at puberty to explain the effect of adolescence on changing human body

1) What change occurs in females at puberty?
   (a) development of large voice box
   (b) development of hair on face and chest
   (c) region below the waist becomes wider
   (d) Shoulder broaden

   Correct Answer: Option (b)

2) How sebaceous glands affect the human body during puberty?
   (a) The persons have acne on their skin due to increased activity of sebaceous glands.
   (b) The persons have acne on their skin due to decreased activity of sebaceous glands.
   (c) The persons have rashes and other skin infections due to increased activity of sebaceous glands.
   (d) The persons have rashes and other skin infections due to decreased activity of sebaceous glands.

   Correct Answer: Option (a)

LOB : Explain the effects of hormones in the development of secondary sexual characteristics in order to illustrate growth during puberty

1) During puberty, the hormones are secreted from endocrine or exocrine glands. Which at secondary sexual characteristic likely develops when testosterone is released in males?
   (a) high pitched voice
   (b) development of Adam's apple
   (c) enlargement of facial and hip bones
   (d) growth of hair on head

   Correct Answer: Option (b)

2) Which secondary sexual characteristic develops in female during puberty by the respective hormones?
   (a) Testosterone- formation of ovaries
   (b) Oestrogen- maturation of ova
   (c) Adrenalin- development of milk secreting glands in ovaries
   (d) Thyroxine- release of milk from the breast

   Correct Answer: Option (b)

LOB : Elaborate the functions of hormones secreted by endocrine glands in order to explain the growth in male and female body at puberty

1) How are the hormones secreted by the endocrine gland cause changes in the body at puberty?
   (a) It increases the muscle mass that helps attain more strength.
   (b) It reduces the metabolism increasing the food intake.
   (c) It stimulates changes in different parts of the body.
   (d) It doubles the capability of body parts to function.

   Correct Answer: Option (c)

2) Oestrogen produced by human body during puberty helps in the development of breast and mammary glands in females at puberty. How is the production of estrogen controlled in the body?
   (a) by a hormone secreted from ovary
   (b) by a hormone secreted from pituitary gland
   (c) by a hormone secreted from adrenal
   (d) by a hormone secreted from testes

   Correct Answer: Option (b)

LOB : Summarize the functions of sex and other hormones to establish their role secondary sexual characteristics

1) Which option correctly differentiates the functioning of estrogen from insulin?
   (a) Oestrogen plays a role in development of mammary glands while insulin helps control blood sugar level.
   (b) Oestrogen plays a role in promoting growth of facial hair while insulin helps control blood sugar level.
   (c) Oestrogen helps control blood sugar level while insulin plays a role in promoting growth of facial hair.
   (d) Oestrogen helps control blood sugar level while insulin plays a role in development of mammary glands.

   Correct Answer: Option (a)

2) During puberty many changes occur in female and male body. An 18 year old boy gets irritated and angry very often. The doctor told him that hormonal imbalance is the reason. Which hormone imbalance is likely causing the problem?
   (a) Testosterone
   (b) Thyroxin
   (c) Adrenalin
   (d) Insulin

   Correct Answer: Option (c)

LOB : Describe mensuration , menarche and menopause to explain the reproductive phases of life in humans

1) What describes menstruation in females?
   (a) the release of the fertilized egg from the uterus that occurs once in a month
   (b) the release of the unfertilized egg from the uterus that occurs once in 28-30 days
   (c) the release of the unfertilized egg from the ovary that occurs twice in 28-30 days

(d) the release of the fertilized egg from the ovary that occurs twice in a month

Correct Answer: Option (b)

2) The table describes the reproductive phase in three females (X, Y, and Z) of different ages.

X	Y	Z
A stop in the process of release of unfertilized egg from the uterus.	The beginning of the process of release of unfertilized egg from the uterus at this age.	The release of unfertilized egg from the uterus once in a month.

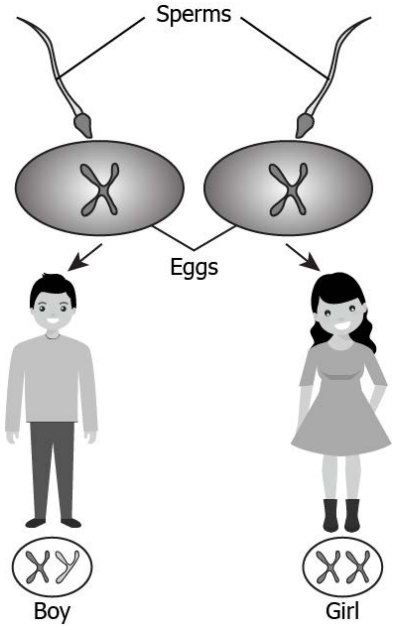
Which phases X, Y and Z represent respectively?

(a) X- menopause, Y- menstruation, Z- menarche
(b) X- menstruation, Y- menarche, Z- menopause
(c) X- menarche, Y- menopause, Z- menstruation
(d) X- menopause, Y- menarche, Z- menstruation

Correct Answer: Option (d)

LOB : Illustrate the procedure for the determining the sex of a baby in order to establish that the gender of the child is decided by the chromosome from male sperm

1) The image shows the distribution of type of sex chromosome in males and females..



Based on the image, when will a male child be born?

(a) When an egg with X chromosome will fuse with a sperm with X chromosome.
(b) When an egg with Y chromosome will fuse with a sperm with Y chromosome.
(c) When an egg with Y chromosome will fuse with a sperm with X chromosome.
(d) When an egg with X chromosome will fuse with a sperm with Y chromosome.

Correct Answer: Option (d)

2) What would likely be the gender of a child if a sperm having X chromosome fertilize an egg?
   (a) A girl, as the unfertilized egg has one X chromosome.
   (b) A girl, as the unfertilized egg has one Y chromosome.
   (c) A boy, as the unfertilized egg has one X chromosome.
   (d) A boy, as the unfertilized egg has one Y chromosome.

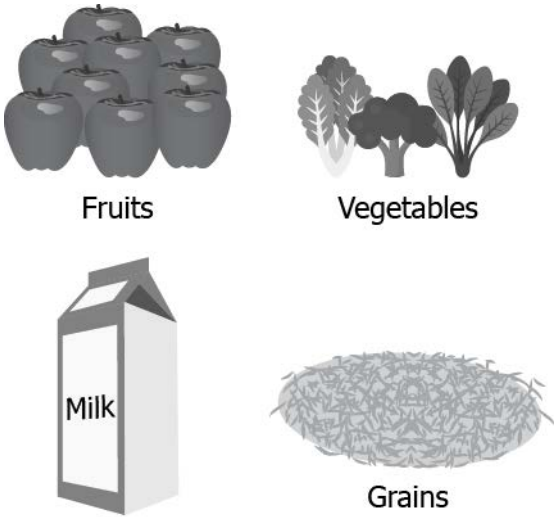
Correct Answer: Option (c)

LOB : Elucidate the need for a balanced diet in order to explain the nutritional needs of adolescents

1) What is the need for balanced diet in adolescents?
   (a) to provide protein, fat, vitamins, carbohydrates in the required amount
   (b) to provide protein, fat, vitamins, carbohydrates in equal amount
   (c) to provide more vitamins, carbohydrates compared to proteins and fats
   (d) to provide more proteins and fats compared to vitamins and carbohydrates

Correct Answer: Option (a)

2) The image shows some nutritious food items.



Which food items will fulfil the need of iron at the time of adolescence in a body?
   (a) grain
   (b) fruit
   (c) milk
   (d) leafy vegetables

Correct Answer: Option (d)

LOB : Identify the harmful consequences of taking drugs in order to explain why drugs are not solution to confused and insecure feeling during adolescence

1) What can be a likely consequence of taking drugs during adolescence?
   (a) They can harm our body.
   (b) They can protect our body from infections.
   (c) They can enhance body's immunity.
   (d) They can make our body resistant to harmful organisms.

   Correct Answer: Option (a)

2) How can a normal person get HIV infection if he is habitual to take drugs?
   (a) by sharing food with a person who takes drugs
   (b) by sharing the syringe with an infected person to inject drugs
   (c) by sharing a common place with an infected person
   (d) by touching an infected person

   Correct Answer: Option (b)

1 Activity

<table>
<tr><td>Activity</td><td>Observe changes in human beings at different stages in life</td></tr>
<tr><td>Material Required</td><td>Blackboard and chalk</td></tr>
<tr><td>Vocabulary</td><td>Infancy, Childhood, Adolescence, Adulthood, Aged</td></tr>
<tr><td>Procedure</td><td>1. Draw the below table on the black board
<table>
<tr><th colspan="5">Changes during different phases of life</th></tr>
<tr><th>Infancy</th><th>Childhood</th><th>Adolescence</th><th>Adulthood</th><th>Aged</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>
2. Ask the learners to categorize the changes according to the stages of life when they occur, i.e. from the time that one is born till one becomes an adult and grows old. The changes could be recorded on the black board or on the index cards/ slips of paper and pinned on the soft board.
3. (In case, learners do not respond, you could provide the following list of changes to initiate the activity: for example, growth in height, learning to talk, learning to walk, menarche, getting a beard, going to school, voice breaking, becoming shy, becoming responsible, osteoporosis (weakening of bones), being economically independent, menopause etc.)</td></tr>
<tr><td>Let’s think</td><td>1. Why do you think people grow old?
2. What do you think causes these changes?</td></tr>
<tr><td>Beyond the classroom</td><td>The facilitator may sum up the discussion byemphasizing onthe following issues:
1. The world is a changing place. We may find changes exciting and good or scary and painful. Sometimes we can influence the changes in our lives and at other times we have no control over them.
2. Some of the changes in our lives are predictable. If we are prepared for them, we may be able to influence some of these processes and manage them better. For example, growth and maturation is a continuous process and adolescence is a stage in the continuum of growth and development across the life span.
3. Adolescents need to be prepared for the physical, mental, psycho-social and emotional changes that take place during this phase of life so that they are not anxious about them and respond to these changes in positive and responsible ways</td></tr>
</table>

11. Force and Pressure

QR Code:

Learning Objectives:

Topic	Learning Objectives
Force - push or a pull	Classify common actions involving motion of object as push or pull in order to define the term force
	Provide examples where force is being applied in order to explain that two objects must interact for a force to come into play
	Analyse motion of an object when force is applied in the same and opposite direction in order to conclude that forces in same direction add while forces in opposite directions subtract
	Predict the motion of an object when force is applied viz-a-vizforce is not applied in order to explain that a force may bring a change in the state of motion of an object
Effect of force	Predict the changes when force is applied to a body that is not free to move in order to explain that force can cause change in shape of objects
Contact and non-contact forces	Cite examples from daily life where an action causes change inmovement or shape due to the contact between two objects in order to define contact forces
	Illustrate with examples from daily life an action that causes change in movement or shape without contact between two objects in order to define non-contact forces.
Pressure	Derive the formula and calculate pressure for given force applied on a given area in order to explain common daily phenomenon requirement of sharp knife etc.
	Discover the direction of pressure applied by liquid when put in a container to conclude that liquids exert pressure on the walls of the container
	Demonstrate and calculate the atmospheric pressure exerted due to the air column above a given area in order to establish that great atmospheric pressure is exerted without us realizing it

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Classify common actions involving motion of object as push or pull in order to define the term force	Classifies materials and organisms based on properties / characteristics, e.g., metals and non-metals; *kharif* and *rabi* crops; useful and harmful microorganisms; sexual and asexual reproduction; celestial objects; exhaustible and inexhaustible natural resources, etc.
Provide examples where force is being applied in order to explain that two objects must interact for a force to come into play	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the conditions required for combustion? Why do we add salt and sugar in pickles and murabbas? Do liquids exert equal pressure at the same depth?)
Analyse motion of an object when force is applied in the same and opposite direction in order to conclude that forces in same direction add while forces in opposite directions subtract	
Discover the direction of pressure applied by liquid when put in a container to conclude that liquids exert pressure on the walls of the container	
Demonstrate and calculate the atmospheric pressure exerted due to the air column above a given area in order to establish that great atmospheric pressure is exerted without us realizing it	
Derive the formula and calculate pressure for given force applied on a given area in order to explain common daily phenomenon requirement of sharp knife etc.	Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.)
Predict the motion of an object when force is applied viz-a-viz force is not applied in order to explain that a force may bring a change in the state of motion of an object	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes;
Predict the changes when force is applied to a body that is not free to move in order to explain that force can cause change in shape of objects	

Cite examples from daily life where an action causes change in movement or shape due to the contact between two objects in order to define contact forces	increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)
Illustrate with examples from daily life an action that causes change in movement or shape without contact between two objects in order to define non-contact forces.	

Test items

LOB : Classify common actions involving motion of object as push or pull in order to define the term force

1) Which action is used in riding a bicycle?
   (a) Lifting
   (b) Picking
   (c) Pushing
   (d) Throwing

Correct Answer: Option (c)

2) The table shows some activities

1. opening of door of refrigerator
2. lifting the bucket
3. inserting a plug into socket
4. switch on the lights

Classify the activities to show if they require push or pull.

(a)

Push	Pull
Lifting the bucket	Switch on the lights
Inserting a plug into socket	Opening of door of refrigerator

(b)

Push	Pull
Lifting the bucket	Inserting a plug into socket
Switch on the lights	Opening of door of refrigerator

(c)

Push	Pull
Switch on the lights	Lifting the bucket
Inserting a plug into socket	Opening of door of refrigerator

(d)

Push	Pull
Switch on the lights	Inserting a plug into socket
Lifting the bucket	Opening of door of refrigerator

Correct Answer: Option (c)

LOB : Provide examples where force is being applied in order to explain that two objects must interact for a force to come into play

1) In which activity one object applies force on another object?
   (a) a batsman hitting a cricket ball
   (b) a chapatti being cooked
   (c) a hand of a clock moving
   (d) a glass of water turning into ice

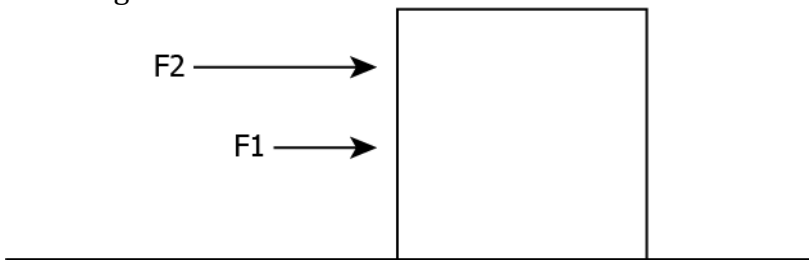
   Correct Answer: Option (a)

2) A person wants to skate using a skateboard. Which two objects should interact in order to move the skate?
   (a) ground and the skateboard
   (b) ground and the foot of the person
   (c) skateboard and wheels of the skateboard
   (d) wheels of the skateboard and foot of the person

   Correct Answer: Option (b)

LOB : Analyse motion of an object when force is applied in the same and opposite direction in order to conclude that forces in same direction add while forces in opposite directions subtract

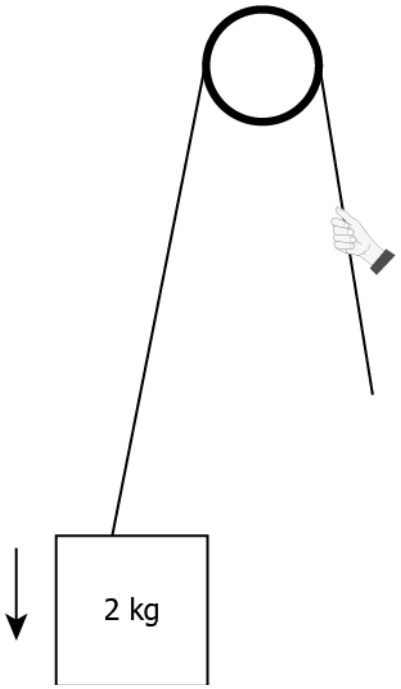
1) The image shows a block in which force F1 and F2 are acting.



What would be the net force on the block?
   (a) F1
   (b) F2
   (c) F2 – F1
   (d) F1 + F2

   Correct Answer: Option (d)

2) A block of mass 2 kg tied with a rope is going down under the force of gravity of 20 N.



How much force is required by the hand to stop the motion of the block?

(a) 10 N
(b) 20 N
(c) 30 N
(d) 40 N

Correct Answer: Option (b)

LOB : Predict the motion of an object when force is applied viz-a-vizforce is not applied in order to explain that a force may bring a change in the state of motion of an object

1) A person X pushes a cart with a force. Another person Y starts pushing the cart in the opposite direction with the same force. How does it affect the cart?

(a) it brings the cart to rest
(b) it changes the direction of cart
(c) it increase the speed of the cart
(d) it will change the shape of the cart

Correct Answer: Option (a)

2) A ball is moving to the left at a speed of 5 km/h. A boy kicks the ball in the same direction. What would be the likely speed of the ball?

(a) 0 km/h
(b) 3 km/h
(c) 5 km/h
(d) 10 km/h

Correct Answer: Option (d)

LOB : Predict the changes when force is applied to a body that is not free to move in order to explain that force can cause change in shape of objects

1) What happens when air is blown into a balloon?
   (a) it remain as it is
   (b) it breaks into two pieces
   (c) the state of balloon changes
   (d) the shape of balloon changes

   Correct Answer: Option (d)

2) A spring is tied with a fixed support at one end and a weight is attached to the other end of the spring. What changes in the spring would observe?
   (a) the mass of the spring will increase
   (b) the length of the spring will increase
   (c) the length of the spring will decrease
   (d) the thickness of the spring will decrease

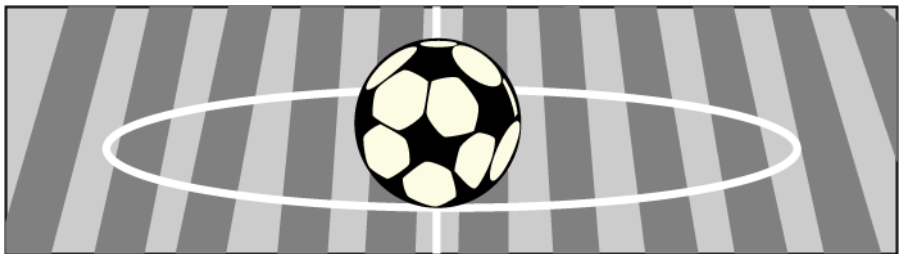
   Correct Answer: Option (b)

LOB : Cite examples from daily life where an action causes change inmovement or shape due to the contact between two objects in order to define contact forces

1) In which activity a force is stopping the motion of an object?
   (a) pushing a cart
   (b) hitting a hammer
   (c) kicking a football
   (d) catching a cricket ball

   Correct Answer: Option (d)

2) A football is placed on the ground, as shown.



   What should be the direction of the force applied to the ball to change the shape of the football?
   (a) Upwards
   (b) Downwards
   (c) Towards left
   (d) Towards right

   Correct Answer: Option (b)

LOB : Illustrate with examples from daily life an action that causes change in movement or shape without contact between two objects in order to define non-contact forces.

1) What is an example of a non-contact force?
   (a) an apple falling from a tree
   (b) drawing water from a well
   (c) a ball bouncing on the ground
   (d) reducing the speed of a ball sliding over a ramp

   Correct Answer: Option (a)

2) A student has a compass. The compass has a needle that moves as the compass moves. Which force causes the movement of the needle?
   (a) muscular force
   (b) magnetic force
   (c) gravitational force
   (d) electrostatic force

   Correct Answer: Option (b)

LOB : Derive the formula and calculate pressure for given force applied on a given area in order to explain common daily phenomenon requirement of sharp knife etc.

1) How much pressure would be exerted by a block exerting 20N of force on 0.5 m^2 area?
   (a) 10 N/m^2
   (b) 20 N/m^2
   (c) 30 N/m^2
   (d) 40 N/m^2

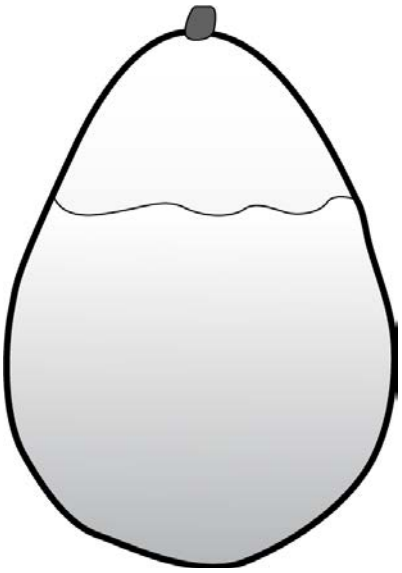
   Correct Answer: Option (d)

2) A porter put a box on a round cloth of area 200 cm^2 over his head. The pressure exerted by the box 0.25 N/cm^2. If the porter increase the area of round cloth to 300 cm^2. What will be the reduced pressure on his head?
   (a) 0.10 N/cm^2
   (b) 0.16 N/cm^2
   (c) 0.25 N/cm^2
   (d) 0.50 N/cm^2

   Correct Answer: Option (b)

LOB : Discover the direction of pressure applied by liquid when put in a container to conclude that liquids exert pressure on the walls of the container

1) A student adds water in a balloon. The student notices that the balloon becomes big, as shown.

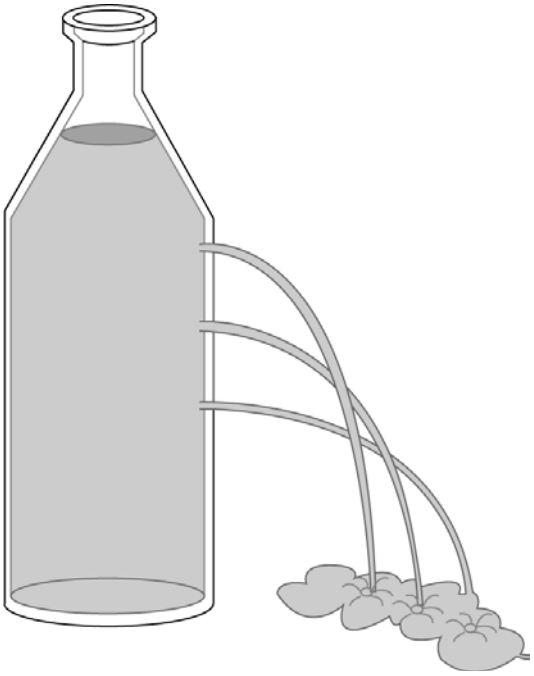


Which statement is correct?

(a) The surrounding air exerts pressure on the liquid.
(b) The liquid exerts pressure to the top of the balloon.
(c) The liquid exerts pressure towards the wall of the balloon.
(d) The air exerts pressure towards the bottom of the balloon.

Correct Answer: Option (c)

2) A student pours water in a bottle and drills three holes at different height in the bottle. The water starts coming out as shown.



What can the student infer from the observation?

(a) at greater height the pressure is low and the water falls to a small distance
(b) at less height the pressure is low and the water falls to a small distance
(c) at greater height the pressure is high and the water falls to a small distance

(d) at less height the pressure is high and the water falls to a small distance

Correct Answer: Option (a)

LOB : Demonstrate and calculate the atmospheric pressure exerted due to the air column above a given area in order to establish that great atmospheric pressure is exerted without us realizing it

1. The area of a small plate is 15cm x 15cm and air in column exerts a force of 2250 N on it. How much atmospheric pressure is exerted by air?

(a) N/cm^2
(b) 10 N/cm^2
(c) 15 N/cm^2
(d) 150 N/cm^2

Correct Answer: Option (b)

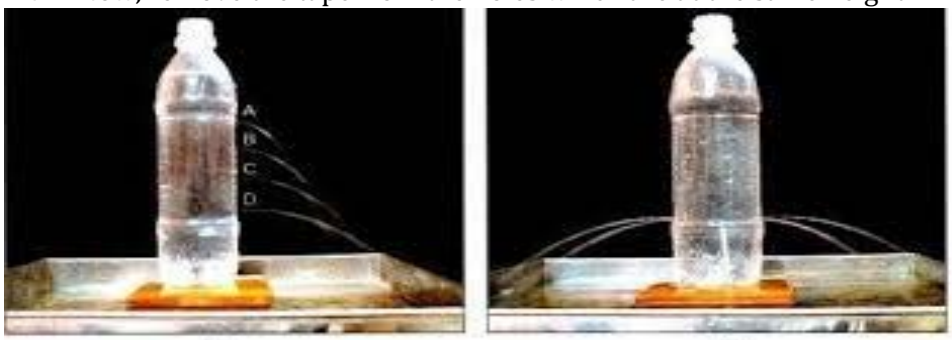
2. On the area of 10 x 10 cm, the air column exerts the force of 1000 N. Calculate the atmospheric pressure by the air in the column?

(a) 0.01 N/cm^2
(b) 0.1 N/cm^2
(c) 10 N/cm^2
(d) 100 N/cm^2

Correct Answer: Option (c)

Suggested Teacher Resources

1 Activity

Activity	Discover the direction of pressure applied by liquid when put in a container to conclude that liquids exert pressure on the walls of the container
Prerequisite	Force, pressure
Material Required	Plastic bottle, scissors, tape, water
Vocabulary	Exert, liquid pressure.
Procedure	1. Take an empty plastic bottle. 2. Drill four holes at the same height from the bottom of the bottle. 3. Drill 3 holes at different heights from the previous one. 4. Cover the holes with tape. 5. Fill the water in bottle. 6. Remove the tape from the holes which are at different height. 7. Now, remove the tape from the holes which are at the same height.  Fig. 8.12 The four jets travel different distances in (a) and the same distance in (b).
Let's think	1. Do the stream of the water coming out from the holes at different height fall at the same distance from the bottle? 2. Do the stream of the water coming out from the holes at the same height fall at the same distance from the bottle? 3. Was there any change in the speed of different stream? 4. What can you conclude from the above observation?
Text to real world connection	The wall of a dam is made thicker at the bottom. The reason is that the pressure exerted by a liquid increases with its depth. A thicker wall is required to withstand a greater pressure and therefore the wall of the dam is made with thickness increasing towards the base.
Beyond the classroom	Why is water tank built at a high height in our houses?

2 Activity

Material required	Plastic bottle, cutter
Procedure	1. Make a half cut along the semi-circular mark of a plastic bottle. 2. Press with thumbs to make a concave shape. 3. Dip bottle in tank to fill it with water. 4. Stand the bottle and check the level of water.
Let's think	1. Why does the water level rise in the narrow part? 2. Can water level in narrow part be changed? If yes, then how?

12. Friction

QR Code:

K2K8W4

Learning Objectives:

Topic	Learning Objectives
Force of friction	Analyse situations where resistance is felt while applying force to move a body in order to explain friction force where acts in opposite direction
	Analyse and identify number of bodies interacting when friction force is felt in order to establish that friction is a contact force.
Friction necessary evil	Discover the factors that cause friction when two bodies moving relatively in order to explain why it is easier to move an object on a smooth surface compared to a rough surface
	Provide advantages and disadvantages of friction in order to justify friction as necessary evil
Reducing friction	Identify factors causing friction in order to come up with formulate strategies to reduce
	Differentiate between rolling friction and sliding friction in order to explain the use of different friction reducing strategies
Fluid friction	Explain why the engine of an airplane is needed when flying in order to explain drag caused by air (friction caused by fluids)

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Differentiate between rolling friction and sliding friction in order to explain why ball bearings are employed in machines e.g. bicycle wheels	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 situations where resistance is felt while applying force to move a body in order to explain friction force where acts in opposite direction	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the conditions required for combustion? Why do we add salt and sugar in pickles and murabbas? Do liquids exert equal pressure at the same depth?)
Analyse and identify number of bodies interacting when friction force is felt in order to establish that friction is a contact force.	

Discover the factors that cause friction when two bodies moving relatively in order to explain why it is easier to move an object on a smooth surface compared to a rough surface	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)
Provide advantages and disadvantages of friction in order to justify friction as necessary evil	
Differentiate between rolling friction and sliding friction in order to explain the use of different friction reducing strategies	
Explain why the engine of an airplane is needed when flying in order to explain drag caused by air (friction caused by fluids)	
Identify factors causing friction in order to come up with formulate strategies to reduce	Designs, plans, makes use of available resources, etc.in order to exhibit creativity.

Test items

LOB : Analyse situations where resistance is felt while applying force to move a body in order to explain friction force where acts in opposite direction

1) Which option describes a situation where resistance accompanies the applied force?
   (a) while kicking a football
   (b) while opening the door
   (c) while lifting the bucket
   (d) while burning a matchstick

   Correct Answer: Option (d)

2) A student designed a model of a car ramp. The student wants to cover the ramp so that the car could stop after travelling a small distance. Which material would be best to cover the ramp?
   (a) Newspaper
   (b) Glossy paper
   (c) Sandpaper
   (d) Butter paper

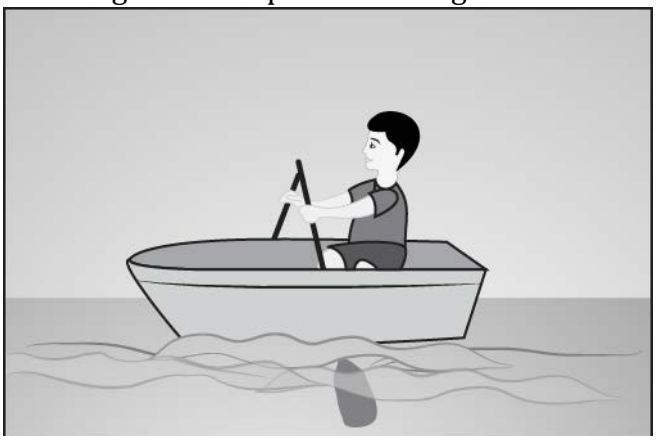
   Correct Answer: Option (c)

LOB : Analyse and identify number of bodies interacting when friction force is felt in order to establish that friction is a contact force.

1) A student is pushing a block on an inclined plane against gravity. Which bodies are interacting when frictional force is felt?
   (a) block and gravity
   (b) student and gravity
   (c) block and inclined plane
   (d) student and inclined plane

   Correct Answer: Option (c)

2) The image shows a person rowing a boat over a river.

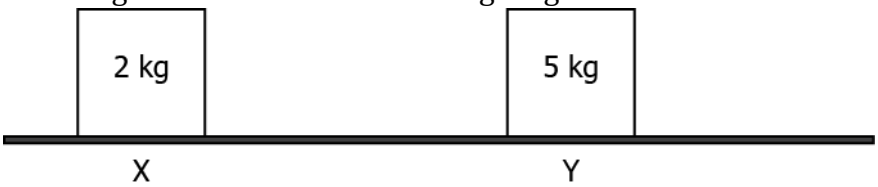


Identify the number of bodies experiencing friction.
   (a) 1, boat because of the river
   (b) 1, boat because of the person
   (c) 2, boat because of the river and the person because of air
   (d) 2, boat because of air and river and the person because of air

   Correct Answer: Option (d)

LOB : Discover the factors that cause friction when two bodies moving relatively in order to explain why it is easier to move an object on a smooth surface compared to a rough surface

1) The image shows two blocks resting on ground.



Block X is easier to move than Block Y. Why is block X easier to move?
   (a) the surface is pressed harder by block X because of lesser mass, so greater is the friction
   (b) the surface is pressed harder by block Y because of greater mass, so greater is the friction
   (c) the surface is pressed harder by block X because of lesser mass, so lower is the friction
   (d) the surface is pressed harder by block Y because of lesser mass, so lower is the friction

Correct Answer: Option (b)

2) A student rolls a marble on two different surfaces with the same force. The table shows the distance travelled in each trial.

Trial	Surface	Distance Travelled (cm)
1	Glossy paper	80
2	Sand paper	65

Why does the marble travel a greater distance on glossy paper but not on sandpaper?

(a) because the mass of the marble on sandpaper is high
(b) because the mass of the marble on glossy paper is high
(c) because interlocking between the surface of marble andsandpaper is high
(d) because interlocking between the surface ofmarble andglossy paper is high

Correct Answer: Option (c)

LOB : Provide advantages and disadvantages of friction in order to justify friction as necessary evil

1) Which option justifies that friction is a necessary evil?
(a) writing on a paper
(b) kicking a football
(c) hitting a cricket ball
(d) swinginga pendulum

Correct Answer: Option (a)

2) The table shows some observations.

1. A person is walking.
2. Lightning of matchstick.
3. A machine making noise.
4. A freshly printed paper feels warm.

Classify these observations to show the advantages and disadvantages of friction.

(a)

Advantages	Disadvantages
A person is walking	Lightning of matchstick
A machine making noise	A freshly printed paper feels warm

(c)

Advantages	Disadvantages
A freshly printed paper feels warm	Lightning of matchstick
A machine making noise	A person is walking

(b)

Advantages	Disadvantages
A person is walking	A machine making noise
Lightning of matchstick	A freshly printed paper feels warm

(d)

Advantages	Disadvantages
Lightning of matchstick	A person is walking
A machine making noise	A freshly printed paper feels warm

Correct Answer: Option (b)

LOB : Identify factors causing friction in order to come up with formulate strategies to reduce

1) A student hears a noise as he opens and closes his bedroom door. What should be done to reduce the noise?
   (a) open the door slowly
   (b) apply the lubricants in door joints
   (c) change the position of door's handle
   (d) apply some water on the door joints

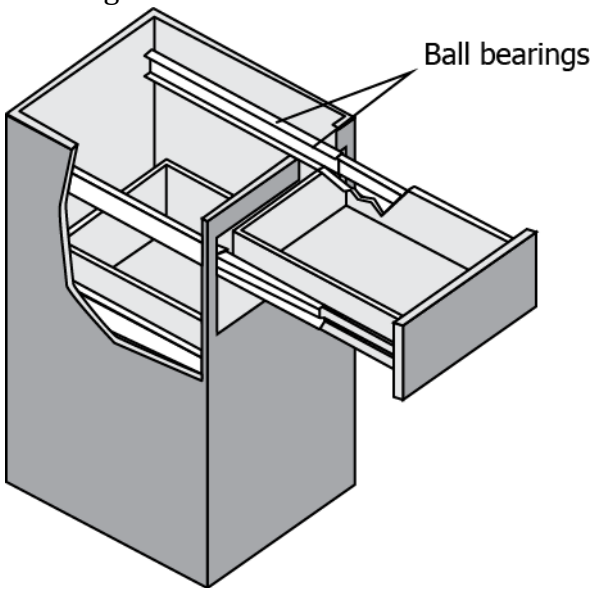
Correct Answer: Option (b)

2) A student wants to move a heavy block from one place to another. What method the student should apply to reduce the effort?
   (a) pull the block using a rope
   (b) place wheels under the block
   (c) slide the block along the surface
   (d) apply oil to the bottom of the block

Correct Answer: Option (b)

LOB : Differentiate between rolling friction and sliding friction in order to explain the use of different friction reducing strategies

1) A student observes ball bearings in the slide track of his drawer as shown.



Why are ball bearings used in the drawer?

(a) it reduces friction
(b) it increases the surface area
(c) it reduces the mass of the drawer
(d) it increases the interlocking between the surfaces

Correct Answer: Option (a)

2) Most of the machines use ball bearings in order to reduce friction. How is rolling more efficient than sliding?

(a) the mass of the object reduces
(b) it provides lubrication between the surfaces
(c) interlocking between the surfaces increases
(d) the area of contact between the surfaces is low

Correct Answer: Option (d)

LOB : Explain why the engine of an airplane is needed when flying in order to explain drag caused by air (friction caused by fluids)

1) When an airplane flies, air exerts a drag on the plane to resist its motion. What is the role of engine in the plane when flying?

(a) it uses drag as a driving force
(b) it changes the shape of the airplane
(c) it stops the drag to act on the airplane
(d) it provides force to overcome the force of drag

Correct Answer: Option (d)

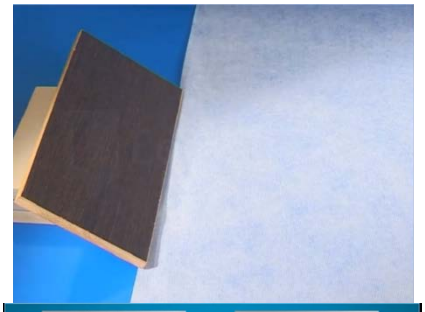
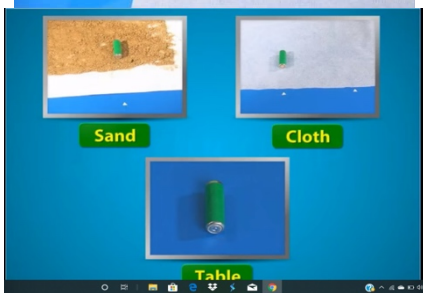
2) Explain how engines of an airplane work when drag is acting on the airplane.

(a) engines reduce the surface area of the airplane
(b) engines increase the surface area of the airplane
(c) engines provide driving force opposite to force of drag
(d) engines provide driving force in same direction to force of drag

Correct Answer: Option (c)

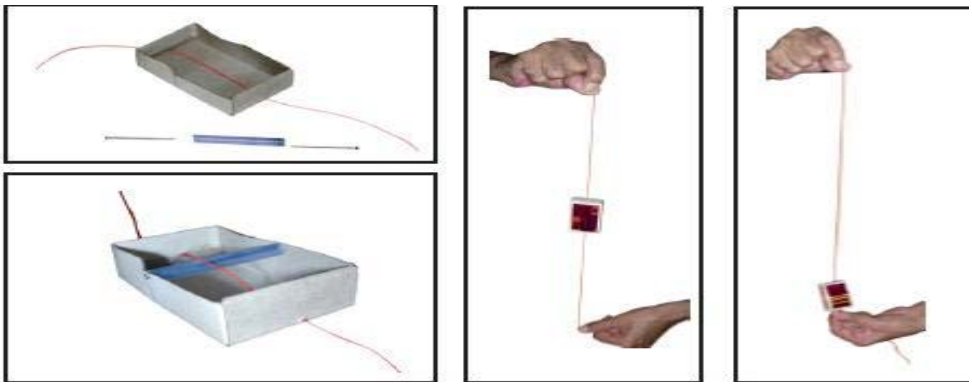
Suggested Teacher Resources

1 Activity

Activity	Discover the factors that cause friction when two bodies are moving relatively in order to explain why it is easier to move an object on a smooth surface compared to a rough surface
Prerequisite	Contact forces, force of friction
Material Required	Wooden board, books, wrinkle free cloth, sand, torch cell
Vocabulary	Surface irregularities, interlocking of irregularities
Procedure	1. Make an inclined plane by supporting one end of the wooden board with books (the inclined plane should be at one end of the table or any smooth surface). 2. Place the torch cell at the top of inclined plane and let it rolled down and observe how far it goes before coming to rest. 3. Make a mark on the surface where cell stops. 4. Now spread the cloth over the table or surface (make sure the cloth is wrinkle free), let the cell rolled down the board from the same point and observe the distance it covers over the cloth and mark it. 5. Now spread sand on table or surface, let the cell roll down again from the same point and mark the distance covered by cell.    

Let's think	1. In which case is the distance covered the minimum? 2. Why is the distance covered by cell different every time? 3. Does the distance covered by cell depends on the nature of the surface of the cell as well?
Text to real world connection	1. Friction allows the matches to reach ignition temperature. 2. Friction allows you to hold onto objects without dropping them. 3. Riding a car. The motion of the car is brought forth because of friction. Without friction, the wheels would keep on turning and the car would remain stationary.
Beyond the classroom	Imagine that friction suddenly vanishes. How would life be affected. List ten such situations.

2 Activity

Activity	Climbing toy
Material required	Matchstick box, thread, used refill, 2 oil pins
Procedure	1. Take an empty matchstick box and take out its tray. 2. Cut a used refill of a ball pen of the same width as the tray as shown in the picture below. 3. Fix the refill with two pins on the top of the tray. 4. Make two holes on opposite sides of the tray. Make sure that the holes are large enough to allow a thread to pass through them easily. 5. Take a thread about a metre long and pass it through the holes as shown. Fix beads at the two ends of the thread so that it does not come out. 6. Insert the tray in the outer cover of the matchbox. 7. Suspend the match box by the thread. Leave the thread loose and write your observation. Tighten the thread now and observe. 
Reflection question	1. Was there any difference between the two observations? 2. Can you relate it to friction?

13. Sound

QR Code:

P8Y2R8

Learning Objectives:

Topic	Learning Objectives
Recognition of causes of sound.	List examples of body moving in to and fro motion in order to explain vibration
	List commonly known musical instrument and identify parts that vibrate in order to explain that vibration produces sound
Sound produced by humans	List and identify functions of parts of human body that produces sound in order to explain the process of sound production
Sounds needs a medium to propagate	Provide examples where sound travels from one point to another in order to establish that sound needs a medium to propagate
We hear sound through our ears	Describe the structure and function of an eardrum in order to explain how humans hear sound
Frequency and amplitude	Differentiate between frequency and amplitude in order to describe factors responsible for loudness and pitch of the sound
	Recall the audible range of sound for humans in order to explain why certain sounds cannot be heard by humans
Noise pollution	List the harmful effects of noise pollution in order to mitigate it

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Differentiate between frequency and amplitude in order to describe factors responsible for loudness and pitch of the sound	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.
Provide examples where sound travels from one point to another in order to establish that sound needs a medium to propagate	Explains processes and phenomenon, e.g., reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.

<table>
<tr><td>List examples of body moving in to and fro motion in order to explain vibration</td><td rowspan="3">Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.)</td></tr>
<tr><td>Provide examples where sound travels from one point to another in order to establish that sound needs a medium to propagate</td></tr>
<tr><td>Recall the audible range of sound for humans in order to explain why certain sounds cannot be heard by humans</td></tr>
<tr><td>Describe the structure and function of an eardrum in order to explain how humans hear sound</td><td>Draws labelled diagram / flow charts, e.g., structure of cell, eye, human reproductive organs; experimental set ups, etc.</td></tr>
<tr><td>List commonly known musical instrument and identify parts that vibrate in order to explain that vibration produces sound</td><td>Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, ektara, electroscope, fire extinguisher, etc.)</td></tr>
<tr><td>List commonly known musical instrument and identify parts that vibrate in order to explain that vibration produces sound</td><td rowspan="2">Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)</td></tr>
<tr><td>List and identify functions of parts of human body that produces sound in order to explain the process of sound production</td></tr>
<tr><td>List the harmful effects of noise pollution in order to mitigate it</td><td>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: (e.g., using resources judiciously; making controlled use of fertilisers and pesticides; suggesting ways to cope with environmental hazards, etc).</td></tr>
</table>

Test items

LOB : List examples of body moving in to and fro motion in order to explain vibration

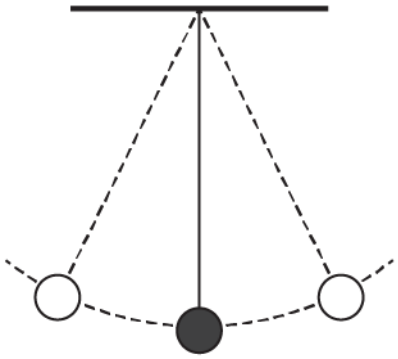
1) What is an example of an object that works on vibrations?
   (a) a spinning top
   (b) a coin is tossed
   (c) marble rolling on a ramp
   (d) guitar string being plucked

Correct Answer: Option (d)

2) Which is an example of a to-and-fro motion?

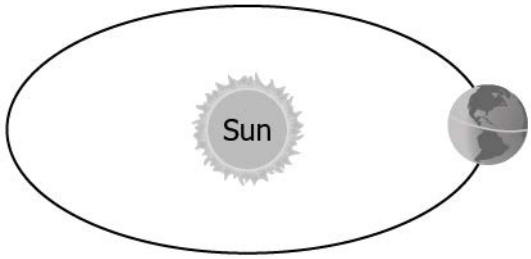
(a)

(c)



(b)

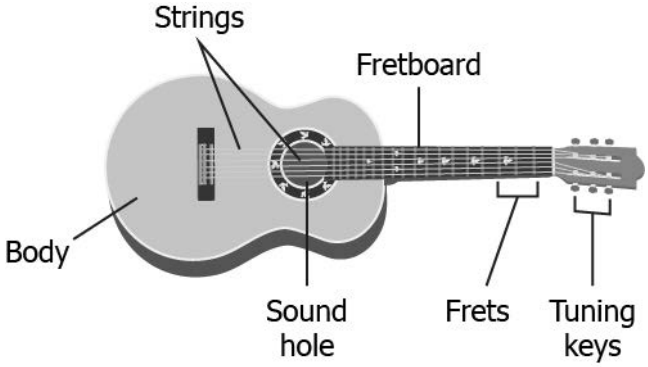
(d)



Correct Answer: Option (c)

LOB : List commonly known musical instrument and identify parts that vibrate in order to explain that vibration produces sound

1) The image shows an instrument and its part.



Which part of this instrument vibrates and produces sound?

(a) Body
(b) Frets
(c) Strings
(d) Soundhole

Correct Answer: Option (c)

2) The table shows the three instruments.

1	Violin
2	Tabla
3	Flute

Which option correctly states the vibrating part of these instruments?

(a)

	Instrument	Vibrating Part
1	Violin	Stretched membrane
2	Tabla	Stretched strings
3	Flute	Air column

(b)

	Instrument	Vibrating Part
1	Violin	Stretched strings
2	Tabla	Stretched membrane
3	Flute	Air column

(c)

	Instrument	Vibrating Part
1	Violin	Stretched membrane
2	Tabla	Air column
3	Flute	Stretched strings

(d)

	Instrument	Vibrating Part
1	Violin	Air column
2	Tabla	Stretched membrane
3	Flute	Stretched strings

Correct Answer: Option (b)

LOB : List and identify functions of parts of human body that produces sound in order to explain the process of sound production

1) Which part of the human throat is responsible for the voice produced by a human?

(a) Larynx

(b) Trachea
(c) Pharynx
(d) Oesophagus

Correct Answer: Option (a)

2) Which option explains how sound is produced by the voice box in a human throat?
(a) the voice box vibrates by the air coming out from lungs
(b) the vocal cords vibrate by the air coming in through the voice box
(c) the vocal cords stretched across the voice box vibrates by air coming from lungs
(d) the stretched vocal cords across the voice box produce the air to vibrate the voice box

Correct Answer: Option (c)

LOB : Provide examples where sound travels from one point to another in order to establish that sound needs a medium to propagate

1) A student does an activity where he puts a ringing phone in the glass tumbler. The student covers the glass tumbler with his hand. The student removes air from the glass tumbler by using a vacuum and observes the sound of the phone fainting gradually. What can be concluded from the observation?
(a) sound eventually fades away
(b) sound gets absorbed by the surrounding
(c) sound requires a medium to travel
(d) sound get reflected in all directions

Correct Answer: Option (c)

2) Two students are at two ends of a room. One of the students claps softly but the other student is unable to hear the sound. The student takes a long metal rod and asks his friend to put the ear on the rod at the other end. The student taps the metal rod with the same intensity and the sound is heard by his friend. What can be concluded by this observation?
(a) Particles in air are closer to one another to the sound travels faster.
(b) Particles in air are farther from one another to the sound travels faster.
(c) Particles in a solid substance are closer to one another to the sound travels faster.
(d) Particles in a solid substance are farther from one another to the sound travels faster.

Correct Answer: Option (c)

LOB : Describe the structure and function of an eardrum in order to explain how humans hear a sound

1) What is the structure of the eardrum?
(a) it is the stretched cord in the ear
(b) it is the stretched membrane in the ear
(c) it is the nerve which transmits a signal to the brain
(d) it is the funnel type canal of the ear through which sound enters

Correct Answer: Option (b)

2) A person is talking on the phone. How does his eardrum work to hear a sound?
   (a) the sound enters the inner ear and travels to the brain.
   (b) the sound vibrates the eardrum which sends signals to the brain.
   (c) the sound vibrates the eardrum which goes into the inner ear and then to the brain
   (d) the sound enters the inner ear and vibrates the eardrum which sends the signal to the brain.

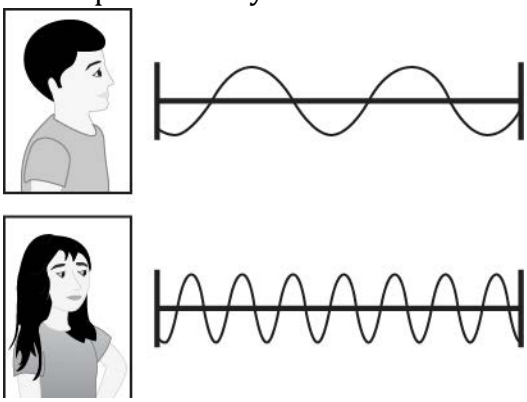
Correct Answer: Option (c)

LOB : Differentiate between frequency and amplitude in order to describe factors responsible for loudness and pitch of the sound

1) What properties of sound change with respect to any change in frequency and amplitude?
   (a) pitch- amplitude; echo – frequency
   (b) echo- amplitude; loudness – frequency
   (c) pitch- amplitude; loudness – frequency
   (d) loudness- amplitude; pitch - frequency

Correct Answer: Option (d)

2) A student learns that the sound travels in a waveform. The image shows the sound waves produced by a man and a woman.



What can be concluded from the image?
   (a) closer the waves, greater will be the amplitude
   (b) closer the waves, greater will be the frequency
   (c) farther the waves, greater will be the amplitude
   (d) farther the waves, greater will be the frequency

Correct Answer: Option (b)

LOB : Recall the audible range of sound for humans in order to explain why certain sounds cannot be heard by humans

1) A student used the ultrasonic sound waves to transmit a message to his friend. What is the reason the sound is not heard by the student?
   (a) it has loudness above 10 dB
   (b) it has loudness above 80 dB
   (c) it has a frequency below 20 Hz

(d) it has a frequency above 20 kHz

Correct Answer: Option (d)

2) A student plucks two stretched metal strings A and E of different thicknesses. The A string vibrates at the rate of 30 vibrations per second and E string vibrates at a rate of 10 vibrations per second. How many vibrations per second should be given to the string E in order to produce higher frequency sound than string A?
   (a) below 10 vibrations
   (b) above 30 vibrations
   (c) between 10 vibrations to 20 vibrations
   (d) between 10 vibrations to 30 vibrations

Correct Answer: Option (b)

LOB : List the harmful effects of noise pollution in order to differentiate noise and music

1) A person works in a factory where a lot of industrial machines run daily. What harmful effects he is likely to suffer from?
   (a) Fever
   (b) Cataract
   (c) lack of vision
   (d) lack of hearing

Correct Answer: Option (d)

2) Which option correctly enlists the effects caused due to excessive exposure of noise?

(a)

Dizziness
Hypertension
Lack of sleep

(c)

Anxiety
Hypertension
Lack of sleep

(b)

Fever
Dizziness
Lack of sleep

(d)

Dizziness
Anxiety
Lack of sleep

Correct Answer: Option (c)

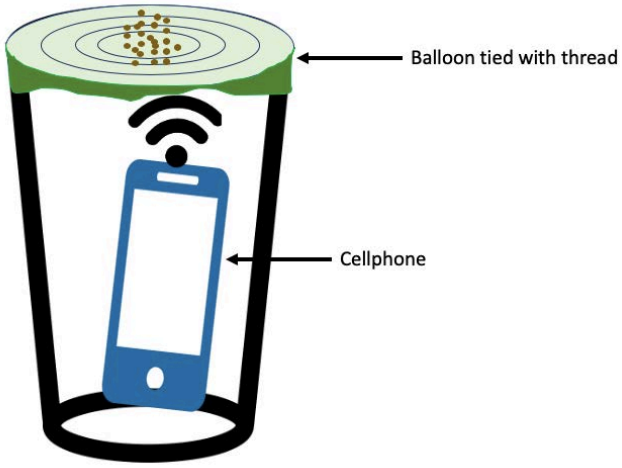
Suggested Teacher Resources

1 Activity

Objective	Provide examples where sound travels from one point to another in order to establish that sound needs a medium to propagate
Prerequisite	What is vibration? How does sound travel?
Material Required	1 metallic scale, 1 balloon, water
Vocabulary	Medium, propagate
Procedure	1. Ask to put an end of scale or rod to one of the Student's ears and ask other students to scratch the other end slowly. 2. Are they hearing the sound of scratching? Ask other students who are standing beside you whether they are hearing sound or not? 3. Ask students to fill the balloon with water. Ask them to put their ear to one side of a balloon and scratch the other side of the balloon softly. 4. Are they hearing the scratching sound?
Reflection Questions	1. Which one of the sounds was clearer and louder? 2. If there is no air between us, can we still hear the sounds around us?
Text to real world connection	If you bang a drum, you make the tight skin vibrate at very high speed (it's so fast that you can't usually see it), forcing the air all around it to vibrate as well. As the air moves, it carries energy out from the drum in all directions. Eventually, even the air inside your ears starts vibrating and that's when you begin to perceive the vibrating drum as a sound.
Beyond the classroom	Identify the sources of noise pollution in your locality. Discuss with your parents, friends and neighbours. Suggest how to control noise pollution. Prepare a brief report and present it in the class.

2 Activity

Material required	Scissors, balloons, 2 cell phones, 2 transparent glasses, thread, sand.
Procedure	1. Take a transparent glass and place it on a table. 2. Take a cell phone and place it in the glass. 3. Cover the lid of the beaker with balloon and tie it with the help of thread.

	4. Place some sand on the balloon. 5. Give a ring to the phone which is inside the glass. 
Reflection question	1. What does happen to sand particles? 2. What is the reason behind it? 3. If there is no sound, will sand particles still dance?

14. Chemical Effects of Electric Current

QR Code:

Learning Objectives:

Topic	Learning Objectives
Do liquids conduct electricity?	Distinguish between good and poor conductors of electricity in order to explain that various materials can conduct electricity under certain conditions
Chemical effects of electric current	List commonly known chemical effects of electricity in order to establish that electricity causes chemical reactions
Electroplating	Describe the process of electroplating in order to explain the application of chemical effects of electricity on metals

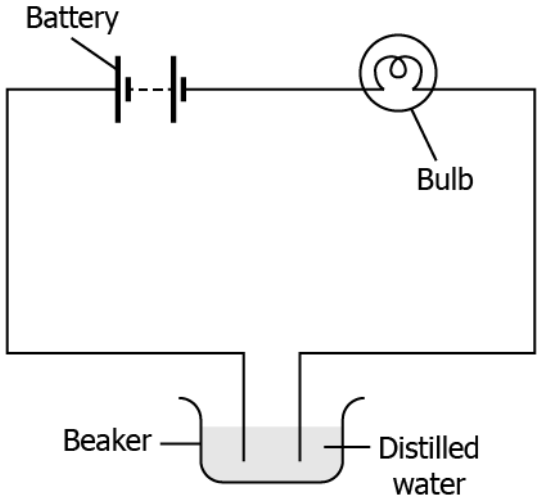
Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Distinguish between good and poor conductors of electricity in order to explain that various materials can conduct electricity under certain conditions	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.
List commonly known chemical effects of electricity in order to establish that electricity causes chemical reactions	Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.)
Describe the process of electroplating in order to explain the application of chemical effects of electricity on metals	Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, ektara, electroscope, fire extinguisher, etc.)
Describe the process of electroplating in order to explain the application of chemical effects of electricity on metals	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)

Test items

LOB : Distinguish between good and poor conductors of electricity in order to explain that various materials can conduct electricity under certain conditions

1) A student makes a circuit as shown.

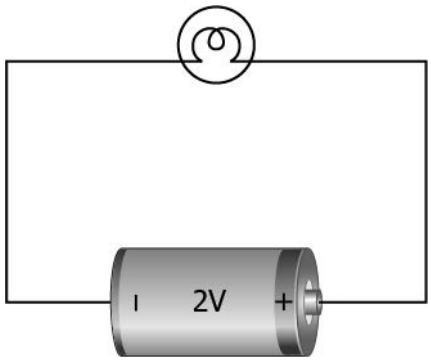


He notices that the bulb does not glow. What changes in the circuit will help to glow the bulb?

(a) add a pinch of sugar in the beaker
(b) cool the water present in the beaker
(c) heat the water present in the beaker
(d) add a pinch of common salt in the beaker

Correct Answer: Option (d)

2) A student makes an electric circuit as shown.



The student notices that the bulb in the circuit is not glowing even though the circuit is complete. His friend advises him to use a LED at the place of the bulb. Why an LED is preferred over bulb in the circuit?

(a) LEDs are brighter than bulbs.
(b) LEDs consume more energy than a bulb.
(c) LEDs eliminate the use of the battery in the circuit.
(d) LEDs can glow even when a weak current flow in the circuit.

Correct Answer: Option (d)

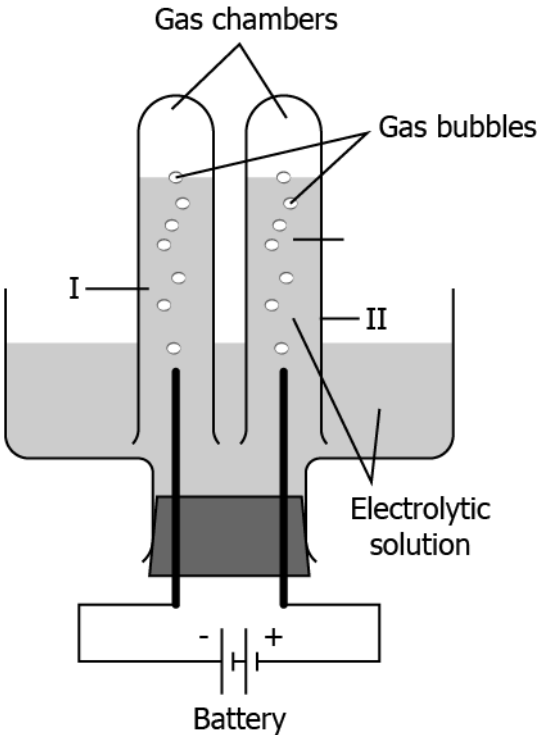
LOB : List commonly known chemical effects of electricity in order to establish that electricity causes chemical reactions

1) A student learns that salts like potassium chloride and sodium chloride are introduced in a weakly conducting solution. What option explains the chemical reactions that salts undergo and affect the conductivity of the solution?

(a) Salts react chemically with the water particles and decrease the conductivity of the solution.
(b) Salts help to make the solution non-conducting by reacting with the particles of the solution.
(c) Salts mix with the particles of the weak conducting solution and helps to produce oxygen from the solution.
(d) Salts undergoes a chemical reaction with the particles of the solution and increase its conductivity.

Correct Answer: Option (d)

2) A student performed electrolysis of water that results in the release of hydrogen and oxygen as shown.



To determine the chambers with hydrogen or oxygen, the student brings a lighted candle near the two chambers. Which option states the correct observations?

(a) Both the gases will put off the candle.
(b) Both the gases will help the candle to burn.
(c) Hydrogen will put off the candle while oxygen would help the candle to burn.
(d) Hydrogen will help the candle to burn while oxygen would put off the candle.

Correct Answer: Option (c)

LOB : Describe the process of electroplating in order to explain the application of chemical effects of electricity on metals

1) What happens when current is passed in the solution of copper sulphate having iron nail as cathode and copper rod as anode?

(a) Copper forms a layer on iron the nail.
(b) Iron gets deposited on the copper rod.
(c) Iron rod completely dissolves in the solution.
(d) Sulphur forms a layer on the walls of the beaker.

Correct Answer: Option (a)

2) A student made a list of the applications of electroplating on metals. He learns that zinc metal is electroplated over iron. Why the electroplating of iron is done?

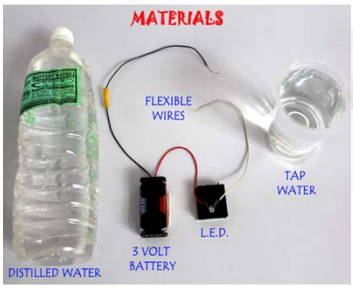
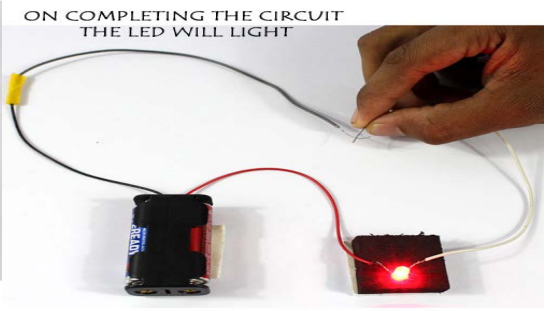
(a) To changes the surface properties of the iron.
(b) To make it resistant to atmospheric moisture.
(c) To improve the appearance of iron and make it shiny.
(d) To alters the chemical properties of the iron and make it stronger.

Correct Answer: Option (b)

Suggested Teacher Resources

1 Activity

Activity	Distinguish between good and poor conductors of electricity in order to explain that almost all materials can conduct electricity under certain conditions.
Prerequisite	What is a conductor?
Material Required	Distilled water, tap water, 3 volt battery, L.E.D. flexible wire, rubber base (to insert L.E.D), 2 plates
Vocabulary	Good conductor, bad conductor (Insulator)
Procedure	1. With the help of battery, wire and L.E.D make a circuit as shown in picture. 2. Pour distilled water in one plate and tap water in another plate. 3. Test the circuit by connecting both wires in air. 4. Complete the circuit by dipping both the ends in the distilled water. 5. Dip the ends of both wires in tap water to complete the circuit. 6. Check the conductivity of other liquids like milk, vegetable oil, lemon juice and matter like iron nail, plastic, wood etc.

	 
Let's think	1. In which case, did the L.E.D glow? 2. Why did L.E.D not glow in another case? 3. What helps to conduct electricity? .
Text to real world connection	1. Copper, Brass, Steel, Gold, and Aluminium are good conductors of electricity. We use them mostly in electric circuits and systems in the form of wires. 2. Gases are not good conductors of electricity as the particles of matter are quite far away and thus, they are unable to conduct electrons. 3. Plastic is a good insulator and it finds its use in making a number of things.
Beyond the classroom	1. How can we increase the conductivity of water? 2. Why do you get a shock when you touch a live wire? 3. Test the conduction of electricity through various fruits and vegetables. Display your result in a tabular form.

15. Some Natural Phenomenon

QR Code:

A7G2T3

Learning Objectives:

Topic	Learning Objectives
Lightning	Recall examples of visible sparks in order to explain the phenomenon of lightning
Charging by rubbing	Analyse if two charged objects attract or repel each other in order to establish that similar charge repel each other while opposite charge attract each other
Types of charges and their interaction	Examine the working of electroscope to detect if an object is charged or not in order to apply the concept of similar charge objects repel each other
Transfer of charge	Investigate the process of earthing in order to assess the process of transferring charge from a charged object to earth in order to explain the advantages of earthing of electric circuits in households
The story of lightning	Examine the sequence of lightening occurring in clouds in order to explain the process of electric discharge in nature
Lightning safety	Predict how lightning travels from the cloud to the ground in order to describe the measures that must be taken during lightning
Earthquake	Justify the phenomenon of earthquake in order to explain that the ground beneath us is not static
	Illustrate with a diagram the movement of earth in order to explain how earthquakes cause tsunami
	Identify and explain seismic zones around earth to explain why some areas are more affected by earthquakes than others

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Identify and explain seismic zones around earth to explain why some areas are more affected by earthquakes than others	Explains processes and phenomenon, e.g., reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.

Analyse if two charged objects attract or repel each other in order to establish that similar charge repel each other while opposite charge attract each other	Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.)
Examine the sequence of lightening occurring in clouds in order to explain the process of electric discharge in nature	
Justify the phenomenon of earthquake in order to explain that the ground beneath us is not static	
Illustrate with a diagram the movement of earth in order to explain how earthquakes cause tsunami	Draws labelled diagram / flow charts, e.g., structure of cell, eye, human reproductive organs; experimental set ups, etc.
Examine the working of electroscope to detect if an object is charged or not in order to apply the concept of similar charge objects repel each other	Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, ektara, electroscope, fire extinguisher, etc.)
Recall examples of visible sparks in order to explain the phenomenon of lightning	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)
Investigate the process of earthing in order to assess the process of transferring charge from a charged object to earth in order to explain the advantages of earthing of electric circuits in households	
Predict how lightning travels from the cloud to the ground in order to describe the measures that must be taken during lightning	
Examine the sequence of lightening occurring in clouds in order to explain the process of electric discharge in nature	Discusses and appreciates stories of scientific discoveries

Test items

LOB : Recall examples of visible sparks in order to explain the phenomenon of lightning

1) Where is the phenomenon of lightning most likely to be seen?
   (a) Hilltop
   (b) Riverbank
   (c) Electric pole
   (d) Roof of a house

   Correct Answer: Option (c)

2) A student was taking off his sweater in a dark room. He saw a spark and heard a cracking sound during the process. Which natural phenomenon is of similar nature?
   (a) Fog
   (b) Lightning
   (c) Earthquake
   (d) Precipitation

   Correct Answer: Option (b)

LOB : Analyse if two charged objects attract or repel each other in order to establish that similar charge repel each other while opposite charge attract each other

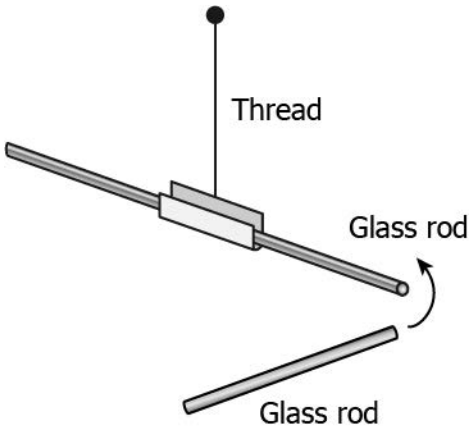
1) A student hung two balloons to a stand using some thread. He noticed that the balloons move away from each other to maintain some gap as shown in the image.

   What might have caused the balloons to repeal?

   (a) like charges on the balloons
   (b) material of the thread
   (c) colour of the balloons
   (d) shape of the balloon

   Correct Answer: Option (a)

2) A student took two glass rod and rub it with silk. He hanged one of the glass rods with a thread and brought the other closer to one end as shown in the image.



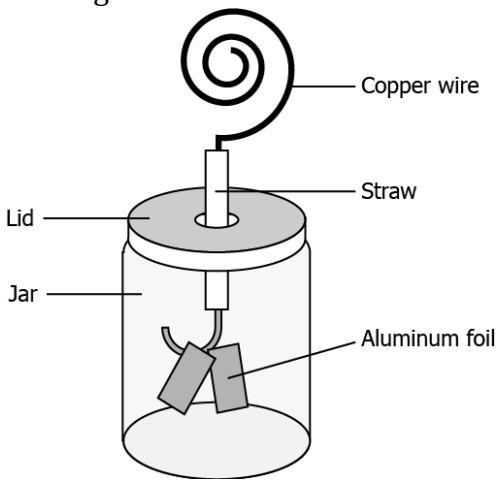
He observed that the glass rods repeal each other when they are brought near. What causes the glass rod to repeal when bought closer?

(a) same material always repeals each other
(b) like charges accumulated on both glass rod
(c) unlike charges accumulated on both glass rod
(d) thread used to hang the glass rod causes it to repel

Correct Answer: Option (b)

LOB : Examine the working of electroscope to detect if an object is charged or not in order to apply the concept of similar charge objects repel each other

1) A student performs an activity to detect if an object is charged or not. He made as electroscope as shown in the image.

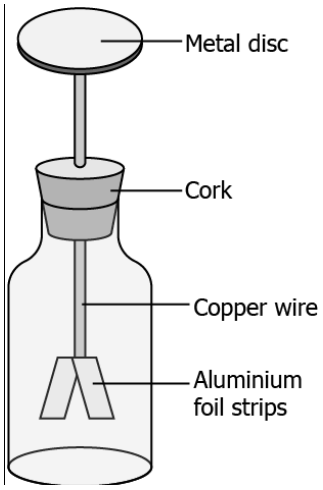


He brought a charged object near the copper wire to test the working of the device. What changes are likely observed when a charged object is brought closer to the copper wire?

(a) the copper wire unwinds
(b) colour of the jar changes
(c) the foil sticks to each other
(d) aluminium foils repeal each other

Correct Answer: Option (d)

2) A student studies that an electroscope consists of two aluminum foils as shown in the image. When a charged body is bought near to the metal disc the aluminium foil strips responds to it.



What causes the aluminuim foil to respond to a charge body?

(a) both strips of aluminum foil gains similar charge and like charges repel each other
(b) both strips of aluminum foil gains similar charge and like charges attract each other
(c) both strips of aluminum foil gains different charge and unlike charges repel each other
(d) both strips of aluminum foil gains different charge and unlike charges attract each other

Correct Answer: Option (a)

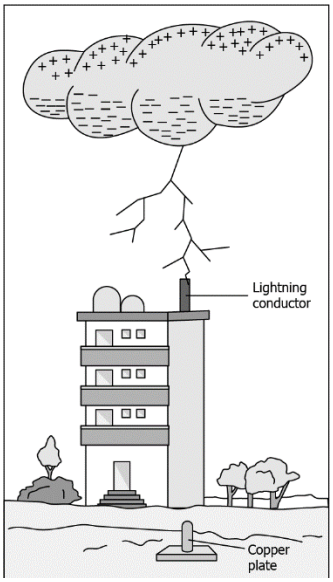
LOB : Investigate the process of earthing in order to assess the process of transferring charge from a charged object to earth in order to explain the advantages of earthing of electric circuits in households

1) Rekha studies that earthing provide advantages to the electric appliances during lightning. What advantages does a lightning conductor provide?

(a) it generates additional electricity in the circuit
(b) it improves the performance of the appliances
(c) it prevents running of excessive current through the circuit
(d) it reduces the amount of electricity consumed by the appliances

Correct Answer: Option (c)

2) A student studies that a device known as lightning conductor is used to protect buildings from the effect of lightning.



How does the device protect the building from the effect of lightning?

(a) it repels lightning to protect the house
(b) it can absorb electric charge and store it for future use
(c) it provides extra strength to the house to sustain the lightning
(d) it provides an easy route for the electric charge to the ground keeping the house safe

Correct Answer: Option (d)

LOB : Examine the sequence of lightening occurring in clouds in order to explain the process of electric discharge in nature

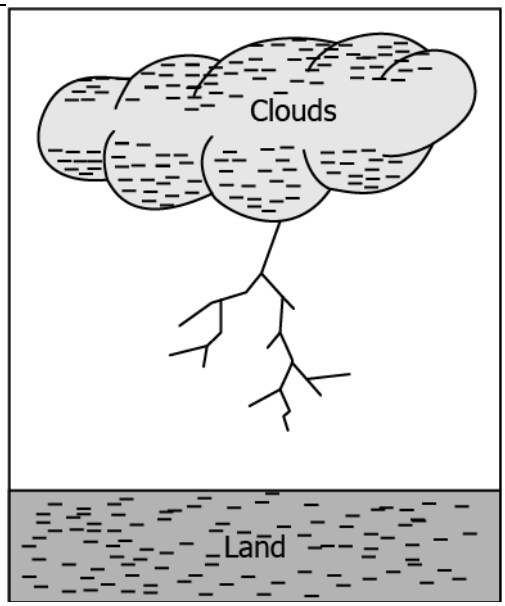
1) A student studies that vigorous movement of air current and water droplet, results in building up of charges in the clouds. Which phenomenon might have resulted with the discharge of the built-up charges in nature?

(a) earthquake
(b) lightning
(c) rainfall
(d) tornadoes

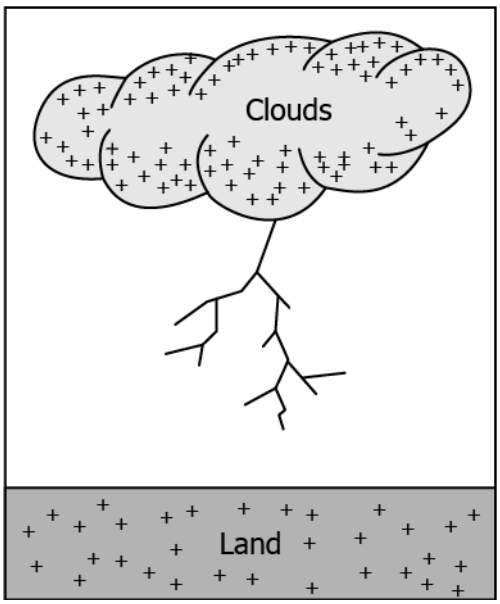
Correct Answer: Option (b)

2) Which of these images explain the discharge of charges that result in the occurrence of lightning?

(a)



(c)



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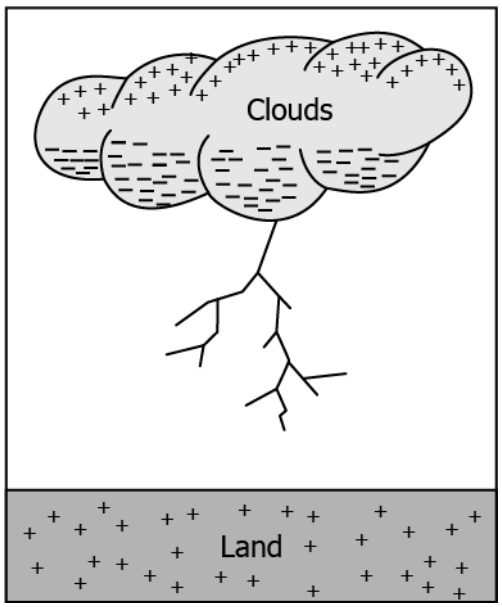
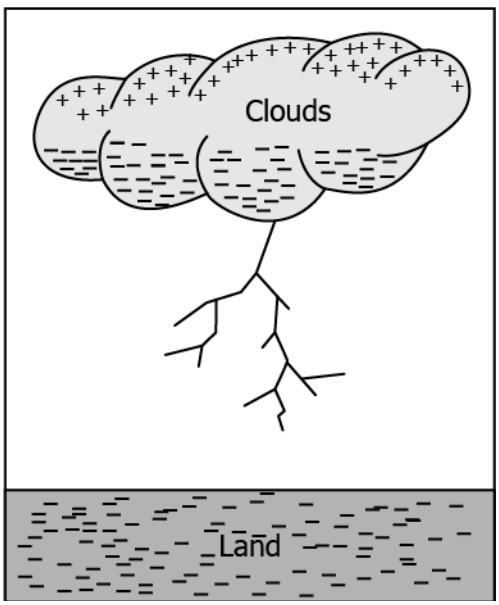


(d)



Correct Answer: Option (b)

LOB : Predict how lightning travels from the cloud to the ground in order to describe the measures that must be taken during lightning

3) Where is lightning most likely to strike from the clouds in order to discharge its charges?
   (a) a shrub
   (b) a tall building
   (c) a car on the ground
   (d) a person squatting low on the ground

Correct Answer: Option (b)

4) On a rainy afternoon, Rahul was in an open field with an umbrella. How should he protect himself in case of an incident of lightening?
   (a) he should lie flat on the open ground
   (b) take shelter under tall trees
   (c) squat low on the open ground
   (d) stand in an open area with his umbrella

   Correct Answer: Option (c)

   LOB : Describe the phenomenon of earthquake in order to explain that the ground beneath us is not static

5) Which of these phenomena is likely to result in an earthquake?
   (a) disturbances occurring deep inside the Earth's crust
   (b) accumulation of charges on the clouds
   (c) uneven heating of the Earth surface
   (d) condensation of the water vapour

   Correct Answer: Option (a)

6) A student studies that the tremors are due to the disturbances that cause deep down inside the crust, which is the uppermost layer of the Earth. The crust of the Earth is not in one piece and broken down into many fragments known as plates. These plates are responsible for the occurrence of an earthquake. What causes the plates to result an earthquake?

   (a) distance of the plates from the equator
   (b) difference in thickness of the plates
   (c) difference in size of the plates
   (d) movement of the plates

   Correct Answer: Option (d)

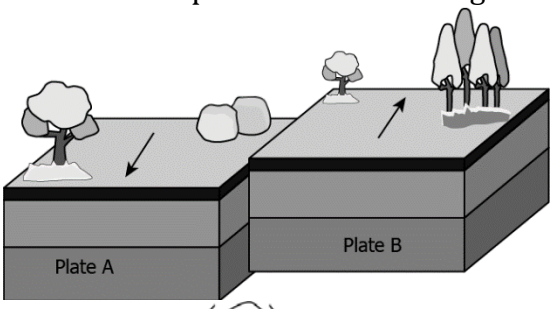
   LOB : Illustrate with a diagram the movement of earth in order to explain how earthquakes cause tsunami

7) Which of these phenomena might result in the occurrence of a tsunami?
   (a) lightning strike
   (b) collision of plates
   (c) percolation of groundwater
   (d) condensation of water vapour

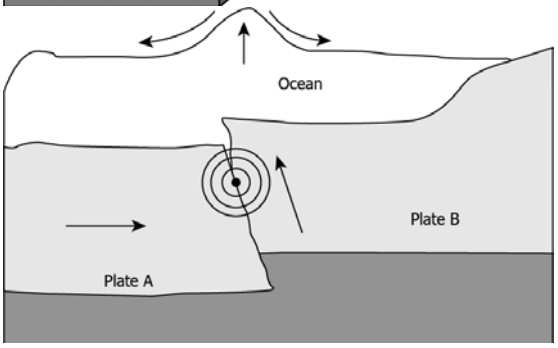
   Correct Answer: Option (b)

8) Which of these plate movements might result a tsunami?

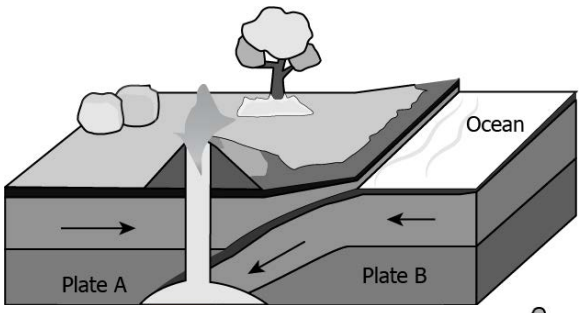
(a)



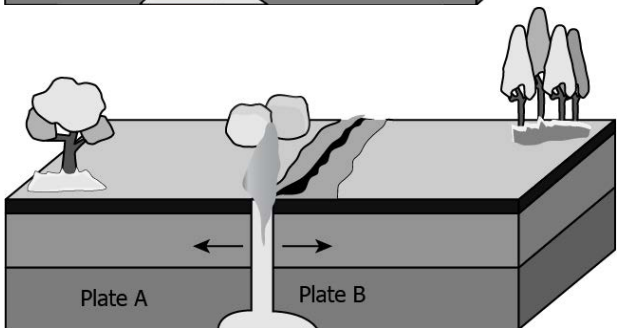
(b)



(c)



(d)



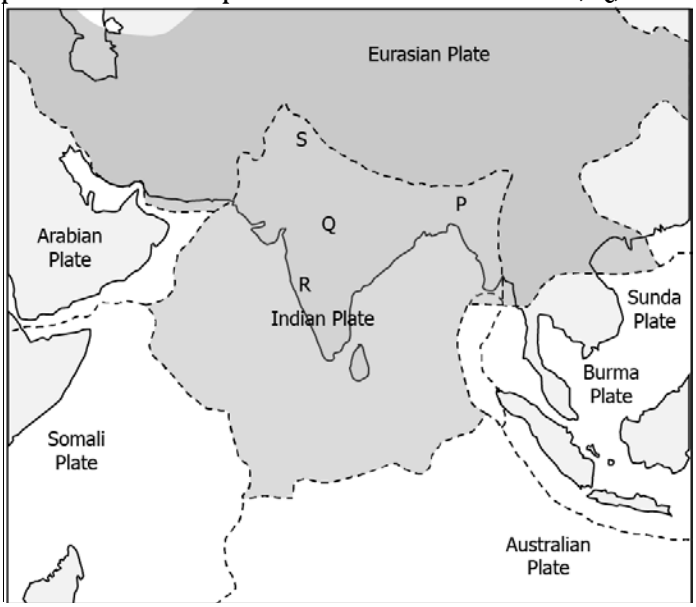
Correct Answer: Option (b)

LOB : Identify and explain seismic zones around earth to explain why some areas are more affected by earthquakes than others

1) A student studies that some areas are more prone to earthquakes than others. What might be the possible reason for a frequent earthquake?
   (a) situated along the coastal region
   (b) **Option 2:** situated above a plate boundary
   (c) **Option 3:** situated near a tropical region
   (d) situated near a desert region

Correct Answer: Option (b)

2) The given image represents Indian plate with four locations P, Q, R and S marked on it.



Which of the marked locations may likely have high seismic activity?

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

Correct Answer: Option (c)

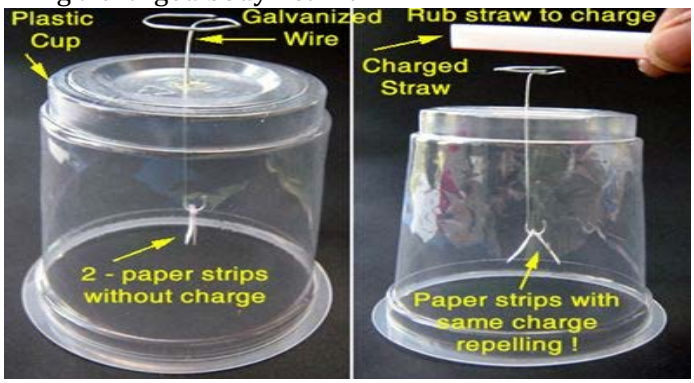
Suggested Teacher Resources

1 Activity

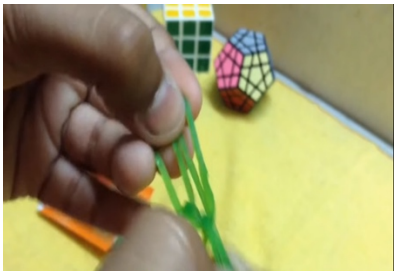
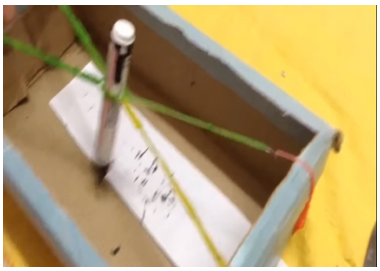
Activity	Describe if two charged objects attract or repel each other in order to establish that similar charges repel each other while opposite charges attract each other.
Prerequisite	There are two kinds of charges: Positive and negative.
Material Required	Plastic bottle, comb, wool, plastic scale, balloon.
Vocabulary	Attract, repel
Procedure	1. Fill bottle with water and put the cap back. 2. Poke a small hole near the base of the bottle with a needle, a thin stream of water will flow out from the hole. 3. Rub an inflated balloon with wool. 4. This will electrically charge the balloon. 5. Then bring the balloon close to the water stream. 6. Repeat the experiment using a comb, and plastic scale. 

Let's think	1. What happens when you bring the electrically charged balloon, comb and plastic scale close to water stream? 2. Do the two attract each other or repel each other?
Text to real world connection	1. Clothes stuck to one another after being in the dryer is another example of static electricity. 2. In printers and photocopiers where **static electric** charges attract the ink, or toner to the paper. Other **uses** include paint sprayers, air filters, and dust removal.
Beyond the classroom	Why is it advised not to stand near trees during a lightning storm?

2 Activity

Activity	Creating a charge detector
Material required	A plastic cup, 2 strips of aluminium foil (3cm *1cm), a piece of copper wire,
Procedure	1. Take an empty transparent plastic glass and keep it upside down. 2. Pierce a hole at the bottom of the glass so that copper wire can be inserted as shown in picture. 3. Twist one end of wire in the shape of coil and bend another end to hang aluminium foil. 4. Cut 2 strips of aluminium foil about 3cm x 1cm and hang them as shown in picture. 5. Bring a charged body near it. 
Let's think	1. Is there any effect on the foil strips? 2. Do they repel each other or attract each other?

3 Activity

Activity	Recording the random motion of an object due to vibration to simulate earth quake
Material required	1 shoe box, marker, rubber bands, cutter, scale, paper
Procedure	1. Mark 1 inch from every corner and cut the rest part as shown in picture. 2. Cut 2 slots in the bottom of the opposite sides of the box to slide the paper. 3. Make a chain of rubber band and arrange it like shown in picture. 4. Fix the marker between rubber band where rubber chains are crossing each other. 5. Slide the paper through the slots. 6. Keep the box on a table, start shaking the table and slide the paper. 7. When table starts shaking marker draws the line on the paper.    
Reflection question	1. What does the graph created by marker represents?

16. Light

QR Code:

Learning Objectives:

Topic	Learning Objectives
Laws of reflection	Identify and calculate the angles of incidence and reflection of a ray of light to illustrate the laws of reflection in real life.
	Conclude the law of reflection and represent it by drawing a ray diagram identifying incident ray, reflected ray and the normal
	Illustrate with a line diagram how images invert when reflecting from a mirror in order to see the applications of the laws of reflection
Regular and diffused reflection	Distinguish between reflection from a rough and a smooth reflecting surface in order to differentiate between diffused and regular reflection
Reflected light can be reflected again	Establish that light can reflect multiple time with a set of mirrors by constructing a kaleidoscope
What is inside our eyes?	Describe various parts of human eye and identify their functions in order to explain how humans see object in presence of light
	Compare and contrast between blind spot and field of view in order to explain how humans see object in the presence of light
Care of eyes	Recommend different measures for protecting eyes when a problem is felt in order to establish the importance of eye care
Visually impaired person can read and write	Describe the braille system in order to explain how people with visual impairment manage to read and write

Learning Objectives and Learning Outcomes:

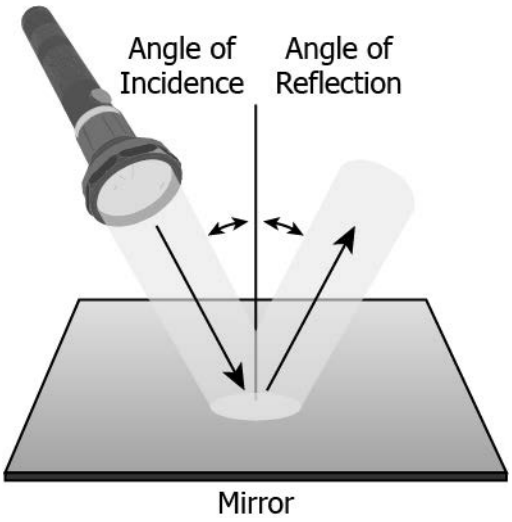
Learning Objectives	Learning Outcomes
Distinguish between reflection from a rough and a smooth reflecting surface in order to differentiate between diffused and regular reflection	Differentiates materials and organisms, such as, natural and human made fibres; contact and non-contact forces; liquids as electrical conductors and insulators; plant and animal cells; viviparous and oviparous animals, on the basis of their properties, structure and functions.
Compare and contrast between blind spot and field of view in order to explain how humans see object in the presence of light	Conducts simple investigations on his/her own in order to seek answers to queries: (such as, what are the conditions required for combustion? Why do we add salt and sugar in pickles and murabbas? Do liquids exert equal pressure at the same depth?)

Conclude the law of reflection and represent it by drawing a ray diagram identifying incident ray, reflected ray and the normal	Explains processes and phenomena in order to relate to science behind the phenomena/processes and develop scientific thinking skills: (such as, reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.)
Identify and calculate the angles of incidence and reflection of a ray of light to illustrate the laws of reflection in real life.	Measures angles of incidence and reflection, etc.
Conclude the law of reflection and represent it by drawing a ray diagram identifying incident ray, reflected ray and the normal	
Illustrate with a line diagram how images invert when reflecting from a mirror in order to see the applications of the laws of reflection	Draws labelled diagram / flow charts, e.g., structure of cell, eye, human reproductive organs; experimental set ups, etc.
Describe various parts of human eye and identify their functions in order to explain how humans see object in presence of light	
Establish that light can reflect multiple time with a set of mirrors by constructing a kaleidoscope	Constructs models using materials from surroundings and explains their working in order to demonstrate scientific knowledge and understanding of how it works: (such as, ektara, electroscope, fire extinguisher, etc.)
Recommend different measures for protecting eyes when a problem is felt in order to establish the importance of eye care	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)
Describe the braille system in order to explain how people with visual impairment manage to read and write	

Test items

LOB : Identify and calculate the angles of incidence and reflection of a ray of light to illustrate the laws of reflection in real life.

1) Rakhi switched on a torch light and pointed it towards a mirror. She calculated the angle of incident and found it to be 50º.

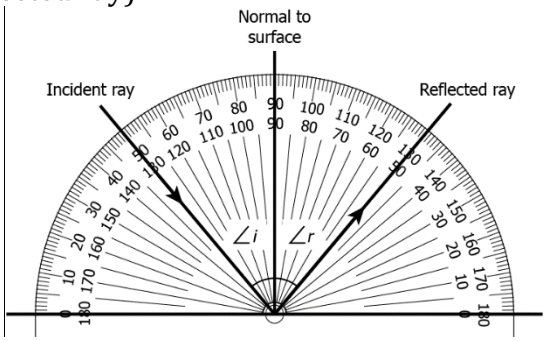


What is the angle of reflection?

(a) 40º
(b) 45º
(c) 50º
(d) 100º

Correct Answer: Option (c)

2) The given image marks the incident ray and the reflected ray. (angle i= angle of incident ray, angle r=angle of reflected ray)



Which pair of angles represents the angle of incidence and the reflected ray to the normal?

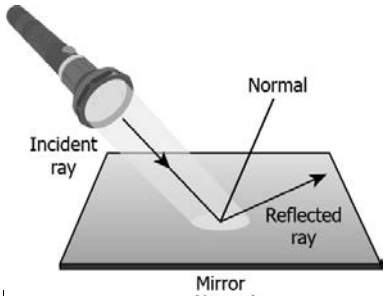
(a) angle i= 50 º, angle r= 50º
(b) angle i= 40 º, angle r= 40º
(c) angle i= 40 º, angle r= 130º
(d) angle i= 50 º, angle r= 130º

Correct Answer: Option (d)

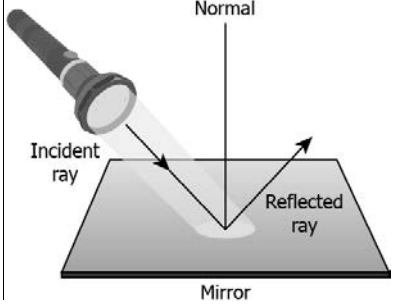
LOB : Conclude the law of reflection and represent it by drawing a ray diagram identifying incident ray, reflected ray and the normal

1) Which of the image traces the incident ray, reflected ray and normal that support the law of reflection?

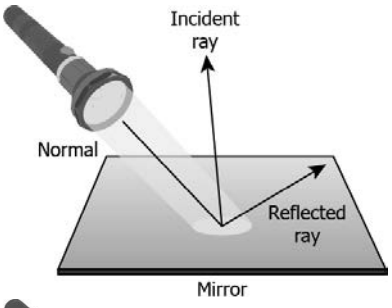
(a)



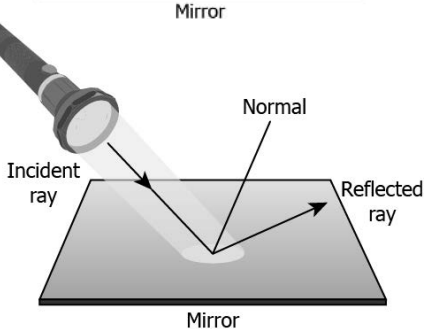
(b)



(c)

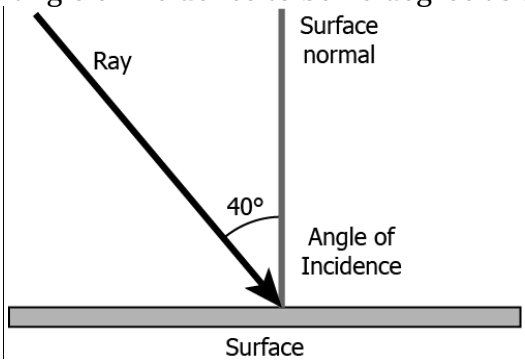


(d)



Correct Answer: Option (b)

2) Rahul traced a ray of incident on a plane mirror. He also plotted the normal to the surface and calculated the angle of incidence to be 40 degree as shown in the image.



Where should he draw the reflected ray?

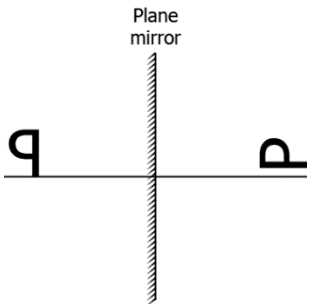
(a) 50° with normal
(b) 40° with normal
(c) 50° with incident ray
(d) 40° with the surface of mirror

Correct Answer: Option (b)

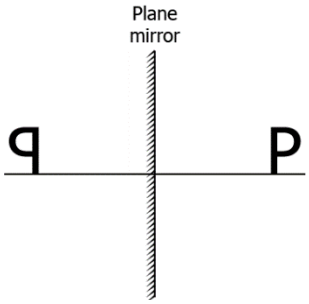
LOB : Illustrate with a line diagram how images invert when reflecting from a mirror in order to see the applications of the laws of reflection

1) A student studies that a plane mirror results in an inverted image after reflecting. Which of these represents the image likely to be formed by a plane mirror?

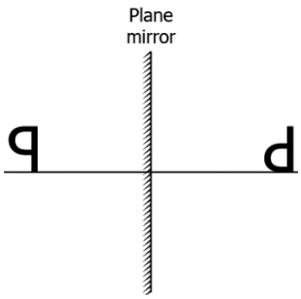
(a)



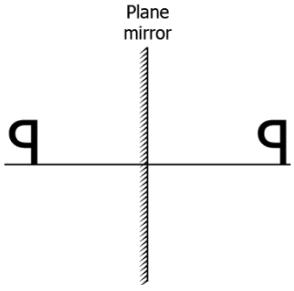
(b)



(c)



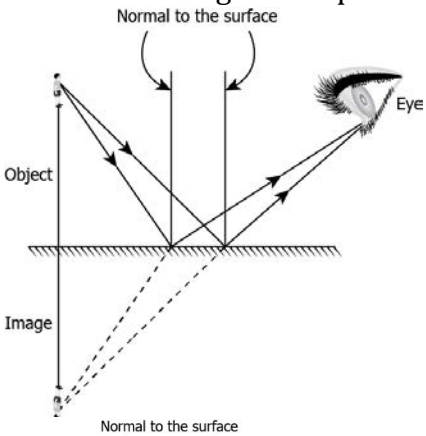
(d)



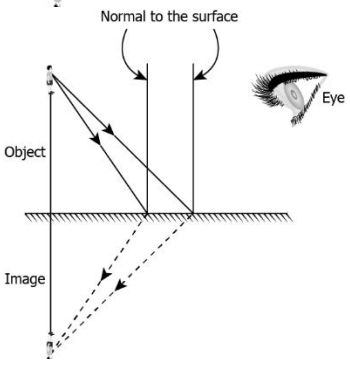
Correct Answer: Option (b)

2) Which of these line diagrams represents the invert image formation by a plane mirror?

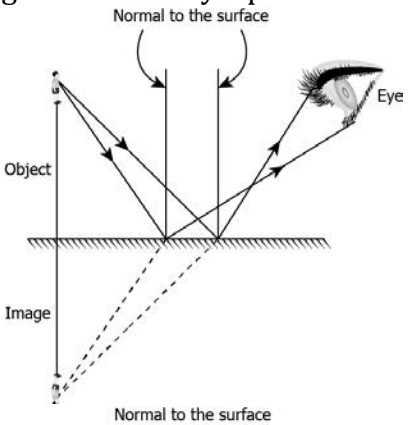
(a)



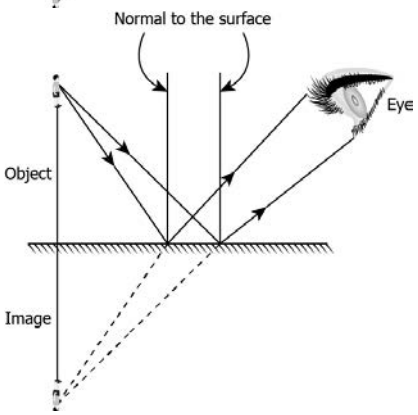
(b)



(c)



(d)



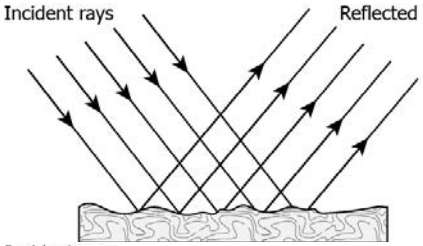
Correct Answer: Option (d)

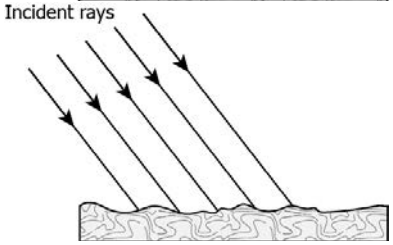
LOB : Distinguish between reflection from a rough and a smooth reflecting surface in order to differentiate between diffused and regular reflection

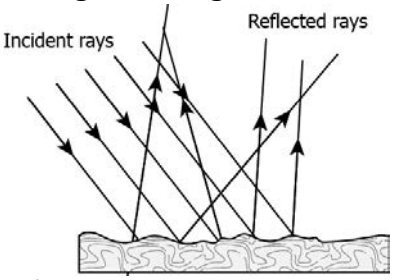
1) A student switched on a torchlight and points it towards a rough reflecting surface. What is likely to happen to the rays of light emitted from the torch?
   (a) rays of light will get absorb
   (b) scattering of the rays of light
   (c) reflect back along the path of incidence
   (d) reflect in one particular direction depending on the angle of incidence

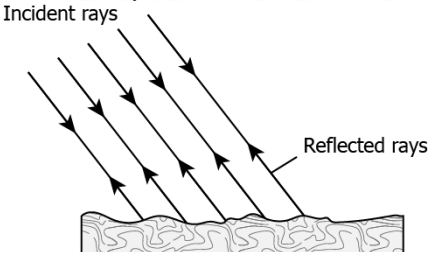
   Correct Answer: Option (b)

2) Which of these ray diagrams represent the path of light falling on a rough surface?

(a)


(b)


(c)


(d)


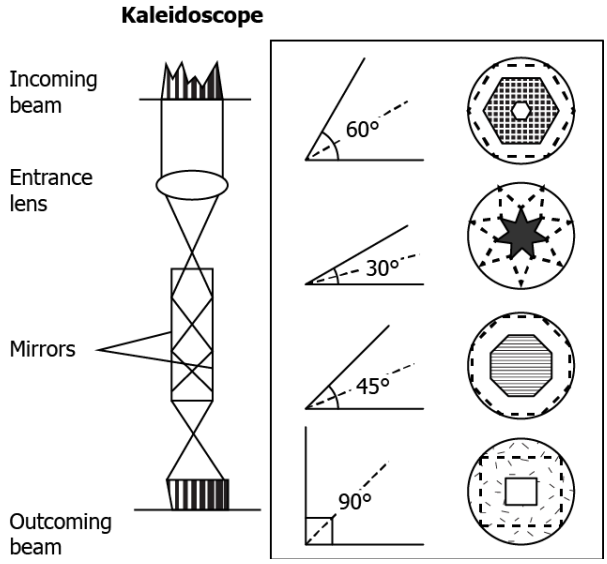
   Correct Answer: Option (c)

LOB : Establish that light can reflect multiple time with a set of mirrors by constructing a kaleidoscope

1) A student observes that using a kaleidoscope he was able to see several patterns in the tube. What causes the kaleidoscope to form these patterns?
   (a) repeated reflection of light
   (b) thickness of the reflecting surface
   (c) roughness of the reflecting surface
   (d) enormous amount of light falling on a reflecting surface

   Correct Answer: Option (a)

2) The image shows the working principle of a kaleidoscope and images formed due to different angle of the mirrors within it.



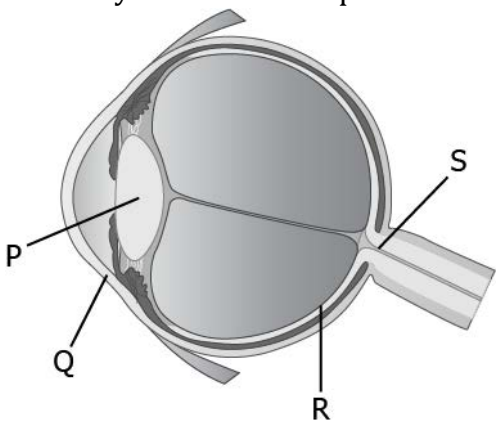
Which phenomenon results in the formation of pattern in a kaleidoscope?

(a) reflection increases the total amount of light
(b) light can be generated by reflection of mirrors
(c) light can be reflected multiple times using sets of mirrors
(d) complete absorption of light by the mirrors results in formation of patterns

Correct Answer: Option (c)

LOB : Describe various parts of human eye and identify their functions in order to explain how humans see object in presence of light

1) The image represents the human eye. It marks few parts of the eye as P, Q, R and S.

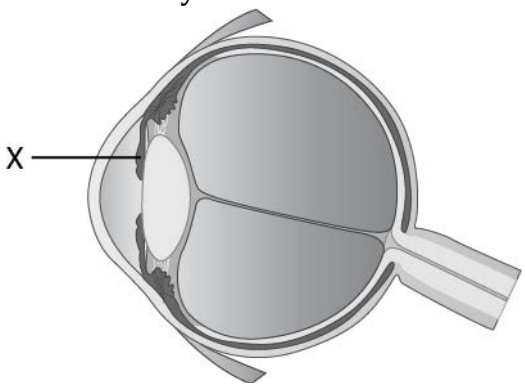


Which marked part of the eye senses the colour of an object?

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

Correct Answer: Option (c)

2) The given image represents a human eye.



What is the function of the part of the eye that is marked as "X"?

(a) it helps to distinguish between colours
(b) it sends the sensation of the light to the brain
(c) it protects the interior part of the eye from accidents
(d) it helps to control the amount of light that enters the eye

Correct Answer: Option (d)

LOB : Compare and contrast between blind spot and field of view in order to explain how humans see object in the presence of light

1) A student studies that at the point where optic nerve and the retina meets, there are no sensory cells. As a result, no vision is possible. Which of these marks the junction point of the optic nerve and the retina?

(a) Iris
(b) Cornea
(c) Blind spot
(d) Optic nerve

Correct Answer: Option (c)

2) One afternoon, Ravi and Kumar were standing on an open field side by side as shown in the image. Ravi noticed that he could not see Kumar's face without turning his head around.

What causes the difficulty to look at Kumar's face?

(a) face was outside the field of vision
(b) no light reflecting from the face
(c) uneven surface of the face
(d) distance between them

Correct Answer: Option (a)

LOB : Recommend different measures for protecting eyes when a problem is felt in order to establish the importance of eye care

1) Which of these activities should be avoided in order to protect our eyes from damage?
   (a) studying under dim light
   (b) using suitable spectacles
   (c) looking directly into the Sun
   (d) washing off eyes with water

   Correct Answer: Option (c)

2) One evening while, Sheetal and her friends were playing, some dust particles went into Sheetal's eye. Which step should be adopted to remove the dust from her eyes?
   (a) rub eyes with fingers
   (b) blow hot air into the eyes
   (c) wash eyes with clean water
   (d) wash eye with any kind of detergents

   Correct Answer: Option (c)

LOB : Describe the braille system in order to explain how people with visual impairment manage to read and write

1) Which of these would represent a braille system?
   (a) patterns of dots
   (b) drawings on paper
   (c) various tones of sound
   (d) symbols made using one's hands

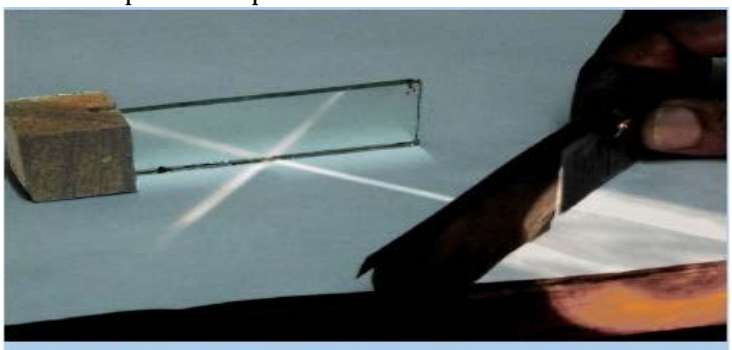
   Correct Answer: Option (a)

2) A student studies that braille system is popular resources which can be used by visually challenged persons to communicate. It is a combination of dots to represent a character. Which sense is likely to help a person in recognizing a braille character?
   (a) hearing
   (b) smell
   (c) taste
   (d) touch

   Correct Answer: Option (d)

Suggested Teacher Resources

1 Activity

Activity	Calculate the incident and reflected angle after striking the mirror with a ray of light to illustrate the law of reflection in real life
Prerequisite	Student should know characteristics of light.
Material Required	Mirror, comb, torch (or laser light), black paper, white sheet, pencil, glue.
Vocabulary	Incident ray, reflected ray, normal, angle of incidence and angle of reflection.
Procedure	1. Fix a white sheet paper on a table. 2. Take comb and close all its opening except one in the middle by using black paper. 3. Hold the comb perpendicular to the sheet of paper and throw the light through the opening of the comb. 4. With slight adjustment of the torch, you will see a ray of light along the paper on the other side of the comb. 5. Place a strip of mirror in the path of the light ray. 6. Trace the path with pencil.  *Fig. 16.1 : Arrangement for showing reflection*
Let's think	1. After striking the mirror, how does light travel? 2. Draw a normal to the surface of the mirror, and measure the angles formed between normal and incident ray/ reflected ray.
Text to real world connection	Rays of **light** reflect, or bounce off, objects just like a ball bounces on the ground. This **reflection of light** is what enables us to see everything around us.
Beyond the classroom	Suppose you are in a dark room. Can you see objects in the room? Can you see objects outside the room? Explain.

2 Activity

Activity	
Material required	3 rectangular mirror strips of same size, broad sticky tape, a button
Procedure	1. Join them together with the tape to for a prism keeping reflecting side inside. 2. Place its one end over a button. 3. Peep through the other side. 
Let's think	1. What do you observe? 2. Do you see the same pattern when you look again?

17. Stars and the Solar System

QR Code:

X8R5Q1

Learning Objectives:

Topic	Learning Objectives
Celestial objects and astronomy	List commonly seen objects in the sky as celestial objects are
Moon and constellation	Explain with diagram the different phases of moon in order to explain that moon rotates around earth
	Categorize the name of commonly known group of stars in order to explain that constellations are a group of stars with recognisable shape
Solar system	Outline and illustrate the planets of the solar system in order to correctly identify them
Celestial bodies	Identify the name of different celestial bodies in the solar system in order to explain the constituting bodies of a solar system
	Differentiate between asteroids, comet and meteor in order identify the celestial body.
	Describe artificial satellites in order correctly classify them as man-made celestial body

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcome
Differentiate between asteroids, comet and meteor in order identify the celestial body.	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.
List commonly seen objects in the sky as celestial objects are	Classifies materials and organisms based on properties / characteristics, e.g., metals and non-metals; *kharif* and *rabi* crops; useful and harmful microorganisms; sexual and asexual reproduction; celestial objects; exhaustible and inexhaustible natural resources, etc.
Categorize the name of commonly known group of stars in order to explain that constellations are a group of stars with recognisable shape	

Explain with diagram the different phases of moon in order to explain that moon rotates around earth	Draws labelled diagram / flow charts, e.g., structure of cell, eye, human reproductive organs; experimental set ups, etc.
Categorize the name of commonly known group of stars in order to explain that constellations are a group of stars with recognisable shape	
Outline and illustrate the planets of the solar system in order to correctly identify them	
Identify the name of different celestial bodies in the solar system in order to explain the constituting bodies of a solar system	
Describe artificial satellites in order correctly classify them as man-made celestial body	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)

Test items

LOB : List commonly seen objects in the sky as celestial objects are

1) The table list few objects seen in the night sky.

1. Moon
2. Saturn
3. Pole star
4. Comets

What is these objects collectively known as?

(a) Asteroids
(b) Celestial bodies
(c) Planets
(d) Stars

Correct Answer: Option (d)

2) A student studies that stars, planets, the Moon, asteroids, etc. are considered as called celestial objects. What describes a celestial object?

(a) natural bodies that is outside the atmosphere of the Earth
(b) artificial bodies that are sent far into the solar system
(c) artificial bodies that revolves around the Earth
(d) natural bodies that revolves around the Earth

Correct Answer: Option (a)

LOB : Explain with diagram the different phases of moon in order to explain that moon rotates around earth

1) The image represents the different phases of the Moon appears from Earth.

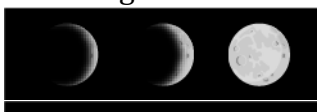
What causes the phases of the Moon to change?

(a) rotation of the Earth on its own axis
(b) rotation of the Moon on its own axis
(c) revolution of the Moon around the Sun
(d) revolution of the Moon around the Earth

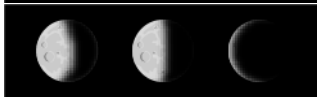
Correct Answer: Option (d)

2) Which of the following patterns correctly show the different phases of the Moon, from its position of being closest to the Sun to being farthest from the Sun?

(a)



(b)



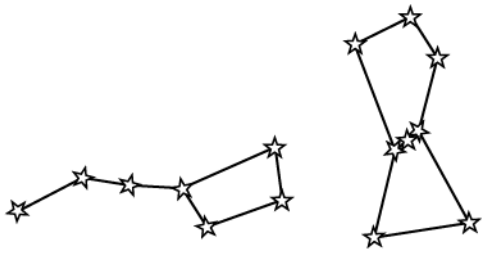
(c)

(d)

Correct Answer: Option (a)

LOB : Categorize the name of commonly known group of stars in order to explain that constellations are a group of stars with recognisable shape

1) The image represents two constellations marked as A and B.



A B

Identify the constellations marked as A and B.

(a) A Orion, B Leo
(b) A Orion, B Ursa Major
(c) A Ursa Minor, B Aries
(d) A Ursa Major, B Orion

Correct Answer: Option (d)

2) The table provide a list of constellations and their number of stars.

	Constellations	Numbers of Stars
1	Ursa Major	7
2	Orion	8
3	Libra	4
4	Aries	4

What can be concluded about the constellations?

(a) it a group of stars
(b) it is a very bright star
(c) it is the closest star to the Earth
(d) it always contains even number of stars

Correct Answer: Option (a)

LOB : Outline and illustrate the planets of the solar system in order to correctly identify them

1) The table list planets of our solar system:

Mercury
Venus
Earth
Mars
Jupiter
Saturn
Uranus
Neptune

Which planet is the largest in our solar system?
(a) Mercury
(b) Jupiter
(c) Neptune
(d) Saturn

Correct Answer: Option (b)

2) A student studies that if Saturn is placed on a large pool of water, it would float above the water. What could result the floating of the Saturn on the water?
(a) large size of the planet
(b) rings around the planet
(c) less density of the planet
(d) spherical shape of the planet

Correct Answer: Option (c)

LOB : Identify the name of different celestial bodies in the solar system in order to explain the constituting bodies of a solar system

1) A student made a list of few objects as given in the table:

1. Sun
2. Moon
3. Jupiter
4. Alpha Centauri
5. Proxima Centauri

Which of these celestial bodies are part of the solar system?
(a) Moon and Jupiter
(b) Sun and Alpha Centauri
(c) Alpha Centauri and Moon
(d) Alpha Centauri and Proxima Centauri

Correct Answer: Option (a)

2) A student studies that like planets, asteroids are also celestial bodies and a part of our solar system. Which characteristics makes asteroids part of the solar system?
(a) its revolution around the Sun
(b) its rotation on its own axis
(c) its distance from the Sun
(d) its huge size

Correct Answer: Option (a)

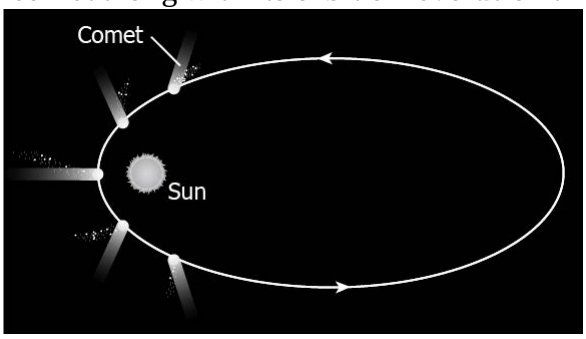
LOB : Differentiate between asteroids, comet and meteor in order identify the celestial body.

1) Which of these is a characteristic of the asteroids?
(a) small size objects that revolves around the Sun
(b) crescent shaped object in the night sky
(c) bright head with a long tail in the sky

(d) bright shiny object in the day sky

Correct Answer: Option (a)

2) The image represents a comet along with its orbit of revolution around the Sun.



Which of these characteristics may help to identify a comet in a sky?
(a) increase in the length of the tail as approaches the sun
(b) rotation of the celestial body on its own axis
(c) circular orbit of revolution around the sun
(d) spherical shape of the body

Correct Answer: Option (a)

LOB : Describe artificial satellites in order correctly classify them as man-made celestial body

1) A student studies that Aryabhata was the first man-made satellite launched by India. It was used for tracking and transmitting signals while orbiting round the Earth. What type of celestial body is Aryabhata?
(a) artificial, because it was the first satellite
(b) natural, because it was sent into the space
(c) natural, because it revolves around the Earth
(d) artificial, because it was a manmade satellite

Correct Answer: Option (d)

2) Which of these characteristics classifies a satellite into an artificial satellite?
(a) They are formed by nature
(b) They are man-made satellites
(c) They are not controlled by humans
(d) They are not used for communication

Correct Answer: Option (b)

Suggested Teacher Resources

1 Activity

Activity	Illustrate with diagram different phases of the moon in order to explain that moon rotates around earth
Prerequisite	Student should know what solar system is.
Material Required	Torch, rubber/plastic ball, pen
Vocabulary	New moon, waxing crescent moon, first quarter, waxing gibbous moon, full moon, waning gibbous, last quarter moon, waning crescent moon
Procedure	1. Place the torch in the corner of the room (keep the room dark). 2. Poke a hole into the ball with pen and hold the pencil, with ball attached, in one hand. 3. Torch as a sun, the ball as moon and your head is going to represent earth. 4. To begin, face the torch and extend the sphere directly in front of you, raising the sphere enough so that lamp can also be seen. 5. Keeping the arm extended in front, turn counter clockwise (make sure you a hole the ball high enough so that light is not blocked by your head). 
Let's think	1. Which part of the moon is visible to you? 2. When was the moon's surface most illuminated? 3. Can you guess the relative positions of the Sun, moon, and earth during solar/lunar eclipse?
Text to real world connection	Diwali is celebrated on the new moon day. Budh Poornima and Guru Nanak's birthday are celebrated on the full moon day. Eid-ul-Fitr is observed on the day following the sighting of the crescent moon.
Beyond the classroom	What are some myths and superstitions around Solar/Lunar eclipse in your community?

2 Activity

Activity	Demonstrate motion of celestial bodies
Material required	2 Bucket, 2 pieces of cloth, stone, 2 marbles, rope
Procedure	1. Take 2 empty buckets and tie the cloth around the rim of the buckets with the help of the rope as shown. 2. Keep both buckets together. 3. Roll the marble from one end of a bucket and observe the path it follows. 4. Put a stone in the middle of the cloth of a bucket and roll the marble again and observe the path of the marble.  
Reflection question	1. What happens to the fabric space when you put a stone in the mid? 2. What kind of path does the marble take in both the cases? 3. How can we make the planet (marble) escape from the star (stone)? 4. If we increase the size of the stone, how would it affect the path of the marble?

18. Pollution of Air and Water

QR Code:

Learning Objectives:

Topic	Learning Objectives
Air pollution	Analyse the problem of air pollution in order to explain why it is a threat to human beings.
	Identify commonly known air pollutants in order to examine their harmful effects
	Elaborate the formation and effects of acid rain in order to explain the reasons for discolouration of the marble of monuments (Taj Mahal)
Greenhouse gas	Explain the effect of greenhouse gases on the planet in order to explain potential reason for rising temperature of the planet.
	Suggest alternate mechanism to lower carbon emission in order to suggest steps to curb the air pollution.
Water pollution	Describe water pollution in order to assess it as a threat to human beings.
	Cite steps taken to prevent water pollution in major river(s) in order to explain measures to deal with water pollutants
	Enumerate steps that can be taken to clean water for drinking in order to explain how water can be made safe for drinking i.e. portable water
	Explain how reducing, reusing and recycling industrial waste helps in reducing the water pollutants in order to explore measures for dealing with water pollution

Learning Objectives and Learning Outcomes:

Learning Objectives	Learning Outcomes
Analyse the problem of air pollution in order to explain why it is a threat to human beings.	Explains processes and phenomenon, e.g., reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.
Elaborate the formation and effects of acid rain in order to explain the reasons for discolouration of the marble of monuments (Taj Mahal)	
Explain the effect of greenhouse gases on the planet in order to explain potential reason for rising temperature of the planet.	
Describe water pollution in order to assess it as a threat to human beings.	

Elaborate the formation and effects of acid rain in order to explain the reasons for discolouration of the marble of monuments (Taj Mahal)	Writes word equation in order to express chemical reactions: (such as, reactions of metals and non-metals with air, water and acids, etc.)
Enumerate steps that can be taken to clean water for drinking in order to explain how water can be made safe for drinking i.e. portable water	Applies learning of scientific concepts in daily life/real life situations in order to solve problems/give solutions/take preventive measures/etc.: (such as, purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.)
Explain how reducing, reusing and recycling industrial waste helps in reducing the water pollutants in order to explore measures for dealing with water pollution	
Identify commonly known air pollutants in order to examine their harmful effects	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: (e.g., using resources judiciously; making controlled use of fertilisers and pesticides; suggesting ways to cope with environmental hazards, etc).
Suggest alternate mechanism to lower carbon emission in order to suggest steps to curb the air pollution.	
Cite steps taken to prevent water pollution in major river(s) in order to explain measures to deal with water pollutants	

Test items

LOB : Analyse the problem of air pollution in order to explain why it is a threat to human beings.

1) If air is contaminated with unwanted substances, it is said to be polluted. Which of these places would most likely to have polluted air?
   (a) Village
   (b) Forest
   (c) Industrial area
   (d) Residential area

   Correct Answer: Option (c)

2) A student learns that polluted air causes various problems to human beings. He makes a table to list some problems caused by air pollution.

   1. Reduced visibility
   2. Respiratory problems
   3. Intestinal diseases
   4. Reduced hearing

   Which of the problems are correctly listed by the student?
   (a) 1 and 3
   (b) 2 and 1
   (c) 3 and 4
   (d) 4 and 1

   Correct Answer: Option (b)

LOB : Identify commonly known air pollutants in order to examine their harmful effects

1) Which air pollutant would increase in the atmosphere, if the number of air conditioners and refrigerators used in an area increases?
   (a) CFC's
   (b) carbon dioxide
   (c) nitrogen dioxide
   (d) sulphur dioxide

   Correct Answer: Option (a)

2) Town X has polluted air. To assess the quality of air in town X, the researchers studied the gases present in the atmosphere. The presence of which gas would justify that the town X has polluted air?
   (a) Argon
   (b) Oxygen
   (c) Nitrogen
   (d) Carbon monoxide

Correct Answer: Option (d)

LOB : Elaborate the formation and effects of acid rain in order to explain the reasons for discolouration of the marble of monuments (Taj Mahal)

1) Gases like sulphur dioxide and nitrogen dioxide reacts in the atmosphere to form acids. The acids in the form of acid rain have corroded the marble of Taj Mahal. What reacts with these gases to produce acids?
   (a) Ozone
   (b) Water vapour
   (c) Suspended dust particles
   (d) Other gases present in the atmosphere

Correct Answer: Option (b)

2) The white marble of Taj Mahal is seen to turn yellow in recent times. Which of these factors would have contributed towards the yellowing of the marble?
   (a) proximity to Yamuna river
   (b) presence of smog in winters
   (c) proximity to Mathura oil refinery
   (d) effect of prolonged exposure to sunlight

Correct Answer: Option (c)

LOB : Explain the effect of greenhouse gases on the planet in order to explain potential reason for rising temperature of the planet.

1) A student concludes that greenhouse gases are responsible for changing the climate of Earth. Which statement correctly states the characteristic feature of greenhouse gases that supports the conclusion made by the student?
   (a) They allow more solar radiation to enter the Earth's surface.
   (b) They allow very less solar radiation to reach the Earth's surface.
   (c) They allow heat radiations to escape from the Earth's surface easily.
   (d) They do not allow heat radiations to escape from the Earth's surface.

Correct Answer: Option (d)

2) According to a study, the concentration of methane, nitrous oxide, and carbon dioxide are increasing in the atmosphere with time globally. Based on the findings of the study, what will be the most likely change to be observed on Earth?
   (a) The sea level on Earth would fall.
   (b) The amount of salt in oceans would increase.
   (c) The glaciers and ice caps would start to melt.
   (d) The surface temperature of Earth would decrease.

Correct Answer: Option (c)

LOB : Suggest alternate mechanism to lower carbon emission in order to suggest steps to curb the air pollution.

1) The table lists few fuels used by automobiles.

1. Petrol
2. Diesel
3. Compressed Natural Gas
4. Unleaded petrol

Which set of fuels would help to reduce air pollution?

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

Correct Answer: Option (c)

2) The air quality of region X is very poor. The table lists few steps to control air pollution in region X.

1. Modifying vehicles to use CNG as a fuel
2. Banning private and public vehicles
3. Using unleaded petrol in place of normal petrol
4. Promoting the use of public transport or car pooling

Which of these steps would help to control air pollution in region X?

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

Correct Answer: Option (d)

LOB : Describe water pollution in order to assess it as a threat to human beings.

1) During an experiment, water is collected from four different sources as listed in the table.

Source	Characteristics
A	Odourless, colourless
B	Colourlerss, with some odour
C	Odourless, light yellow in colour
D	Contains suspended tiny particles, odourless, colourless

Which source provides portable water?

(a) source A
(b) source B
(c) source C
(d) source D

Correct Answer: Option (a)

2) River Y flows through an area. Which of these can make river Y polluted?
   (a) if rainwater would fall in river Y
   (b) if water from canal merges into river Y
   (c) if discharge from industries drain into river Y
   (d) if surplus discharge from nearby catchment areas drains into river Y

Correct Answer: Option (c)

LOB : Cite steps taken to prevent water pollution in major river(s) in order to explain measures to deal with water pollutants

1) The table lists few steps to prevent water pollution in major rivers.

1. Educating the people and spreading awareness.
2. Implementing strict laws against activities that contaminate river water.
3. Restricting villagers to use river banks only for bathing and washing and not defecating.
4. Replacing the use of jute bags with poly bags in areas located close to rivers.

Which set of steps would prove to be most useful in controlling river pollution?

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

Correct Answer: Option (a)

2) A river flows through regions X and Y. The proximity to the regions has polluted the river. A list of steps that can be taken to reduce the pollution are listed in the table.

1. Treatment of industrial waste before discharging into the river.
2. Installing water treatment plants near every industrial unit in regions X and Y.
3. Decreasing use of organic manure and promoting pesticides in agricultural farms in regions X and Y.
4. Diverting the sewage discharge away from the river.

Which of these steps would help to clean the river?
   (a) 1 and 3
   (b) 2 and 3

(c) 3, 2, and 1
(d) 4, 2, and 1

Correct Answer: Option (d)

LOB : Enumerate steps that can be taken to clean water for drinking in order to explain how water can be made safe for drinking i.e. portable water

1) The table lists the steps to clean water for drinking purpose.

1. Adding chlorine tablets to the water.
2. Pouring the water through candle filter.
3. Freezing the water.
4. Reusing the water in multiple household activities.

Which set of steps would help to provide water fit for drinking?
(a) 1 and 2
(b) 2 and 3
(c) 3 and 4
(d) 4 and 1

Correct Answer: Option (a)

2) Enna's mother always boils water to make it fit for use. In what ways does boiling the water makes it portable?
(a) It kills germs present in water.
(b) It reduces the growth of germs present in water.
(c) It completely dissolves the germs in water.
(d) it makes the germs present in water harmless.

Correct Answer: Option (a)

LOB : Explain how reducing, reusing and recycling industrial waste helps in reducing the water pollutants in order to explore measures for dealing with water pollution

1) An industry located close to farmlands produces large amount of waste water that contains suspended particles. What should be done to manage the waste water drained from the industry?
(a) reusing the drained water to irrigate farmlands
(b) recycling the drained water to be used in other industrial processes
(c) draining the water produced from the industry in rivers to increase the level of water
(d) diverting the water through water pipes and channels to recharge underground water

Correct Answer: Option (b)

2) An industrial unit decides to change its water hose, water taps, and other faucets with the ones with latest technologies. The new fixtures have automatic on- off option and are installed with timers. How will the new equipment help the industrial unit?

(a) It will help to reuse the limited water available.
(b) It will help to reduce the wastage of water.
(c) It will help to reduce the contamination of water.
(d) It will help to recycle the water to make it fit for other purposes.

Correct Answer: Option (b)

Suggested Teacher Resources

1 Activity

Activity	Describe what air pollution is in order to explain why it is a threat to human beings.
Material Required	1 transparent glass, matchsticks, piece of paper, aluminium foil.
Vocabulary	Smog (smoke+fog)
Procedure	1. Take an empty glass, make lid of it with the help of aluminium foil as shown. 2. fill some water in it, get all the sides wet of the glass after that dump all the water. 3. Take a small twisted piece of paper, put it in glass and burn it. 4. Put the aluminium lid on the glass swiftly. 5. Put some ice cubes on the foil. 
Let's think	1. What did you see inside the glass? 2. What do you think it is? 3. What causes smog in atmosphere? 4. In which season, do we experience smog? 5. How is it affecting our health?

Text to real world connection	Of the most polluted cities in the world, 22 out of 30 were in India in 2018. The 51% of pollution is caused by industrial pollution, 27% by vehicles, 8% by crop burning and 5% by Diwali fireworks. Air pollution contributes to the premature deaths of 2 million Indians every year. Emissions come from vehicles and industry, whereas in rural areas, much of the pollution stems from biomass burning for cooking and keeping warm.
Beyond the classroom	1. What are the 5 simple steps we can take to reduce air pollution? 2. Make a poster or write a slogan on "Prevention of air pollution" to make your community members aware of this issue.

2 Activity

Material required	1 Plastic bottle, cutter, napkin paper/fine cloth, cotton, sand, gravel, dirty water.
Procedure	1. Cut the bottle in 2 halves at the centre. 2. Use upper half as a funnel by putting it upside down in the lower half. 3. Make a layer in it with napkin paper or a fine cloth, cotton, sand and gravel. 4. Now pour dirty water through the filter and observe the filtered water. 
Reflection question	1. Why do we need to filter water before drinking? 2. Where do you get your drinking water from? 3. What will happen if we drink polluted water?