



MATRIX OLYMPIAD

The Most Innovative Talent Recognition Exam

SCIENCE

Class - V



MATRIX

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Force

In This Lesson

- How force affects our day-to-day life
- Why different types of force are important
- How force can be harmful to us



Look, those people are pushing the car to move it in the snow.

They have to push hard. The car is not moving easily in the snow.

Those people are applying force against the friction caused by the surface. That's why it is difficult.

A force is a 'push' or a 'pull' that acts on an object. Force is everywhere. In everyday life, generally, we exert force through the actions of our muscles. Opening a door, lifting a heavy object, twisting a towel, and kicking a ball depends on the force needed to move them or to stop them.

In some actions, like twisting and turning, a combination of forces act together.

We cannot see force. However, the effects of force can be observed in everyday life.

Think Science

Force can make objects move. What would life be like if there was no force? What type of forces are involved in our daily life?

Effects of Force

The effects of force can cause things to start moving, move faster, slow down, stop moving, change shape and/or change direction.

A force can make a **stationary object move** or **increase the speed of a moving object**. It happens when **force is applied in the same direction** in which the object is moving.

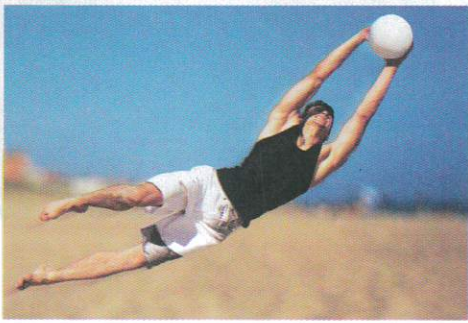


The force from the finger causes the carrom board striker to move.

The force applied on the bicycle pedals increases the speed of the bicycle.



A force can make a **moving object stop** or **slow down the speed of a moving object**. It happens when **force is applied in the direction opposite** to which the object is moving.

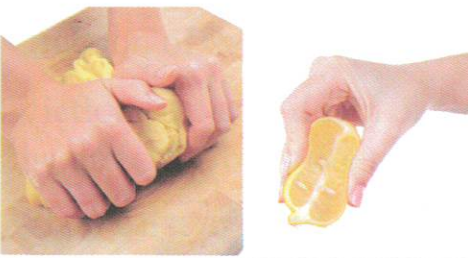


The force on the ball stops it from moving.

The force on the wheel of the brakes slows down the speed of the bicycle.



A force can change the shape and/or the direction of an object.



Force changes the shape of the object.

Force changes the direction of the object.



So, if an object starts moving, changes direction, moves faster, slows down or stops moving, it means that a force is acting on it.

Building Block

Join two building blocks and then separate them from each other. Observe the actions of your hands as you do this.

When did you push?

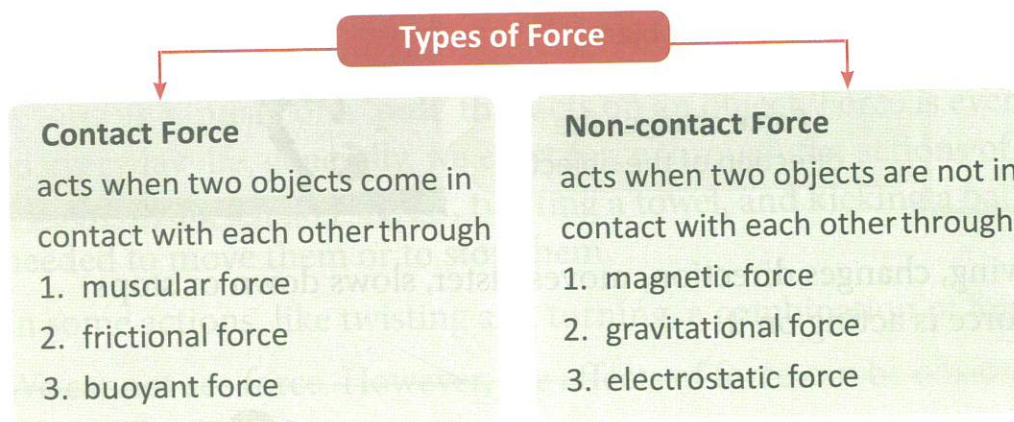
When did you pull?

We can see the effects of force in the playground. The children are enjoying different rides in the playground. They are applying different types of force.



Different Types of Force

There are various types of forces that act in our surroundings and in daily life. Some types of forces act only when two objects come in contact with each other while other types of forces can act on objects from a distance.



Info Bit

Animals also push or pull using muscular force.

Muscular Force

A force applied using parts of our body, like arms and legs, is called **muscular force**. Our muscles work together and apply muscular force. It helps us in our daily activities, like holding and lifting any object, opening the door, twisting towels, and so on.



Muscles help to hold an object by applying muscular force.

We apply **muscular force** to lift a heavy object.



Muscular force helps to open the drawer.



Frictional Force



It is easier to skate on this road than on our uneven society playground.

Yes! It is smoother than the playground. Here, friction is less to oppose our motion.

Frictional force or friction is the force that opposes motion when two surfaces are in contact. It always acts in the direction opposite to the direction of the motion of the object.

Friction can slow down or stop moving objects as it acts in the direction opposite to the motion of the object.

When carrom coins are pushed on the board, a frictional force acts between the surface of the carrom board and coins. This force slows down the coin until it stops.



Friction affects the motion of objects differently on different surfaces. There is more friction between rough surfaces than between smooth ones.

A ball moves for a shorter distance on a rough surface but for a comparatively longer distance on a smooth surface.

When there is a greater friction between an object and a surface, a greater force is required to move the object.

Info Bit

Machines can last longer with less friction. Friction can be reduced by using lubricants, like oil and grease, in machinery parts. **Rollers and wheels** also reduce friction between the floor and the surface of the object. This makes it easy to move heavy objects.

Advantages of Frictional Force

Friction is very useful in our daily life.



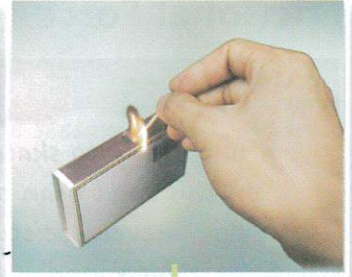
Friction between the soles of our shoes and the ground prevents us from slipping when we walk or run. The grooves in the sole of the shoe helps to increase the friction.



Friction allows us to write on a chalkboard using a piece of chalk. It is not easy to write on a smooth and slippery surface.



We can hold anything because of frictional force. The surfaces of our fingers are covered with fine ridge patterns. These patterns increase friction so that we can grip things better.



Friction between the tip of the matchstick and the surface of the matchbox causes the matchstick to light up.

Disadvantages of Frictional Force



It is difficult to move a heavy object due to greater friction.



Friction causes damage to tyres of vehicles, the soles of our shoes and makes these objects wear away with time.



Friction generates heat. Heat produced due to friction damages the parts of heavy machines.

Science Talk

A worn-out tyre is dangerous because there is very less friction between the tyre and the road. This will cause the car to skid or slip more easily.

There are grooves in new tyres, that increases the friction between the tyre and road.



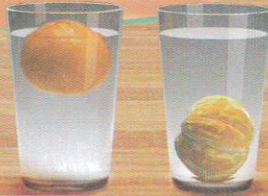
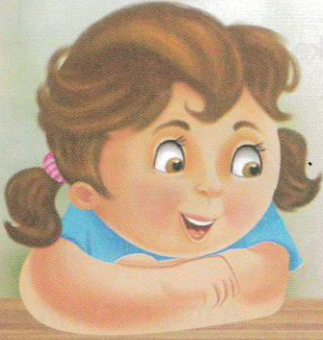
Worn-out tyres

Buoyant Force or Buoyancy

Look here, the peeled orange sinks, whereas the unpeeled one is floating.

Why does it happen?

It is because a force exerted by water makes objects float. The peel of an orange has air pockets. This makes the unpeeled orange lighter than the peeled one.



Objects dropped into water either float on the surface or sink. The water exerts an upward force on the objects, called a **buoyant force or buoyancy**. The object also applies a force on water surface due to its mass.

If the upward force applied by the water on the object is more than the force of the mass of the object on water, **the object floats on the surface**. Otherwise the object sinks in water.

Archimedes explained the concept of flotation of an object. According to this concept, the buoyant force is equal to the weight of the water displaced by the object. This statement is called **Archimedes' principle**.



Magnetic Force

We generally apply more force to open the door of a refrigerator as compared to opening the doors of our room.

It also shuts easily, even with a gentle push. Why is it so?

The door of a refrigerator has a magnet. A magnet exerts force, called magnetic force.



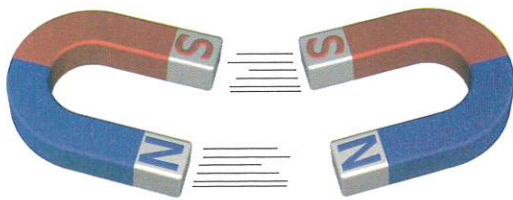
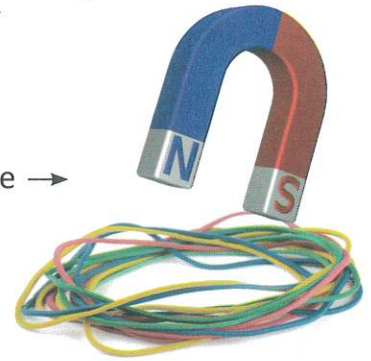
A magnet attracts metals, like iron, cobalt and nickel. These metals are called **magnetic materials**.

Magnetic force or **magnetism** is the force with which magnets pull magnetic materials. It is a non-contact force. It can act at a distance also.

Learning **LINK** - Interactions

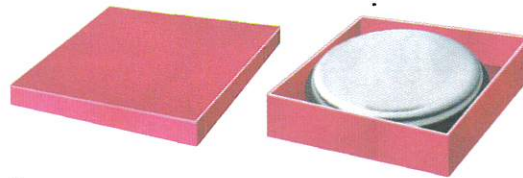
You have already learnt the basic concept of frictional, gravitational, and magnetic forces in Grades 3 and 4; Unit IV-Interactions.

Magnets do not attract non-magnetic materials like plastic, rubber, or paper. →



A magnet attracts other magnets as well.

Magnets may also repel each other due to magnetic force.



A magnet kept in a plastic box does not attract any magnetic material.

Gravitational Force

When we throw a ball up in the sky, it always comes back down.

The Earth pulls all the objects towards itself with a force. This force is called **gravity** or **gravitational force**.

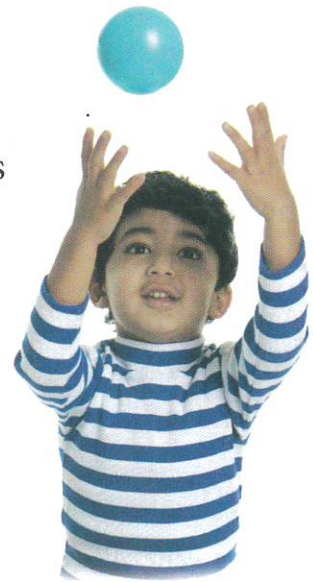
Gravity is a force of attraction between two objects. Gravity acts on all objects.

The strength of gravity depends on—

1. The mass of the object.
2. The distance between two objects.

The amount of gravitational force is not the same everywhere. The gravity on the Moon is not the same as on the Earth. The Moon has one-sixth the gravity of the Earth.

It is gravitational force that enables us to stand on the ground, causes water to flow downwards, speeds you up as you go downhill and pulls you back as you try to climb up.



Info Bit

Our weight on the Moon becomes one-sixth of our weight on the Earth. It is because of the difference in the level of gravity on the Moon and on the Earth.

Electrostatic Force



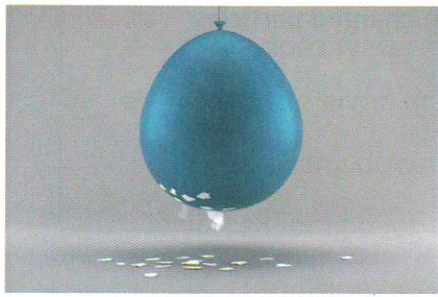
Look at that girl; she can lift up her hair using a balloon. How is this possible?



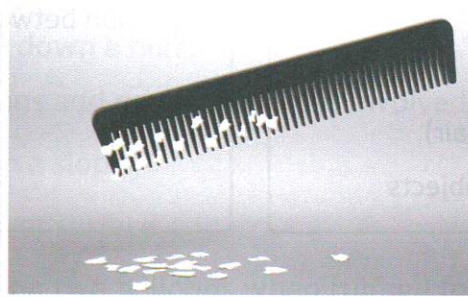
The balloon is charged and is exerting a force on her hair.



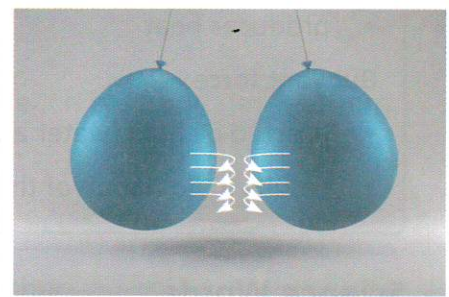
Some materials get charged when rubbed with other materials; they, then, attract lighter objects.



When a balloon is rubbed against a plastic chair, it gets charged and easily attracts the hair and tiny pieces of paper.



Run a comb through dry hair; the comb gets charged and attracts tiny pieces of paper.



The balloons, when charged with the same charge, repel each other.

The force that one charged body applies on another charged body or on an uncharged body is called **electrostatic force**.

Sometimes the Force Cause Damage in Nature

An earthquake occurs when the Earth shakes. The force of earthquakes is tremendous. This can cause buildings and bridges to collapse, roads to develop cracks and properties to be damaged.



I Have Learnt

- A pull or a push is called force.
- Force may cause things to:
 - » move by changing their speed and direction
 - » change the shape of the objects.

Types of Force

Contact Forces

Muscular force: exerted by muscles

Frictional force

- opposes the motion of the object
- produces heat

Buoyant force:

- exerted by fluid (water and air)
- results in floatation of the objects

Non-contact forces

Magnetic force: exerted by magnets

Gravitational force: exerted by the Earth

Electrostatic force: an attraction or repulsion between charged particles

Science Words

- Friction
- Buoyancy
- Electrostatic
- Gravity
- Charges
- Muscular force

Evaluate

A. Objective type questions

Tick (✓) the correct answers. Exchange your notebook with your classmate and check his/her responses.

1. When a girl lifts a heavy bag from the ground, there is a force opposing her. The force is—
a. friction b. gravity c. magnetic d. muscular
2. The force caused because of charged particles is—
a. friction b. gravity c. electrostatic d. muscular
3. The gravity on the Moon is _____ of that on the Earth.
a. same b. one-third c. one-sixth d. one-tenth
4. The force that opposes the motion of the object is—
a. friction b. gravity c. magnetic d. muscular
5. Which of the following forces cannot act from a distance?
a. friction b. gravity c. magnetic d. none of these

B. Short answer questions

1. Why is it difficult to unscrew a jar with an oily hand?
2. Aman has observed ice cubes floating on the surface in his juice tumbler. Why do ice cubes float on the surface? Name the principle involved.
3. Why is it necessary to oil machine parts regularly?
4. Electrostatic force can attract lighter things like paper and hair. Then how is this force different from a magnetic force?
5. What enables us to stand on the ground? What are the two factors on which this force depends?

C. Long answer questions

1. Give reasons for the following.
 - a. Why do we apply talcum powder on the surface of a carrom board?
 - b. Why does going up a flight of steps take more effort than going down?
 - c. Why does water fall down a hill?
2. a. Read the given actions and name the forces involved in each case and define them.
 - i. walking down on a slope
 - ii. slipping over a wet surface
 - iii. repulsion between two balloons when rubbed together
 - iv. lighting up the matchstick
- d. Can a force be a problem? Explain.
3. How is the frictional force useful to us? Write some ways to reduce the frictional force.

D. HOTS

A boy has inflated a balloon. After tying it, he let go off the balloon. It falls slowly to the ground. However, when his sister releases her helium-filled balloon which she has bought from the market, it immediately rises and drifts out of reach. Why is this so?



I WONDER

Investigate

A 1 [21] [21] CT EA

I will: Explore the effects of types of force.

I need: Rubber band, marker pen with cap, a plastic ball, comb, and paper

I do:

1. Identify the force applied as a push or a pull and types of force.
2. Observe the effects of force in each case.

ACTION	PUSH OR PULL	TYPE OF FORCE	EFFECT OF THE FORCE
Stretch a rubber band.			
Open the cap of the marker pen.			
Block a ball which is rolling towards you.			
Writing with pen on a paper.			
Attraction of paper pieces with a comb rubbed in your dry hair.			

Suggested Activity

A 1 EA

Rub any two flat surfaces of various materials—like wood, paper, cloth, glass, sandpaper and styrofoam—against each other. Find out—

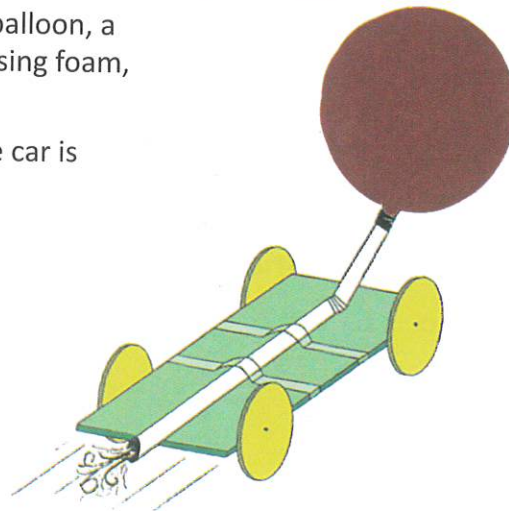
- a. Which pair of surfaces have the greatest friction?
- b. Which pair of surfaces have the least friction?

Project Work

ART [21] CR [21] COLL [21] CT [21] COM

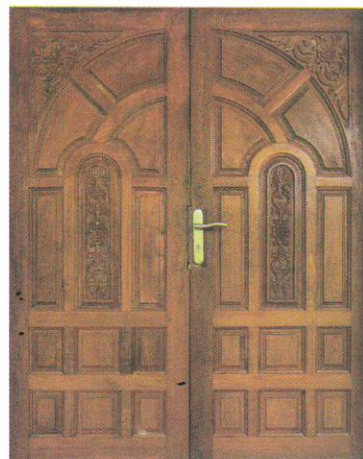
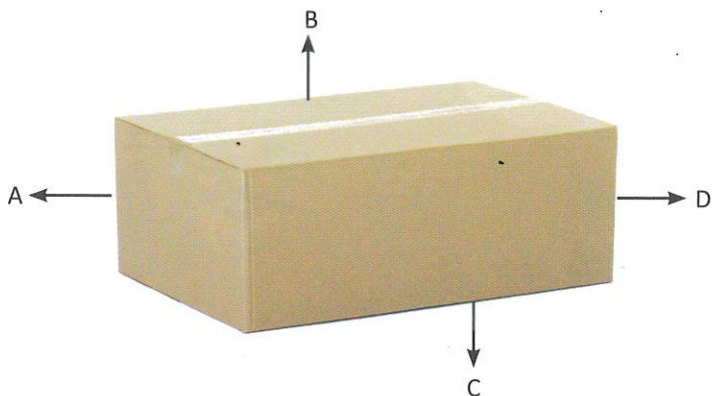
Work in pairs. Construct a balloon car, using a balloon, a light weight plastic car (you can make the car using foam, straw, and bottle caps) and double-sided tape.

Identify various types of forces acting when the car is moving. Discuss your responses in class.



Worksheet

1. Chinmaya's family has decided to shift to another city. They packed their belongings. Chinmaya noticed a big carton in the corner. He tries to move that box out of the door.



Door

- a. Which is the easiest way to move the box?

- b. In which direction, should the force be applied? Explain.

- c. Name two forces that make the box difficult to move.

2. Observe the given image.

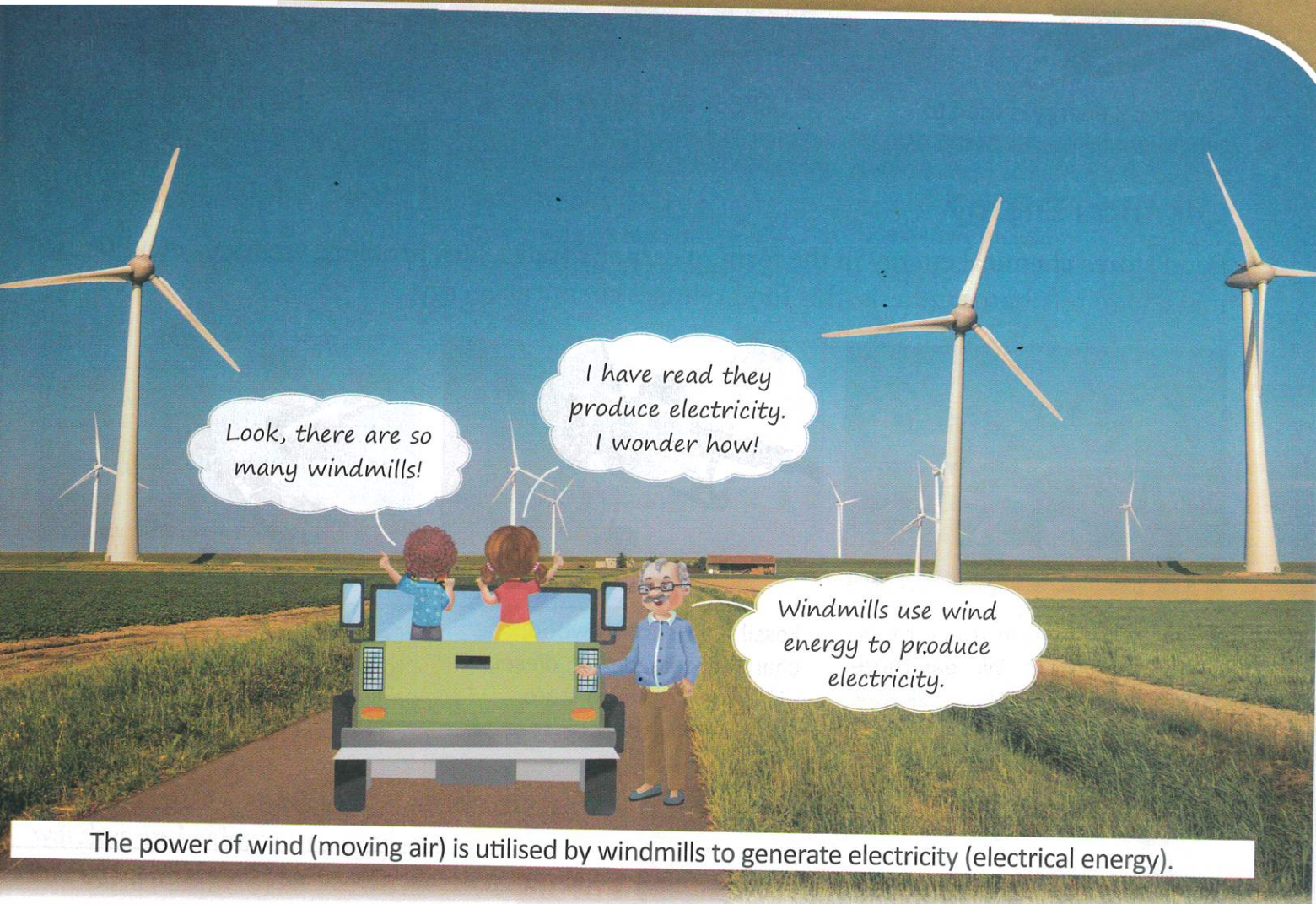
- a. What will happen when the inflated balloon is released?

- b. Explain your answer.



Forms of Energy

- Different forms of energy
- Types of energy changes that can be observed in our surroundings
- Type of energy fuels have
- Various types of fuels that are useful to us



There are various forms of energy in our surroundings. Energy can neither be created or nor destroyed. It can only be changed from one form to another form.

Electrical Energy

Look at the fan. It is switched on.

It moves using electricity. Electricity gives electrical energy.

Electrical appliances work using electricity or electrical energy.

Equipments, such as televisions, refrigerators, and washing machines, are plugged into electrical sockets so that they may work using electrical energy.

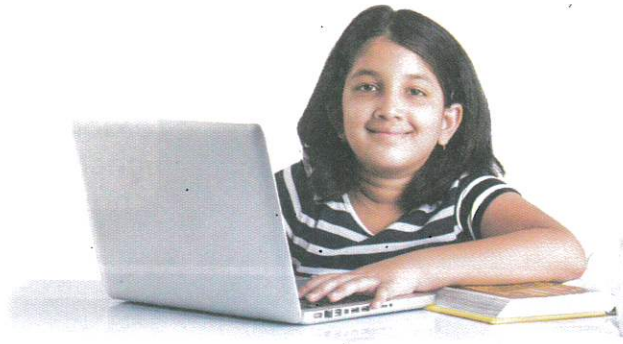
Info Bit

The word energy comes from the Greek word '*energeia*'.





Electrical energy is used to charge mobile phone batteries.



Laptops use electrical energy.



Table lamp gives us light using electrical energy.

Chemical Energy

Food stores chemical energy in the form of carbohydrates, fats, proteins, vitamins, etc. Plants make food by photosynthesis; this food releases chemical energy..



Plants store food in fruits, roots, leaves, and stem. We eat these parts of the plant to get energy. It is the chemical energy which keeps our body warm and helps us to do work.



Fossil fuels such as wood, charcoal, coal, petrol, diesel, CNG, LPG, etc., also store chemical energy.



Cells and batteries used in torches, remotes, mobile phones, mikes, alarm clocks, etc., store chemical energy.

Chemical energy is converted into other forms of energy when used. For example, the chemical energy of batteries is converted into electrical energy.

Info Bit

The unit of energy is Joule (J) or kilo Joule (kJ) or Calories (cal). $1 \text{ kJ} = 1000 \text{ J}$ And $1 \text{ J} = 0.239 \text{ Calorie}$

EXPLORE

There are many devices and appliances at home, in school or in your surroundings.

Make a list of the things that work

- using batteries
- when plugged into the electric socket
- without using chemical energy

Fuels

A fuel is a substance used as a source of energy. All fuels have chemical energy. When a fuel is burnt, the chemical energy is converted into heat and light energy.

Info Bit

Hydrogen gas can also be used as a fuel. It is pollution free and considered as an alternative fuel.

Types of fuel

Solid Fuels

For example, wood and coal



Burning of wood and coal gives heat and light energy that can be used for cooking food, to warm up the surroundings in winter.

Gas Fuels

For example, CNG (Compressed Natural Gas) and LPG (Liquified Petroleum Gas)



LPG used in kitchen

Liquid Fuels

For example, petrol and diesel used in vehicles.



CNG is also a gas fuel used in vehicles to move them. Stored chemical energy helps the vehicles to move.

Solar Energy

The energy that we get from the Sun is called **solar energy**.

Solar powered equipments, such as solar watches and calculators, cookers, use electrical energy from solar cells.

These solar cells convert light energy of the Sun into electrical energy.

Heat and light are forms of energy, too.



Solar panels convert solar energy into electrical energy.

Light Energy

Light energy helps us to see things around us. The Sun is the main source of light energy. Other man-made sources of light energy are electric bulb, tube lights, torches, and candles.



Electric bulb



Candle



Torch

Heat Energy

Heat energy is used to cook food. It keeps our body warm during winter. Burning fuels, such as coal, LPG, and kerosene releases heat energy.

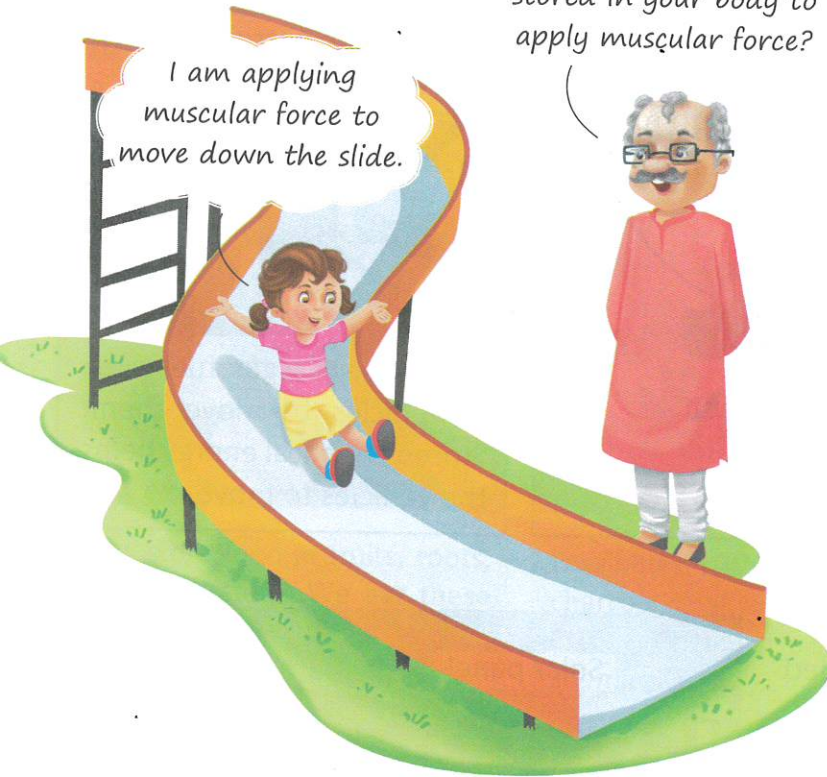
The heat energy that we get from the Earth is called **geothermal energy**. It is used to generate electricity.



lantern

Potential Energy

Do you know that you are using the energy stored in your body to apply muscular force?



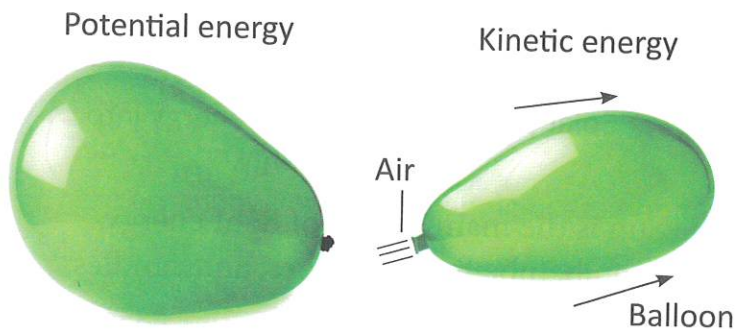
Assess

Answer briefly.

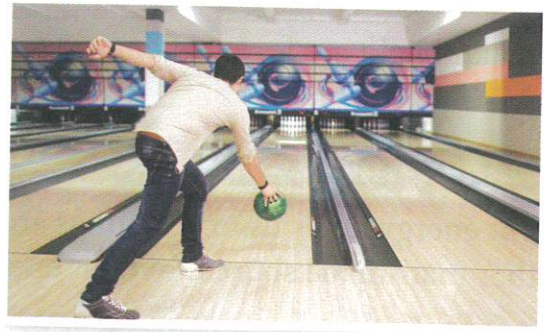
1. Reena ate a chocolate bar of 50 grams. It gave her 268 calories of energy. Convert this energy into Joule.
2. Name the device used to convert solar energy into electrical energy.
3. Our Earth also stores heat energy. How can we use it?
4. What do windmills do?
5. State a common use of wind and solar energy.

It is the energy stored in an object, and can be used later. It is generally associated with the position or height of the object. The object at a higher place possesses more potential energy.

Potential energy of an object is converted into kinetic energy when it moves.



The balloon has stored potential energy in the form of air. The moment the air releases it pushes the balloon to move. Thus, potential energy of balloon is converted into kinetic energy.



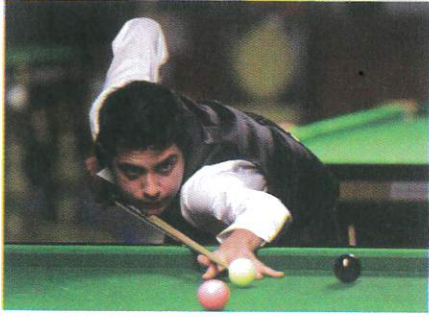
The ball in the hands of the bowler has stored potential energy. When the bowler throws the ball, its potential energy is converted into kinetic energy.

Kinetic Energy

All moving things have kinetic energy. The amount of kinetic energy depends on the speed of the object. The faster an object moves, the more kinetic energy it has.

Kinetic energy is a form of mechanical energy possessed by an object due to its motion or movement. When a player hits a pool ball with a stick, the energy is transferred from the stick to the ball and then, the moving ball has kinetic energy.

Our stored potential energy becomes kinetic when we do physical work.



Energy from the stick is transferred to the ball, on hitting.



The satellite is orbiting the Earth, so it is in motion and possesses kinetic energy.



Planets orbiting the Sun also have kinetic energy.

Mechanical Energy

Mechanical energy is the sum of kinetic and potential energy. It is associated with the motion and position of the object.

Potential energy and kinetic energy in combination are called mechanical energy.



Kinetic energy



Energy due to movement of an object

Potential energy



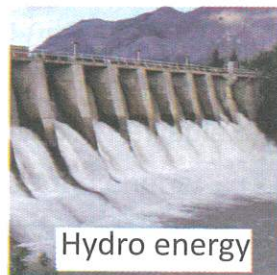
← energy stored at certain height

Mechanical energy

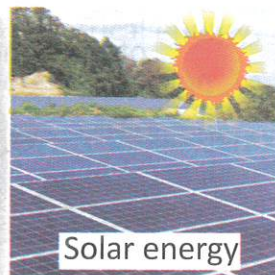
Sources of Energy

Renewable Sources of Energy

These sources of energy can be renewed. These sources will not get finished ever. These sources are naturally replenished and can be reused.



Hydro energy



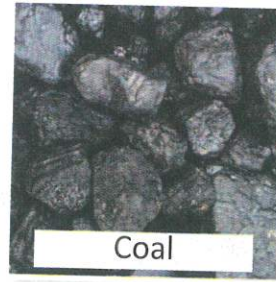
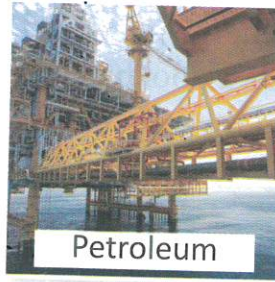
Solar energy



Wind energy

Non-renewable Sources of Energy

These sources of energy cannot be renewed and will be finished after use. These resources are replenished in thousands of years. They cannot be reused and recycled. For example, coal, petroleum (petrol and diesel), natural gas, and nuclear energy.



These fuels are an important part of our life, but from where do we get these fuels? Do we make them?

We get these fuels from nature. We cannot make them. One day all these fuels may get over, if not used properly.

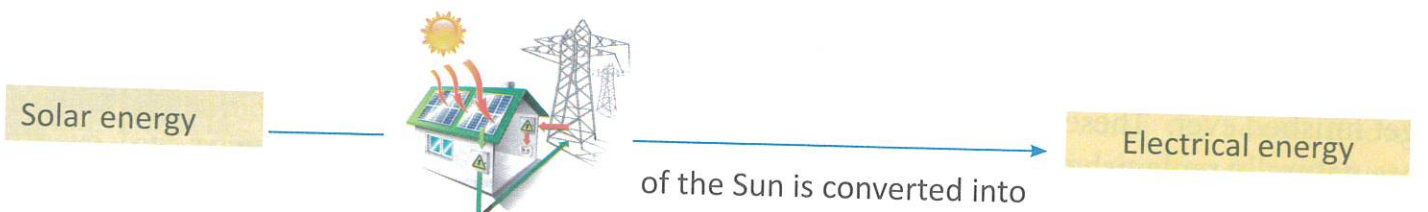
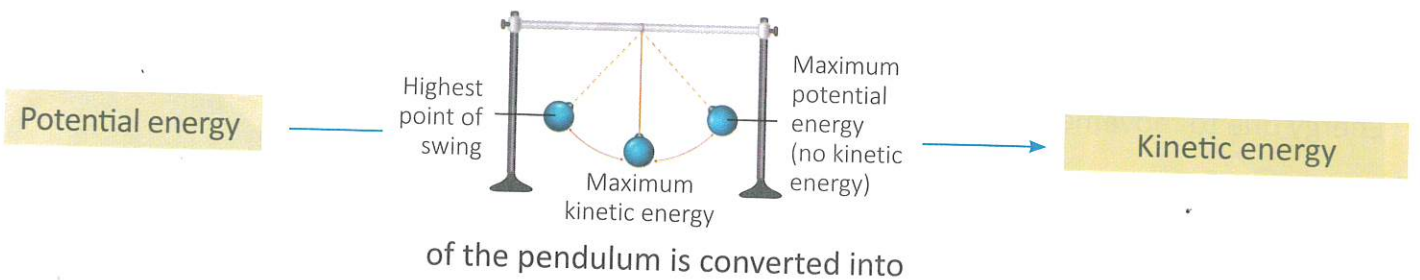


These fuels are found in the Earth's crust and are **non-renewable** sources of energy.

Conversion of Energy

Energy changes from one form to another; this is called **energy conversion**. It can be neither created nor destroyed; it can only be transferred from one into another.

For example, during photosynthesis, plants use energy from sunlight to make food. Light energy from the Sun is changed into chemical energy in plants.

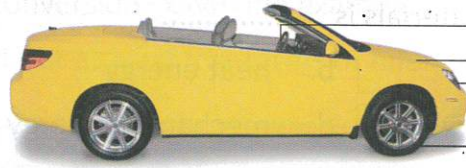


Electrical energy

is converted into



Sound energy



Sound

Heat of car engine

Light

Movement of wheels → kinetic

- A car moves using fuel that is petrol, diesel, or CNG.
- The fuel has chemical energy, that is converted into different forms.

Chemical energy

is converted into

Electrical energy

+

Heat
+
Light
+
Sound

I Have Learnt

There are various forms of energy in our surroundings.

Energy

Forms

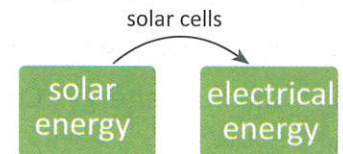
- **Electrical energy:** from electricity
- **Chemical energy:** from food and other stored chemicals such as fuels
- **Solar energy:** from the Sun
- **Light and heat energy:** from the Sun, electric bulbs, tubelight etc
- **Geothermal energy:** heat energy from the Earth
- **Potential energy:** stored energy associated with position or height of the object
- **Kinetic energy:** energy associated with the movement of the object

Sources

- **Renewable:** It can be replenished. eg. solar, wind and hydro energies.
- **Non-renewable:** It cannot be replenished. eg. coal, petroleum and natural gases.

Conversion

- One form of energy changes into another form. eg.



- Energy can neither be created nor destroyed.

Science Words

- Chemical energy
- Electrical energy
- Potential energy
- Kinetic energy
- Energy conversion
- Renewable energy
- Non-renewable energy
- Heat energy
- Light energy
- Sound energy
- Mechanical energy

Evaluate

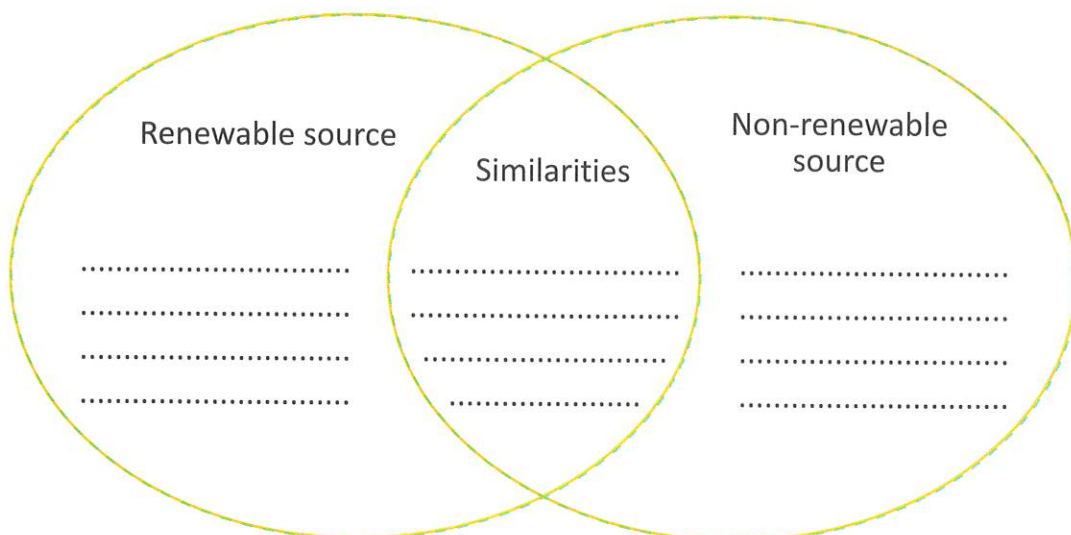
A. Objective type questions

Tick (✓) the correct options. Exchange your notebook with a classmate and check his/her responses.

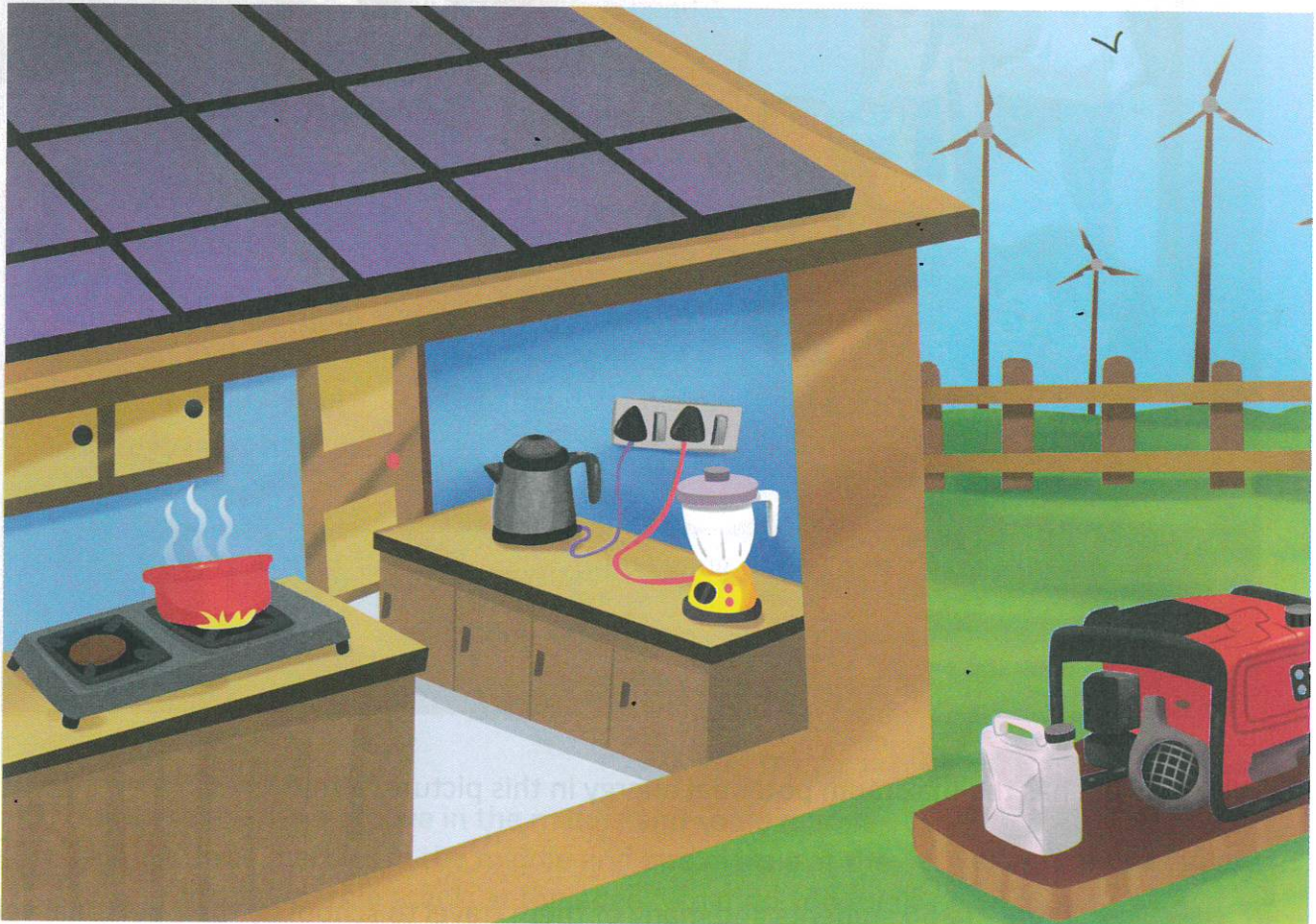
1. The form of energy stored in food materials is
a. chemical energy b. heat energy
c. light energy d. mechanical energy
2. 1 kJ is equal to
a. 10 J b. 100 J
c. 1000 J d. 10,000 J
3. Petrol and coal are examples of
a. renewable sources of energy b. non-renewable sources of energy
c. mechanical energy d. sound energy
4. Which of the following statement is not correct about energy?
a. Energy is stored.
b. Energy can be converted from one form to another form.
c. Chemical energy can be converted into electrical energy.
d. Energy can be created and destroyed.
5. Fuels that contain chemical energy are
a. coal b. petrol
c. cng d. all of these

B. Short answer questions

1. Some sources of energy are renewable, like solar energy, while some are non-renewable, like fuel energy. Compare them using a Venn diagram.



2. Radhika lives in a rural area. Many times, at night, there is no electricity in that area. She lights wax candles to work at that time. Wax candles store some energy. Which form of energy does wax candle store? Write the energy conversion that takes place on lighting the wax candle.
3. What is mechanical energy? Write its types.
4. What is energy conversion? Give one example.
5. Observe and find out at least five forms of energy that help to run this house.



C. Long answer questions

1.
 - a. A boy is standing at the top of a hill. What kind of energy does he possess?
 - b. Then, he starts skating from the top to the bottom of the hill. Does his energy convert into another form or not?
 - c. Identify the change in the form of energy.
 - d. List the differences between kinetic energy and potential energy.
2. What are the different types of fuels? Give one example of each. Write the energy conversion that occurs when fuels are used in vehicles.

D. HOTS

Observe the given picture and list the energy conversions taking place in it. Exchange the list with your classmate and score each other.



Which object has the maximum potential energy in this picture? Why?

E. Values and life skills

In your class, there are 50 students and many of them travel to school by their personal vehicles. They do not practice carpooling though many students come from the same place. Is this way of travel good or bad for the environment?

I WONDER

Investigate

I will: Construct an anemometer. An anemometer is an instrument used to measure the speed of wind.

I need: 4 small glasses, 1 small piece of thin pipe, 1 circular base, 1 thin metal rod, 4-glass holding stand, 1 ring holding stand and 1 stopper

I do:

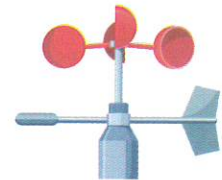
1. Insert one end of the iron rod in the middle of the circular base.
2. Insert a stopper at the other end of the metal rod.
3. Insert the pipe through the middle hole of the ring-holding stand.
4. Now insert glasses in each ring of the glass-holding stand.
5. Fit the glass-holding stand with the ring-holding stand in such a way that the mouth of glasses should remain on one side.
6. Now insert the pipe attached to the ring-holding stands through the top of the metal rod.
7. Our anemometer is ready. Blow air into the mouth of any glass. What do you observe?

I observe:

All four empty glasses on blowing of any one glass.

I conclude:

Moving air possess known as energy.



Suggested Activity

1. Take a ruler with a groove in the middle and some marbles. Line up three marbles in the middle and one marble at the edge. Flick the marble that is at the edge. What do you think will happen? Observe what happens. Discuss the reason for the same.
2. Find out the names of any two hydroelectric power plants in India using the Internet. Which energy conversion takes place in these dams? Discuss your answers in class.



Project Work

Work in pairs. Fruits and vegetables store chemical energy. Make different fruit/vegetable batteries to show the energy conversion from chemical to electrical energy. Follow the steps given below:

1. Take two pieces of connecting wire and tie one with a zinc nail and other with copper nail/coin/plate.
2. Now make holes into the lemon and fix these nails at a distance in the same lemon. Attach LED by connecting these wires.
3. The LED will start glowing after 5-7 minutes.



Worksheet

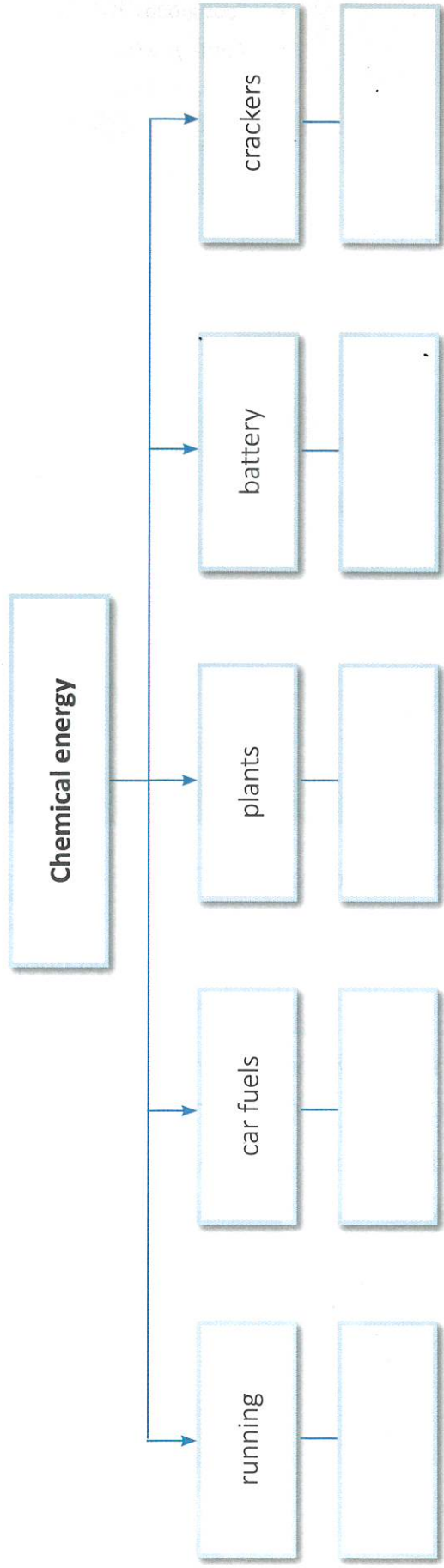
Answer the following questions.

- Find the answers to the clues in the given word grid.

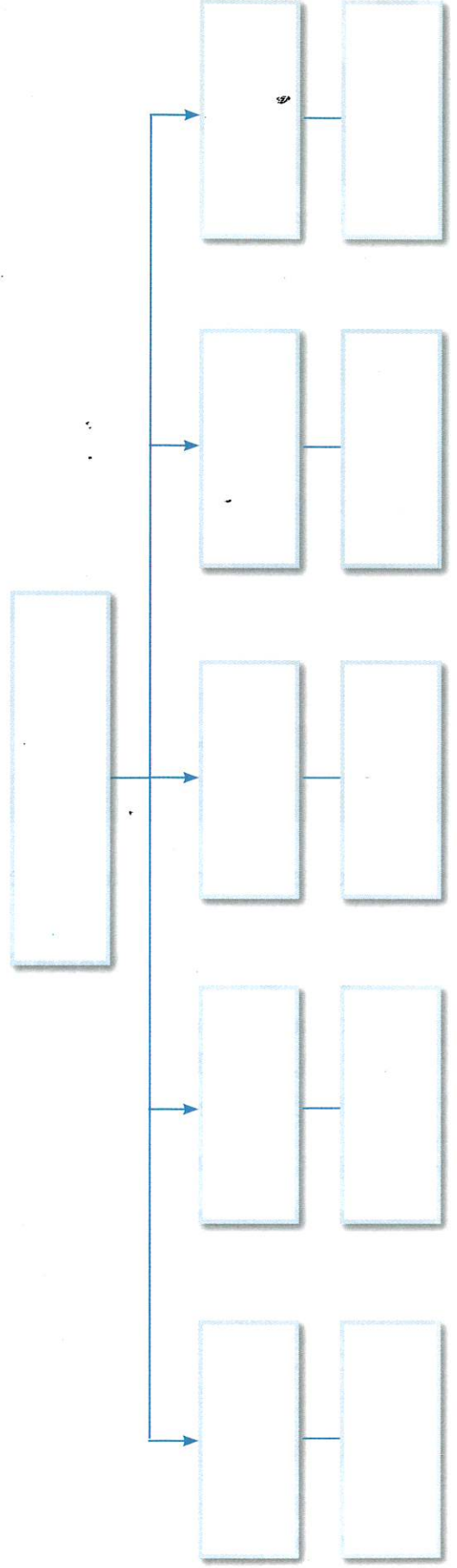
L	K	M	C	N	N	O	P	G
P	U	G	H	L	R	G	U	T
O	B	H	E	H	E	A	T	R
T	B	J	M	T	N	M	J	U
E	T	K	I	N	E	T	I	C
N	B	G	C	K	W	L	P	N
T	T	Y	A	O	A	D	M	G
I	C	G	L	B	B	N	J	T
A	R	F	V	J	L	L	O	I
L	Y	J	O	I	E	N	M	L

- Energy possessed by an object, when at a height
- Energy possessed by an object due to motion
- Energy stored in batteries
- Energy source that can be used forever
- Energy we get from the Sun
- The fuel used in vehicles but exists in gaseous form

2. Complete the given diagrammatic presentation of conversion of energy.



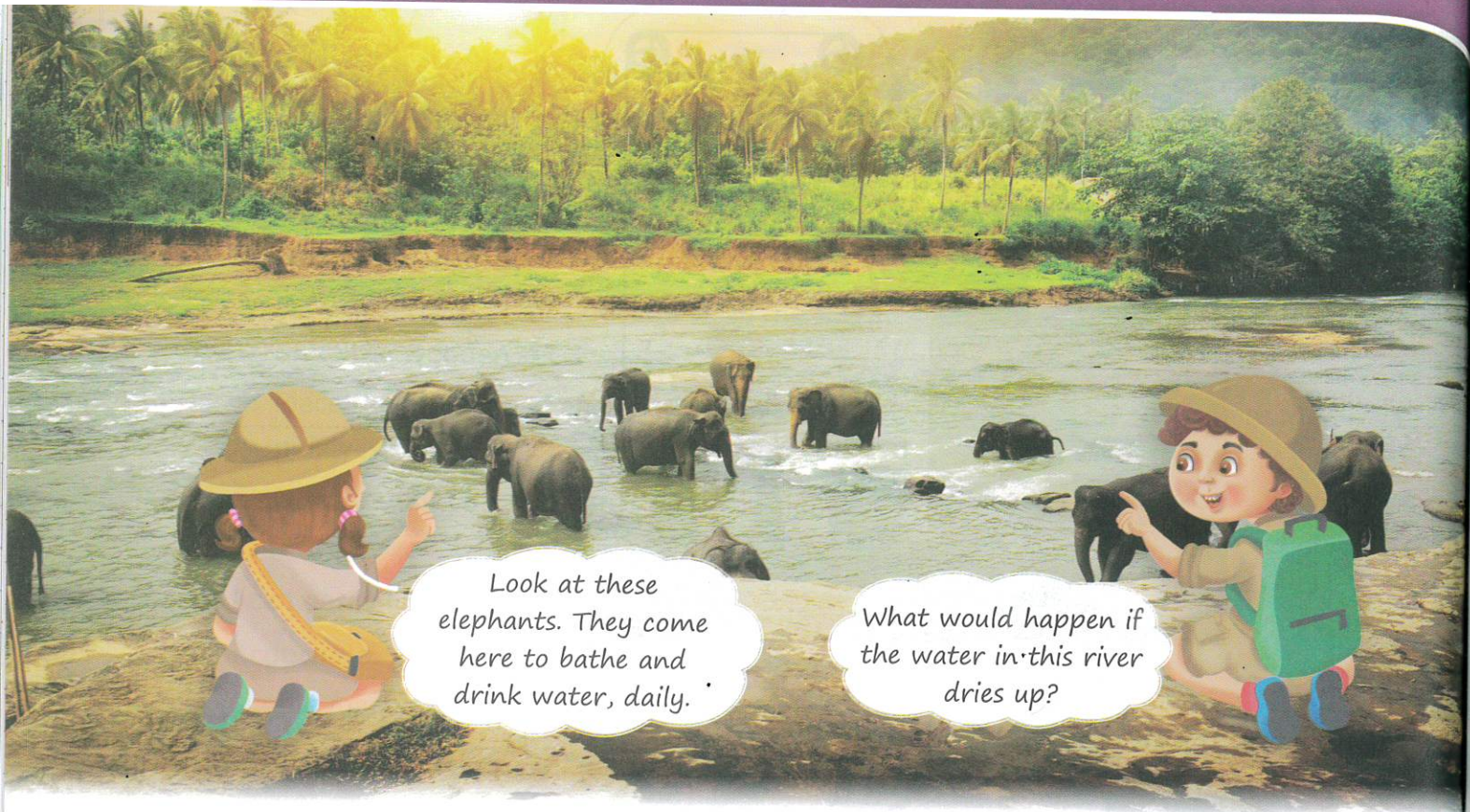
Create a similar mind map showing the conversion of electrical energy.



Our Environment

In This Lesson

- Components of environment
- Layers of atmosphere
- Interaction in environment—food chain and food web
- Positive impact of humans on environment
- Pollution— Result of human activities
- Ways to save our environment



Look at these elephants. They come here to bathe and drink water, daily.

What would happen if the water in this river dries up?

All living things are affected differently by factors in the environment. These factors include **air, food, water, sunlight, and temperature.**

Environment is everything that makes up our surroundings and affects life on the Earth. Our environment is made of two components.

Components of environment

Biotic component (Living things)
animals, microorganisms, plants



Abiotic component (Non-living things)
air, water, land, sunlight, and temperature



Interactions in Environment

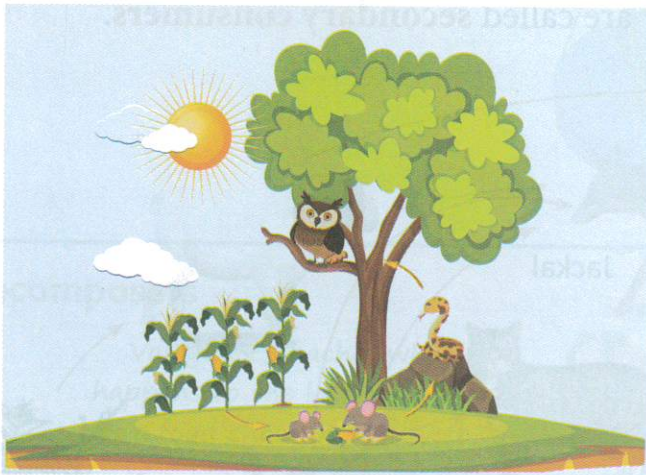
All biotic and abiotic components of our environment interact with, and influence each other. If any component is missing from the environment, all living organisms will be affected.

Think Science

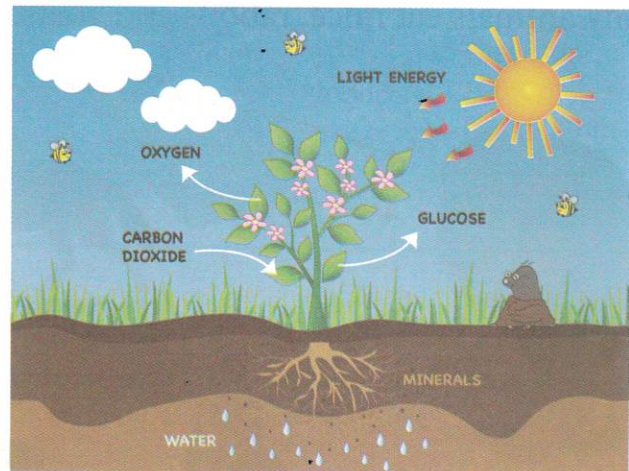
Imagine if there were no plants on the Earth. What would happen? Would it affect our lives? Write in your own words.

Main Interactions in Our Environment

Interaction among living things



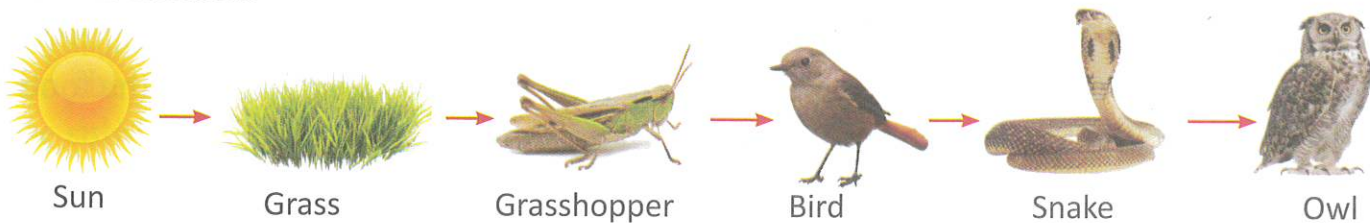
Interaction between living and non-living things



Food Chain and Food Web

A food chain begins with a plant or parts of a plant. A **food chain** shows the relationship among organisms and the transfer of energy among organisms in the form of food.

When a plant is eaten by an animal, which is in turn is eaten by another animal, a **food chain** is formed.

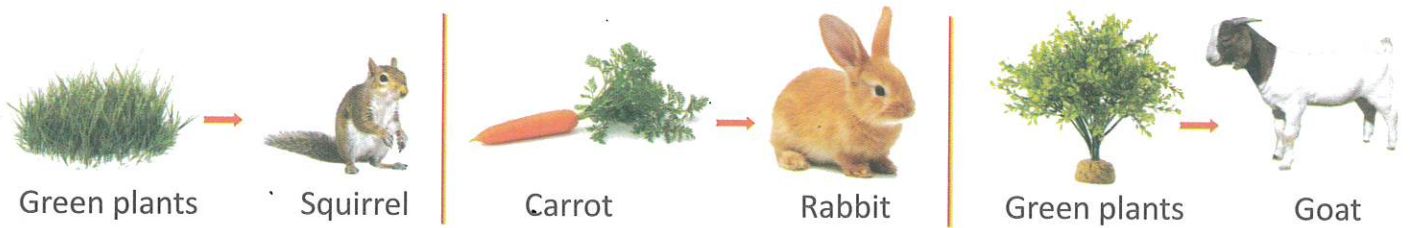


In the given food chain, grasshopper eats the leaves of grass, the bird eats the grasshopper, the snake eats the bird, and the owl eats the snake.

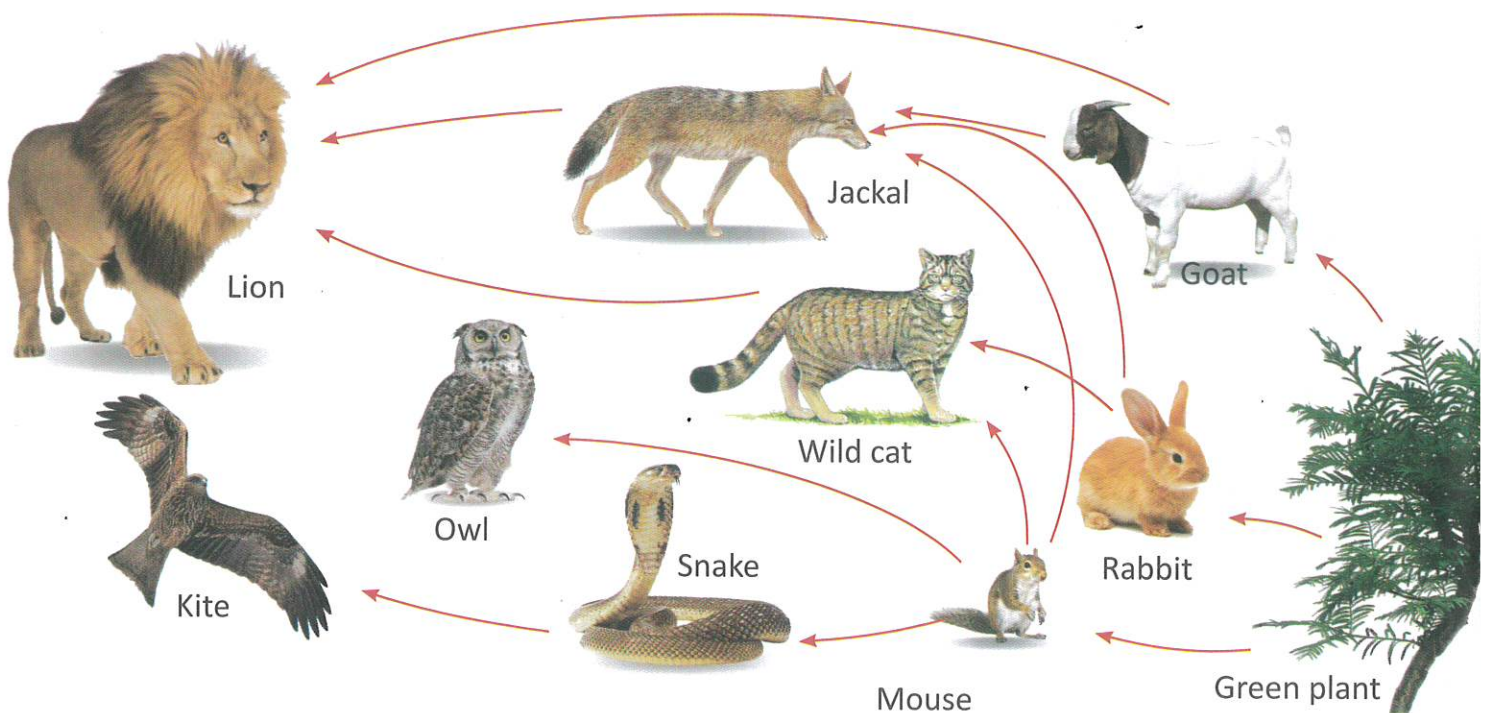
Here, the grass is the **producer** as it produces food using sunlight by photosynthesis while other living organisms are **consumers**; they are dependent on plants or other animals for their food.

Animals that hunt and feed on other animals are called **predators**. Animals that are hunted and eaten by predators are called **preys**.

Plants are producers and many animals depend on plants for their food. They are called **primary consumers**. It means an organism can be eaten by more than one type of organism.



Many animals eat mice, rabbits and goats. They are called **secondary consumers**.



The wild cat and jackal are eaten by lion. So, lion is considered as a **tertiary consumer**. So, an organism can be the part of more than one food chain. In a community, the food chains are interconnected and form a **food web**.

Building Block

Think and construct the food chains.

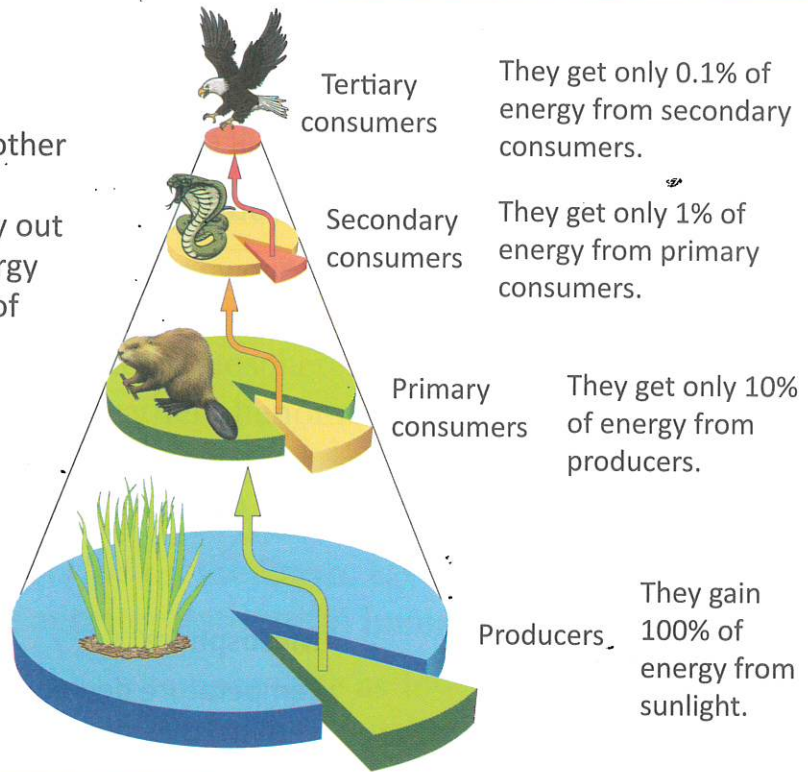
- a. Bird, grass, caterpillar b. Owl, mouse, corn plant c. Grass, lion, zebra

Identify and categorise 'producers' and 'consumers'.

Science Talk

In a food chain, all the energy is not transferred from one organism to the other organism. This is because some of the energy is used by the organism to carry out life processes and activities. Some energy is lost to the environment in the form of heat.

Therefore, only ten percent of the energy present at one feeding level is passed on to the next.



Decomposers

Vaigyanik Chacha, what happens to the last consumer of a food chain or food web?

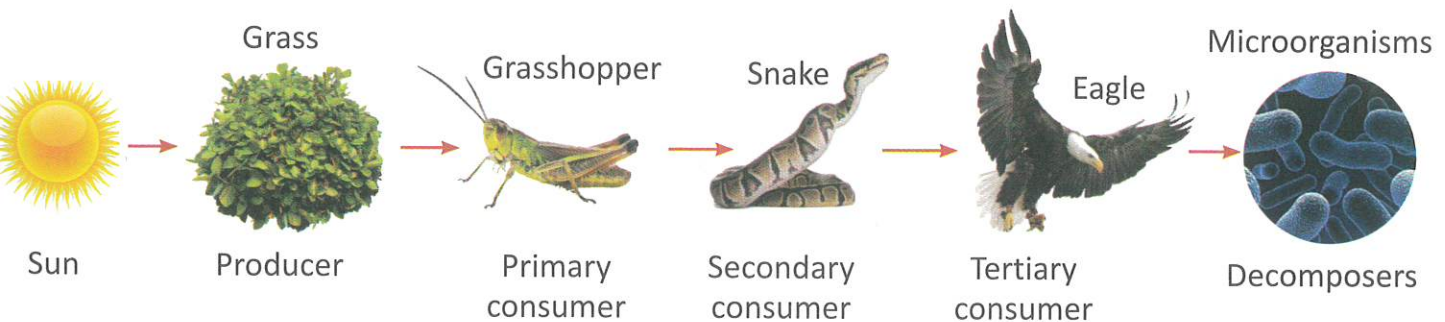


When they die, scavengers feed on them and the remains are decomposed by the microorganisms.

Science Talk

Some animals like vultures and ants help decomposers to break down dead organisms into simpler substances, though they are not decomposers.

When the last consumers of the food chain or food web die, they are consumed by microorganisms. These microorganisms are called **decomposers**. All living organisms, when they die, are decomposed into mineral salts, water, and carbon dioxide. Most of these substances are returned to the soil to be used again by plants.



Fill in the blanks using appropriate words.

1. The main components of environment are _____ and _____.
2. A _____ shows the food relationship among organisms.
3. Animals that hunt and feed on other animals are called _____.
4. _____ are known as decomposers.

The Atmosphere

The layer of air around the Earth is known as the **atmosphere**. This is a mixture of gases, like nitrogen, oxygen, carbon dioxide, inert gases, water vapour, etc. It surrounds the Earth like a blanket.

Troposphere

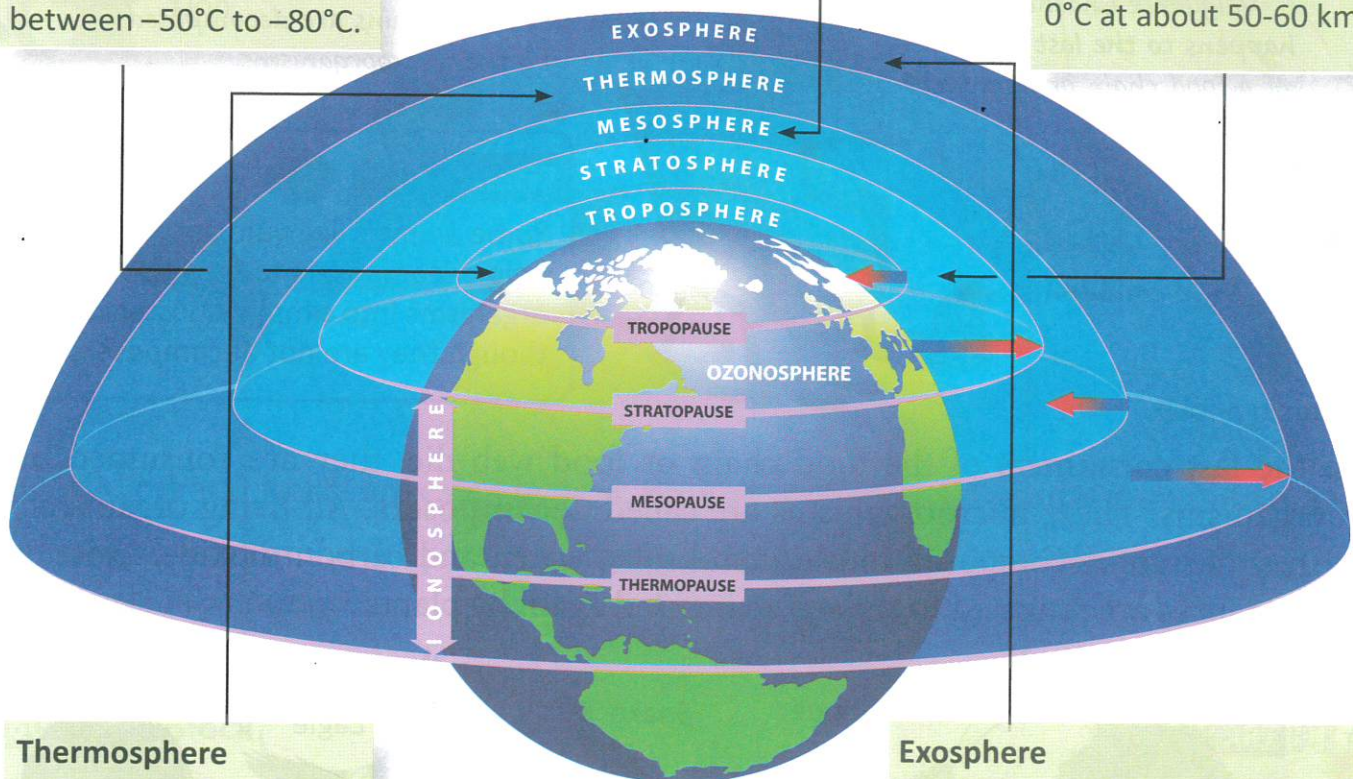
Temperature decreases with height at an average of approximately 6.5°C per kilometre. Near the end of troposphere temperature could be between -50°C to -80°C .

Mesosphere

Temperature decreases with height, to about -100°C at about 80-100 km.

Stratosphere

Temperature increases with height, to about 0°C at about 50-60 km.



Thermosphere

Temperature increases with height, to about 1500°C at about 380-500 km.

Exosphere

Temperature varies greatly and can range from 0°C to over 1700°C . It is colder at night and much hotter during the day. It is about 1000 km above Earth's surface.

Info Bit

Ozone layer is a deep layer in the stratosphere, encircling the Earth. This layer has large amounts of ozone in it. Ozone is a special form of oxygen, made up of three oxygen atoms rather than the usual two oxygen atoms. Ozone layer is becoming thinner and thinner, day by day. The gases responsible for the depletion of the ozone layer are mainly **chlorofluorocarbons (CFCs)**.

Layers of Atmosphere

Troposphere: It contains about 75%-80% of the atmosphere's mass and 99% of the total mass of water vapour and aerosols. Most of the weather phenomena, like change in temperature, atmospheric pressure, humidity, cloud formation, rain, etc, occur in this layer.

Stratosphere: No weather change affects this layer. It contains the ozone layer that absorbs UV rays from the Sun and thus protects life on the Earth. UV rays cause many diseases, like sunburns, skin cancer, premature aging of skin, etc, in humans.

Mesosphere: It is the coldest layer. It has a temperature as low as -100°C . The meteors enter the atmosphere melt or vaporise here due to collisions with gas particles of the layer.

Thermosphere: The temperature in this layer is very hot, varying from 500°C to 2000°C . There is a lot of energy here due to solar radiation like absorption of X-rays and UV radiations.

Exosphere: It is the uppermost layer where the atmosphere thins out and merges into interplanetary space.

Man's Impact on Environment

Without the ozone layer, harmful UV rays would reach the Earth and cause diseases in humans.



Pollution, caused by humans, is responsible for the depletion of the ozone layer.



Absolutely! We have also made some unwanted changes that affects our environment.



Humans have adapted to, and changed their environment to make life more comfortable and convenient. For this, they make scientific discoveries and develop technologies. Many discoveries of man have a positive impact on the environment, but some have a negative impact also.

Positive Impact of Human Activities on Environment:

Conservation of Natural Resources

- We conserve our natural resources, like water, forest and energy by practising 3R's: Reduce, Reuse, and Recycle.
- We need to conserve the natural resources on the Earth to keep us alive.

Reforestation

- Forests are homes for animals and food resources for all living organisms.
- Forests prevent extinction of wildlife.
- Many attempts are being made all over the world to plant seeds and young plants to overcome the destruction of our environment and to solve our environmental problems.



Reforestation

Man made Materials

Materials such as ceramics, alloys, eco-friendly materials, etc. are used to make utensils, tiles, stationary items, etc.

Quality Food products

Biotechnology makes use of microbes to make useful and better quality food products, such as cheese, yogurt, vinegar, bread, soya sauce, cake, etc. and some medicines.

Farming

Biotechnology is used to produce plants that can grow faster, yield more food, resistant to diseases, pest and extreme low or high temperature.

Water Treatment Plants

It purifies water and supplies potable water after its purification in water treatment plants.



Most harmful activities of humans are—

- a. deforestation
- b. pollution
- c. extensive use of natural resources and their wastage

Deforestation causes soil erosion, global warming and loss of life of the living organisms.

Pollution

Many harmful substances (pollutants) are released into the air, water, and land and make our environment polluted. These pollutants are released due to human activities.

Air pollution

Causes



Factories



Burning of oil, coal and wood



Vehicles



Smoke from cigarettes

Impact

Causes respiratory diseases

Acid Rain

Smoke contains harmful substances, some of these dissolve in rain water and form acids. It is known as acid rain. It causes corrosion of materials, damage to monuments, killing of plants and animals and pollution of water bodies.

Water pollution

Causes



Industrial waste



Domestic waste



Agricultural waste

Impact

Chemicals from factories and agricultural lands (pesticides) cause

- Harm to aquatic plants and animals
- Harm to many water bodies
- Disturbs ecosystem

Land pollution

Causes



Improper disposal of waste



Excessive use of chemical fertilisers and pesticides



Impact

Decreases the fertility of soil and affects the growth of plants and hence the life of all living organisms

Ways to Save Our Environment

1. Say 'NO' to plastics.
2. Plant more seeds or young plants and add house plants to your home.
3. Save trees by reducing the use of paper.
4. Conserve energy: turn off the lights, fans and other electrical appliances, when not in use.
5. Save water: do not waste even a single drop of water.
6. Use public transport.
7. Practice 3Rs: Reduce, Reuse and Recycle.
8. Do not throw garbage in the open.

I Have Learnt

- Our environment is made of biotic components (living things) and abiotic components (non-living things).
- All the components of our environment interact with each other.
- Food chain and food web are the examples of interaction among biotic components.
- A food chain is the food relationship among organisms. It starts from plants.
- A food web is the result of many interconnected food chains.
- Producers (plant) consumers (animals) and decomposers (microbes) are parts of a food chain and a food web.
- Air, an abiotic component, makes the atmosphere of the Earth.
- The main layers of the atmosphere are troposphere, stratosphere, mesosphere, thermosphere and exosphere.
- Our environment gets polluted due to humans activities.
- The smoke produced by burning coal and fuels, smoke from factories and vehicles causes air pollution. It may cause acid rain and respiratory diseases.
- Improper waste management causes water and land pollution.

Science Words

- Biotic • Abiotic • Atmosphere • Food chain • Food web • Producers
- Consumers • Decomposers • Deforestation • Pollutants • Reforestation • Smog

Evaluate

A. Objective type questions

Tick (✓) the correct answers. Exchange your notebook with your classmate and check his/her responses.

- Humans clear the land to grow food, to make buildings, factories, etc. This activity by humans is called

a. pollution	<input type="checkbox"/>	b. deforestation	<input type="checkbox"/>
c. extinction	<input type="checkbox"/>	d. reducing	<input type="checkbox"/>
- Which one of the following food chains is incorrect?

a. grass seeds → mouse → owl	<input type="checkbox"/>
b. water plant → pond skater → great diving beetle → kingfisher	<input type="checkbox"/>
c. leaf → caterpillar → chick → snake	<input type="checkbox"/>
d. leaf litter → millipede → centipede → crow	<input type="checkbox"/>
- Acid rain is the result of

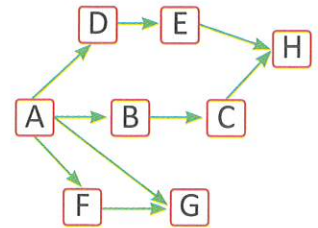
a. air pollution	<input type="checkbox"/>	b. water pollution	<input type="checkbox"/>
c. land pollution	<input type="checkbox"/>	d. noise pollution	<input type="checkbox"/>
- Full form of CFC is

a. carbon fluoro chlorine	<input type="checkbox"/>	b. chloro fluoro carbon	<input type="checkbox"/>
c. carbon fluorine carbide	<input type="checkbox"/>	d. none of these	<input type="checkbox"/>
- Most harmful activities of humans are

a. deforestation	<input type="checkbox"/>	b. pollution	<input type="checkbox"/>
c. both a. and b.	<input type="checkbox"/>	d. none of these	<input type="checkbox"/>

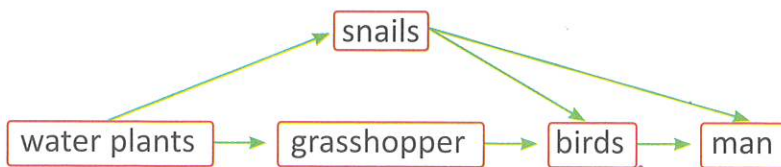
B. Short answer questions

- Study the given food web. Its components are shown using letters. Find the animals which are carnivores. Define the term 'carnivore'.
- Atharv told his sister about an aquatic food web. He said, "The fish eats water plants. The ducks eat the fish and water plants. Man eats the fish and water plants."

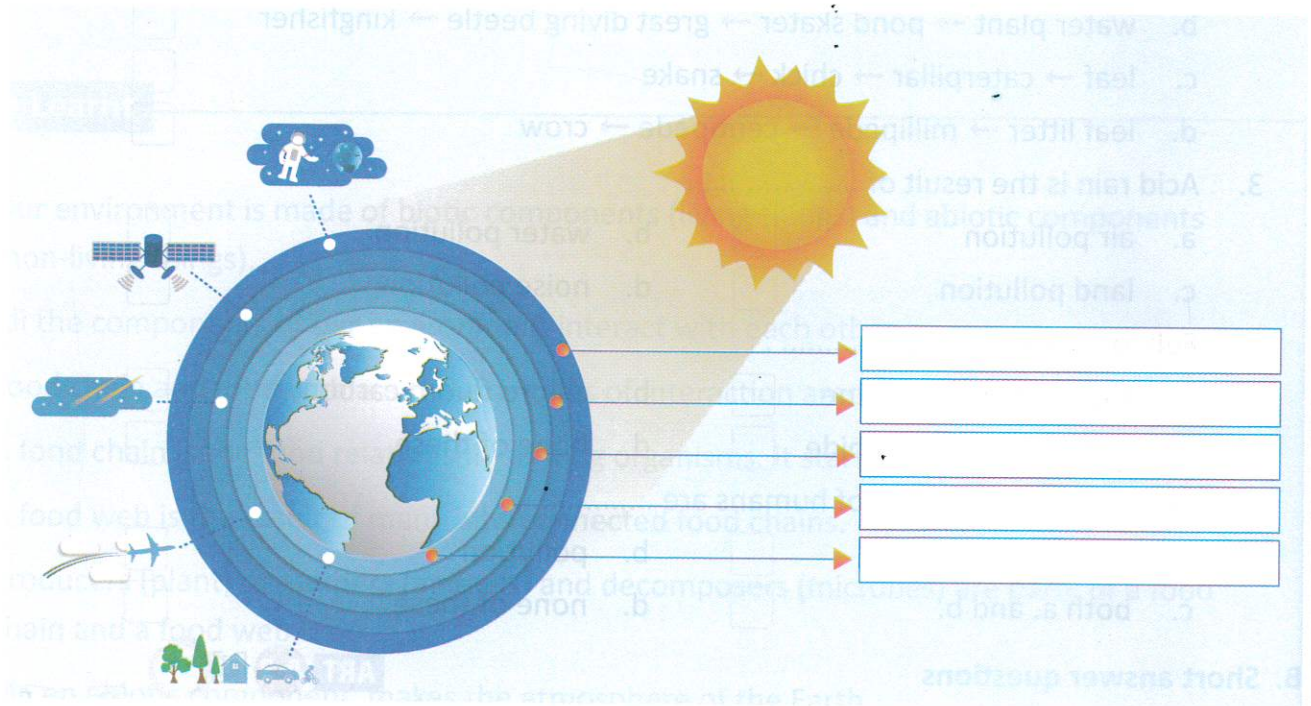


Draw a diagram to show the food web explained by Atharv.

- What are the possible interactions that take place in our environment? Name them and give 1 example of each.
- How is stratosphere important for life on the Earth?
- Observe the given diagram and answer the following.

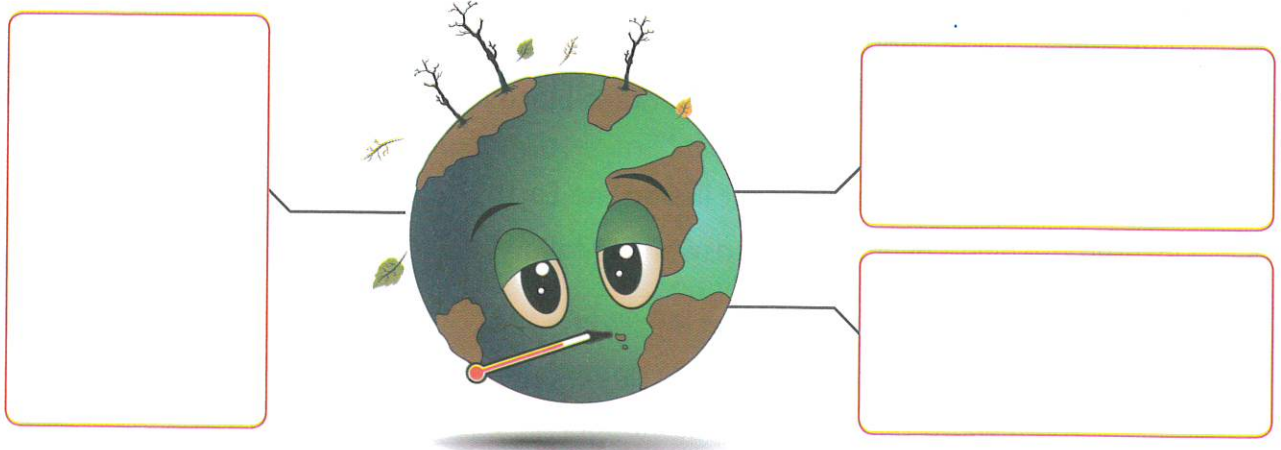


- a. Write down two statements that correctly describe the above diagram.
 - b. What will happen if the population size of grasshoppers decreases?
 - c. Chinmaya told Jigyasa that the water plant is also eaten by a caterpillar, which is a prey for birds. Add this information in the given diagram to complete it.
6. Ritika observes the living things in a pond and writes the following comment. "Water snails love to eat the leaves of hydrilla. However, they have to hide from fish so that they are not eaten by the fish."
- After a few days, all the water snails disappear.
- a. What could be the reason for the disappearance of the water snails?
 - b. What will happen to the population size of hydrilla? Will it increase or decrease?
7. Observe the given picture. What does it show? Label it properly.



C. Long answer questions

1. List the impact of human activities on the Earth's environment in the given space. Present the pointers you list as a paragraph or a poster in the class.

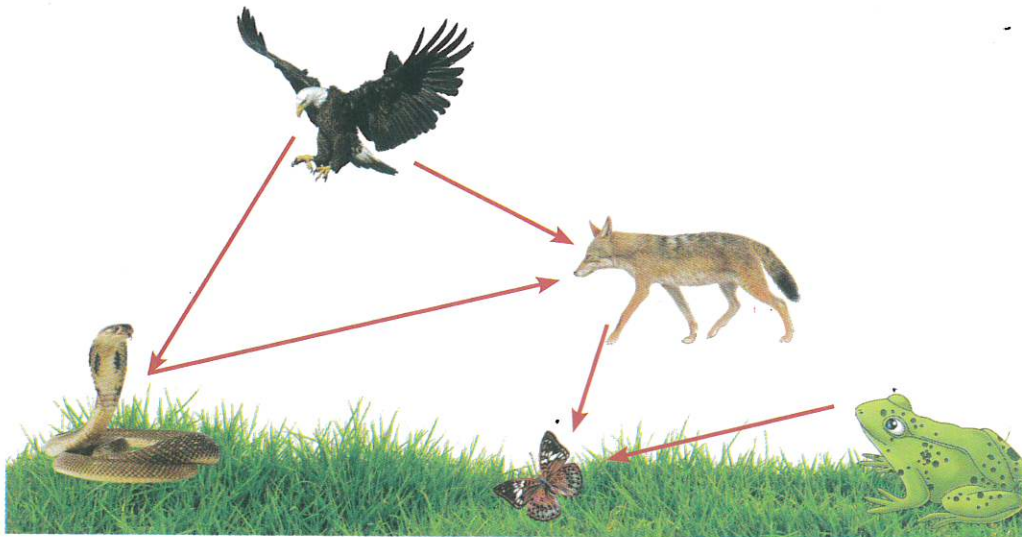


2. a. Define pollutants and pollution. Observe the given picture. It is a real picture of a water resource located near a chemical factory. In this pond/lake, many dead fishes are floating.
 - i. What do you understand from the picture given?
 - ii. What may be the cause of death of the fish?
 - iii. Write any two ways to control the situation.
- b. Write any four ways to save our environment.
3. What is air pollution? Write the causes of air pollution and any 2 of its impacts on our environment.
4. What is reforestation or afforestation? How would it affect our environment? Mention any three points.



D. HOTS

Observe the given diagrammatic representation and answer the questions asked.



- a. Categorise the components into producers and consumers.
- b. If the plants gives 100% energy to the butterflies or frogs which eat them, what percentage of energy will the snake get which eats frogs?
- c. What will be the effect on the environment if snakes are removed from this food web?

E. Values and life skills

Chlorofluorocarbons (CFCs) were discovered by Thomas Midgley in the 1920s. They were used in air conditioning/cooling units, as aerosol spray propellants prior to the 1980s, and in the cleaning processes of delicate electronic equipment. Later, the government decided to replace it in the air conditioning units, as CFCs cause depletion of the ozone layer and thus affect life on the Earth. Many people and organisations are concerned about the safety of our environment.

- a. How concerned are you about the kinds of pollution? Write anything which you actually do to save your Earth.
- b. Be honest and write one action of yours which can pollute our environment.
- c. Why were CFCs replaced in air conditioning units?



I WONDER

Investigate

A 1 [21] CT ART [21] CR

I will: Construct a food web.

I need: A soft cardboard sheet, plant and animal cards, push pins and rubber bands.

I do:

1. Arrange the plants and animals, keeping in mind who eats whom.
2. Now fix the cards using push pins.
3. Make 2 or 3 separate food chains.
4. Now, make a food web using these food chains with the help of rubber bands.
5. Label producers, consumers, and decomposers with the help of paper flags.

I observe: Some animals like _____ and _____ depend on plants for their food, some animals like _____ and _____ depend on _____ for their food while some animals depend on both _____ and _____ for their food.

I conclude: All living organisms _____ with each other and are _____.

Suggested Activity

[21] VI [21] COLL [21] COM HL

Plant small trees in your school garden and at home. Involve your friends and family in this activity too.



Project Work

ART HL CcL [21] CR [21] COM

Use waste and unwanted materials such as old newspaper and ice-cream sticks, to make objects that you can use in school or at home. Display it in class. Discuss its merits with each other.

For example you may make a penstand or a wall hanging.

Worksheet

1. Match the following. Check your classmate's answers.

Column 'A'

Producers

Consumers

Decomposers

Pollutants

Afforestation

Column 'B'

destroy the dead organisms

planting trees

make food by photosynthesis

feed on plants and other animals

cause pollution

2. Observe the given picture and answer the questions asked.

a. In which layer do we live?

.....

b. Which layer protects us from UV rays?

.....

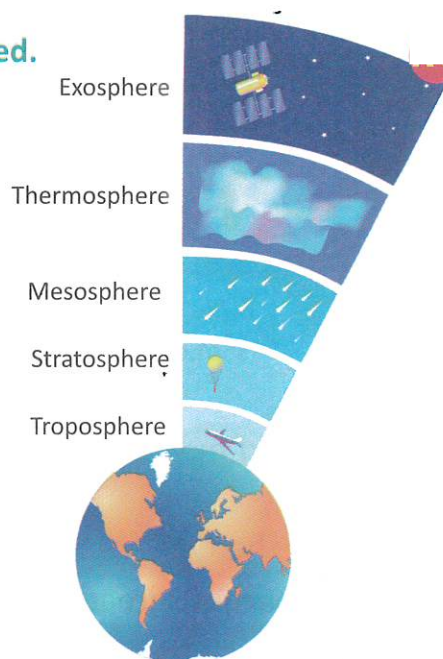
c. Can we live in thermosphere?

.....

Justify your answer.

.....

.....



3. Study the graph given here.

a. From the graph, name the town which has the highest amount of pollutants released by factories.

.....

Explain the reason.

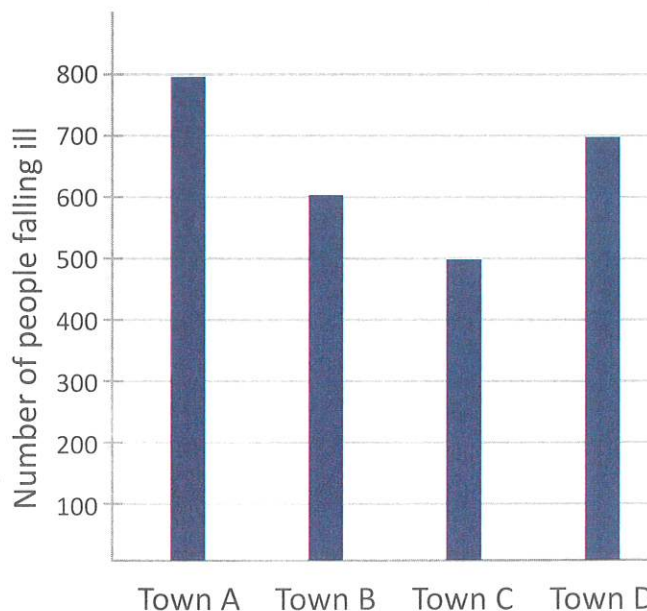
.....

.....

b. Suggest two ways to reduce the number of people falling ill in all the towns.

.....

.....



Connecting Science

ART

IC

HL

CcL

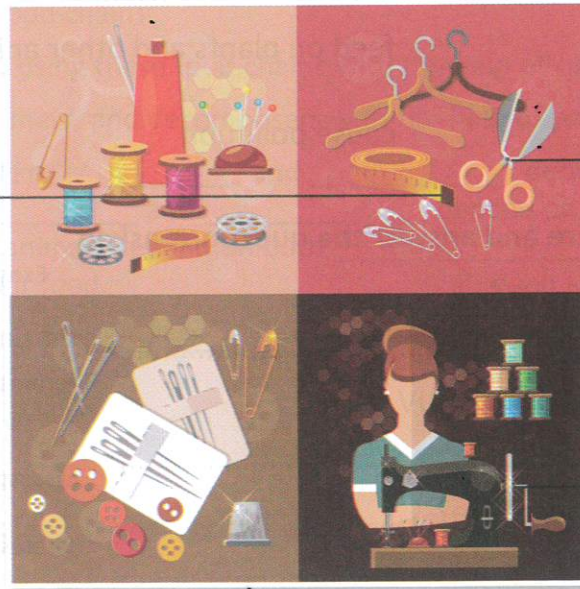
ET

CR

Food, clothing and a house to live in have been considered as essential necessities for human beings. With changing times, today clothing provides not only protection but is also a mode of expression of one's personality.

Today's clothing is a medium of expression of creative skills of the designer and the skills of a fabricator. Stitching is the basic skill which transforms the preconceived idea, which is expressed as "design" into its practical usable form of "garment" or a "style". Stitching is the craft of fastening or attaching objects using stitches made with a needle and thread. Sewing is used in garment-making and also in a variety of crafts and industries.

Measuring tape is used to measure the length and width of the cloth.



Scissors are a type of simple machine used to cut the clothes to design a dress.

Sewing machine is a complex machine used to stitch garments.

Machines and measuring tape are the most important tools to make a designer dress.

Science

1. Name the types of machines that you can see in the given picture.
2. A tailor must grease and oil the machine regularly for smooth functioning. Why is greasing and oiling required?

Social Science

Where do you find most of the garment industries in India? Mark it on the map of India.

Math

Take measurement of your and an elder's clothes. Compare the two measurements. Write the measurements converting the larger unit into a smaller unit.

English

Write a paragraph on 'How do the clothes we discard effect the environment'. Suggest some ways of reusing clothes.

Art and Craft

Use old socks, buttons and wool to create puppets.

States of Matter

In This Lesson

- Interconversion of states of matter and phenomena involved in it
- Applications of interconversion of states of matter
- Solution and its types
- Impurities in water and their removal
- Water conservation

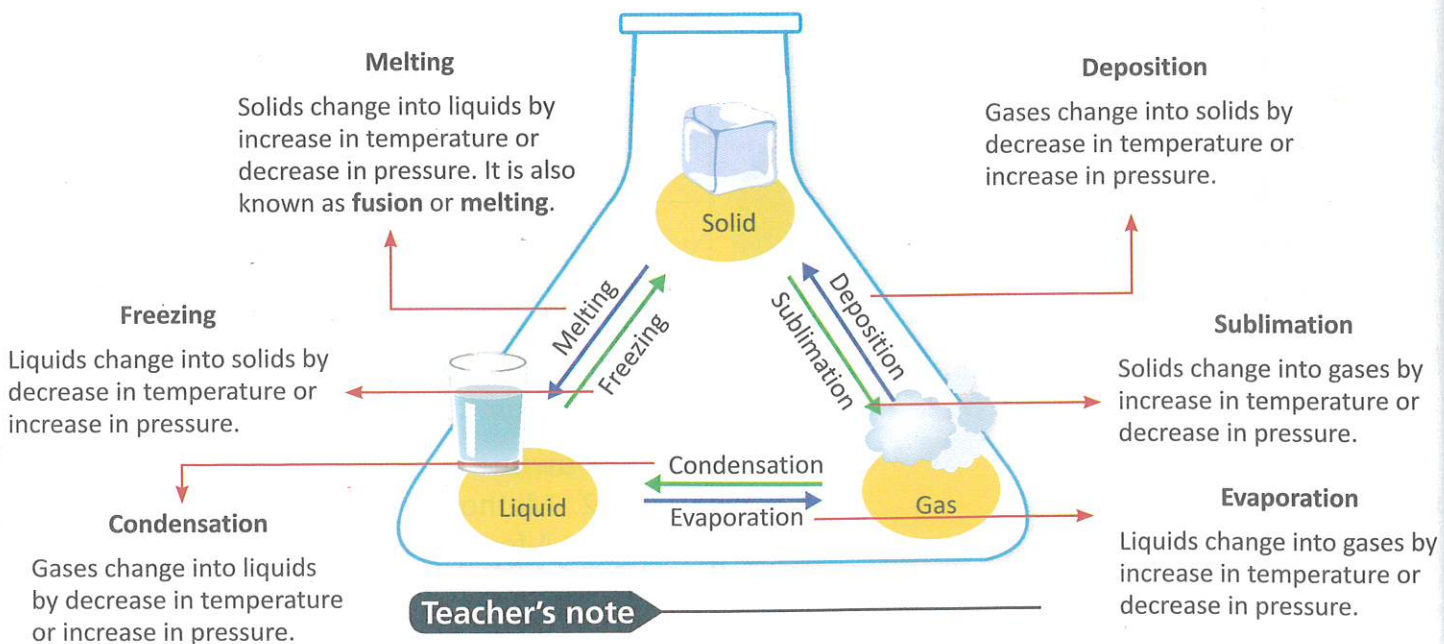
The white layer of snow and the flowing water in the river looks so soothing.

Yes! The clouds in the sky carry water vapour. So, we can see all three states of water in nature.

Interconversion of States of Matter

Matter changes from one state to the other with the change in its temperature and pressure. This is called **interconversion of states of matter**.

The processes involved in the interconversion of states of matter are **melting, freezing, evaporation, condensation, sublimation, and deposition**.



Applications of Interconversion of States of Matter



Snowfall and rainfall are the result of conversion of states of matter.



Water cycle maintains the amount of water on the Earth's surface, and under the ground too.

Examples of conversion of matter from one state to other



Cooking gas, LPG (Liquified Petroleum Gas), is filled in gas cylinders by changing the gaseous state of matter into the liquid state.



Wet clothes dry as water evaporates due to the heat of the Sun.

Science Talk

DL

Do you know, that ice and snow can also change directly into vapour but this process is very slow and hence we are unable to observe it. Mount Everest is losing its snow cover due to windstorms. Snow is constantly being lost, invisibly, due to sublimation.

Solution

When sugar is dissolved in water or milk, it forms a sugar solution. But what if we add milk in water?

Do we also call it a solution?

Yes, it is also a solution. Like sugar, milk also dissolves completely in water.

Info Bit

Most solutions require at least one liquid or gas as the solvent. Metallic alloys are the exceptions as they are solid solutions.

When two substances mix together such that they are evenly distributed, a **solution** is formed. The substance that dissolves is called **solute** and the substance in which it dissolves is called **solvent**. Generally solutes are present in lesser quantity than the solvent.

In sugar solution, sugar is solute and water is solvent. Here, the quantity of sugar is less than water.

Types of Solutions

Solutions may be of different types depending on the states of solute and solvent.

1. **Solids dissolve in liquid:** The solution formed when the solute is solid and the solvent is liquid.

For example, sugar solution and salt solution.

2. **Liquids dissolve in liquid:** The solution formed when both the solute and the solvent are liquids. For example, milk in water and vinegar in water.

All liquids do not mix with each other. When two liquids are mixed together and dissolve in each other, completely, they are called **miscible liquids**. For example, milk in water.

However, when two liquids do not mix together or they do not dissolve in each other, completely, they are called **immiscible liquids**. For example, oil in water.

3. **Gases dissolve in liquid:** The solution formed when the solute is a gas and the solvent is a liquid.

For example, carbonated drinks (carbon dioxide gas dissolved in water), and oxygen gas dissolved in water bodies.

4. **Gases dissolve in gas:** The solution formed when, both, the solute and the solvent are gases. For example, air is a mixture of many gases.

Think Science

You might have seen your mother or grandmother keep your woollen garments, safely, in a box, at the beginning of summer. They keep some small white balls in between the clothes. What are these balls? When they open the box at the beginning next winter, the balls disappear. Where do the balls disappear? Find the reason behind it.

Water—A Universal Solvent

Most substances dissolve in water; therefore, water is known as the **universal solvent**. The water that we use comes mainly from rivers, ponds, lakes, and wells. The water collected in these sources contain substances such as sand, dirt, and germs, which make the water impure. The substances in water that make it impure are called impurities.

Water is a universal solvent. Many substances can be dissolved into it and make it dirty.



Oh! That's why we use water purifier to get clean water.



Building Block

Work in groups of three. Make a density tower in a transparent bottle, using coloured water, oil and liquid dishwash soap. Observe which liquid settles at the bottom and which one rises to the top.



Impurities in water

Soluble

For example, common salt dissolves in sea water.

Insoluble

For example, sand, mud, other substances which do not dissolve in water.

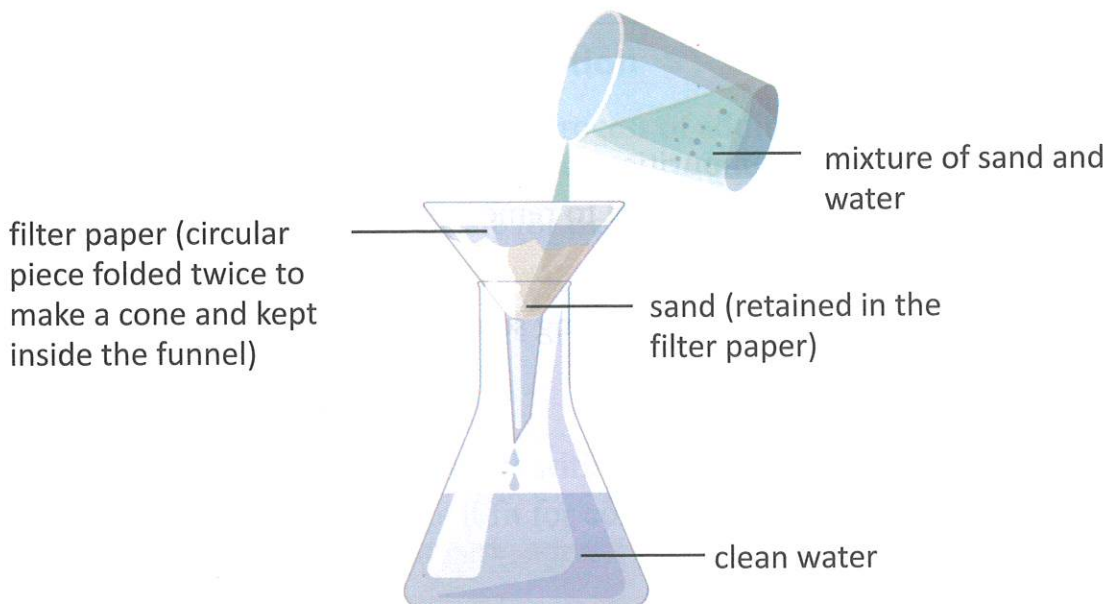
Separating Impurities from Water

We need to remove the impurities from water to make it fit for consumption. Different methods are used to separate soluble and insoluble impurities from water.

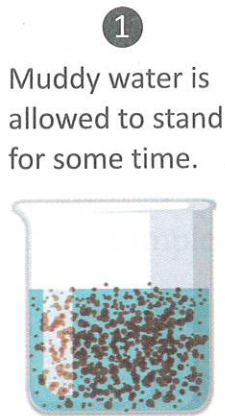
Separating Insoluble Impurities

It is easier to remove insoluble impurities. They can be removed through filtration, sedimentation and decantation.

Sand or solid impurities can be removed by passing the impure water through a filter paper. This is called **filtration**.



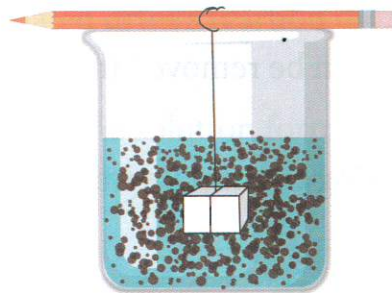
In the process of **sedimentation**, water is left to stand undisturbed in a container. After some time, the insoluble substances known as sediments settle at the bottom of the container. Clean water can then be poured out into a separate container. This is called **decantation**.



Info Bit

Alum is a chemical that helps in sedimentation as it increases the rate of sedimentation. This process is called **loading**.

1. A piece of alum is suspended in the beaker containing muddy water.



2. Alum particles attach themselves to the dirt particles suspended in muddy water, making them heavier.

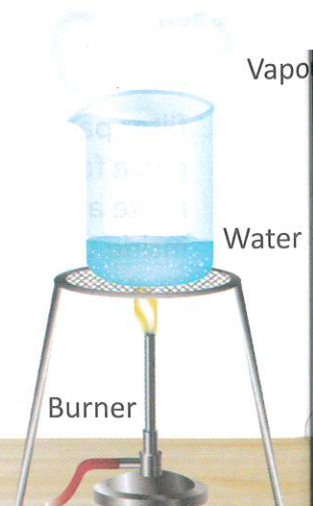


3. The dirt particles settle faster at the bottom of the container.

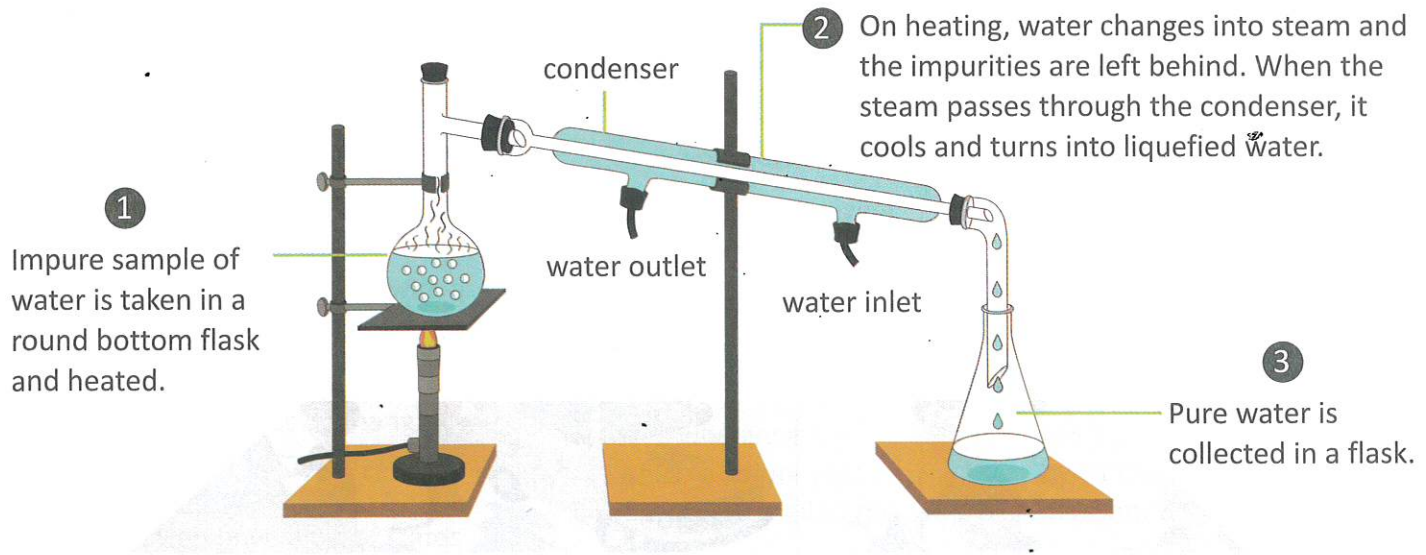
Separating Soluble Impurities

It is more difficult to separate soluble impurities as compared to insoluble impurities. Evaporation and distillation are used to remove soluble impurities.

In the process of **evaporation**, a solution containing soluble impurities such as salt and sugar is heated.



Distillation involves evaporation followed by condensation.



Purification of Water

Despite separating impurities from water, it may contain germs. Drinking contaminated water may cause diseases. Purification of water is required to make it fit for drinking.

Water purification is the process of removal of harmful substances, germs, and undesirable chemicals to make water potable. Water that is safe to drink or to use for food preparation is called potable water.

Water can be made potable by the following methods:

Boiling

It is the simplest way of purifying drinking water. Most germs can be killed by boiling water for upto 3 minutes.



Chlorination

It is the process of adding chlorine tablets to drinking water to kill germs present in it. This purifies the water and makes it safe for drinking. Chlorine destroys the germs that can cause waterborne diseases.

Water Filters

These machines use various technologies with microfilters to remove germs from water and make it fit for consumption.



Water Conservation

Refraining from wasting water and protecting our water sources is known as **water conservation**.

We can help to conserve water by practicing **3 R's—Reduce, Reuse and Recycle**.

Reduce: We should use less water.

Water is precious for our lives, but it is limited in amount. We should not waste it.

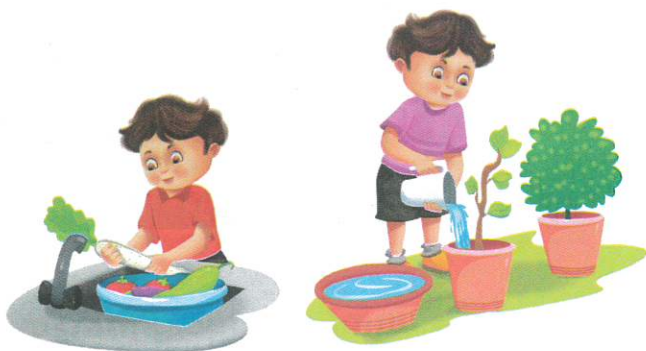


Wash dishes in a tub instead of a running tap.



Use a piece of cloth and a pail of water to wash cars instead of spraying water from a hose or a pipe.

Reuse: Water that has been used can be utilised again.



Water used for washing vegetables or rice can be used again for watering plants.



Water used for rinsing clothes can be used again for washing the toilet.

Recycle: Used water can be purified in a water treatment plant and used again.

Assess

1. Name the chemical used to kill germs in water.
2. Name the chemical that increases the rate of sedimentation.
3. Name the element that can exist in all three states in nature.
4. Name the processes used to remove soluble impurities from water.

States of Matter

Interconversion of States of matter

- One state of matter changes to another with a change in its temperature and pressure.
- The process of changing matter from one state to other is called interconversion of states of matter.
- It involves melting, freezing, evaporation, condensation, sublimation and deposition.
- Snowfall, rainfall, water cycle etc. are its applications.

Solution

- It is formed by mixing a solute in a solvent.
- The substance that dissolves is called the solute.
- The substance in which a solute gets dissolved is called the solvent.
- Solutions may be of different types depending on states of the solute and solvent.

Water

- It is a universal solvent.
- Contaminated water has impurities mixed in it.
- Soluble impurities can be separated by evaporation and distillation.
- Insoluble impurities can be separated by sedimentation, decantation and filtration.
- Water can be made potable by boiling and chlorination or by the use of water filters.

Science Words

- Evaporation • Fusion • Sublimation • Deposition • Condensation • Solution • Solute
- Solvent • Sedimentation • Loading • Decantation • Filtration • Distillation
- Water conservation • Water cycle • Miscible liquids • Immiscible liquids

Evaluate

A. Objective type questions

Tick (✓) the correct answers. Exchange your notebook with your classmate and check his/her responses.

1. Water cycle is important as:

- a. it maintains the amount of water on the Earth.
- b. it is a cyclic process.
- c. it involves change of states of matter.
- d. none of these

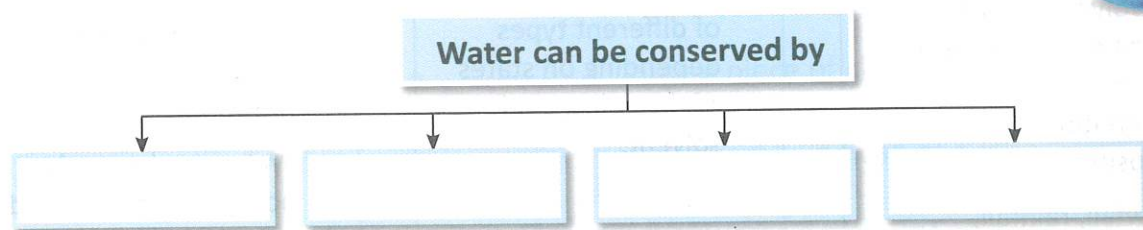
2. The phenomenon which changes gaseous state of matter into solid state is—

- a. evaporation
- b. sedimentation
- c. deposition
- d. fusion

- Soluble impurities from water can be removed by—
 - evaporation
 - distillation
 - both a and b
 - none
- Select the ways to make water germ-free and drinkable.
 - boiling
 - chlorination
 - both a and b
 - loading
- In which of these is the conversion of states of water involved?
 - rainfall
 - snowfall
 - water cycle
 - all of these

B. Short answer questions

- Identify the process shown in the diagram on the right and define it.
- What is difference between fusion and freezing?
- We spread our wet clothes under the Sun to dry them. Name the process involved in the drying of wet clothes and define it.
- Complete the given chart.



- Dry ice is a solid substance and transforms directly into gaseous carbon dioxide. Name and define the phenomenon involved in this.

C. Long answer questions

- Define water conservation. What are the 3 R's? Explain them with examples.
- What are the ways to remove soluble impurities from water? Explain them.
- Draw a simple water cycle to show the following processes involved in it: evaporation, condensation, and fusion. How is water cycle important to us?
- When a solute dissolves in a solvent, it forms a solution. How many types of solutions can you make? Categorise the given solutions based on state of the solute dissolved in the solvent.

banana milkshake

smog

air

LPG

cold drinks

Name the solutes and solvents in each type of solution.

D. HOTS

A group of students residing in a rural area have made a homemade water filter using different sizes of gravel and charcoal.

- What is the reason for using different sized gravel?
- Their teacher had told them that filtered water looks clean but it is not fit for drinking. Explain the reason.
- What should they do to make this water fit for drinking?

I WONDER

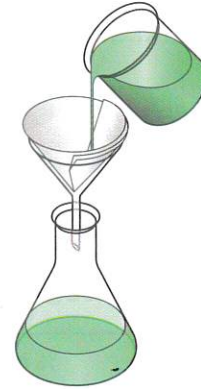
Investigate

I will: Remove insoluble impurities from water.

I need: Filter paper, funnel, beaker, muddy water, alum, thread, and a small stick of wood

I do:

1. Fold the filter paper in a conical shape as shown here.
2. Keep it in a funnel and now, keep this funnel in a beaker.
3. Now, pour muddy water through the filter paper.
4. The water in the beaker, now, is called a **filtrate**.
5. With the help of a thread, tie a small piece of alum on a wooden stick and suspend it in the beaker. It is called **loading**.
6. Keep the beaker undisturbed for few minutes.



I observe: Filtrate is free of mud but still it is not clean. But after _____, all mud particles settle down and a _____ is obtained.

I conclude: _____ impurities can be removed from water by filtration, _____ and decantation.

Suggested Activity

Sodium polyacrylate is a chemical substance used in baby diapers. Take half a spoon of sodium polyacrylate powder in a glass and add some water in it and observe the change that takes place.

Project Work

Form groups of three in class. Construct a vacuum cleaner using a pipe, a bottle, a DC motor, and a fan.



Worksheet

1. Look at the given picture. How does this picture depict various processes to conserve water?

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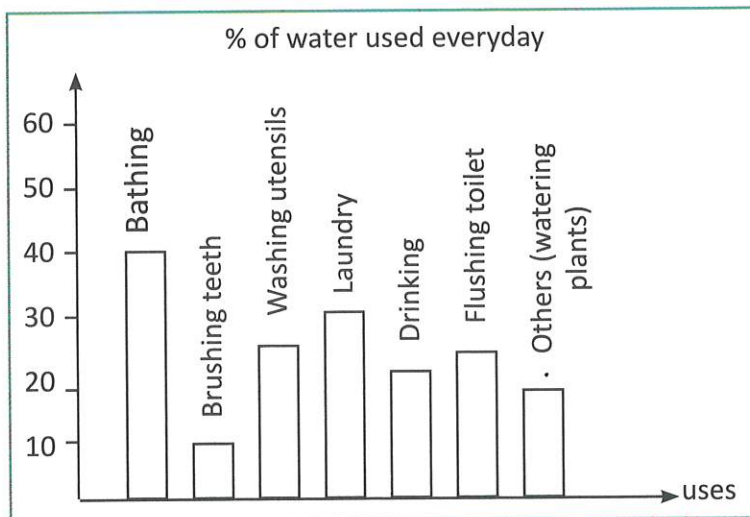
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2. The graph given below shows the percentage of water used by Avi's family, every day.



Name the activity that consumes—

- a. the maximum amount of water.

.....

- b. the least amount of water.

.....

- c. Suggest any two ways the family members can save water.

.....

.....

3. To reuse water, Radhika collected the water she used for washing dishes, to water her plants in the garden. After a week, she noticed that some of her plants were dying.

- a. What could be the reason?

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- b. What should she do if she plans to continue reusing water?

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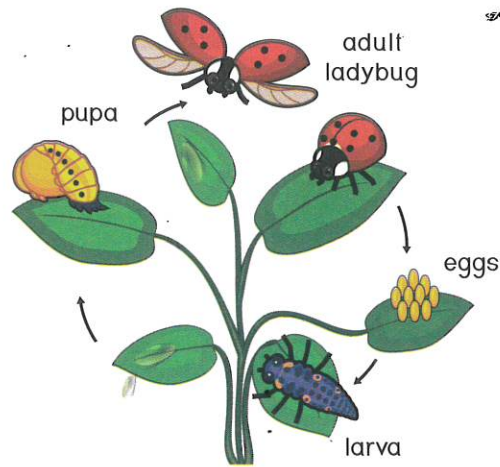
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Connecting Science

Study the given pictorial presentations of various cycles in nature.



Plant growth stages



Ladybug growth stages

Science

- What is fertilisation?
 - Is it common to both plants and animal reproduction?
 - State the result of fertilisation in i) plants ii) animals
- Notice the water droplet on the leaf above. Which state of matter is it? How do such water droplets appear on leaves?

Social Science

Find out and write these facts about India.

National Symbol	Name	Geographical Region of Presence
Flower		
Animal		

Math

Take a China rose flower and separate all its parts like petals, sepals, etc. Measure all the dimensions of sepals, petals and stamen.

English

Imagine yourself as a flower or an animal. Write the story of your life in a paragraph.

GK

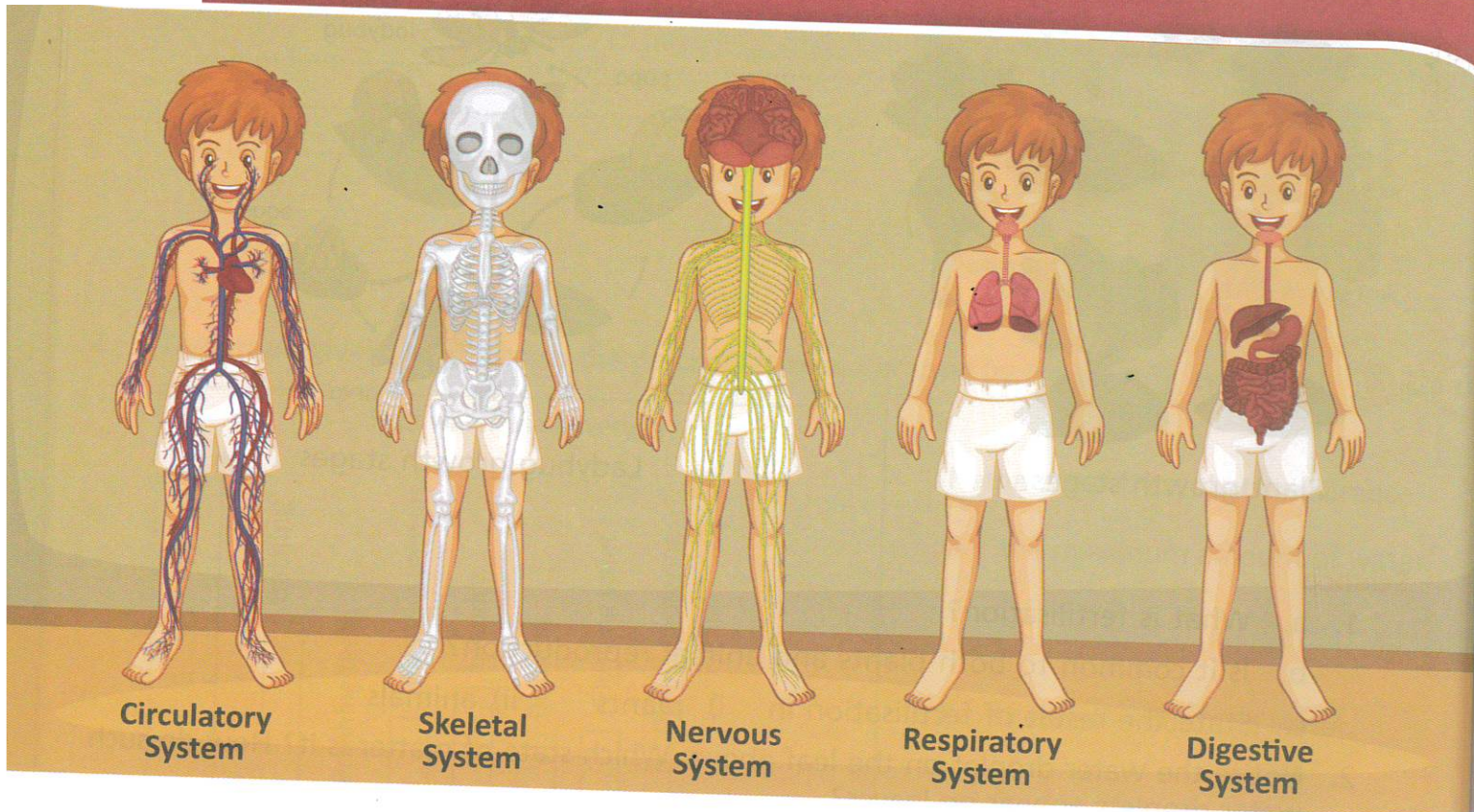
China rose is the National Flower of a country. Do you know the name of the country? What is India's National Flower?

Art and Craft

Create different flowers and animals using origami technique.

Human Body Systems

- Respiratory system
- Circulatory system
- Skeletal system
- Nervous system

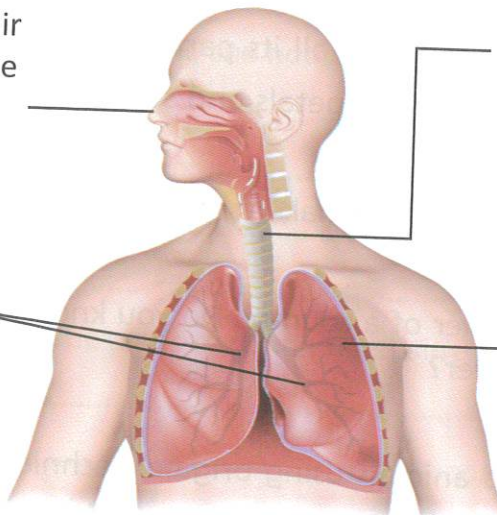


The human body is a fascinating system! The human body comprises of groups of organs, which perform specific functions for the body. They are called organ systems. These organ systems work together to perform life functions.

Respiratory System

The main organs of the respiratory system are **lungs**, **windpipe** and **bronchi**.

1. When we breathe in, air enters through the nose and is cleaned by the hair in the nostrils.
2. The air, then, moves down through the windpipe or trachea.
3. The windpipe branches off into smaller tubes called bronchi or bronchial tubes. These tubes end with balloon-like air sacs.
4. **Lungs** are the main organ of the respiratory system. In the lungs, oxygen is absorbed from the inhaled air and carbon dioxide is removed from the lungs as exhaled air. The air that we breathe in has more oxygen while the air that we breathe out has more carbon dioxide.



Info Bit

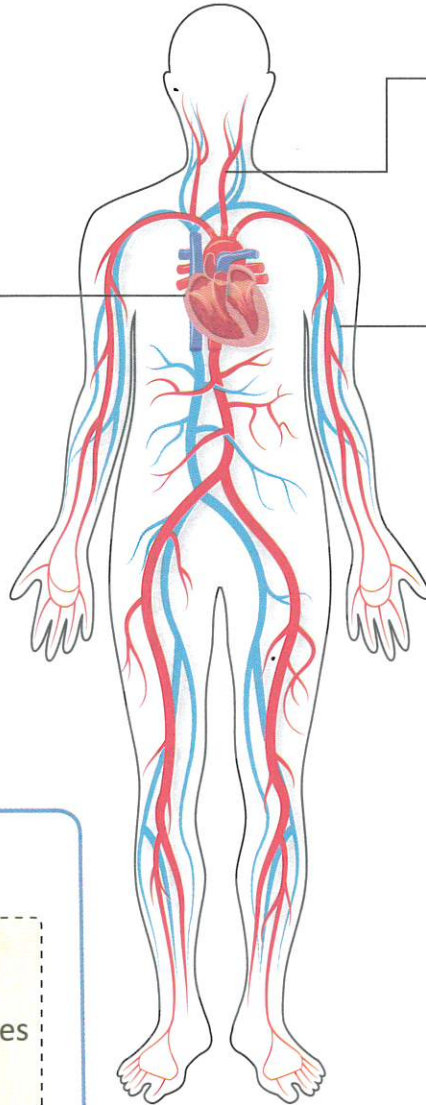
Blood is a part of the circulatory system. It transports the inhaled oxygen to all the parts of our body.

Circulatory System

Our **circulatory system transports** digested food materials and other substances to all the parts of our body. It is responsible for the flow of blood throughout the body. It consists of **heart, blood and blood vessels (veins and arteries)**.

Heart

It is a muscular organ, divided into 4 chambers. It pumps blood through these chambers to all the parts of our body. It contracts and relaxes 70-80 times a minute, when we are at rest (usually 72 times). The right side of the heart collects impure (deoxygenated) blood from all parts of the body and its left side distributes pure (oxygenated) blood to different parts of the body.



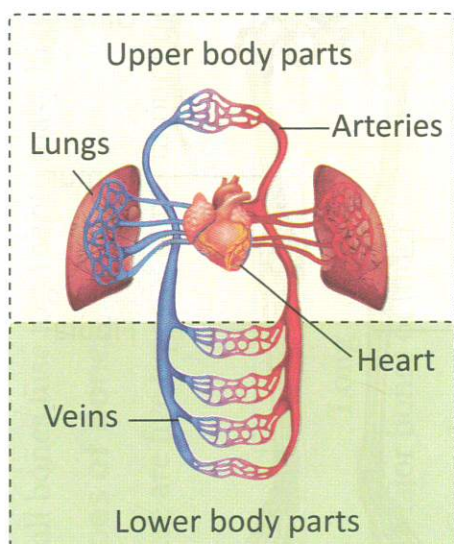
Arteries carry blood away from the heart. They circulate pure and oxygenated blood to different parts of the body.

Veins carry the blood towards the heart. They collect impure and deoxygenated blood from different parts of the body and carry it to the heart for purification.

Info Bit

1. An adult's heart pumps nearly 7500 litres of blood each day.
2. Your heart beats about 30 million times a year.
3. An adult body contains over 96000 km of blood vessels. If all the blood vessels of a body are laid from end to end, they can go around the Earth more than twice.

Science Talk



Our circulatory system circulates blood in two parts, as shown in the picture.

When arteries are blocked due to certain reasons, the heart does not get sufficient oxygenated blood and so the cells of the heart muscles are under stress. This is called a **heart attack**.

Blood

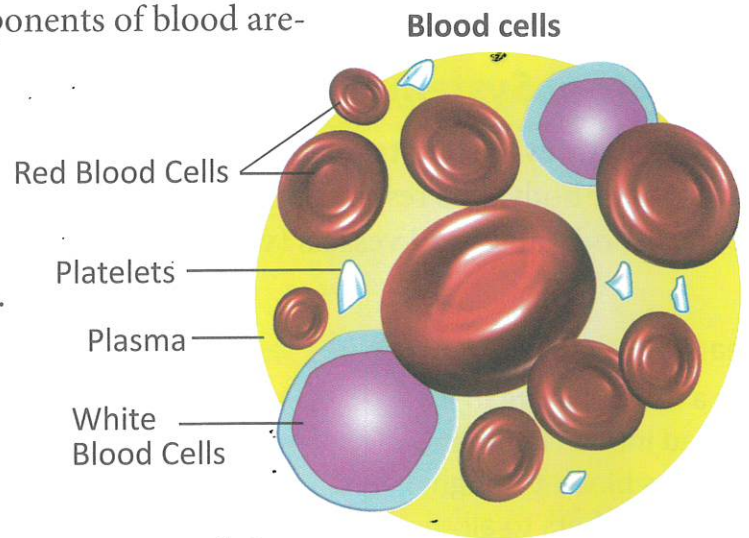
It is a fluid that transports oxygen and nutrients to our cells and collects carbon dioxide and other waste products. The important components of blood are-

RBCs (Red Blood Cells): They carry oxygen to and carbon dioxide from the cells of the body.

WBCs (White Blood Cells): They defend our body from germs, viruses and bacteria.

Platelets: They repair blood cells and are responsible for blood clotting.

Plasma : This carries nutrients.

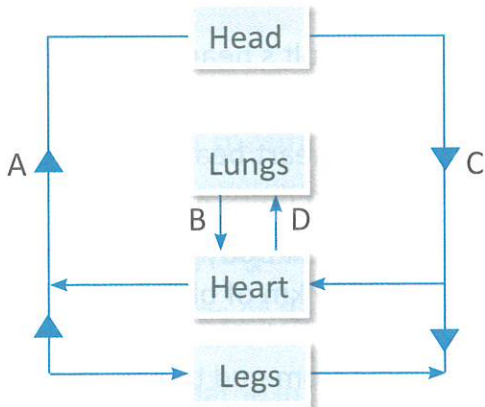


The human blood is classified into 4 groups: A, B, AB, and O.

This system is called the circulatory system as it circulates or moves blood from the heart to all the parts of the body and back to the heart again.

Think Science

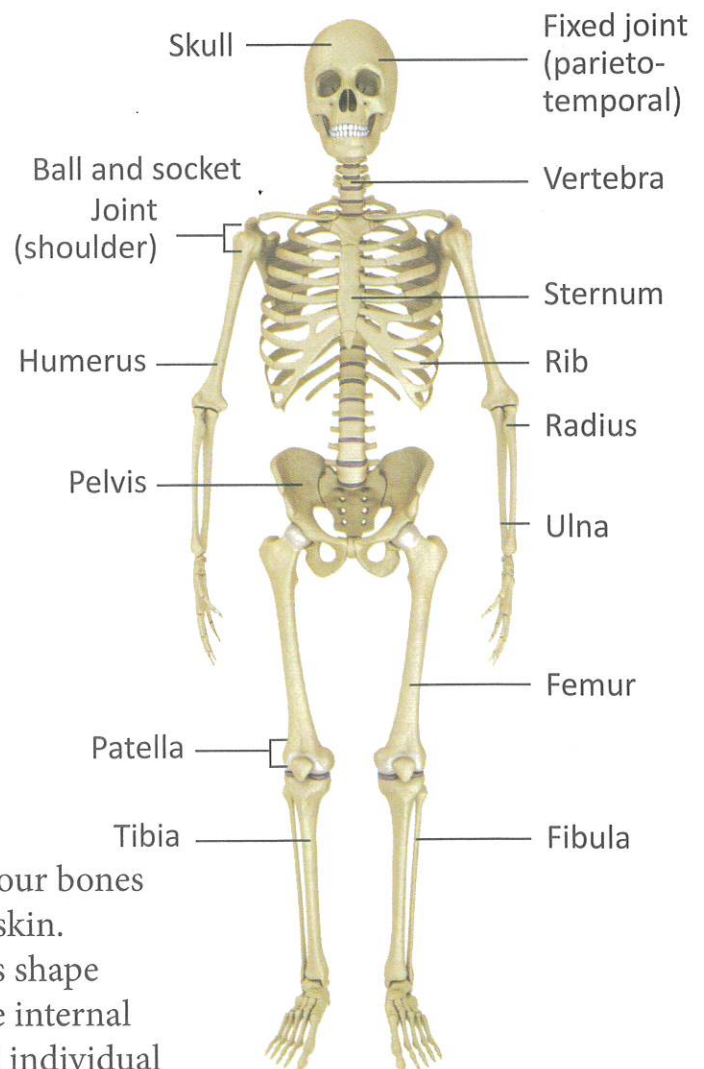
This is a simple diagram to show blood circulation in our body.



Which blood vessel—'B' or 'D'—carries deoxygenated blood? Give reason for the same.

Skeletal System

Bones make our **skeletal system**. We can't see our bones but we can feel some of them underneath our skin. Bones are hard and stiff. Bones give our bodies shape and support. They protect our soft and delicate internal organs. The skeletal system of an adult has 206 individual bones. A human baby is born with 270 to 300 bones.



The number of bones in our body reduces as we grow up because some small bones fuse together to make bigger ones.

Types of Bones

There are five types of bones in our body.

Types of Bones



Long

- Major bones of limbs
- Grow the most throughout childhood
- Responsible for our heights

Example

femur, tibia, fibula

Short

- Often round or cube-shaped

Example

wrist bones, ankle bones

Flat

- Vary in size and shape
- Very thin and flat
- Protect delicate organs

Example

ribs, hip bones

Irregular

- Differ in shape; from long to short and flat bones
- Non-uniform in shape

Example

vertebrae, some bones of the skull

Round

- Small and round in shape

Example

hands, knees, feet

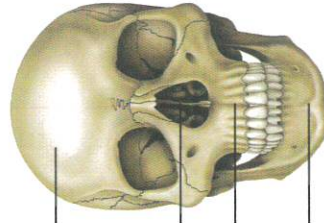
Info Bit

The longest bone in our body is the thighbone (Femur). The average adult Femur is about 19 inches long.

Components of the Skeletal System

Skull

It is made of 22 bones: 8 cranial and 14 facial. Its bones are immovable as they are joined together, except the bones of the **lower jaw (mandible)**. Skull protects our brain, eyes and middle and inner ears.



Frontal lobe

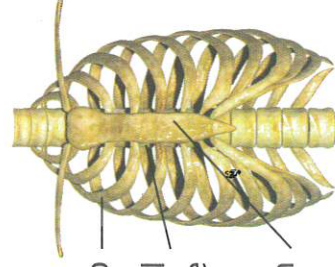
Nasal bone

Maxilla

Mandible

Ribcage

It is a cage of 24 ribs. Ribs are flat, thin bones. The ribcage protects our lungs, heart, stomach, and kidneys. In the middle of the chest there is sternum (**breast bone**) that holds the ribs. The last two ribs are not attached to the sternum, and hence, are called **floating ribs**.



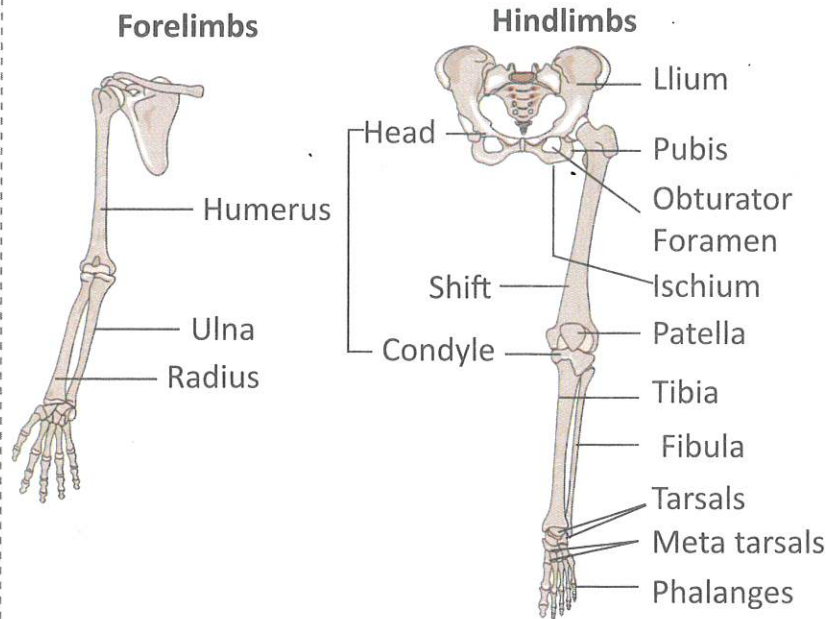
Rib

Costal
Cartilage

Sternum

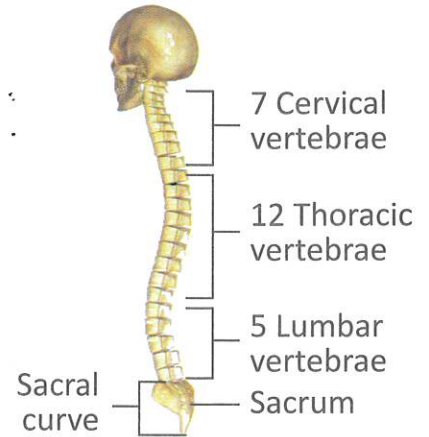
Limbs

Two types of limbs are: one pair of **forelimbs** and one of pair **hindlimbs**. The forelimbs consist of **arms and hands**, while hindlimbs consists of **thighs, legs, feet and kneecaps**.



Vertebral Column (Spine or Backbone)

It is attached to the skull and contains 33 irregular shaped bones called **vertebrae**. The spinal cord passes through it. It is divided into 5 parts: **cervical, thoracic, lumbar, sacrum and coccygeal**.



Info Bit

There are two girdles in the human skeleton—the shoulder girdle and hip girdle. Girdles are ring-like bony structures.



Our skeleton is made of hard and stiff bones. So, how are we able to move our hands, legs, etc.?

We move various parts of our body with the help of joints and ligaments.



Joints and Ligaments

Joints are special points at which two or more bones are attached to each other with the help of ligaments. Ligaments are very strong elastic bands of tissues that join the bones together.

Types of joints

1. **Movable:** They help in movement. For example, arms, legs, fingers, etc.
2. **Non-movable:** They do not help in movement. For example, joints of ribcage, skull, etc.

Pivot joint (radioulnar)

Rounded surface of one bone fits into the ring of another to make a pivot.

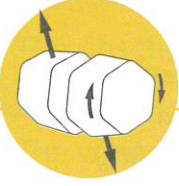
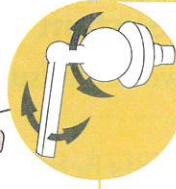
For example, the spine that helps us move our head.



Ball-and-socket joint

It looks like a ball fitted in a socket and so named as 'ball-and-socket'. It allows multidirectional movement and rotation.

For example, hips and shoulders.



Gliding joint (intercarpal)

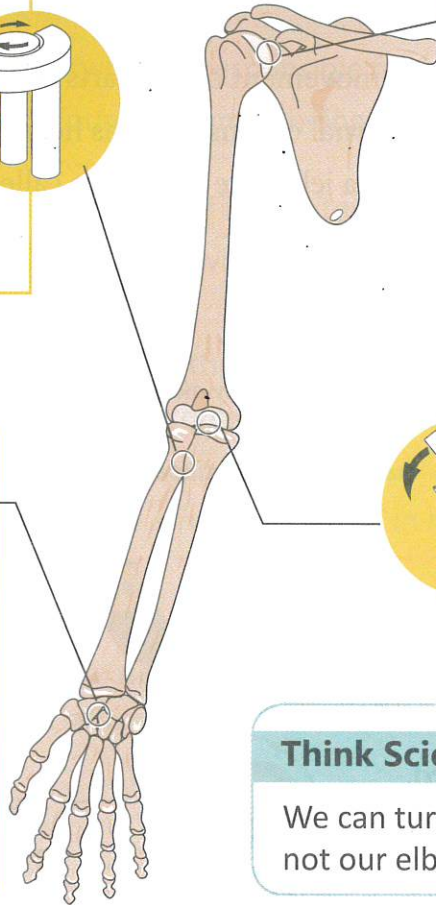
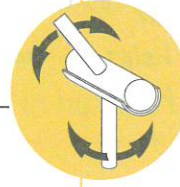
It is composed of many interconnected bones. It allows the bones to glide against each other and facilitate up-down, left-right and diagonal movement.

For example, wrist and ankle.

Hinge Joint

It is like the joint of a door. It allows movement in one direction only.

For example, elbows, knees and fingers.



Think Science

We can turn our head in multiple directions but not our elbows or knees. Why?

Cartilage and Muscles

Cartilage is a flexible tissue that holds the bones together at joints. Some organs, such as ribcage, the ear and the nose, among other components, have cartilage. It protects the bones. Bones would rub against each other and wear out if there were no cartilage.

What Muscles Do

Muscles stretch across the bones and cover them. They are connected to the bones with help of **tendons (a tissue)**. Muscles, in combination with bones, help in the movement of every part of our body. There are more than 600 muscles of different shapes and sizes which perform various functions in our body. Muscles that we can control are **voluntary** muscles and those which we cannot control are **involuntary** muscles.

Types of Muscles

1. **Smooth:** Their movement cannot be controlled by choice. These are involuntary muscles. For example, the majority of blood vessels and internal organs, such as in the digestive system.
2. **Skeletal:** We have control over them. They help in movement of the parts of our body. These are voluntary muscles. For example, muscles in arms, legs, etc.
3. **Cardiac:** These are the muscles in the heart. Their movement cannot be controlled by choice. They work automatically. These are involuntary muscles.

Functions of Skeletal System

1. It provides the framework that supports the body, maintains its shape, and helps us to stand upright.
2. Muscles, bones, and joints help in the movement of the parts of our body.
3. The skeleton **protects** our delicate internal organs, such as heart, lungs, and stomach.
4. We have many hollow bones filled with a jelly-like substance called **bone marrow**, in which blood cells are produced.

Nervous System



Whenever we touch a hot object, our nervous system helps us to move our hand back, instantly.

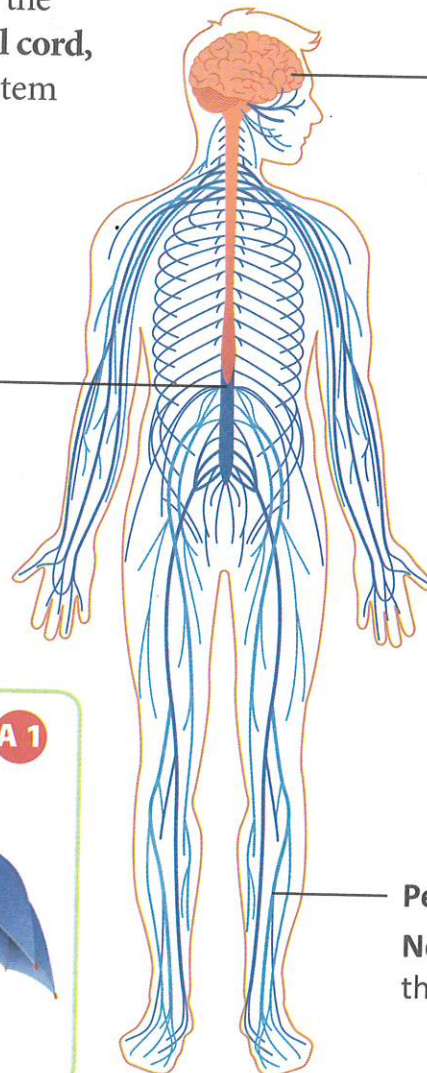
But, what makes us to withdraw our hand so immediately?



It is our nerves that help us in withdrawing our hand instantly.



All our actions are controlled by the nervous system. Our **brain, spinal cord,** and **nerves** work together in a system called **nervous system**.



Brain

The brain controls the whole body. Its main parts are **cerebrum, cerebellum, and medulla**.

Spinal cord

It is a bundle of nerves that carries messages from brain to the other parts of the body.

Peripheral nerves

Nerves carry messages throughout the body.

Building Block

DL A 1

Which of your organ systems has the same function as the metal framework of an umbrella? Explain why.



Fill in the blanks using suitable words.

1. Human circulatory system consists of , and
2. The component of blood which is responsible for blood clotting is
3. The main blood groups found in human beings are , , and
4. are the main organs of respiratory system.
5. We move the parts of our bodies with help of joints and
6. The joint found in the hip is
7. The ribs that are not attached to the sternum are known as
8. protects our body from bacterial diseases.
9. The windpipe is also known as
10. are ring-like bony structures found in hip and shoulder.

Brain

The brain is the control centre of the nervous system. It controls all body functions. It is active even when we are asleep. The brain has three different parts that work together.

Cerebrum

Cerebrum is the largest part of our brain. It is the thinking part of the brain and it controls the voluntary muscles. It is the **centre of intelligence**. It has grooves and folds.

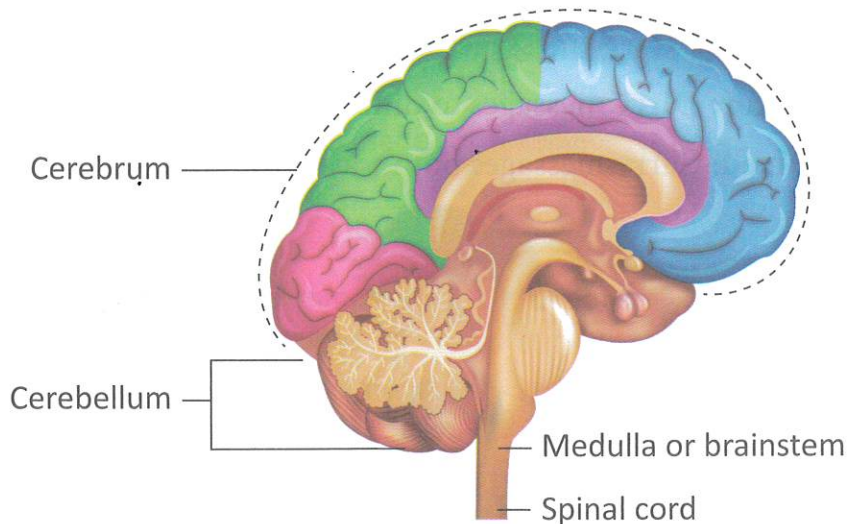
It is responsible for creativity, thought process, learning, memorising, logical reasoning, etc.

Cerebellum

Cerebellum lies below the cerebrum and at the back of the brain. It is also known as the **little brain**.

It is responsible for control and coordination of voluntary muscles, balance, and posture of our body. It is because of the cerebellum that we can stand upright, keep our balance or move around.

Brain stem or medulla connects our brain to the spinal cord. It is responsible for breathing, food digestion, blood circulation, etc. It controls the involuntary muscles, such as stomach and heart muscles.



Info Bit

The cerebrum has two halves, known as the right brain and the left brain. Our memories both short term memory and long term memory are stored in the cerebrum.

Spinal Cord

It is a thick bundle of nerves that lies in, and is protected by, the vertebral column. It acts like a bridge between the brain and the rest of the body as the brain receives and sends signals through spinal cord.

It also controls the actions that do not involve the brain. Such actions are called **reflex actions**.

Nerves

They are made up of **nerve cells or neurons**.

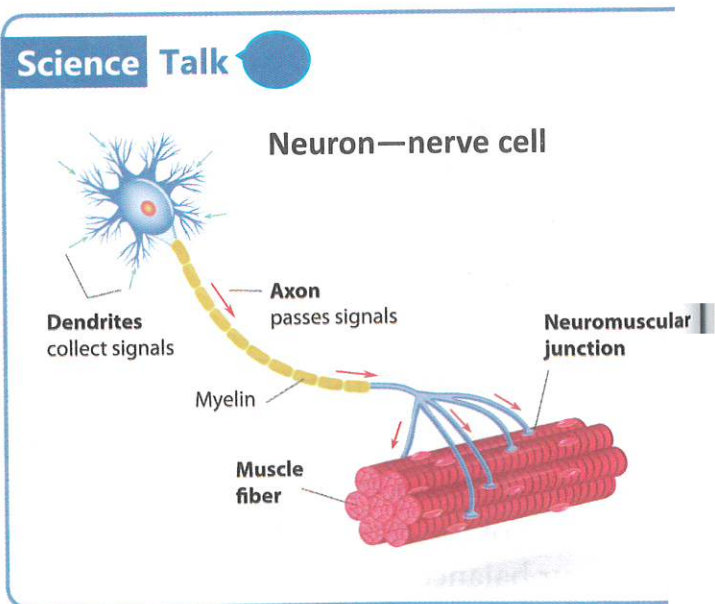
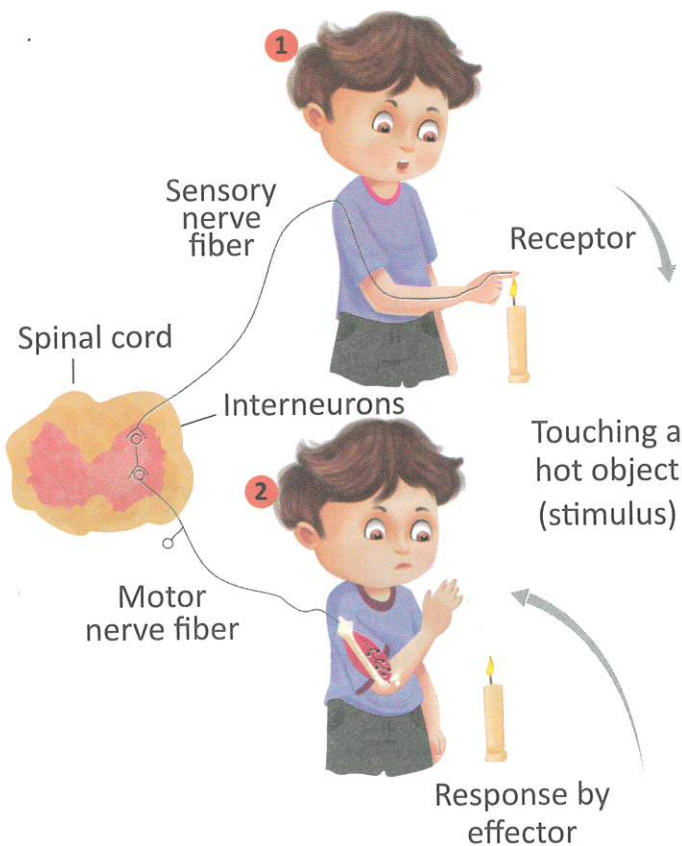
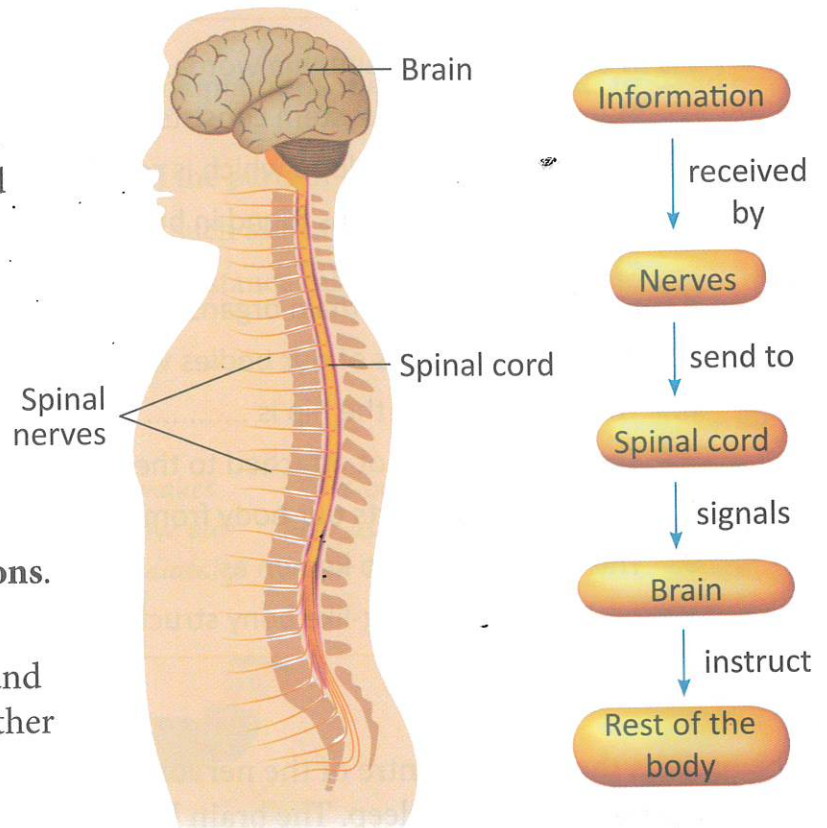
Nerves work as a network that runs throughout the body, carry messages to and from the brain, the spinal cord and the other parts of the body.

Types of Nerves

Sensory: Carry messages from different parts of the body to the brain or the spinal cord

Motor: Carry messages to different parts of the body from the brain or the spinal cord

Mixed: Carry messages both ways, from the brain to different parts of the body and vice-versa



Reflex Action

Whenever you touch a hot object, you remove your hand, immediately. This automatic **response** of a body to an event (**stimulus**) is called reflex action.

In this action, the brain is not involved. Such actions are very fast and are controlled by the spinal cord.

EXPLORE

Why is a reflex action an automatic behaviour? Give some examples of such actions. Analyse the reasons why reflexes are useful.

Assess

There are three different organs given below. Identify them and name the organ systems which they belong to.



.....



.....



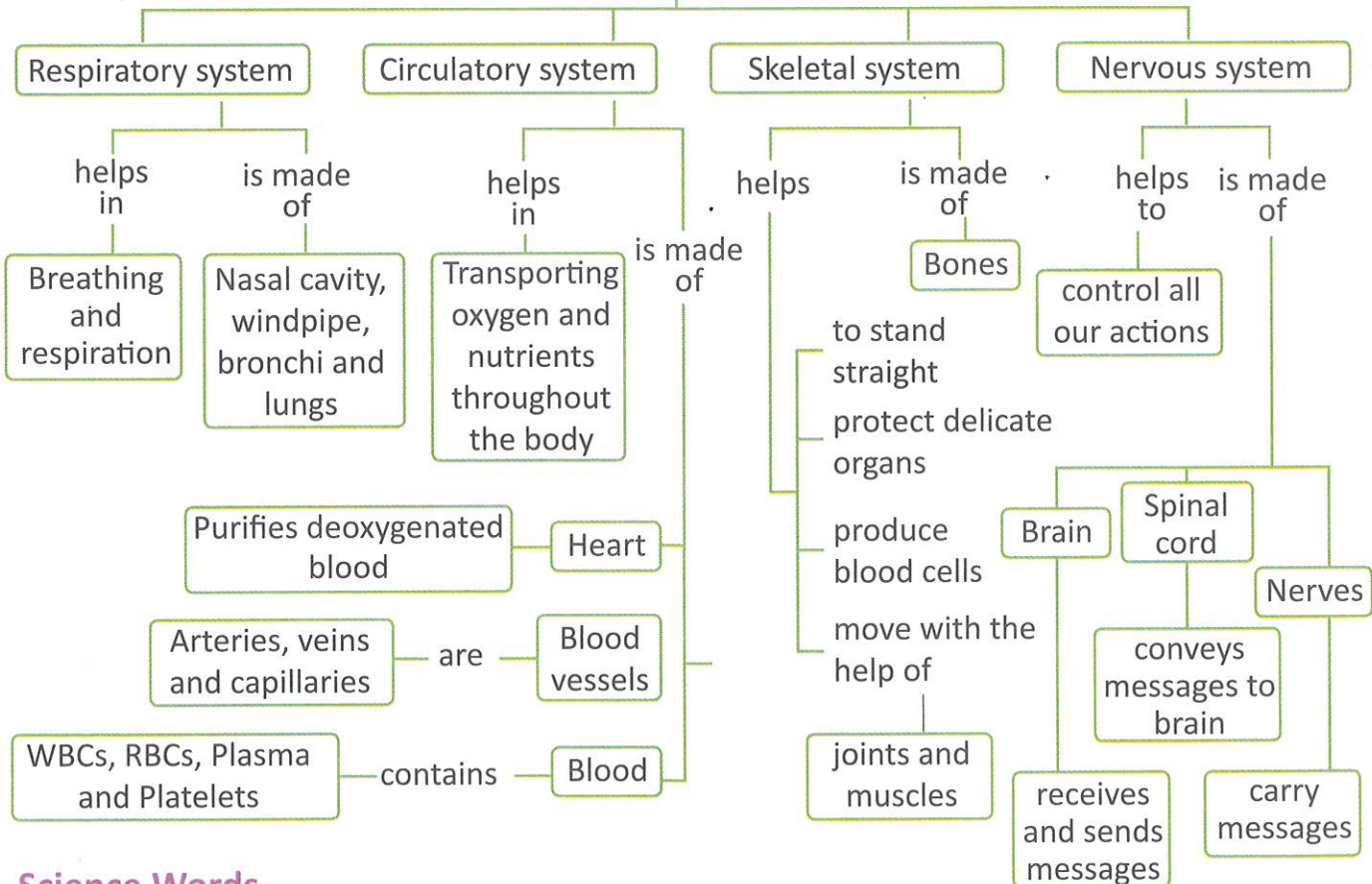
.....

What will happen if any of the systems are not present in someone's body? Write in brief.

.....

I Have Learnt

Human Body System



Science Words

- Arteries • Veins • Blood • Blood cells • Circulation • Platelets • Mandible • Respiration
- Ligament • Joints • Bones • Cartilage • Spinal cord • Neuron • Bone Marrow
- Reflex action • Stimulus

Evaluate

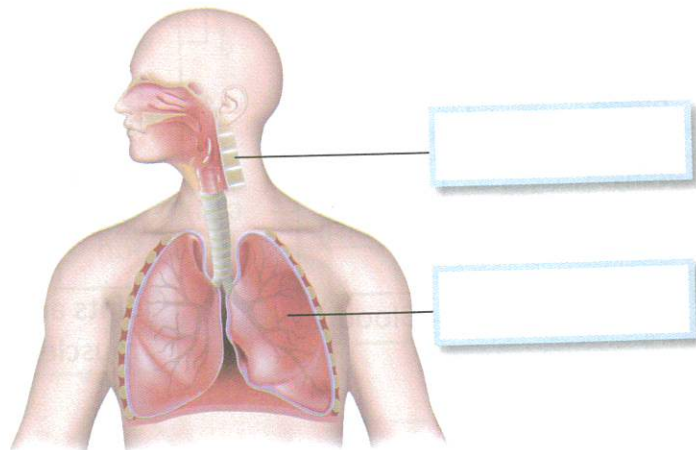
A. Objective type questions

Tick (✓) the correct options. Exchange your book with a classmate and check his/her answers.

- The organ system that transports digested food materials and other substances throughout the body is
a. the skeletal system b. the circulatory system
c. the nervous system d. the digestive system
- Which of the following is known as the 'Centre of intelligence'?
a. cerebrum b. cerebellum c. spinal cord d. nerves
- The organ in the respiratory system in which the exchange of gases takes place is—
a. lungs b. windpipe c. nose d. bronchioles
- The involuntary muscles in human body are the—
a. ear muscles b. cardiac muscles
c. tongue d. thigh muscles
- Hinge joints are found in the—
a. elbow b. knee c. fingers d. all of these

B. Short answer questions

- What does our spinal cord do?
- What is 'bone marrow'? Why is it important for us?
- Label the given diagram and write the main function of each part.



- State one difference and a similarity between cerebellum and cerebrum.
- What is blood? Name the constituents of blood and write their main function in the human body. Name the blood groups humans have.

C. Long answer questions

1. Name the types of joints that are involved in moving and folding the body parts in this posture. List the functions of each of the joints involved.



This is how the the skeletal system looks when we sit.

2. What are muscles? Name the different types of muscles. Write their functions.

D. HOTS

Amit wants to find out how his actions affect his heartbeat. He notes his heartbeats and makes a table as shown below.

Activities he performed	Heartbeats per minute
reading books	69
sitting in a room	65
walking	72
jogging	100
running	110

How are the activities and heartbeat (per minute) related? Give reasons for the same. Can he control his heartbeat? How?

E. Values and life skills

Last evening, in the park, Annu noticed an old person. He was not feeling comfortable. She found out he felt pain in his chest. Annu held his hand and took him to the medical clinic nearby.

The doctor immediately gave him first-aid and appreciated Annu for her helpful behaviour. Her action had helped an old person.

What may be the reason for the pain in the old man's chest? Can the problem be related to the circulatory system? If yes, which part of the circulatory system could be affected?



I WONDER

A 1 EA HL 21 CT

Investigate

I will: Observe the movement of our ribcage while breathing and count the number of breaths in a minute.

I need: A noise-free place and a stopwatch

I do:

1. Take a deep breath and keep my palm on my chest.
2. Start the stopwatch and start breathing (inhale and exhale) normally.
3. Note down the number of breaths at least thrice.



I observe:

1. When I inhale air, my ribcage moves out and upwards and causes the space in the chest to become bigger.
2. When I exhale air, my ribcage moves in and downwards and causes the space in the chest to become smaller.
3. I breathe out times in a minute.

I conclude:

1. When we breathe in, our chest expands, and thus, helps to pull the air into lungs.
2. When we breathe out, our chest contracts, and thus, helps to push out the air from lungs.
3. Number of breaths varies from 12 to 20 times a minute.

Suggested Activity

CcL HL

Find out how much air can your lungs hold. Take a balloon and stretch it. Take a deep breath and blow all at once into the balloon. Tie the balloon at the top to hold the air in. Ask a partner to measure the circumference of the balloon at the middle using a measuring tape. Record the width. Perform an exercise and repeat the air blowing process. Compare the readings.

Project Work

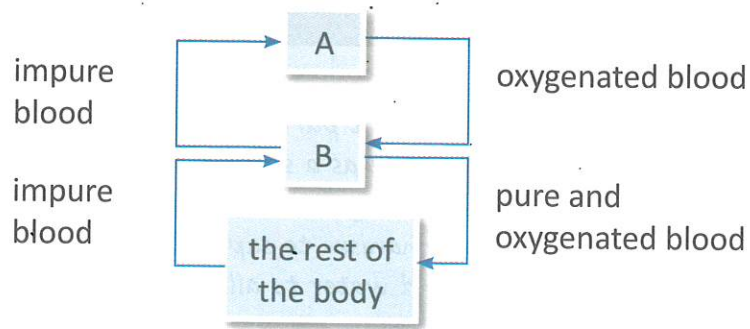
Work in pairs. Make a model of a nerve cell, using wool threads and beads.



Worksheet

Answer the following questions.

1. Study the given diagram and answer the questions asked.



- What does the diagram show?
.....
- Name the organs 'A' and 'B' involved in the process.
.....
- Explain the whole process shown in the given diagram.
.....

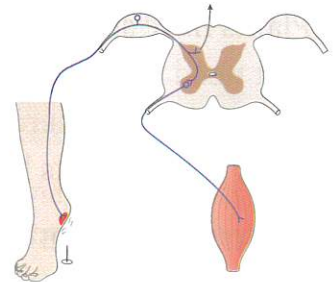
2. Study the diagram of the human ribcage. Answer the given questions.

- Which organ system does it belong to?
.....
- Name any two organs that are protected by the ribcage.
.....
- Explain how the chest gets bigger when we breathe in.
.....



Human ribcage

- What kind of an action does the given picture depict?
.....
 - Explain the process involved in the action.
.....
.....
.....



Stepping on a nail

Microorganisms

In This Lesson

- How microbes are classified
- The importance of fungi and bacteria
- The harmful effects of fungi and bacteria
- Understand the need for food preservation

Chinmaya, look at these fruits! There are some spots on them.

I think these spots appear when fruits rot.

These spots carry very small organisms that grow on the fruits and cause it to rot.



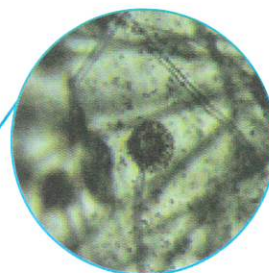
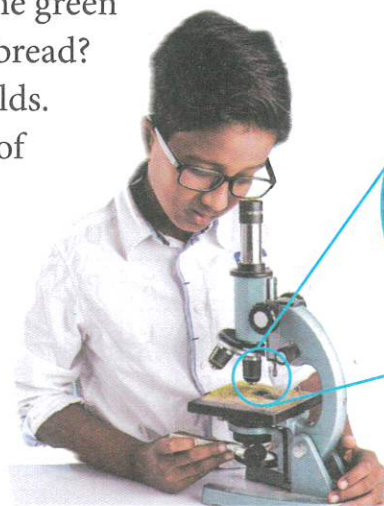
There are many living organisms in our surroundings that can't be seen through the naked eye. They may cause diseases.

Very small living organisms that can only be seen using a microscope are called **microorganisms** or **microbes**.

Have you ever noticed some green or black spots on slices of bread? These formations are moulds. Mould is also a collection of microorganisms.



These spots are moulds.



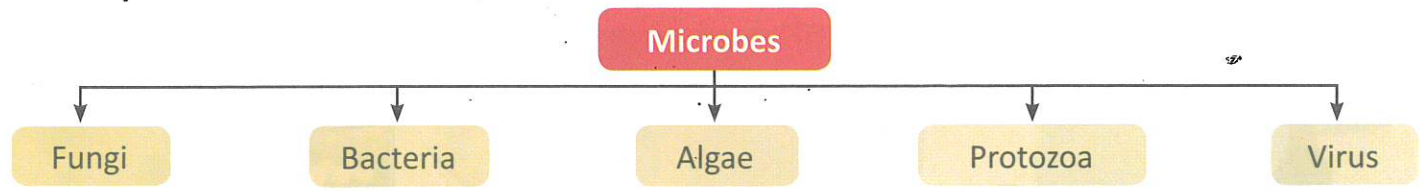
Mouldy bread under a microscope

Info Bit

The first microscope was invented by **Hans Janssen** and his son, **Zacharias Janssen**.

Types of microorganisms

Microorganisms are categorised into five groups.

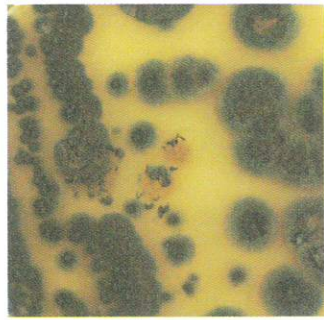


Fungi

Fungi are found in various sizes. Some fungi, such as mushrooms and yeast, are large enough to be seen with the naked eye, while others, such as moulds, are so small that microscopes have to be used to see them.



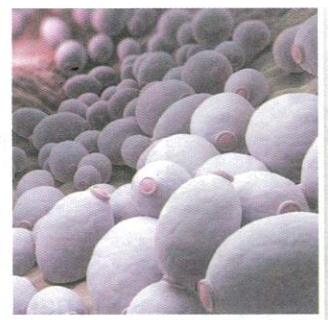
Fungi growing on the trunk of a tree



Moulds grow on the surface of a liquid (oil) and thus feed upon it.



Mushrooms



Yeast cells under a microscope

Harmful Effects of Fungi

Most fungi have harmful effects. Fungi are responsible for diseases like ringworm and athlete's foot.

Fungus - A harmful organism



causes diseases in humans and other animals



spoils food, fruits and vegetables



can be poisonous



causes plant diseases

Importance of Fungi

Though most fungi spoil our food materials and cause diseases, some of them are useful too.

Food made using fungi



Soy sauce



Bread



Vinegar

Used in bakery shops



To bake cake, pizza, biscuits, etc.

Help to recycle nutrients in soil



Soil

Saprophytic bacteria and fungi recycle nutrients by feeding on dead and decayed materials.

Bacteria

Produce medicines



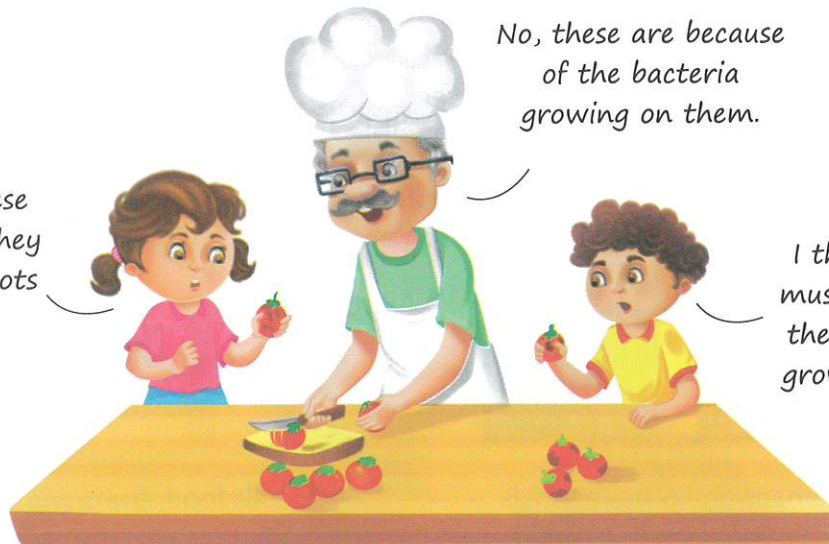
Penicillin, an antibiotic, is produced from a fungus called Penicillium.

Used as food



Mushrooms and Yeast

Look at these tomatoes! They also have spots on them.



No, these are because of the bacteria growing on them.

I think, these must be due to the fungi that grow on them.

Think Science

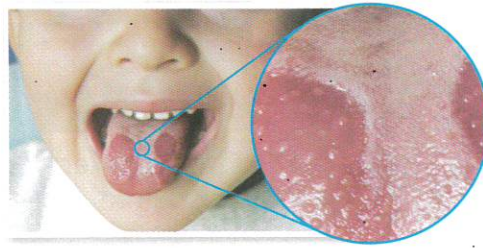
One day, Jigyasa's science teacher took the students of her class outside to the school park. Jigyasa found that some leaves of a plant were looking different from the others. Some of the leaves had brownish yellow spots. She was puzzled to see such leaves. Can you help her to find the reason behind this? Write your view on the same.



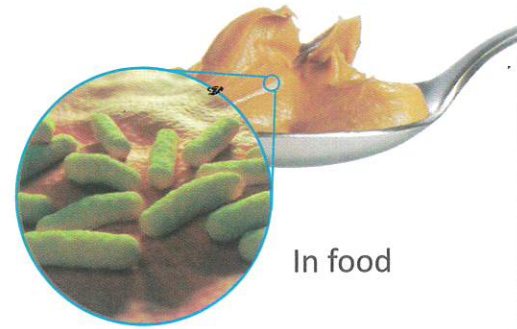
Bacteria are living organisms and can only be seen under a microscope. Bacteria are everywhere. Some bacteria are good, and some are bad.



In air



Bacteria on the surface of the tongue



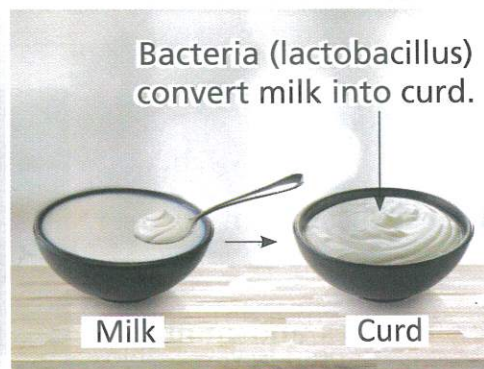
In food

Good Bacteria

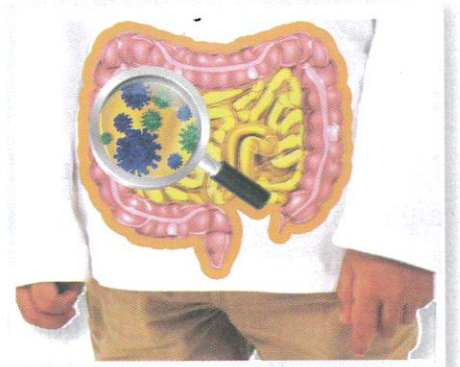
Good bacteria are useful to us in many ways.



Bacteria in the roots of leguminous plants help to absorb nitrogen from the soil.



Bacteria also help to turn milk into cheese, butter and yogurt.



Bacteria live in our intestines and help in digestion.

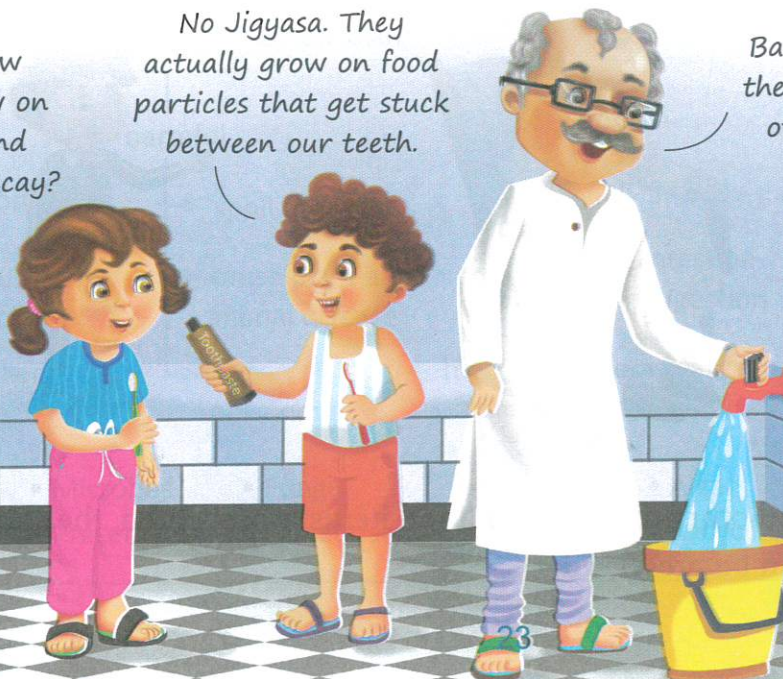
Bad Bacteria

Bacteria cause many diseases in humans, plants, and animals.

Do you know bacteria grow on our teeth and cause teeth decay?

No Jigyasa. They actually grow on food particles that get stuck between our teeth.

Bacteria are also the cause of some other diseases.



Info Bit

Some bacteria can grow in the absence of oxygen or air and they are called anaerobic bacteria. For example, the bacteria found in our gastrointestinal tract is anaerobic.

Bacteria which grow in the presence of oxygen or air are called aerobic bacteria.

Bacterial diseases in animals

Cholera	Diarrhoeal diseases	Pneumonia
Tuberculosis	Anthrax, Typhoid	Tetanus
Diphtheria	Whooping cough	Leprosy

Bacterial diseases in plants



Citrus canker on lime



Wilt in oak



Early blight in tomato

Think Science

On a summer day, Chirag's mother forgot to keep the milk in refrigerator. The milk was left in the warm kitchen overnight. In the morning, she noticed that the milk had curdled. Now find out—

1. the reason for the curdling of the milk;
2. how the milk looks after curdling.

Other Microbes

Not only fungi and bacteria, but other microbes, such as algae, protozoa and viruses, also cause diseases in plants and animals.

Polio, chicken pox, dengue fever, measles and mumps are some diseases caused by viruses, while malaria and sleeping sickness are protozoan diseases.

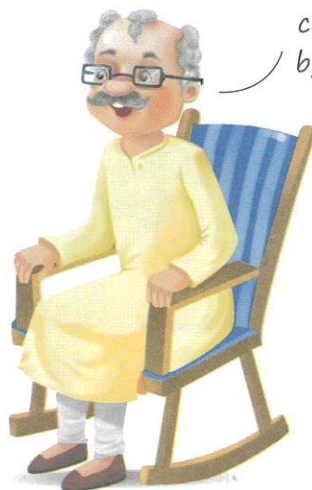


Algae grown in pond water. They are green in colour. Some algae can be blue or red in colour.

Food Preservation



Fungi and bacteria spoil our food. Can we not stop them from doing it?



Spoiling of food can be prevented by preserving our food items.



Vaigyanik Chacha, how can we preserve our food?

If growth of bacteria, fungi and other microbes on food items is prevented, the spoiling of food can be stopped. Thus, food can be preserved.

Some common methods of food preservation are:



Pasteurisation: It destroys disease causing bacteria and other microbes by boiling and then cooling.



Canning and Bottling: This means storing jams, sauces and similar items in air-tight cans and bottles.



Pickling: It means mixing salt and oil to fruits and vegetables.



Deep Freezing: This involves keeping food items in the freezer for long-time preservation.



Drying: This is the oldest way of food preservation.

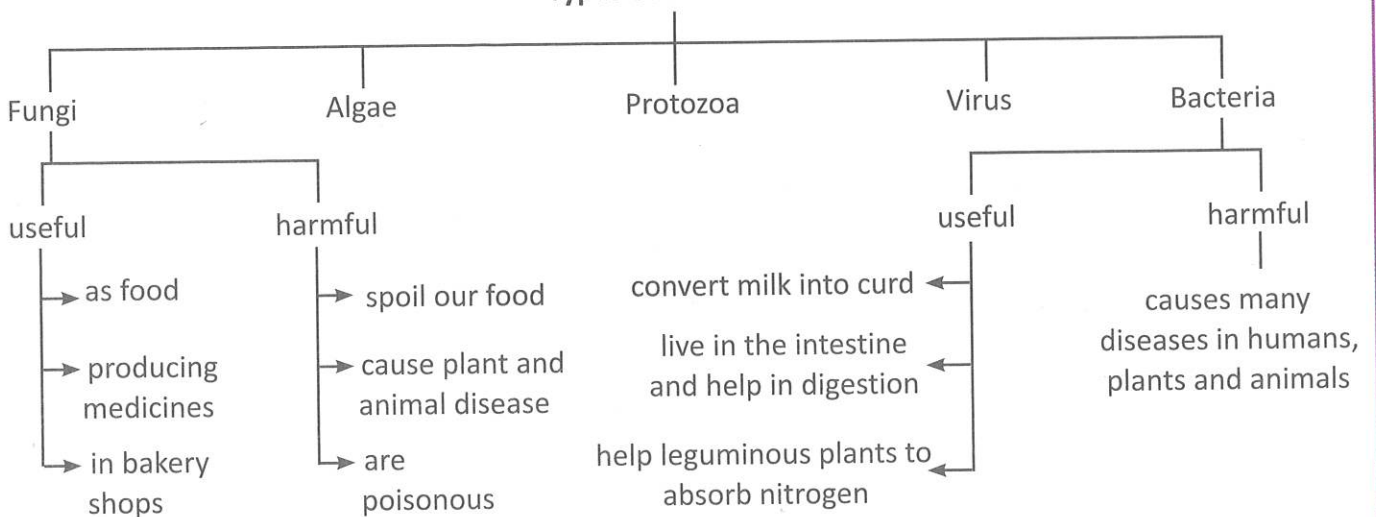


Refrigerating: This means keeping food at a low temperature for short-term preservation.

I Have Learnt

Microbes or microorganisms are small living organisms that can be seen only by using a microscope.

Types of Microbes



Science Words

- Microbes
- Fungi
- Bacteria
- Algae
- Moulds
- Preservation
- Pasteurisation
- Canning
- Recycling nutrients
- Pickling

Evaluate

A. Objective type questions

Tick (✓) the correct answers. Exchange your notebook with your classmate and check his/her responses.

- The microscope is generally used to observe—
a. plants b. animals c. microbes d. mushrooms
- Which of the following live in the human intestine and help in digestion?
a. moulds b. mushrooms c. yeast d. bacteria
- Which statement about microbes is incorrect?
a. Some microbes are useful to us, they do not harm us.
b. Most of them can be seen clearly only under a microscope.
c. Some of them are useful but some are harmful also.
d. All of these.
- The microbes generally used for baking food items like pizza and biscuits are—
a. moulds b. mushrooms c. yeast d. bacteria
- A microbe that can be seen with the naked eye is—
a. virus b. mushroom c. bacteria d. none of these

B. Short answer questions

- Ria noticed a green formation on the bread. Should she eat this bread? Give a reason for your answer.



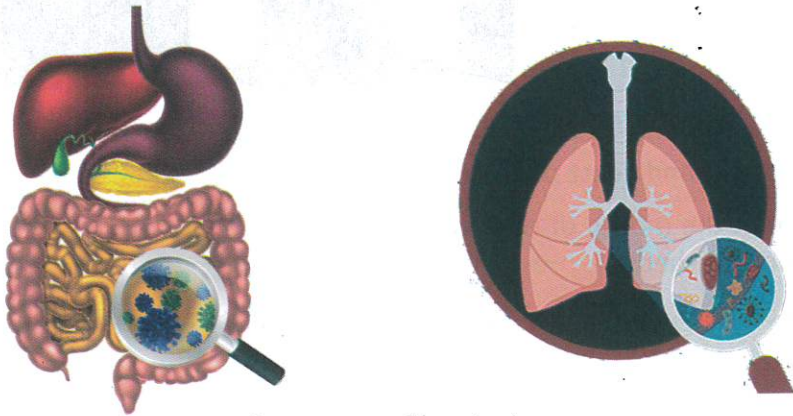
- We make pickles and sauces of vegetables.
What is the scientific reason behind it?
- Name any two diseases caused by protozoa.
- Name any two bacterial diseases each in plants and animals.
- A 7-year old boy eats many chocolates and candies everyday. Soon, he complains of toothache. What could be the reason for the toothache? How can it be prevented?

C. Long answer questions

- Your parents and teachers ask you to wash your hands and other exposed parts of your body whenever you come back from a playground. What is the reason for it? What could happen if you do not wash the parts of your body properly?
 - Why are some bacteria called good bacteria? Mention two reasons.
- Deepu bought a packet of milk and drank it. It tasted sour. A few hours later, he became ill. Why did Deepu become ill? How can we prevent fresh milk from getting sour? Explain.
- 'Fungi are harmful as well as useful to us'. Justify the statement. Mention any three points.

D. HOTS

Identify the given organ systems. How do bacteria affect both the systems?



Presence of bacteria

E. Values and life skills

A child in your play group eats junk food regularly. You have noticed that he often puts his finger in his mouth to remove stuck particles. What dangers do his habits pose? What advice would you give him?