

01.

Air, Water and Weather



Key Concepts

1. Atmosphere
2. Composition of air and its uses
3. Properties of air
4. Land breeze and sea breeze
5. Water: evaporation and condensation
6. Water cycle and its importance
7. Weather

Why should I read this chapter?

Air and water form the basis of our lives as we require air to breathe and water to drink. In this chapter, we will read about the composition of air and water and their importance. We will also read about changes in weather and how it affects our daily life.





Prep-up

Have you ever wondered how birds and aeroplanes fly in the sky?



1. What do you think makes these changes happen, air or water?



2. Why do you think air is important to us?

a. It helps birds and aeroplanes to fly.

b. _____

c. _____

Key Concept: Atmosphere

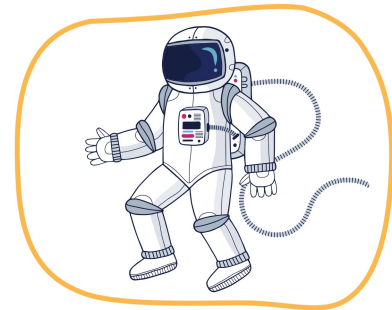


Activity 1

Astronauts are required to wear special spacesuits while going to space or the moon.

Tick (✓) the correct option.

1. Why are the astronauts required to wear spacesuits?



Space has no air.

The suits protect them from the aliens in space.

The air in space is unsuitable for them.

2. Why are we not required to wear spacesuits on the Earth?

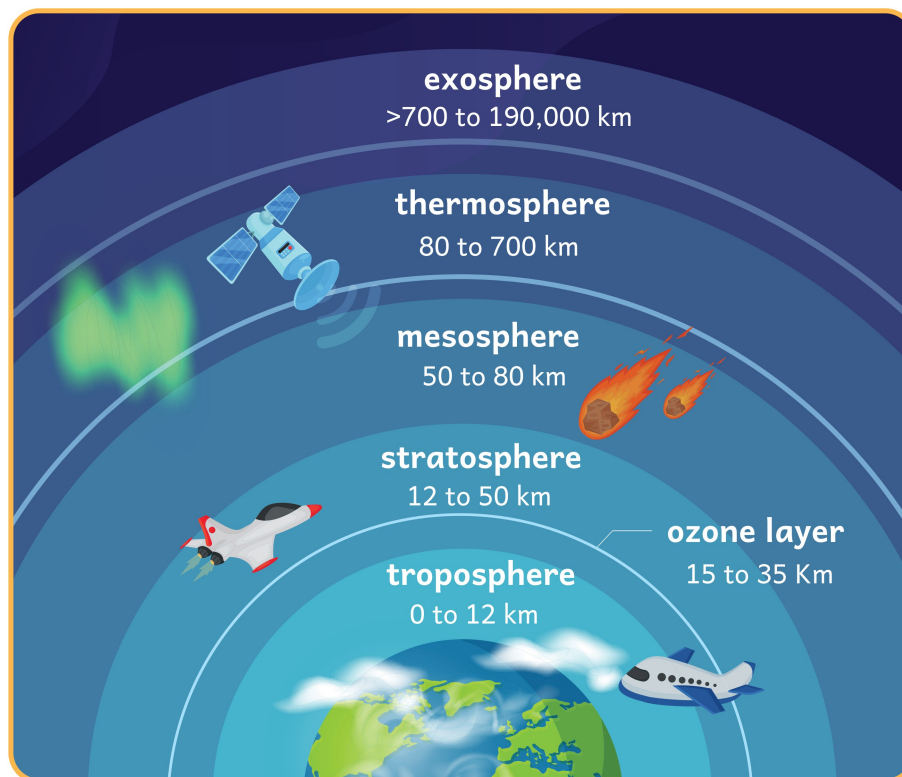
Air is present around the Earth.

Air is present in the outer space, but absent on the Earth.



Learner's Digest

1. The thick layer of air surrounding the Earth, is called the **atmosphere**.
2. As the Earth moves, this blanket of air also moves.
3. The atmosphere is composed of several layers of air as shown below.



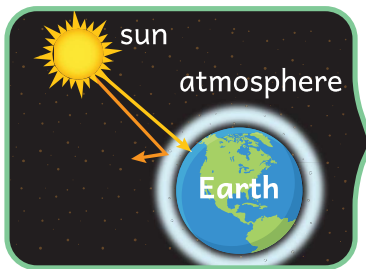
the layers of atmosphere

(Note: The distance of the atmospheric layers from the surface of the Earth is approximately given.)

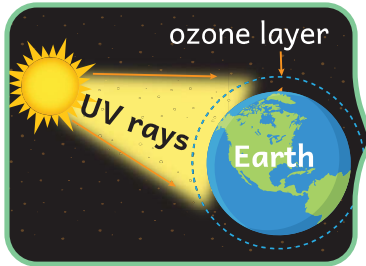
4. We live in the troposphere. Clouds are formed and birds fly in the troposphere.



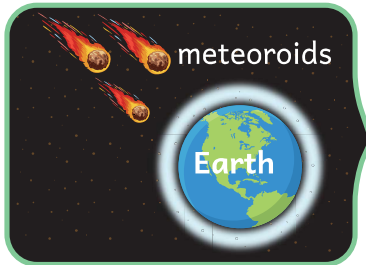
The importance of the atmosphere



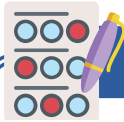
The atmosphere traps the heat coming from the sun and helps maintain the right temperature for the survival of living things.



The ozone layer of the stratosphere absorbs the harmful ultraviolet radiation and protects us.

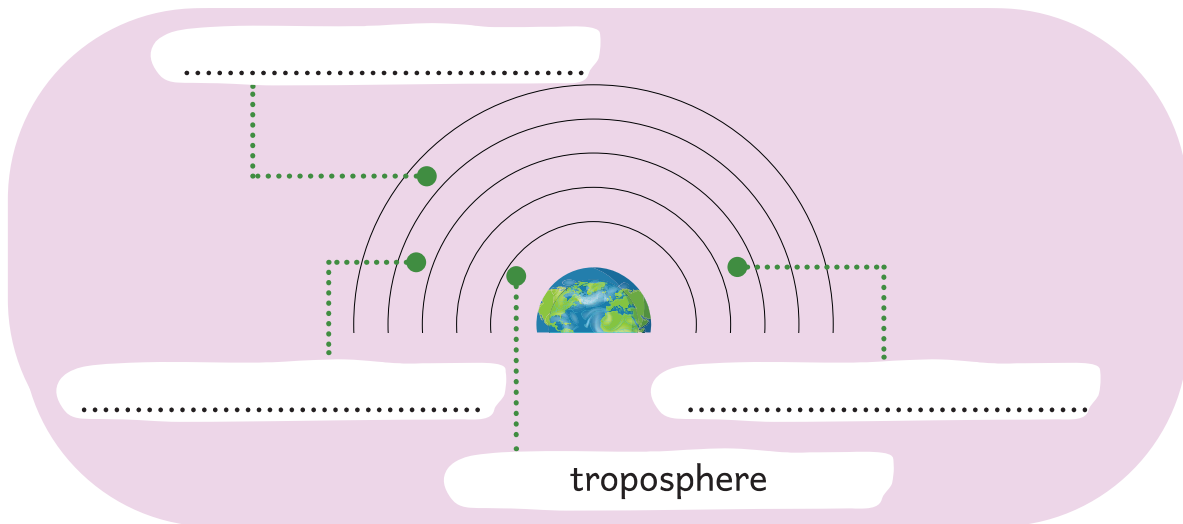


Meteoroids are capable of causing major damage to the surface of the Earth. They are destroyed in the mesosphere. Thus, the mesosphere helps in protecting the Earth.



Progress Meter

I. Label the layers of the atmosphere.

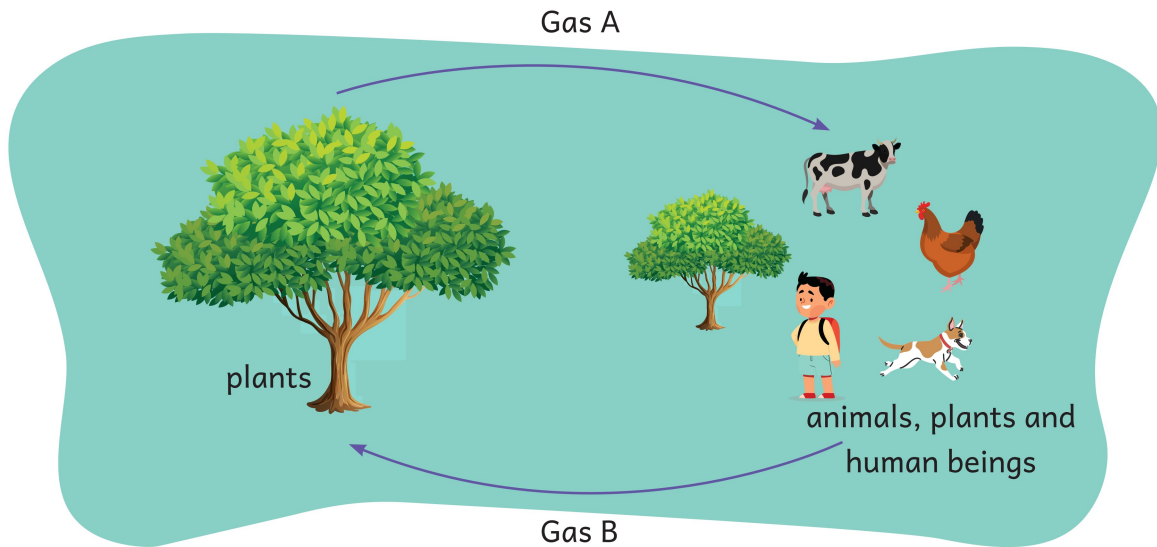


Key Concept: Composition of air and its uses



Activity 2

1. Observe the image given below.



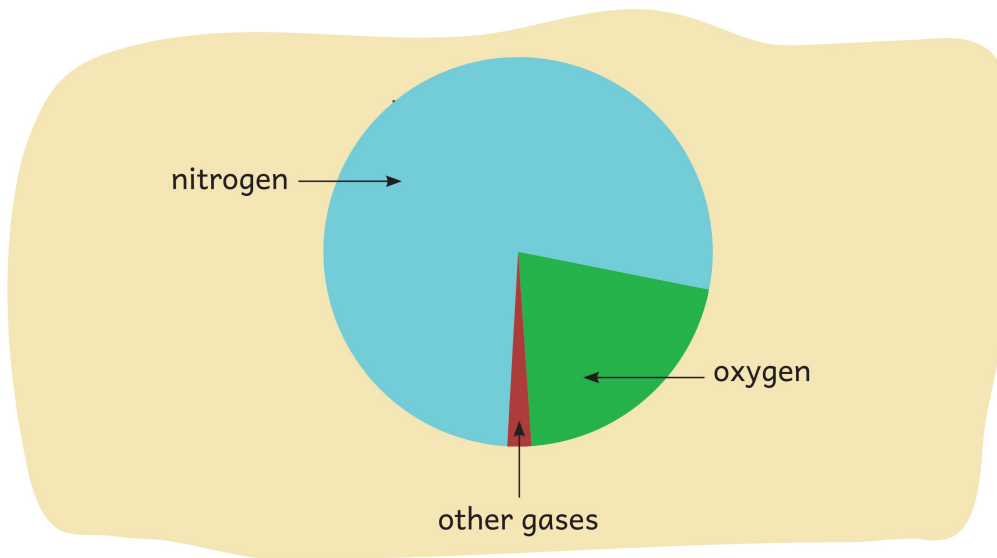
- a. Plants give out Gas A, which animals and human beings breathe in.
Identify Gas A.
- b. Plants require Gas B to prepare food.
Identify Gas B.

2. Is the air around us composed of only one gas?



Learner's Digest

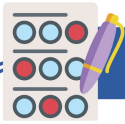
1. Air is composed of many gases, like nitrogen, oxygen, carbon dioxide, water vapour and small proportion of other gases. Let us look at the proportions of different gases in the atmosphere.



the composition of air

2. The different uses of air are given below.
 - a. Human beings, animals and plants require oxygen to breathe.
 - b. Plants require carbon dioxide to make their own food.
 - c. Sound travels through air. Without air, we would not be able to hear sound on the Earth.
 - d. Wind helps yachts to sail. Gliders, parachutes and aeroplanes fly in the atmosphere.
 - e. Wind energy is used to generate electricity through a windmill.





Progress Meter

I. Choose the correct words to fill in the boxes.



carbon dioxide | oxygen | nitrogen

It is the major component of air.

.....

This gas is used by plants to perform photosynthesis.

.....

Plants and animals need this to breathe.

.....

Key Concept: Properties of air

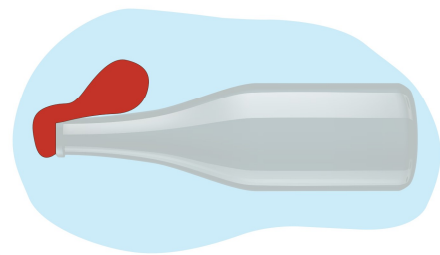


Activity 3

1. Suppose you tie a balloon over the neck of an empty bottle.

Tick (✓) the correct options based on your observation.

- a. Put the bottle in a bowl of hot water. Which of the following situations do you observe?



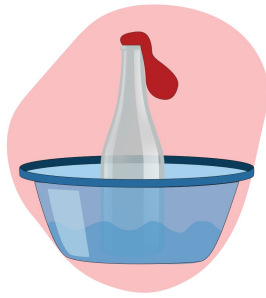


Image (i)

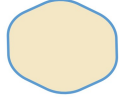


Image (ii)



b. Why do you think the balloon inflates?

Warm air in the bottle rises up and occupies space in the balloon.

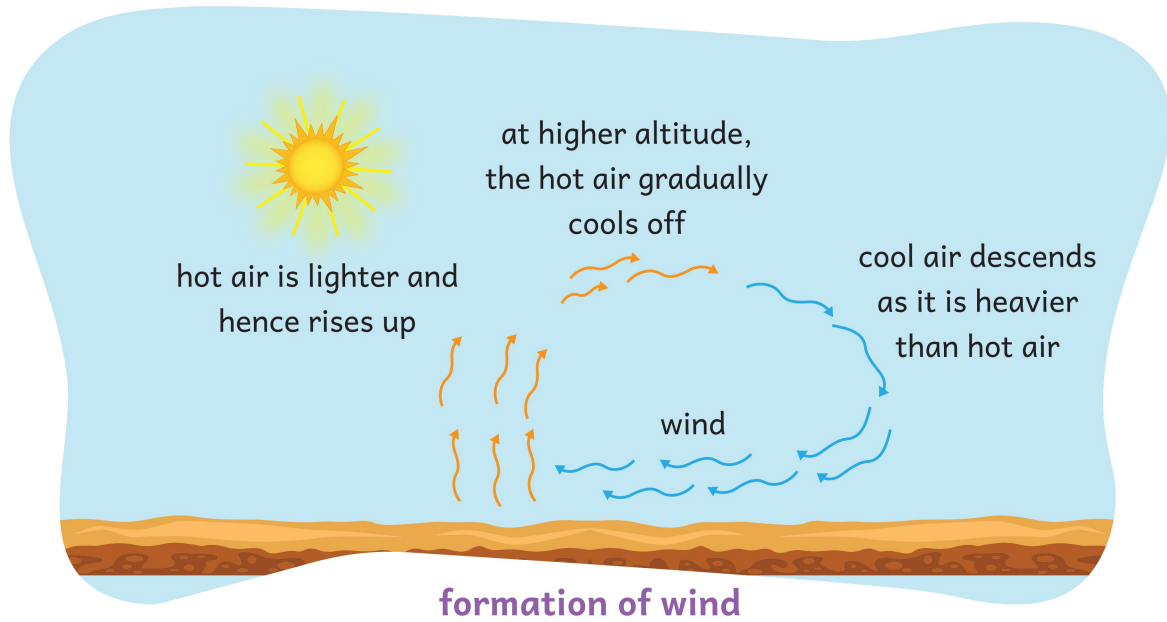
Water vapour in the bowl enters the bottle and inflates the balloon.

The balloon inflates due to the surrounding air entering inside the bottle.



Learner's Digest

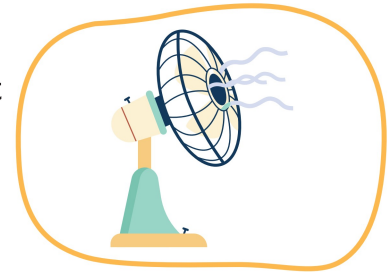
1. Air shows the following properties.
 - a. Air has weight.
 - b. Air occupies space.
 - c. Warm air rises up.
2. In the atmosphere, the air often gets heated due to sunlight. Hot air rises up, while cool air moves down. This movement continues and causes the formation of **winds**.



Activity 4

Suppose you take a piece of cloth and hold it in front of a table fan or a hand fan.

Tick (✓) the correct options based on your observation.



1. What happens to the cloth when you turn on the fan or start waving a hand fan?

The cloth stays still.

The cloth moves.

2. Can you explain a reason for your observation?

The moving air moves the cloth.

The cloth is a living being, that is why it moves.



Learner's Digest

Moving air is called wind.



Strong winds with rain or snow are called storms.



When a storm occurs with lightning and thunder, it is called a thunderstorm.



A gentle and light wind is called a breeze.

Key Concept: Land breeze and sea breeze

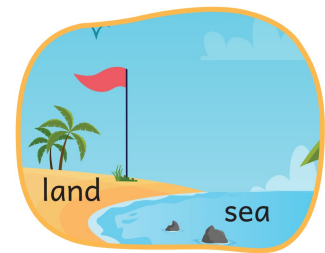


Activity 5

1. A pink flag was hoisted on a beach, as shown in the two images alongside.

Do you observe any change in the direction of the flag in the two images?

2. Write the changes you observe. _____

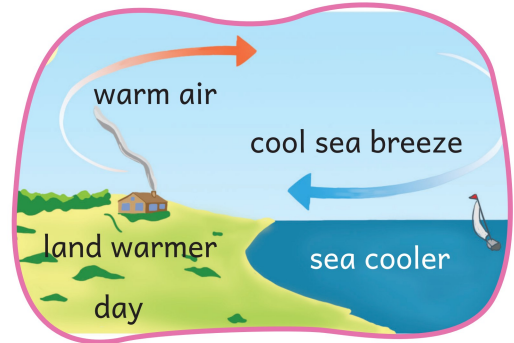


3. What can you conclude based on the given observation?
- During the day, wind blows from the _____ to the _____.
 - During the night, wind blows from the _____ to the _____.

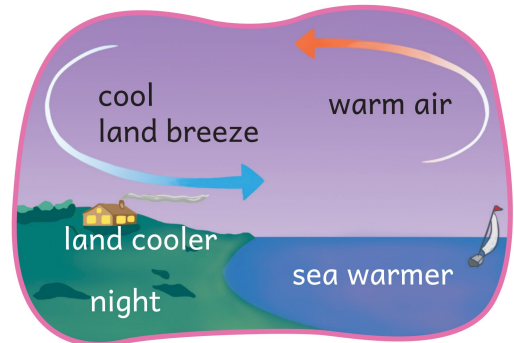


Learner's Digest

- During the daytime, the land heats up faster than the sea. The air above the land gets warm. The warm air rises up. The cool air from the sea flows to take its place.
- The breeze blowing from the sea towards the land is called **sea breeze**.
- During the night, the land cools down faster than the sea. The air above the sea is warmer than the air above the land. The warm air above the sea rises up and the cool air from the land flows to take its place.
- The breeze blowing from the land towards the sea is called **land breeze**.



sea breeze



land breeze

Key Concept: Water: evaporation and condensation



Activity 6

- Have you seen this activity in your home? If yes, then what is the name of this activity?

.....





2. Aman, Avinash and Shreya are stating the following reasons for the above activity. Who do you think is correct and why?



The clothes absorb the water and dry up.

Aman



Water in the clothes changes to ice in presence of sunlight.

Avinash



In presence of sunlight, water in the cloth vaporises to water vapour.

Shreya



Learner's Digest

1. The conversion of water into water vapour is known as **evaporation**.
2. The water on the surface of the Earth evaporates due to the heat of the sun.
3. The process of evaporation is faster under the following conditions.
 - a. when the weather is windy
 - b. when the temperature is high
 - c. when the air is dry
 - d. when the surface of the liquid is large
4. Drying of wet clothes in sunlight and evaporation of sweat from the body are examples of evaporation.



Activity 7

Suppose you take a glass and fill it with ice cubes and keep the glass at room temperature for a few minutes.



1. Will you observe water droplets on the outer surface of the glass?

Yes

No

2. The water droplets are formed because _____.

water vapour present in the air turns into water

the ice inside the glass melts to form water

3. Which of the following can you conclude?

Water vapour is changed to water when the surrounding is cold.

Water vapour is changed to water when the surrounding is hot.



Learner's Digest

1. The process of changing water vapour into water droplets on cooling is known as **condensation**.
2. Formation of clouds and dewdrops are examples of condensation.



a. Clouds are formed when water vapour in the air condenses to form tiny water droplets.

b. The tiny water droplets fall on the Earth in the form of rain.

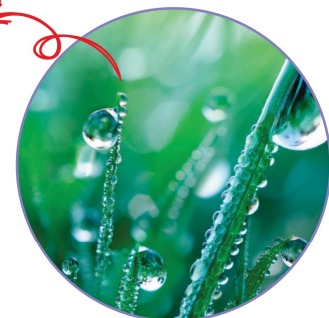


c. Snow forms when the atmospheric water vapour condenses to form ice crystals and fall as tiny flakes.

d. Hail is observed when raindrops grow in size and freeze to form hard ice balls.



e. Dew is formed by the condensation of water vapour present in the air on cool surfaces.



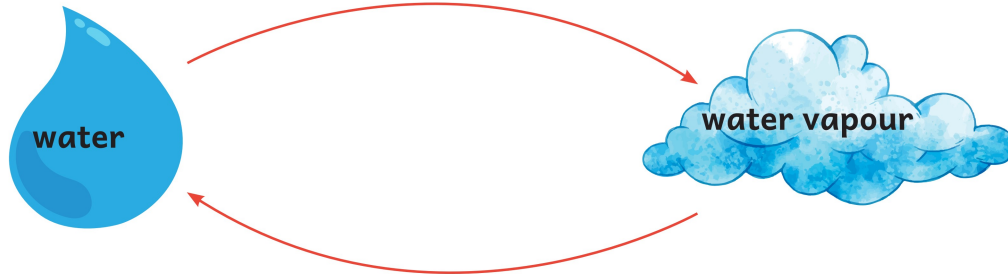
f. Frost is formed when dew freezes to form ice.



Progress Meter

I. Fill in the blanks with the correct options.

1. Water turns to water vapour
(by heating / by cooling)



2. Water vapour turns to water
(by heating / by cooling)

Key Concept: Water cycle and its importance



Activity 8

Water is present around us in ponds, rivers, lakes, seas and oceans.

1. Do these water bodies dry up due to evaporation of water in the sun?



Let us see what Aman and Shrishti have to say!

The water in ponds, lakes, and other water bodies fills up as a result of rainfall.



Water vapour also condenses back to water. Thus, water remains the same.



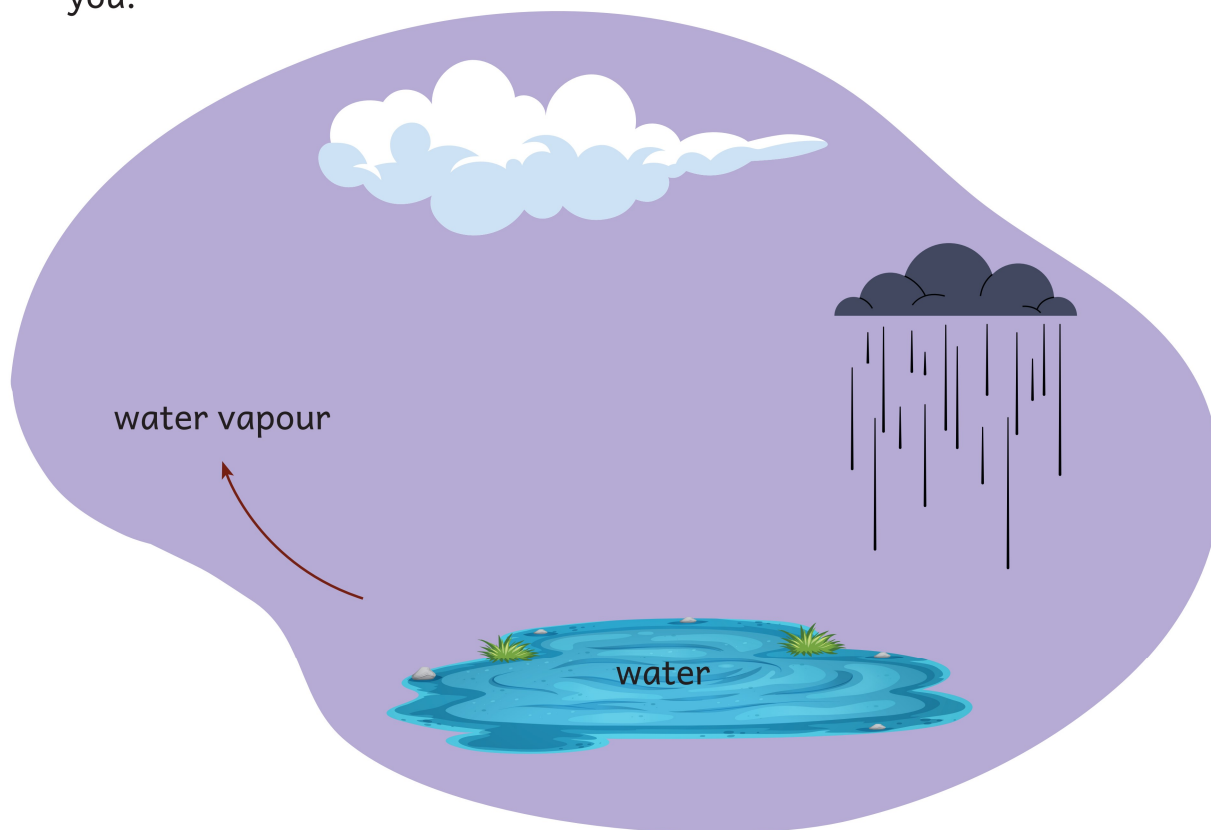
2. With whom do you agree? _____
3. Why do you think rainfall takes place? Tick (✓) the correct option.

Water vapour condenses to form clouds leading to rainfall.



The sky already contains stored water, which sometimes falls as rain.

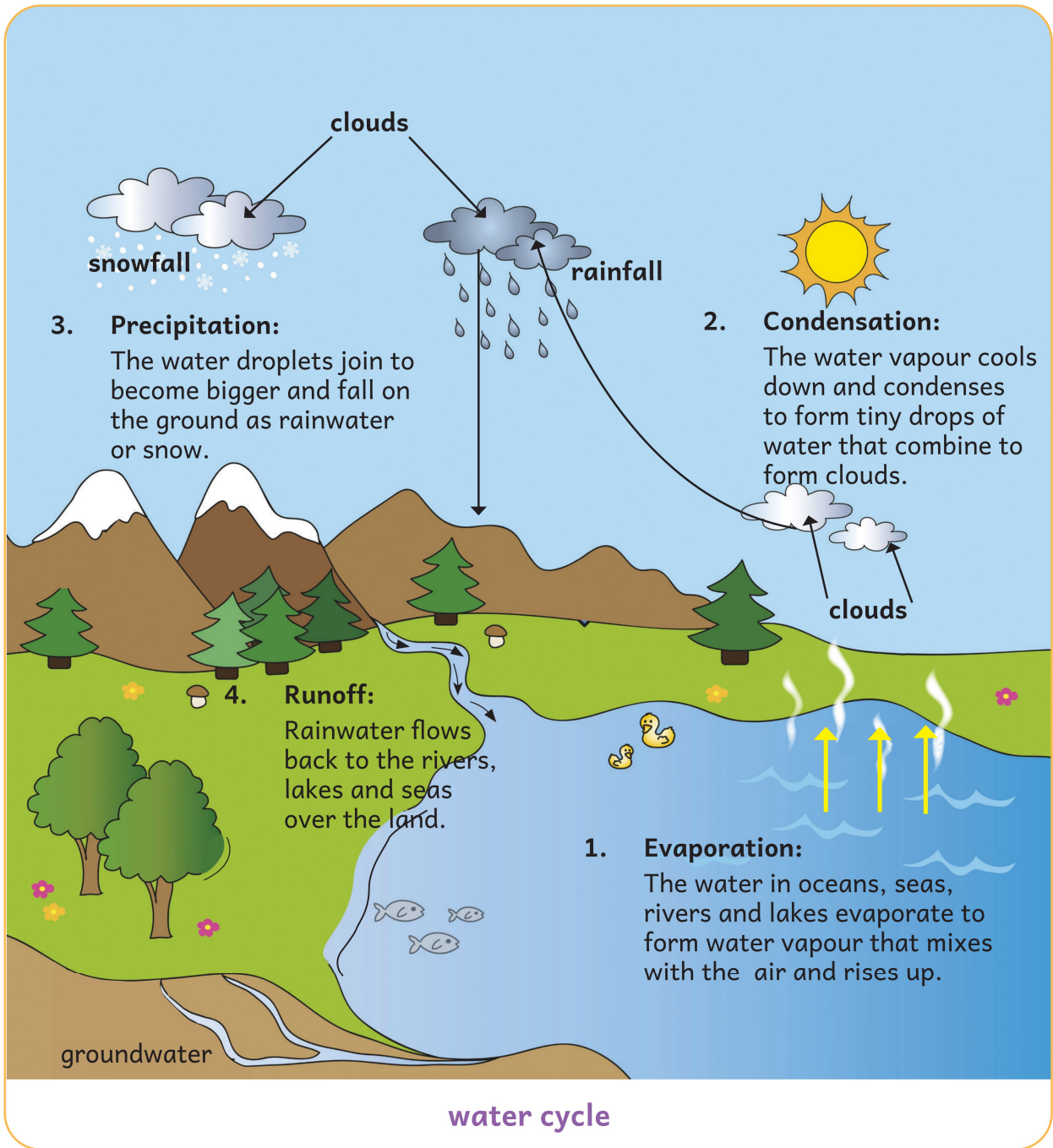
4. Draw arrows to complete the diagram below. One has been done for you.





Learner's Digest

1. The process of evaporation of water from seas, lakes and ponds, followed by condensation of water vapour into cloud and finally **precipitation** of water as rainfall/snow is called **water cycle**.



Key Concept: Weather



Activity 9

Observe the different images shown below.



1. Circle the correct options.

the image showing a sunny sky



the image showing a cloudy sky



the image showing rainfall



the image showing snowfall



2. Weather can be _____ (same/different) at different times of the year.



Learner's Digest

1. The atmosphere is not the same everyday, but changes from time to time. Sometimes it is sunny, sometimes it is cloudy, while sometimes it rains heavily.
2. This condition of the atmosphere is called **weather**.



clear sky and sunny weather



heavy rainfall

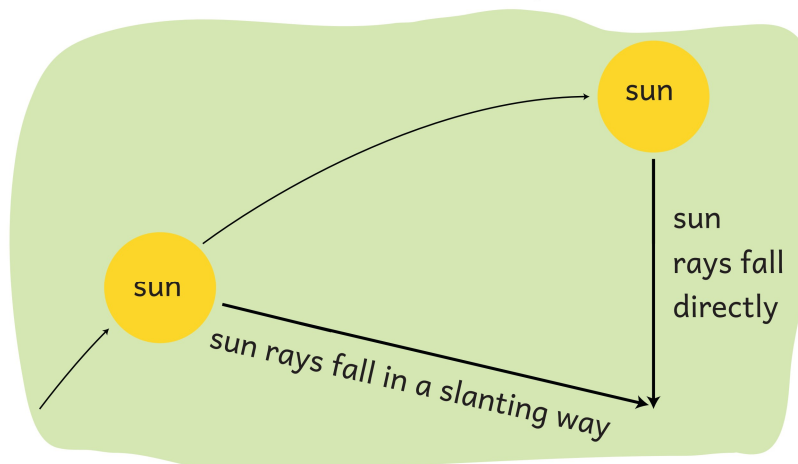


cloudy sky



thunderstorm

3. Weather changes quickly and it may change even in a single day. In the morning, the weather could be sunny. However, in the afternoon it could be cloudy and rainy.
4. The sun and the movement of the Earth play an important role in the change of weather.
5. When the sun rises or sets, its rays are slanting. So, mornings and evenings feel cool.
6. At noon, the rays of the sun fall directly on the Earth. Therefore, afternoons are the hottest time of the day.



the rotation of the Earth and thus, the position of the sun at a given time determines the weather



Progress Meter

I. Name the different weather conditions shown below.



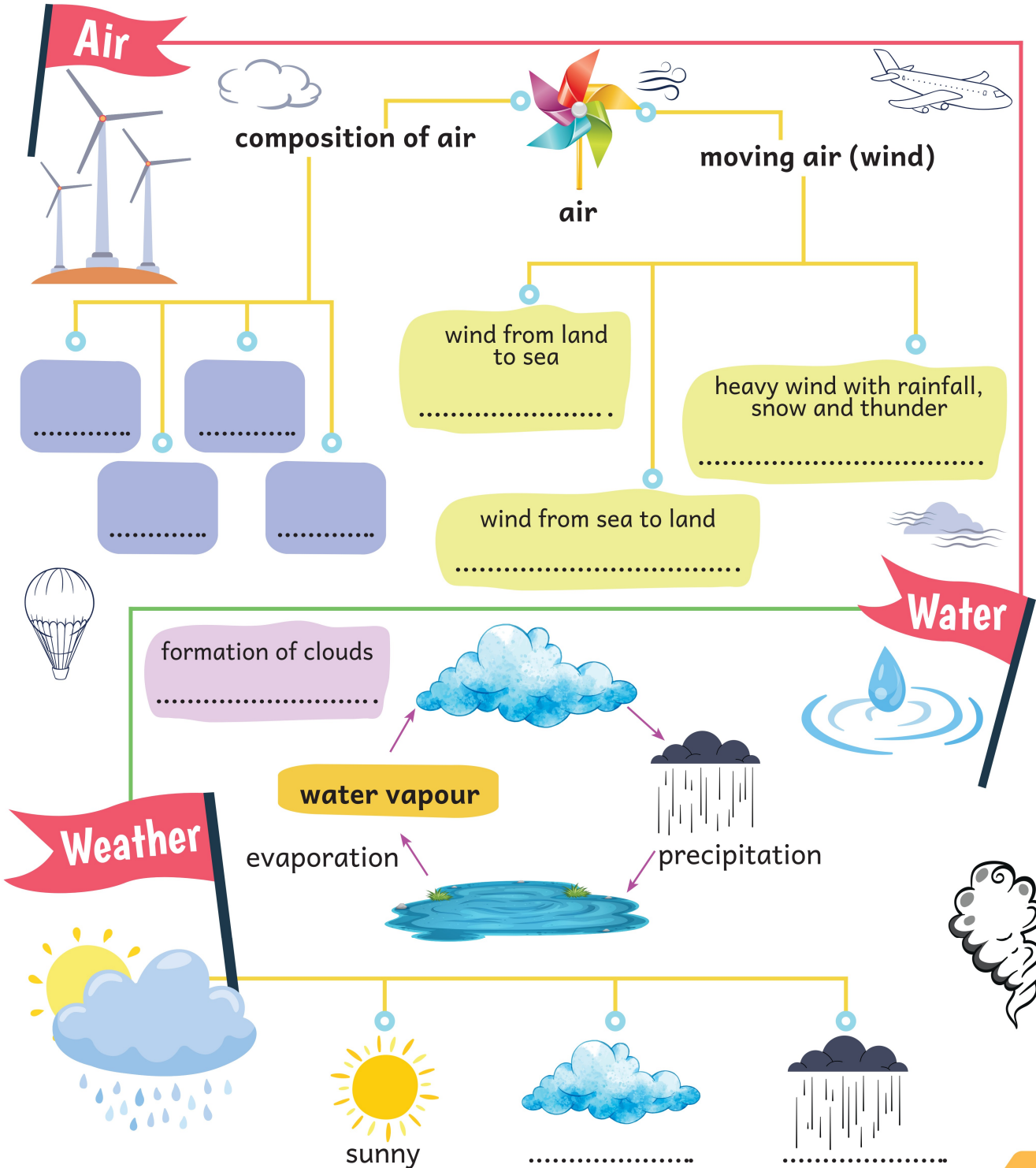
Key Takeaways

- The Earth is surrounded by layers of air called the atmosphere.
- Air is composed of several gases such as nitrogen, oxygen, water vapour, carbon dioxide, etc.
- Air has weight and occupies space.
- Warm air rises up and cold air flows down.
- Moving air is called wind.
- Water evaporates to form water vapour, which condenses back to water.
- The water cycle refers to the cyclical process of evaporation, condensation, and precipitation of water.
- Weather can be sunny, rainy, cloudy or windy.



Concept Map

Shweta is a student of Grade 4. She has learnt about air, water and weather in her class, and has been instructed to complete the concept map given below. Let us help Shweta complete the task.





Exercise

I. State whether the following statements are true or false. Correct the false statements.

1. A very strong movement of air is called wind.
2. The gas that is present in the air in the highest amount is oxygen.
3. The clouds in the sky are made of nitrogen.
4. Clothes dry faster during the rainy season.

II. Fill in the blanks.

1. Water changes to _____ on heating and to _____ on cooling.
2. Living organisms use _____ present in air for breathing.
3. _____ are formed when water vapour in the air condenses to form tiny water droplets.
4. The _____ layer of the atmosphere protects us from harmful radiation.

III. Answer the following questions.

1. Define atmosphere.
2. Name the different gases present in the air.
3. State the conditions for evaporation to occur faster.
4. What happens to the temperature of the land and sea during the day and at night?
5. What is water cycle? Draw a diagram to explain the water cycle.
6. Why do clothes dry faster during the summer?

IV. Circle the odd word.

1. wind, breeze, snow, storm
2. evaporation, condensation, boiling, precipitation
3. nitrogen, oxygen, water vapour, dust



V. Select the correct options.

1. What is true about the given image?

- a. Windmills have been shown in the image.
- b. They use wind energy.
- c. They are used to generate electricity.
- d. All of the above statements are correct.



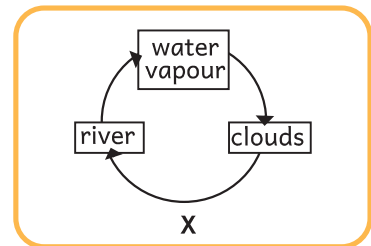
2. Unscramble the words and identify the name of the natural phenomenon shown in the image.

- a. ormst
- b. derstohutnrm
- c. nwdi
- d. tawre



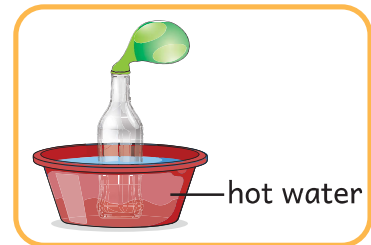
3. The diagram given alongside shows a part of the water cycle. Identify X.

- a. evaporation
- b. precipitation
- c. condensation
- d. boiling



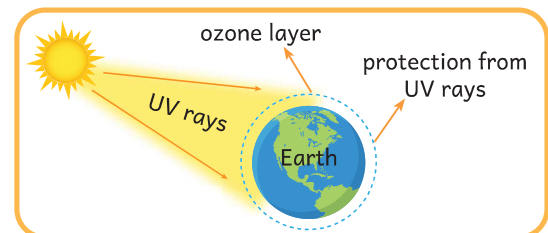
4. In the image shown alongside, the balloon inflates due to which of the following reasons?

- a. warm air rises up
- b. cold air rises up
- c. water vapours rise up
- d. warm air flows down



5. The phenomenon shown alongside takes place in the _____.

- a. exosphere
- b. troposphere
- c. stratosphere
- d. mesosphere





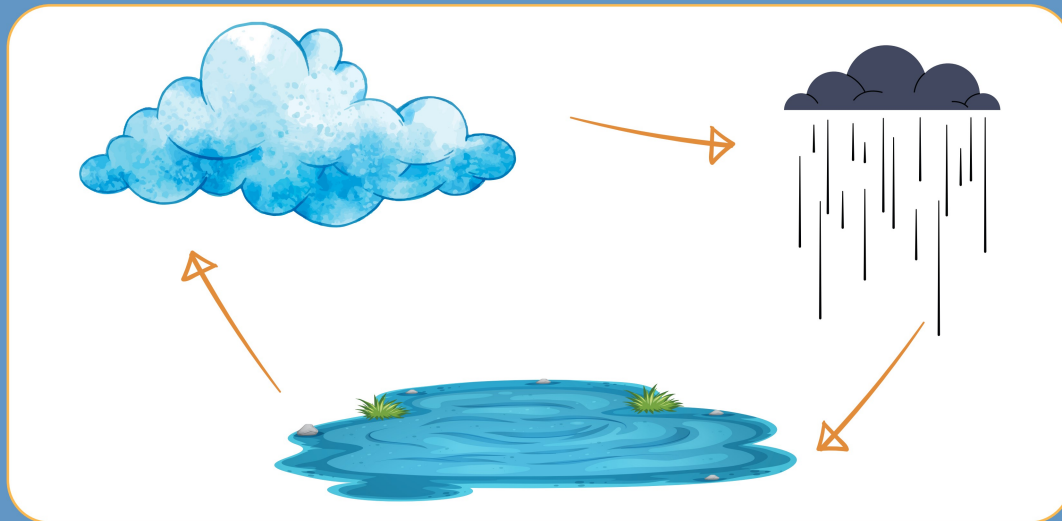
Think Class

I. Hot-air balloon contains a hot burner that helps it fly. How does this burner help the balloon to fly?

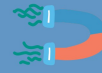
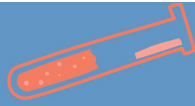
Four horizontal dotted lines for writing an answer.



II. We know that water vapour condenses to form clouds in the sky. Why do you think formation of clouds does not occur near the water surface?



Four horizontal dotted lines for writing an answer.



III. Why do clouds float in the sky instead of falling down?



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IV. When we sit under a fan on a very hot day, our sweat evaporates rapidly compared to when we sit outside in the sun. Can you state a reason for this observation?

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