EL-MOASSER
SERIES

SCIENCE

The Main Book

By A Group of Supervisors

Interactive E-learning Application

معاك
Ma3ak App

بتصريح وتحت إشراف
وزارة التربية والتعليم والتعليم الفني
MINISTRY OF EDUCATION AND TECHNICAL EDUCATION

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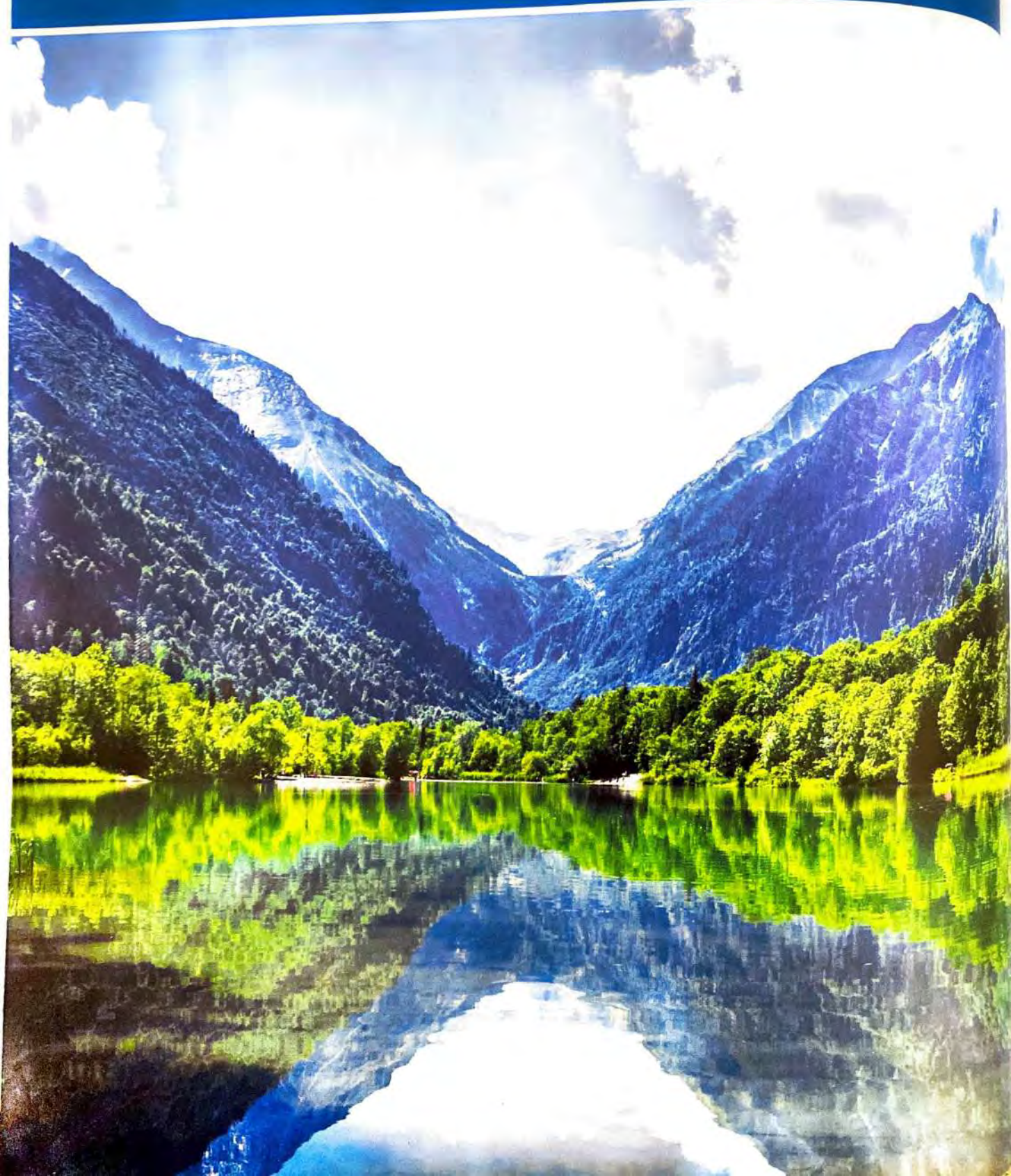
Theme Three : Protecting Our Planet

UNIT 3 | Our Earth's Resources



Get Started

What I Already Know

- **Water is an important natural resource for all living organisms to survive, where :**
  - Animals and plants need water to survive.
  - People use water for drinking, cooking, bathing and even playing.

- **The freshwater resources on the Earth decreases gradually due to climate change, pollution and water waste.**

- **Recycling of wastewater is one of the solutions to conserve freshwater resources, where :**
  - Water that we use for washing and showering can be filtered and cleaned, then used again for other purposes such as irrigation of farms.
  - The Bahr Al-Baqar wastewater treatment plant in Egypt is one of the largest water treatment plants in the world.

Bahr Al-Baqar wastewater treatment plant

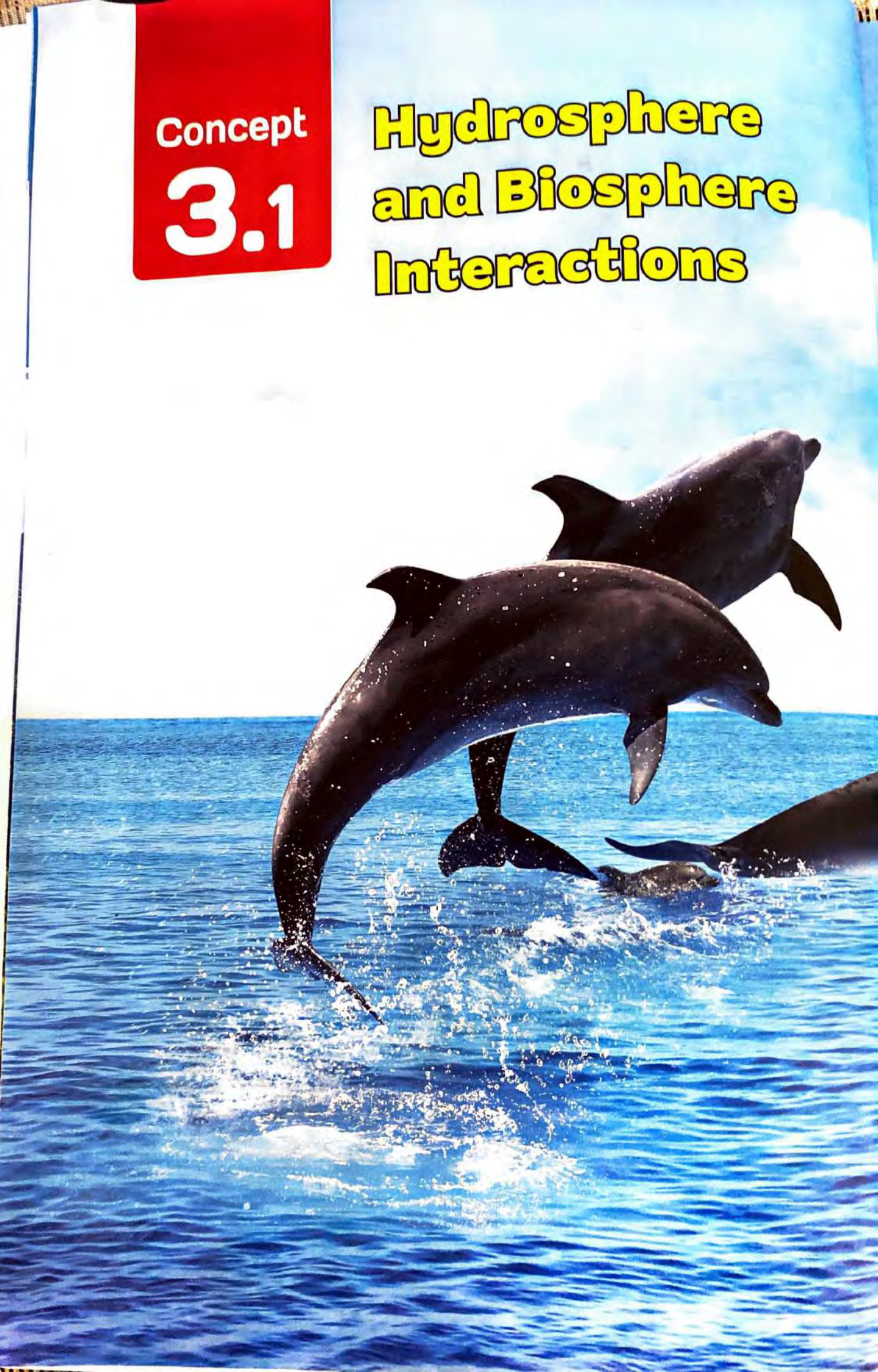
- **In this unit, you are goint to study :**
  - Importance of water.
  - The interactions between different spheres (or subsystems) of the Earth.
  - Water as a valuable natural resources.
  - How to protect the Earth's natural resources.

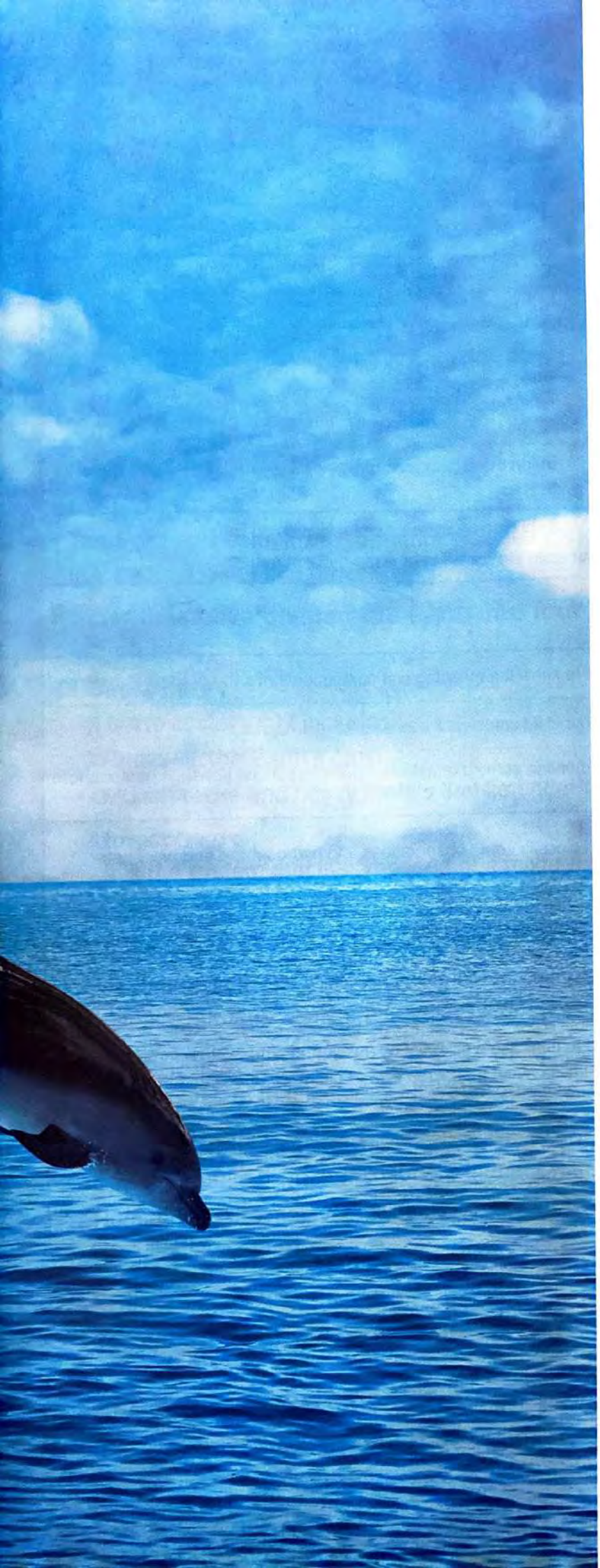
- **Unit project : "We all live Downstream"**

  At the end of this unit, you are going to make a model of water sources to show how pollution in one of the water sources can affect other water sources, and also how living organisms can be affected by water pollution.

Concept 3.1

Hydrosphere and Biosphere Interactions





Learning outcomes

By the end of this concept, your child will be able to :

- Classify systems on Earth as parts of the hydrosphere, biosphere, geosphere and atmosphere.
- Develop a model of interactions between the hydrosphere and the biosphere.
- Identify defining characteristics of different aquatic ecosystems.

Key vocabulary

- Estuary
- Aquifer
- Glacier
- Groundwater
- Hydrosphere
- Geosphere
- Atmosphere
- Biome
- Biosphere
- Ecosystem

Notes For Parents On Concept [3.1]

Lessons	Activities	What you should do with your child
1	Activity 1	Explain to your child the four main systems of Earth.
	Activity 2	Discuss with your child how water affects living organisms and nonliving thing
	Activity 3	Help your child mention the importance of water for life on Earth and some of uses in our daily life.
	Activity 4	- Discuss with your child some different water bodies on Earth. - Explain to your child the meaning of water cycle in nature.
2	Activity 5	Let your child classify some different items according to the four main sphere Earth.
3	Activity 6	Help your child to know the meaning and components of each of Earth's syste
	Activity 7	Discuss with your child some characteristics of hydrosphere.
	Activity 8	Let your child mention some examples for the interactions between hydrosph and biosphere.
4	Activity 9	Help your child classify some observations into hydrosphere and biosphere.
	Activity 10	Explain to your child some characteristics of saltwater ecosystems and freshwater ecosystems.
	Activity 11	Discuss with your child the type of water in some water bodies and some species live in each of them.
5	Activity 12	Help your child to think like a scientist by answering a question about one of t main points of this concept then write his/her claim, evidence and the scientifi explanation.
	Activity 13	Explain to your child the harmful effects of microplastics on aquatic ecosyster and soil.
	Activity 14	Let your child review the main points in this concept.

LESSON 1

Activity 1 Can You Explain ?



- The Earth is a complex system that includes living organisms and nonliving things that interact with each other.

▸ **Scientists have divided the Earth into four main systems (or spheres) which are :**

- **Geosphere :**

  It is the system that includes :

  - Rocks on the Earth's crust.
  - Molten rocks and heavy metals that lie under the Earth's crust.

- **Atmosphere :**

  - It is the system that is composed of a mixture of some gases such as nitrogen, oxygen, carbon dioxide, water vapor ... etc.

- **Biosphere :**

  It is the system that includes all living organisms such as microorganisms, plants, animals, humans ... etc.

- **Hydrosphere :**

  It is the system that includes all water on the Earth (fresh water and salt water).

▸ **How does Earth's biosphere interact with Earth's hydrosphere ?**

All living organisms in the biosphere interact with the hydrosphere, where :

- Humans and animals drink water.
- Some animals and plants live in water.

▸ **In this concept, we will study :**

- The importance of water for life on Earth.
- Hydrosphere and biosphere interactions.
- Characteristics of the hydrosphere and biosphere.
- Types of aquatic ecosystems.

complex	مركب / معقد	geosphere	الغلاف الأرضى	biosphere	الغلاف الحيوى
characteristics	صفات	interact	يتفاعل	atmosphere	الغلاف الهوائى
hydrosphere	الغلاف المائى	aquatic ecosystem	النظام البيئى المائى	Earth's crust	القشرة الأرضية

Activity 2 Water's Impact on Living Organisms

▸ **Put (✓) or (✗) :**

1. Water causes some weather phenomena such as raining and snowing. ( )
2. All living organisms except plants need water to survive. ( )

- Water is important for all living organisms and also can affect nonliving things.

▸ **How do living organisms use water ?**

Living organisms need water to drink, grow and survive.

▸ **How does water affect nonliving things ?**

Water can cause weathering and erosion of rocks on the Earth's surface.

Weathering of rocks by water

Notes

1. Weathering means the breakdown of rocks into smaller particles due to the effect of rain, wind, temperature ... etc.
2. After rocks are broken down, erosion process happens which means the transportation of small particles of rocks to another place by water or wind.

Check your understanding

▸ **Complete the following sentences using the words below :**

(erosion – water – weathering)

1. Living organisms need ..... to survive.
2. Water can cause ..... then ..... of rocks.

▸ **Put (✓) or (✗) :**

1. Earth's systems are divided into geosphere and biosphere only. ( )
2. Fresh water and salt water belong to the hydrosphere. ( )

impact	تأثير	weathering	التجوية	transportation	انتقال
survive	يبقى حيًا	erosion	التعرية		

Activity 3 The Importance of Water for Life on Earth

- Water is found everywhere on Earth, where it is found in rivers, lakes, oceans, seas and underground.
- Nearly three-quarters of Earth is covered by water, so our planet looks like a blue marble from space.

Water bodies on Earth can change from liquid state to :

- **Solid state** (ice) by freezing in extreme cold weather
- **Gas state** (water vapor) by evaporation in hot weather

- The total amount of water on Earth does not change, even if water changes from one state to another, so we cannot make new water, but we can recycle it.

Importance of water for life

Water is important for life of living organisms on Earth, where :

Humans and animals drink water to survive.

Plants need water to grow.

Some animals and plants live in water.

three-quarters	ثلاثة أرباع	evaporation	تبخر	recycle	إعادة استخدام / تدوير	17
freezing	تجمد	water bodies	مسطحات مائية	extreme	شديد / مفرط	

Uses of water

Humans use water in many purposes such as :

Preparing food

Bathing

Cleaning

Recreation

Travelling

Manufacturing

Check your understanding

▸ Put (✓) or (✗) :

1. The total amount of water on Earth does not change. ( )
2. Half of Earth's surface is covered by water. ( )
3. When water freezes, it changes to water vapor. ( )

purposes أغراض
preparing food إعداد الطعام
bathing استحمام
recreation
travelling

Activity 4 What Do You Already Know About Hydrosphere and Biosphere Interactions ?

Water bodies on Earth have different forms and locations such as :

Oceans and seas :

- They are very large water bodies.
- Oceans and seas always contain salt water.

Lakes :

- A lake is a water body that is surrounded by land.
- Lakes are often contain fresh water, but sometimes they contain salt water.

Rivers :

- A river is a water body that always flows from an area of high altitude (high place) to an area with lower altitude (lower place) in a definite channel.
- Rivers always contain fresh water.

Estuary :

- It is a water body at which the fresh water of a river meets the salt water of a sea or ocean.
- Estuaries always contain mixture of salt water and fresh water.

Runoff :

It is a water body that is formed of water from rain or melting of snow and moves into rivers or the ground.

interactions	تفاعلات	sea	بحر	river	نهر
estuary	مصب النهر	ocean	محيط	lake	بحيرة
altitude	ارتفاع	runoff	جريان سطحي		

Groundwater :

It is the water that lies beneath (under) the Earth's surface.

Is water a renewable resource ?

- Water that forms the hydrosphere is one of the renewable resources on Earth because it has what is called "water cycle" in nature.

Renewable resource means a natural resource that can be replaced.

- **During the water cycle in nature :**
  - Water presents in water bodies on Earth evaporates and goes into the air forming clouds.
  - Water returns back to the Earth's surface during raining.

Water cycle

Are plants considered a renewable resource ?

- Plants are one of the components of the biosphere on Earth.
- Plants can be planted from seeds that grow up forming new plants.
- Plants depend on water to grow and survive, so plants are affected if the amount of water decreases or water get polluted.

▶ **From the previous explanation, we can observe that :**

Hydrosphere interacts with biosphere, where living organisms (such as plants) in the biosphere depend on the hydrosphere to survive.

Check your understanding

▶ Put (✓) or (✗) :

1. Oceans and rivers always contain salt water. ( )
2. Water and plants are considered renewable resources. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (1)

groundwater	المياه الجوفية	renewable	متجدد	water cycle	دورة المياه
pollute	يتلوث	beneath	تحت / أسفل	resource	مصدر
nature	الطبيعة				

Exercises on Lesson 1

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. All the following are components of the atmosphere, except .....
   a. oxygen gas. b. nitrogen gas. c. molten rocks. d. water vapor.
2. Rocks are broken down into smaller particles during ..... process.
   a. photosynthesis b. weathering
   c. erosion d. respiration
3. Which of the following is a part of the hydrosphere ? .....
   a. Water. b. Air. c. Rocks. d. Plants.
4. Which of the following is a part of the biosphere ? .....
   a. Ice. b. clouds. c. Water. d. Animals.
5. Water covers nearly ..... of the Earth planet.
   a. $\frac{1}{4}$ b. $\frac{1}{2}$ c. $\frac{1}{5}$ d. $\frac{3}{4}$
6. By heating of water it changes from ..... state to ..... state
   a. solid – liquid. b. liquid – solid. c. liquid – gas. d. gas – liquid.
7. Water is used in all the following purposes, except .....
   a. recreation. b. burning. c. bathing. d. manufacturing
8. At the beginning of water cycle in nature, water ..... and goes into the air forming .....
   a. freezes – snow. b. evaporates – clouds.
   c. freezes – clouds. d. evaporates – snow.

2 Choose from column (B) what suits it in column (A) :

1.

(A)	(B)
1. Geosphere	a. contains oxygen and nitrogen gases.
2. Atmosphere	b. contains rocks and heavy metals.
3. Biosphere	c. contains fresh water and salt water.
4. Hydrosphere	d. contains animals and plants.
	e. contains clouds and molten rocks.

1. ..... 2. ..... 3. ..... 4. .....

2.

(A)	(B)
1. Oceans	a. contain fresh water or salt water.
2. Lakes	b. contain salt water only.
3. Rivers	c. contain mixture of fresh water and salt water.
4. Estuary	d. contain fresh water only.
5. Groundwater	e. is the water found under the Earth's surface.
	f. is the water found in a gas state.

1. ..... 2. ..... 3. ..... 4. ..... 5. .....

3 Put (✓) or (✗) :

- 1. Water on the Earth is divided into fresh water and salt water. ( )
- 2. The system that includes rocks and heavy metals is called hydrosphere. ( )
- 3. Rainwater is the only reason for weathering and erosion of rocks on the Earth's surface. ( )
- 4. Water is important for growing of living organisms. ( )
- 5. If there is no hydrosphere, the biosphere will not exist. ( )
- 6. Water can change into water vapour in extreme cold weather. ( )
- 7. The total amount of water on Earth doesn't change. ( )
- 8. Some animals and plants live in water. ( )
- 9. A river always flows from an area of low place to an area with higher place. ( )
- 10. When the amount of water decreases or water get polluted, biosphere will be affected. ( )

4 Write the scientific term of each of the following :

- 1. A water body that is surrounded by land. (.....)
- 2. An area where the fresh water of a river meets the salt water of a sea. (.....)
- 3. A cycle shows the continuous movement of water from the Earth to the atmosphere then to the Earth again. (.....)
- 4. The process of breaking down of rocks into smaller particles due to the effect of rain, water or temperature. (.....)
- 5. The process in which the small particles of rocks are transported from a place to another. (.....)

5 Complete the following sentences :

- 1. The Earth's system that includes all living organisms is called .....
- 2. Water is responsible for ..... process and ..... process of rocks.

3. Water bodies on Earth can change from liquid state to ..... state by freezing, while they can change into ..... state by evaporation.
4. Fresh water forms some water bodies such as ..... and some lakes, while seas and oceans and formed of ..... water.
5. When a river meets a sea, an ..... is formed.
6. A water body that is formed of water from rain or melting of snow and moves into rivers or the ground is called .....
7. During the water cycle in nature, water evaporates forming ..... , then it returns back to the Earth's surface during .....
8. The groundwater found in soil and rocks is an example of interaction between two spheres which are ..... and .....

6 Give reasons for :

1. Water is important for all plants on Earth.

.....

2. Water can affect nonliving things like rocks.

.....

3. Our planet looks like a blue marble from the space.

.....

4. Water that forms the hydrosphere is one of the renewable resources on Earth.

.....

7 What happens to ... ?

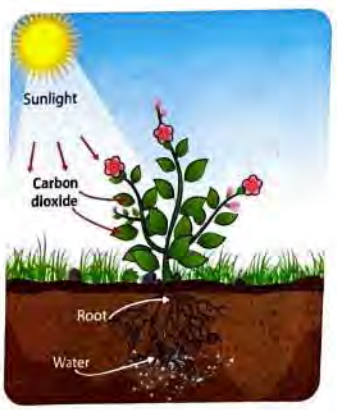
1. The state of water when it is subjected to extreme cold weather.

.....

2. Fresh water of a river when it meets the salt water of a sea.

.....

8 Green plants can make their food by photosynthesis process. In this process plants take water from the soil, carbon dioxide and sunlight.



From the previous paragraph, find out the words that belong to each system and write them in the following table.

Atmosphere	Hydrosphere	Biosphere	Geosphere
(a)	(b)	(c)	(d) .....

LESSON 2

Activity 5 What is in your Environment?

▶ **Put (✓) or (✗) :**

1. The components of Earth can be classified into hydrosphere and biosphere only. ( )
2. Oceans and seas are considered as a part of the atmosphere. ( )

- In this activity, you are going to observe some components of an environment around you and classify them into the four main groups you have learned which are geosphere (land), hydrosphere (water), biosphere (life) and atmosphere (air).

▶ **Imagine that you are at a park as shown in the picture below :**

schoolyard	فناء المدرسة	environment	بيئة
components	مكونات	classify	يصنف

▶ **We can classify the living organisms and nonliving things in the previous picture as shown in the following table :**

Geosphere (Land)	Hydrosphere (Water)	Biosphere (Life)	Atmosphere (Air)
• Soil. • Rocks.	• Puddle.	• Boy. • Girl. • Birds. • Butterflies. • Tree. • Grasses. • Flowers.	• Wind (that moves the leaves). • Breathing of humans and animals.

Check your understanding

▶ **Classify the following items in the table below :**

(Rivers – Insects – Mountains – Seas – Deserts – Crocodiles – Wind)

Biosphere	Geosphere	Atmosphere	Hydrosphere
.....	.....	.....	.....
.....	.....	.....	.....

In the Assessment Book :
Try to answer :
Self-Assessment (2)

puddle	برکة ماء	insects	حشرات	deserts	صحاری		
breathing	تنفس	mountains	جبال	crocodiles	تماسیح		

Exercises on Lesson 2

Understand · Apply · Analyze · Evaluate · Create

1 Choose the correct answer :

1. Rainwater is a part of .....

a. biosphere. b. hydrosphere. c. geosphere. d. atmosphere.

2. Presence of dolphins in oceans represents an interaction between ..... and .....

a. biosphere – hydrosphere. b. biosphere – geosphere.

c. hydrosphere – atmosphere. d. hydrosphere – geosphere.

3. Falling of a small tree due to blowing of strong winds is an example of an interaction between ..... and .....

a. geosphere – atmosphere. b. biosphere – hydrosphere.

c. hydrosphere – geosphere. d. atmosphere – biosphere.

4. Groundwater is present under Earth's surface in rock and soil pores. This is an interaction between ..... and .....

a. geosphere – atmosphere. b. biosphere – atmosphere.

c. geosphere – hydrosphere. d. hydrosphere – biosphere.

5. Acacia tree has very long roots that grow downward through soil rocks to search for groundwater. Which Earth's sphere is not involved in this sentence ?

a. Hydrosphere. b. Geosphere.

c. Atmosphere. d. Biosphere.

2 Put (✓) or (✗) :

1. Earth's systems don't interact with each other. ( )
2. When wind carries seeds of some plants to new places, an interaction between atmosphere and biosphere can be observed. ( )
3. Weathering of rocks as a result of the effect of rains is an example of an interaction between hydrosphere and biosphere. ( )
4. Water evaporates from the surface of a lake will move from atmosphere to hydrosphere. ( )

3 Complete the following sentences :

- 1. A rat that digs a barrow in the soil is an example of the interaction between ..... and geosphere.
- 2. Irrigation of plants is an example of the interaction between two Earth's systems which are ..... and .....
- 3. Air pollution due to burning of wood of trees is an example of an interaction between two Earth's spheres which are ..... and .....

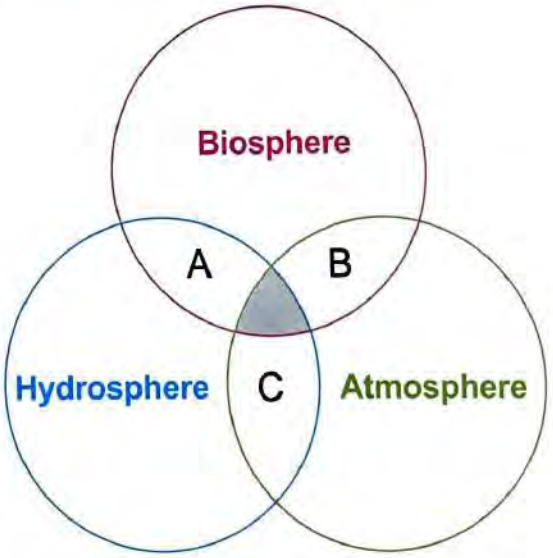
4 Give a reason for the following :

- Hiding of worms inside the soil is an example of an interaction between two Earth's spheres.

.....

.....

5 The following model shows a diagram containing three interacted Earth's spheres. Read these sentences, then put (✓) or (✗) :



1. Area (B) can represent a student respire in oxygen gas. ( )
2. Area (A) can represent small rocks in an ocean. ( )
3. Area (C) can represent evaporation of sea water forming clouds and falling of rains. ( )

LESSON 3

Activity 6 Earth's Systems

▶ **Put (✓) or (✗) :**

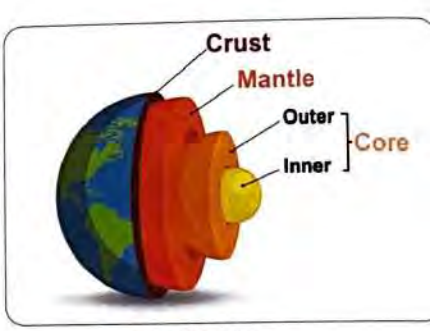
1. The main systems (groups) of Earth are hydrosphere, geosphere, atmosphere and biosphere. ( )
2. Biosphere, hydrosphere, atmosphere and geosphere interact together. ( )

- Scientists named each of the four Earth's systems using the word "sphere" because the shape of Earth is very close to be a sphere.
- In this activity, we are going to learn more about the four Earth's systems.

Geosphere

Geosphere :

It is the system that includes all the layers of Earth which are the crust, the mantle and inner and outer core.



Earth's layers

- The word "Geo" means "Earth".
- **This system contains :**
  - Rocks. - Minerals. - Soil.
  - Landforms (such as mountains, valleys... etc.)
  - Molten rocks inside Earth.

Hydrosphere

Hydrosphere :

It is the system that includes all of the water on, under and above Earth.

- The word "Hydro" means "water".
- **This system contains :**
  - Oceans. - Seas. - Rivers. - Groundwater. - Glaciers.

Notes

1. Glacier is a large sheet of ice or snow that moves slowly over Earth's surface.
2. Hydrosphere includes another system known as "cryosphere" which means the frozen water on Earth.


Glacier

Earth's systems	أنظمة الأرض	crust	القشرة	inner core	ب الداخلى
landforms	التضاريس	molten rocks	صخور منصهرة	glacier	ر جليدى
include	يتضمن	mantle	الوشاح	outer core	ب الخارجى
valleys	وديان	cryosphere	الغلاف الجليدى	minerals	ادن

Atmosphere

Atmosphere :

It is the system that includes all the gases that surround Earth.

Atmosphere

- The word "Atmos" means "vapor".
- The atmosphere is usually called "air".
- Air (atmosphere) is a mixture of many kinds of gases such as :
  - Oxygen gas. - Carbon dioxide gas. - Nitrogen gas.

Biosphere

Biosphere :

It is the system that includes all living organisms on Earth.

- The word "Bio" means "life".
- **Biosphere contains :**
  - Humans. - Animals. - Plants.

Earth's systems interact :

The following table represents some phenomena that show the interaction between the different four systems of Earth :

Interactions	Phenomena
Hydrosphere interacts with geosphere.	• Erosion of rocks by water.  • Formation of lakes. 
Atmosphere interacts with biosphere.	During photosynthesis process, plants take in carbon dioxide gas from air and give out oxygen gas to air. 
Geosphere interacts with biosphere.	During photosynthesis process, soil provides nutrients for plants roots. 

carbon dioxide ثانى أكسيد الكربون
phenomena ظواهر
provide يمد
nutrients المواد المغذية

Note

In the previous table, there is an exchange of energy and matter in each phenomena.

Check your understanding

▸ Choose the correct answer :

1. Hydrosphere includes all the following items, except .....
   a. oceans. b. rivers. c. molten rocks. d. groundwater.

2. The large sheets of ice or snow that moves slowly over Earth's surface are called .....
   a. minerals. b. glaciers. c. rocks. d. biosphere.

▸ Put (✓) or (✗) :

1. Geosphere contains crust and mantle only. ( )
2. Atmosphere is a mixture of some different gases. ( )

Activity 7 Characteristics of the Hydrosphere and Biosphere

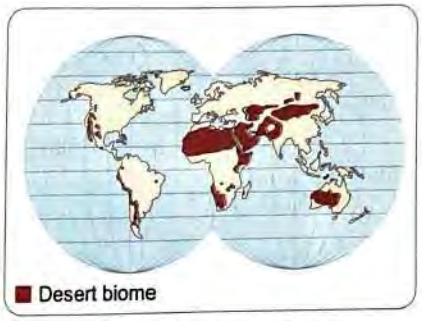
▸ In this activity, we are going to study some characteristics of both the biosphere and hydrosphere, and some examples that show their interactions.

Some characteristics of biosphere

• Biosphere is any part of Earth in which life can exist where it includes humans, animals and plants.

Biome :

It is a large region of the world that has similar soil, climate, plants and animals (wildlife).



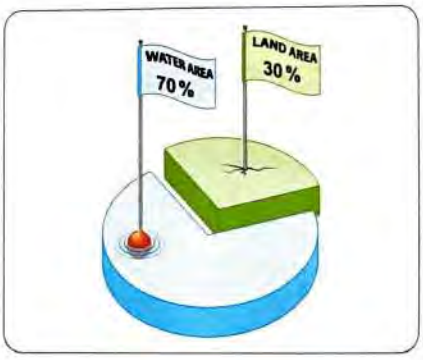
Desert biome on Earth

• **Examples of biomes :**

- Deserts.
- Forests.
- Rainforests.
- Grassland.
- Wetland.

Some characteristics of hydrosphere

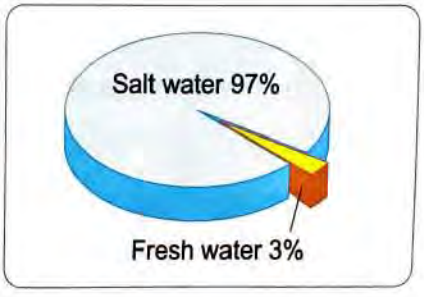
- Hydrosphere contains all the liquid, solid and gaseous water on Earth.
- Nearly 70 percent (70%) of Earth is covered by water.



• **Water that covers Earth may be :**

▸ **Salt water :**

- It forms about 97 percent (97%) of water on Earth.
- It is found in oceans, seas, gulfs and some lakes.



▸ **Fresh water :**

- It forms about 3 percent (3%) of water on Earth.
- It is found in rivers, rainwater, groundwater and most of lakes.

- Most of the fresh water on Earth is not found in liquid or running water, but it is found in the form of frozen water as large pieces of ice known as glaciers.

biome	منطقة حيوية	rainforest	غابة مطيرة	wetland	أرض رطبة
salt water	ماء مالح	gulf	خليج	climate	المناخ
grassland	أرض عشبية	percent	نسبة مئوية	fresh water	ماء عذب

Notes

1. Groundwater is water that lies beneath (under) Earth's surface and has been leaked into Earth through a layer of porous rocks forming what is known as aquifer.
2. Groundwater supplies wells and springs with water.

Aquifer

▸ Examples of hydrosphere and biosphere interactions :

Plants need water to survive

Humans drink water to survive

Animals drink water to survive

Water is the habitat of fish

Check your understanding

▸ Put (✓) or (✗) :

1. Most of water surfaces on Earth contain salt water. ( )
2. Most of lakes have fresh water, while some other lakes have salt water. ( )

Digital Extension Activity

Activity 8 " **Identify Interactions** "in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

leak	يتسرب	porous rocks	صخور مسامية
habitat	موطن	wells	آبار
springs	ينابيع	supply	يمد / يغذى
aquifer	طبقة المياه الجوفية		

In the Assessment Book :
Try to answer :
Self-Assessment (3)

Exercises on Lesson 3

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. The number of Earth's layers that form geosphere is ..... layers.
   a. two b. four c. six d. eight
2. Mountains and valleys are parts of .....
   a. geosphere. b. atmosphere. c. biosphere. d. hydrosphere.
3. Nitrogen and oxygen are gases that make most of the .....
   a. biosphere. b. geosphere. c. hydrosphere. d. atmosphere.
4. 97% of Earth's water is .....
   a. salt water. b. sugar water. c. fresh water. d. frozen water.
5. Formation of lakes is an example of an interaction between ..... and .....
   a. biosphere – hydrosphere. b. atmosphere – biosphere.
   c. hydrosphere – geosphere. d. geosphere – atmoshpere.
6. Roots fix plants in the soil, this is an interaction between ..... and .....
   a. biosphere – atmosphere. b. biosphere – geosphere.
   c. hydrosphere – geosphere. d. hydrosphere – atmosphere.
7. All the following water bodies contain salt water, except .....
   a. gulfs. b. seas. c. oceans. d. rivers.
8. Which of the following is found between pores of rocks below Earth's surface ? .....
   a. Ice. b. Groundwater. c. Oceans. d. Water vapor.
9. Polar bears live on ice, this is an example of an interaction between ..... and .....
   a. atmosphere – hydrosphere. b. geosphere – hydrosphere.
   c. biosphere – geosphere. d. biosphere – cryosphere.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. The word "Geo" refers to	a. water
2. The word "Hydro" refers to	b. Earth
3. The word "Atmos" refers to	c. life
4. The word "bio" refers to	d. vapor
	e. Sun

1. ..... 2. ..... 3. ..... 4. .....

3 Put (✓) or (X) :

1. All living organisms are parts of the atmosphere. ( )
2. Oceans, lakes and rivers are included in the hydrosphere. ( )
3. Deserts and forests are examples of biomes. ( )
4. Less than 50% of Earth's surface is covered with water. ( )
5. Most of the salt water on Earth is found in the form of frozen water. ( )
6. Fresh water forms about 3% of water on Earth. ( )
7. Without water, all forms of life will disappear. ( )
8. Wells and springs obtain their water from aquifers. ( )
9. All animals and plants can live in aquatic habitats. ( )

4 Write the scientific term of each of the following :

1. The system of Earth which contains all different landforms. (.....)
2. The Earth's system which is made up of water. (.....)
3. The frozen water part of the hydrosphere. (.....)
4. The Earth's system which consists of a mixture of gases surrounding Earth. (.....)
5. The system that includes humans, animals and plants on Earth. (.....)
6. A large area of the world that has similar soil, climate, plants and animals. (.....)

5 Complete the following sentences :

1. The Earth consists of 4 layers which are the ..... , the ..... and outer and inner core.
2. The large sheet of ice or snow that moves slowly over Earth's surface is known as .....
3. Breaking down of rocks by the effect of running water is an example of interaction between two Earth's systems which are ..... and .....
4. The amount of fresh water on Earth is ..... than the amount of salt water.
5. Most lakes have ..... water, while some other lakes have ..... water.
6. The Earth's sphere that contains rocks, sand and soil is known as .....

6 Give reasons for :

1. Importance of atmosphere for plants in making their food.

.....

2. More than 50% of known living organisms live in the aquatic environments.

.....

3. Most of the fresh water on Earth can't be used for drinking.

.....

7 What happens if ... ?

1. Plants can't get carbon dioxide gas from air.

.....

.....

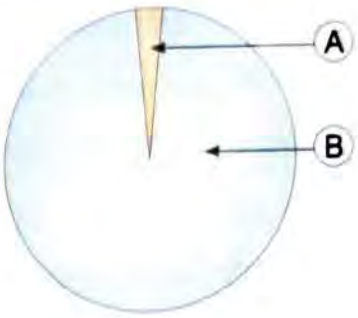
2. We compare the rainforest biome with the desert biome.

.....

.....

8 Look at this graph that shows the percentage of both salt water and fresh water in Earth's hydrosphere, then put (✓) or (✗) in front of the following sentences :

1. Area (A) represents salt water. ( )
2. Seas and oceans are examples of water bodies that belong to area (B). ( )
3. During water cycle, water evaporates from both areas (A) and (B). ( )
4. The type of water in rivers belongs to area (A). ( )



9 Read the following paragraph, then complete the sentences :

Frogs are amphibians, so they can live on land and in water, frogs inhale oxygen gas and exhale carbon dioxide gas. They feed on insects and use the water to hide from their predators.

1. Frogs can live on land, this is an interaction between biosphere and .....
2. Hiding of frogs in water is an interaction between biosphere and .....
3. Respiration of frog is an example of an interaction between biosphere and .....

LESSON 4

Activity 9 Hydrosphere or Biosphere

▸ **Look at the opposite picture that shows some aquatic organisms in an ocean, then put (✓) or (✗) :**

1. Oceans are parts of the hydrosphere as they contain fresh water. ( )
2. Any change happens in the water of an ocean affects the aquatic organisms live in it. ( )

In the previous activity, you observed some images and observations that show the interactions between the hydrosphere and biosphere.

▸ **In this activity, read the following observations and try to classify them in the table below into hydrosphere or biosphere as the example given :**

- A bird makes a home in a tree.
- Water evaporates from a pond.
- Saltwater waves crash in the ocean.
- Ants eat a piece of bread.
- Running water in a river.
- A snake eats a rat.

Hydrosphere	Biosphere
• Rainwater falls on a river. • An iceberg breaks off from its glacier.	• A hawk spots its prey. • Bees pollinate a flower.
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

aquatic	مائية	crash	يصطدم بـ	hawk	
pollinate	يلقح	pond	بركة ماء	iceberg	يدى
spot	يرصد				

Activity 10 Types of Aquatic Ecosystems

- Water ecosystems are also called aquatic ecosystems.
- Aquatic ecosystems on Earth can be classified in different ways such as, they can be classified into :

- Saltwater ecosystems. **- Freshwater ecosystems.**

Saltwater ecosystems

- Oceans are the largest saltwater ecosystems that cover large parts of Earth's surface.
- **Saltwater ecosystems of oceans and seas include :**

Intertidal zone

▸ **Shallow areas :**

These areas contain coral reefs and intertidal zones.

Note

Intertidal zone is the area along the coast that disappears underwater at the high tide and appears at the low tide.

▸ **Deep areas :**

These areas are called abyssal zones which are very deep areas in oceans, so that sunlight cannot reach them.

- Saltwater lakes are examples of saltwater ecosystems, let's study one of these saltwater lakes.
- **Saltwater lakes :**

Lake Assal

- Some lakes have salt water.
- Lake Assal in Djibouti is an example of saltwater ecosystem.
- Lake Assal has a high concentration of natural salts, so it is too salty for fish and most aquatic animals to live in also, there are few plants that can grow in this area.
- There are many different types of bacteria live in Lake Assal.
- Lake Manzala, Lake Mariout, Lake Bardawil and Lake Idku are saltwater lakes found in Egypt.

shallow areas	مناطق ضحلة	intertidal zone	منطقة المد والجزر	low tide	الجزر
abyssal zone	منطقة شديدة العمق	concentration	تركيز	coral reefs	شعاب مرجانية
high tide	المد	deep areas	مناطق عميقة	bacteria	بكتيريا

Freshwater ecosystems

- **Freshwater ecosystems include :**

▸ Ponds and lakes :

- In many ponds and lakes, the water is present all year.
- Some other ponds and lakes dry up in the hot summer months, so animals and plants that live there must adapt to the changes that happen in these ponds and lakes.
- Lake Nasser, Lake Qaroun and Lake of Wadi Al-Rayan are freshwater lakes in Egypt.

Pond

▸ Flowing water bodies:

- They include rivers and streams (streams are small bodies of flowing water).
- Water is always moving in the flowing water bodies.
- Streams and rivers connect other bodies of water such as lakes, oceans and seas.
- Many different plants and animals live in flowing water bodies.

Stream

Notes

1. An estuary is a special type of aquatic ecosystems that is formed along the edges of seas or oceans, where a river or stream ends, so an estuary is formed where a river meets a sea or an ocean.
2. Estuaries have a mixture of salt water from the sea or ocean and fresh water from a river or stream.

Estuary

Check your understanding

▸ Write the scientific term :

1. The area along the coast between the high tide and the low tide. (.....)
2. The water body where a river meets a sea or an ocean. (.....)

dry up	تجف	stream	جداول المياه
adapt	يتكيف	edges	حواف

Activity 11 Aquatic Ecosystems

▸ In this activity, we are going to compare between some characteristics and species (living organisms) that live in three different aquatic systems which are : ponds, streams and oceans.

Ponds

- **Type of water :** They have fresh water.
- **Water movement :** They have still water.
- **Species live in ponds :**

There are different living organisms that live in ponds such as :

Some plants like water lilies.

Some insects live and lay their eggs in ponds.

Some types of worms such as leeches live at the bottom of ponds.

Salamanders and frogs live in ponds and eat insects found there.

? Give a reason for :

Some insects lay their eggs in ponds.

Because ponds have still water, so the eggs will not move away.

Streams

- **Type of water :** They have fresh water.
- **Water movement :** They have running water, where water in streams are cool and flows fast.
- **Species live in streams :**

There are different living organisms that live in streams such as :

- Some mosses attach themselves to the rocks of streams (mosses look like algae).

Stream

species	أنواع / أجناس	water lily	نبات اللوتس	leeches	العلقيات
salamander	حيوان السلمندر	attach	يلتصق	still water	مياه راكدة
lay	يبيض	worm	دودة	mosses / algae	الطحالب

- Some animals live in streams such as :


Catfish


Crayfish


Trout

Oceans and seas

- **Type of water :** They have salt water.
- **Water movement :** Water of oceans and seas is constantly moving in the form of waves that crash onto the shore.
- **Species live in oceans :**

There are many living organisms that live in oceans and seas such as :


Kelp


Dolphin


Starfish


Moses fish (Flounder fish)

Notes

1. Oceans and seas environments include many smaller ecosystems.
2. Wind also moves the water of oceans and seas forming waves.
3. Ocean water circulates around the world in patterns called ocean currents.
4. The directions of ocean currents around the world can be predicted.

Check your understanding

▸ **Put (✓) or (✗) :**

1. Dolphins live in ponds and streams. ( )
2. Ponds and streams contain fresh water. ( )
3. Water of oceans is constantly moving in the form of waves. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (4)

catfish	سمك السلور	constantly	باستمرار	kelp	عشب البحر
circulate	يدور	predict	يتنبأ	trout	سمك السلمون المرقط
shore	شاطئ	flounder fish	السمك المفلطح	ocean currents	تيارات المحيط

Exercises on Lesson 4

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. Cats and grass are parts of the .....
   a. atmosphere. b. hydrosphere. c. biosphere. d. geosphere.
2. Which of the following is not a component of the hydrosphere ? .....
   a. Oceans. b. Rivers. c. Lakes. d. Rocks.
3. A spring flows out from a rock is an example of an interaction between ..... and .....
   a. hydrosphere – geosphere. b. hydrosphere – biosphere.
   c. biosphere – geosphere. d. biosphere – atmosphere.
4. Aquatic ecosystems can be classified into ..... ecosystem and ..... ecosystem.
   a. forest – desert. b. savannah – tundra.
   c. grassland – rainforest. d. freshwater – saltwater.
5. All the following are characteristics of abyssal zone, except .....
   a. they are very deep areas. b. sunlight cannot reach it.
   c. they are dark areas. d. they are shallow areas.
6. Rivers and streams contain ..... water, while ponds contain ..... water.
   a. salt – fresh b. fresh – salt c. running – still d. still – running
7. Estuaries have a mixture of ..... and .....
   a. groundwater – rainwater. b. fresh water – salt water.
   c. groundwater – fresh water. d. rainwater – salt water.
8. Water lilies can live in .....
   a. ponds. b. seas. c. oceans. d. deserts.
9. Among animals that can be found in ponds are ..... and .....
   a. lions – salamanders. b. dogs – frogs.
   c. frogs – salamanders. d. foxes – bears.
10. ..... is a saltwater lake in Egypt.
    a. Lake Nasser b. Lake Qaroun
    c. Lake Manzala d. Lake of Wadi Al-Rayan
11. All the following are saltwater lakes, except .....
    a. Lake Assal. b. Lake Nasser.
    c. Lake Idku. d. Lake Bardawil.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Shallow areas of oceans	a. don't receive sunlight.
2. Abyssal areas of oceans	b. contain coral reefs.
3. Mosses	c. live in salt water.
4. Dolphins	d. live in fresh water.
	e. live in deserts.

1. ..... 2. ..... 3. ..... 4. .....

3 Put (✓) or (✗) :

1. Living organisms are parts of geosphere. ( )
2. All of the water on Earth represents the hydrosphere. ( )
3. There are no living organisms live in the hydrosphere. ( )
4. Gases which surround the Earth represents the atmosphere. ( )
5. There is only one type of aquatic ecosystems known as saltwater ecosystems. ( )
6. The deep areas of the ocean that sunlight cannot reach it, are called abyssal zones. ( )
7. Some ponds and lakes may dry up in winter months. ( )
8. The place where two oceans meet is called an estuary. ( )
9. Some types of worms such as leeches live at the bottom of ponds. ( )
10. Rivers and streams are freshwater moving bodies. ( )
11. Some animals live in streams such as catfish, crayfish and trout. ( )

4 Write the scientific term of each of the following :

1. The largest saltwater ecosystems that cover large parts of Earth's surface. (.....)
2. Areas of the ocean which contain coral reefs and intertidal zones. (.....)
3. The area along the coast that disappears at the high tide and appears at the low tide. (.....)
4. An area where a river or a stream meets an ocean. (.....)

5 Complete the following sentences :

1. Rainwater is needed for plant growth, this is an interaction between two Earth's spheres which are ..... and .....
2. We can classify the aquatic ecosystems according to their amounts of salt into ..... ecosystem and ..... ecosystem.

3. Intertidal zone is the area along the ocean between the ..... tide and ..... tide.
4. Abyssal zone in the ocean is a dark area as ..... cannot reach it.
5. Some ponds and lakes dry up in the ..... months.
6. According to water movement, ponds have ..... water compared to streams that have ..... water.
7. Kelp, starfish and Moses fish live in ..... which are considered the largest saltwater ecosystems in the Earth.

6 Give reasons for :

1. Some ponds and lakes may dry up during some months.

.....

2. No green plants can survive in the abyssal zones of oceans.

.....

3. Mosquitoes lay their eggs in ponds.

.....

7 What happens to ...?

1. Animals that live in lakes if they dry up.

.....

2. The eggs of a frog if it lays its eggs in a river instead of a pond.

.....

8 Look at the opposite picture, in which area (A) shows a river, and area (C) shows an ocean, then choose the correct answer :

1. Area (B) represents .....
   a. pond. b. lake.
   c. estuary. d. groundwater.
2. Water lilies can be found in .....
   a. area (A). b. area (C).
   c. both area (A) and area (C). d. both area (B) and area (C).
3. All the following organisms can be found in area (C), except .....
   a. dolphin. b. starfish. c. flounder fish. d. frog.

LESSON 5

Activity 12 Record Evidence Like a Scientist

You have learned a lot about how Earth's hydrosphere and biosphere interact. In this activity, which will be repeated at the end of each concept, we will learn how to think like scientists to answer a question about one of the main points of this concept through four main steps.

- **Step 1** : The Question.
- **Step 2** : My Claim.
- **Step 3** : My Evidence.
- **Step 4** : My Scientific Explanation.

Step 1 The Question

How does Earth's biosphere interact with Earth's hydrosphere ?

Step 2 My Claim

Living organisms in the Earth's biosphere depend on the interactions with the Earth's hydrosphere for survival.

Note

Your claim should be formed of a sentence that gives an answer for the previous question in step 1.

Step 3 My Evidence

- Water from rain gives plants the water they need to survive.
- Humans and animals need to drink water to survive.
- Many animals live in water habitats.

Note

You should mention enough and suitable evidence that support your claim.

Step 4 My Scientific Explanation

- Earth's hydrosphere interact with Earth's biosphere when animals and plants live in it or use it for their basic needs.
- Plants depend on water to grow.
- Some animals live in water where they depend on the underwater environment for shelter and to find the food that they eat.
- Humans and animals need to drink enough water to survive.

Note

Your scientific explanation should explain your claim and evidence introducing some supportive examples from what you have learned.

repeat	يكرر	evidence	دليل
claim	فرض	scientific explanation	تفسير علمي

Activity 13 STEM in Action

▶ **Put (✓) or (✗) :**

1. Plastic waste materials cause water pollution. ( )
2. Throwing plastic waste materials in rivers and seas don't affect the life of aquatic organisms. ( )

▶ **To understand water, hydrologists must study how the hydrosphere interacts with the other spheres on Earth such as :**

- How water runs across the land (geosphere).
- How water affects living organisms (biosphere).
- What happens to water in air (atmophere).

Hydrologists are scientists who study water

Microplastics

- Microplastics are plastic pieces whose lengths are less than 5 millimeters.
- Microplastics are formed when plastic waste is broken down into small particles by wind, sunlight and wave action at sea.
- Microplastics are found everywhere on Earth, from the highest place on land to the deepest part of the ocean.
- Hydrologists are concerned about the amount of plastic pollution found in the hydrosphere.
- Microplastics found in aquatic ecosystems are more harmful to aquatic organisms than large plastic waste, where aquatic organisms cannot differentiate between their real food and plastic waste, so they can eat these pieces of plastic and get harmed.

Analyzing pollution

- A group of scientists in india wanted to learn more about the effects of microplastics on the environment.
- These scientists took samples of the water and the soil of a polluted river and they found that microplastics were present in the water and the soil of that river.
- After analyzing these samples, scientists found that most of these microplastics were from decayed plastic carry bags, packing materials, and fishing lines.

hydrologists	علماء المياه	concern	يقلق	defferentiate	يفرق
samples	عينات	packing materials	مواد تعبئة	microplastics	الجسيمات البلاستيكية
pollution	تلوث	analyzing	تحليل	decay	تفتت
fishing lines	خيوط الصيد				

Note

Rivers carry plastic waste materials from land to the oceans.

Check your understanding

▸ Complete the following sentences using the words below :

(wind – aquatic organisms – sunlight)

1. Tiny particles of plastic enter food chains when ..... eat them.
2. Sea waves, ... and ..... break down plastic materials into smaller particles.

In the Assessment Book :

Try to answer :
Self-Assessment ⑤
Model Exam on Concept (3.1).

Activity 14 Review : Hydrosphere and Biosphere Interactions

▶ **We can summarize this concept in the following main points :**

- Living organisms need water to drink, grow and survive.
- Water can cause weathering and erosion of rocks on the Earth's surface.
- **Weathering** means the breakdown of rocks into smaller particles due to the effect of rain, wind, temperature ..... etc.
- **Erosion process** means the transport of small particles of rocks to another place by water or wind.
- Nearly, three-quarters (more than 70%) of Earth is covered by water, so our planet looks like a blue marble from space.
- The total amount of water on Earth does not change, even if water changes from one state to another, so we cannot make new water, but we can recycle water.
- Water bodies on Earth can change from liquid state to :
  - Solid state (ice) by freezing in extreme cold weather.
  - Gas state (water vapor) by evaporation in hot weather.
- **Importance of water :**
  - Humans and animals drink water to survive.
  - Plants need water to grow.
  - Some animals and plants live in water.
- **Uses of water :**

  Humans use water in many purposes such as :

- Preparing food.	- Bathing.	- Cleaning.
- Recreation.	- Travelling.	- Manufacturing.

- **Water bodies on Earth :**
  - **Oceans and seas :** They are large water bodies that always contain salt water.
- **Lakes :**
  - They are water bodies surrounded by land.
  - They are often contain fresh water, but sometimes they contain salt water.
- **Rivers :**
  - They are water bodies that always flow from areas of high altitude (high places) to areas with low altitude (lower places) in definite channels.
  - They always contain fresh water.

- **Estuary :**
  - It is a water body at which the fresh water of a river meets the salt water of a sea or ocean.
- **Runoff :**
  - It is a water body that is formed of water from rain or melting of snow and moves into rivers or the ground.
- **Groundwater :**
  - It is the water that lies beneath the Earth's surface. and has been absorbed into Earth through a layer of porous rocks forming aquifer.
- Water is one of the renewable resources on Earth because it has what is called "water cycle" in nature.
- **During water cycle in nature :**
  - Water presents in water bodies on Earth evaporates and goes into the air forming clouds.
  - Water returns back to the Earth's surface during raining.

- **The four Earth's systems are : Geosphere, hydrosphere, atmosphere and biosphere.**

Geosphere

It is the system that includes all the layers of Earth which are the crust, the mantle and inner and outer core.

- **This system contains :**
  - Rocks. - Minerals. - Soil.
  - Landforms (such as mountains, valleys... etc.)
  - Molten rocks inside Earth.

Hydrosphere :

It is the system that includes all of the water on, under and above Earth.

- **This system contains :**
  - Oceans. - Seas. - Rivers. - Groundwater. - Glaciers.

Atmosphere :

It is the system that includes all the gases that surround Earth.

- The atmosphere is usually called "air".
- Air (atmosphere) is a mixture of many kinds of gases such as :
  - Oxygen gas. - Carbon dioxide gas. - Nitrogen gas.

Biosphere :

It is the system that includes all living organisms on Earth.

- **Biosphere contains :**
  - Humans. - Animals. - Plants.
- There are interactions between the different four systems of Earth.

Biome :

It is a large region of the world that has similar soil, climate, plants and animals.

- **Water that covers Earth may be :**
  - Salt water that forms about 97 percent (97%) of water on Earth and it is found in oceans, seas, gulfs and some lakes.
  - Fresh water that forms about 3 percent (3%) of water on Earth and it is found in rivers, rainwater, groundwater and most of lakes.
- Most of fresh water on Earth is found in the form of frozen water.
- **Saltwater ecosystems includes :**
  - Shallow areas which contain coral reefs and intertidal zones (intertidal zone is the area along the coast that disappears underwater at the high tide and appears at the low tide).
  - Deep areas which are called abyssal zones, these areas are very deep, so that sunlight cannot reach them.
- **Some water ecosystems :**

Points of comparison	Ponds	Streams	Oceans and seas
Type of water :	Fresh water.	Fresh water.	Salt water.
Water movement :	Still water.	Running water.	Constantly moving in the form of waves.
Species live in :	- Water lilies. - Some insects. - Some types of worms such as leeches. - Salamanders. - Frogs.	- Some mosses. - Catfish. - Crayfish. - Trout.	- Kelp. - Dolphin. - Starfish. - Flounder fish.

- Microplastics are formed when plastic waste is broken down into small particles by wind, sunlight and wave action at sea.
- Aquatic organisms cannot differentiate between their real food and the plastic waste, so they can eat these pieces of plastic and get harmed.
- Rivers carry plastic waste materials from land to the oceans.

Exercises on Lesson 5

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. Hydrologists study the movement of ..... across the Earth.
   a. air b. rocks c. water d. planes
2. All the following are factors affecting the breakdown of plastics into microplastics, except .....
   a. sunlight. b. moon. c. wind. d. sea waves.
3. Water evaporation and its condensing on planet Earth show an interaction between ..... and .....
   a. hydrosphere – atmosphere. b. hydrosphere – biosphere.
   c. biosphere – geosphere. d. biosphere – atmosphere.
4. All the following organisms can be negatively affected by throwing plastic waste in seas, except .....
   a. fish. b. shrimps. c. corals. d. foxes.

2 Put (✓) or (✗) :

1. Microplastics are large plastic pieces which can harm oceans and aquatic life. (
2. Some aquatic organisms cannot differentiate between their real food and plastic waste. (
3. Microplastics can be found in water as well as in soil. (
4. Throwing plastic waste materials in rivers and seas never affect the life of aquatic organisms. (
5. Some human activities are responsible for water pollution. (

3 Write the scientific term of each of the following :

1. A type of pollution that occurs as a result of throwing waste in rivers and seas. (.....
2. The scientist who studies water and its movement around the Earth. (.....
3. Tiny plastic particles that result from the breakdown of larger plastics. (.....

4 Complete the following sentences :

1. Large plastic waste in aquatic ecosystems are ..... harmful to aquatic organisms than microplastics.
2. Water runs across the land is an example of an interaction between hydrosphere and .....

3. When plastic waste materials are subjected to sunlight, wind or water waves, they are broken down into small particles known as .....

4. The scientists who study water on Earth are called .....

5 Give reasons for :

- Recycling the plastic bottles is more better than throwing them in seas and oceans.

.....

.....

6 What happens if ... ?

- Aquatic organisms eat pieces of plastic instead of their real food.

.....

.....

7 A scientist took a sample from a water body.

He found that there are very small pieces of plastic less than 5 mm. in length which are known as microplastics.

Look at this picture, then put (✓) or (✗) :

1. This water body is a part of Earth's atmosphere. ( )
2. Living organisms that live in this water body represent an interaction between biosphere and hydrosphere. ( )
3. Microplastics are found only in salt water, but not in fresh water. ( )
4. Microplastics don't affect the organisms that live in this water body. ( )
5. Microplastics that found in this water body are more harmful to aquatic organisms than large plastic wastes. ( )

Model Exam on Concept (3.1)

Total mark
20

1 (A) Choose the correct answer : (5 marks)

1. Which of the following is a part of the biosphere ? .....
   a. Ice. b. Clouds. c. Water. d. Animals.
2. Hydrologists study the movement of ..... across the Earth.
   a. air b. rocks c. water d. planes
3. Groundwater is present under Earth's surface in rock and soil pores. This is an interaction between ..... and .....
   a. geosphere – hydrosphere. b. biosphere – atmosphere.
   c. geosphere – atmosphere. d. hydrosphere – biosphere.
4. 97% of Earth's water is .....
   a. salt water. b. sugar water. c. fresh water. d. frozen water.

(B) Give a reason for the following :

Some ponds and lakes may dry up during some months.

.....

.....

2 (A) Put (✓) or (✗) : (5 marks)

1. A river always flows from an area of low place to an area with higher place. ( )
2. All animals and plants can live in aquatic habitats. ( )
3. Some animals live in streams such as catfish, crayfish and trout. ( )
4. Some human activities are responsible for water pollution. ( )

(B) What happens if ...?

Aquatic organisms eat pieces of plastic instead of their real food.

.....

.....

3 (A) Complete the following sentences : (5 marks)

1. Large plastic waste in aquatic ecosystems are ..... harmful to aquatic organisms than microplastics.
2. Earth's system that includes all living organisms is called .....

3. A rat that digs a barrow in the soil is an example of the interaction between ..... and geosphere.
4. The large sheet of ice or snow that moves slowly over Earth's surface is known as .....

(B) Cross out the odd word :

Rivers – Rainwater – Gulfs – Groundwater. (.....)

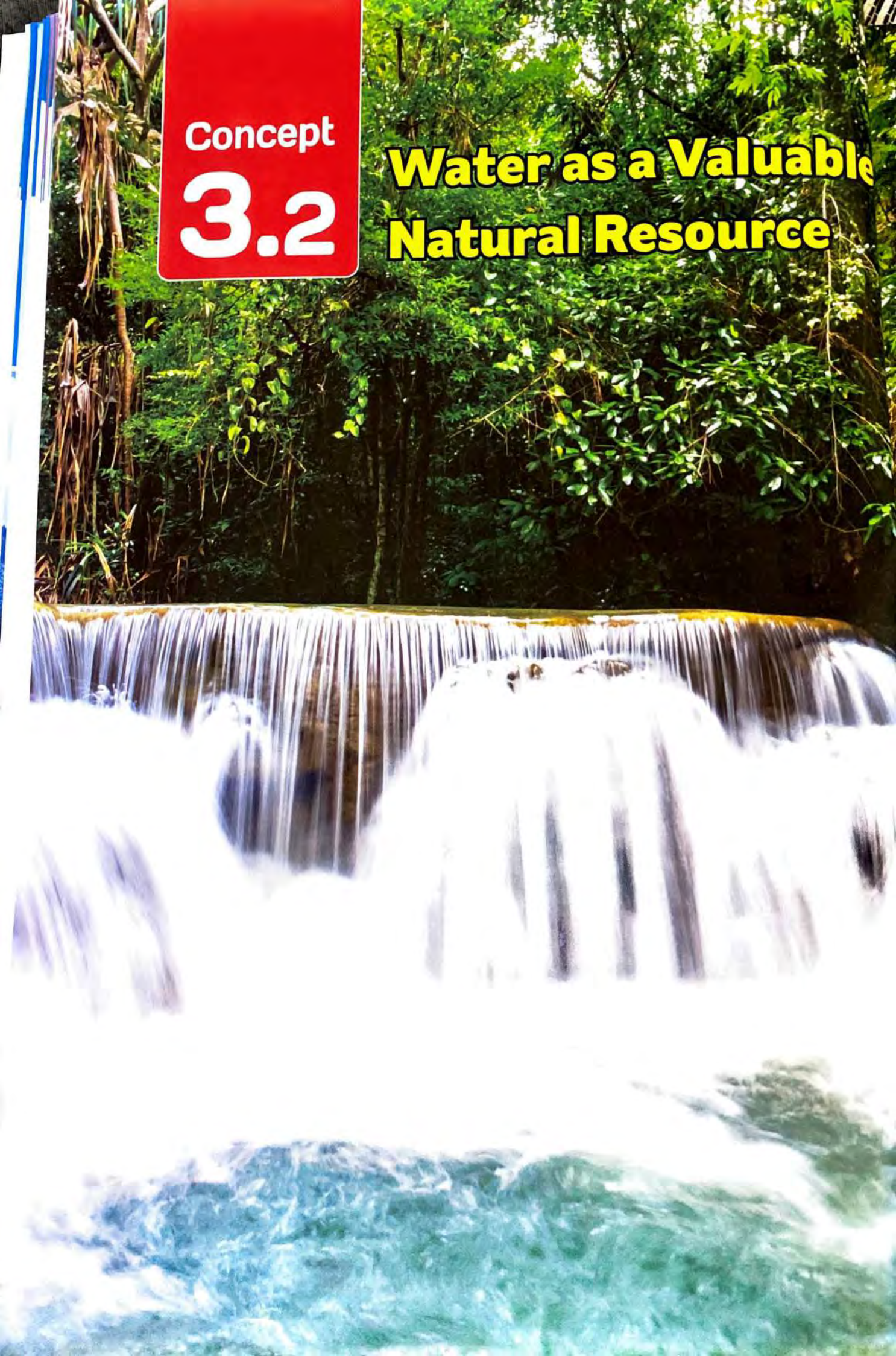
---

4 (A) Write the scientific term of each of the following : *(5 marks)*

1. An area where the fresh water of a river meets the salt water of a sea. (.....)
2. The frozen water part of the hydrosphere. (.....)
3. A large area of the world that has similar soil, climate, plants and animals. (.....)
4. Areas of the ocean which contain coral reefs and intertidal zones. (.....)

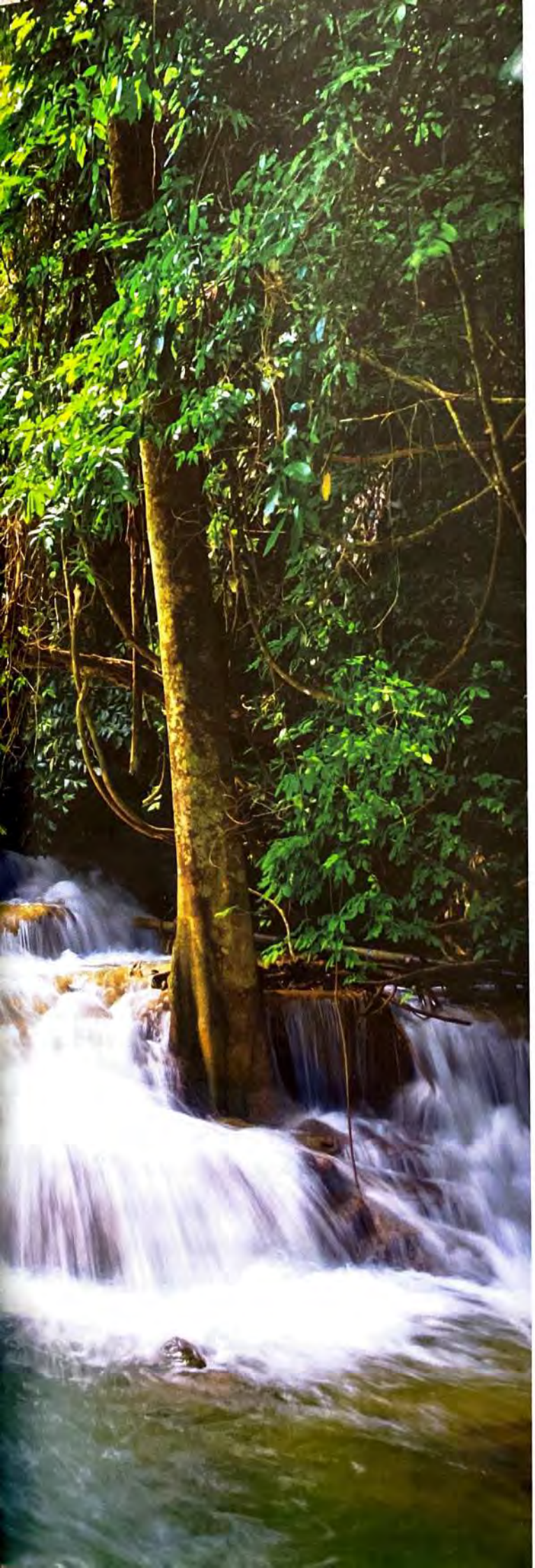
(B) Look at this picture, then complete the following sentences :

1. Label (A) refers to one of the Earth's systems which is .....
2. Label (B) refers to another Earth's system which is .....



Concept
3.2

Water as a Valuable Natural Resource



Learning outcomes

By the end of this concept, your child will be able to :

- Develop a model that describes the patterns of water distribution on Earth.
- Analyze a map and predict outcomes of events in a watershed.
- Identify threats to freshwater resources and offer suggested solutions.
- Identify the problem related to overconsumption of natural resources.
- Describe how human activities have effects on water, and other natural resources.
- Compare several solutions for the conservation and sustainable use of the Earth's natural resources.
- Discuss with evidence how people can change their behavior to protect natural resources and environment.

Key vocabulary

- Salt water
- Fresh water
- Watershed
- Scarcity
- Sustainability
- Wastewater
- Wetland
- Natural resource
- Conservation
- Pollution
- Preservation
- Water filter

Notes For Parents On Concept [3.2]

Lessons	Activities	What you should do with your child
1	Activity 1	Discuss with your child why water is considered a valuable natural resource on Earth.
	Activity 2	Help your child mention some uses of water and some sources of water.
	Activity 3	Discuss with your child sources of fresh water and sources of salt water and how we can conserve fresh water.
2	Activity 4	Discuss with your child some water bodies of Earth in details.
	Activity 5	Discuss with your child that poor quality of fresh water has dangerous effects on living organisms.
3	Activity 6	Discuss with your child that fresh water is a precious resource, so we must conserve it.
	Activity 7	Explain to your child how some human activities that take place in some water bodies affect living organisms that live near or in these water bodies.
4	Activity 8	Explain to your child different ways to conserve natural resources.
	Activity 9	Discuss with your child there are many activities in our daily life that require water.
5	Activity 10	Explain to your child how making a water filter using some simple materials.
6	Activity 11	Help your child to think like a scientist by answering a question about one of main points of this concept then write his/her claim, evidence and the scientif explanation.
	Activity 12	Discuss with your child importance of recycle water.
	Activity 13	Let your child review the main points in this concept.

LESSON 1

Activity 1 Can You Explain ?

- There are many natural resources on Earth such as water, metals (like gold, silver and aluminum), plants ...etc.
- People must protect and conserve the natural resources on Earth.

▸ From the above pictures, we can observe that why is water considered a valuable natural resource on Earth ?

- **Water is a valuable natural resource that is found in nature and used by living organisms, where :**
  - All living organisms (humans, animals and plants) need water to survive.
  - Water makes up nearly two-thirds of the human body.
  - Water keeps the body temperature of living organisms moderate.
- **There is a limited amount of water on Earth, where :**
  - Most of the water is salt water which cannot be processed by most plants and animals.
  - **So,** we must conserve fresh water and prevent it from pollution, where polluted water can harm plants and animals.

▸ In this concept, we will study :

- The importance of water.
- Water bodies of Earth.
- Earth's fresh water.
- Conservation, preservation and sustainability.
- Wastewater engineers.

valuable	ذو قيمة / مهم	natural resource	مورد طبيعى	moderate	معتدلة
limited amount	كمية محدودة	process	معالجة	pollution	تلوث
preservation	الحفظ	sustainability	الاستدامة	wastewater	مياه الصرف الصحى

Activity 2 The Importance of Water

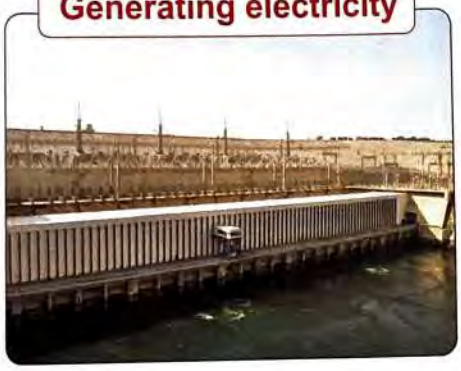
▸ **Look at the opposite picture, then put (✓) or (✗) :**

1. Water is used in many purposes such as cleaning vegetables and fruits. ( )
2. Water is important to all living organisms to survive. ( )

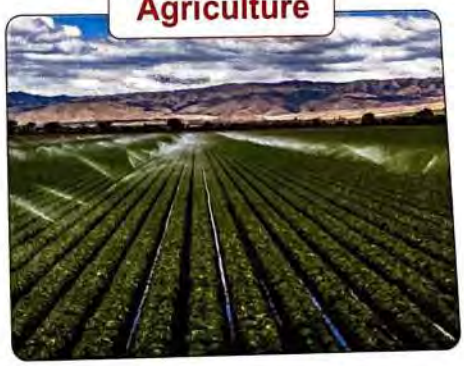
Uses of water

- You have studied in the previous concept that humans can use water in many purposes such as : drinking, bathing, cleaning vegetables and fruits, fishing and transportation.
- **Let's see some other uses of water such as :**

Generating electricity



Agriculture



Sources of water

There are many sources of water on Earth such as :

- Rivers
- Streams
- Lakes
- Oceans
- Glaciers
- Groundwater (Aquifers)
- Ponds
- Seas
- Rains

Check your understanding

▸ **Put (✓) or (✗) :**

1. In Egypt, water is used to generate electricity at the Aswan High Dam. ( )
2. Water is used for agriculture in Egypt. ( )

purposes	أغراض	transportation	النقل	generating electricity	توليد الكهرباء
sources	مصادر	agriculture	الزراعة	High Dam	السد العالي

Activity 3 What Do You Already Know About Water As a Valuable Natural Resource ?

▸ **You have known from the previous concept that there are two different types of water :**

- Fresh water.
- Salt water.

▸ **Now,** we are going to classify different water bodies on Earth into **sources of fresh water** and **sources of salt water**.

1 Sources of fresh water

Rivers

Rains

Glaciers

Groundwater (Aquifers)

Ponds

Streams

2 Sources of salt water

Oceans

Seas

Note

Most of lakes contain fresh water and some contain salt water.

classify يصنف water bodies مسطحات مائية

Conserving fresh water

- Conserving fresh water means using water in a correct way, because the percentage of fresh water that is suitable for drinking is very small compared to the percentage of water on Earth.
- **So,** we must conserve the limited amount of fresh water through many ways such as :

1. Drinking more juice instead of water.

2. Turning off water tap (faucet) during brushing your teeth.

3. Taking a quick shower.

4. Turning off the water, while washing your hair.

Check your understanding

In the Assessment Book :
Try to answer :
Self-Assessment (6)

Complete the following statements :

1. There are two types of water which are ..... and .....
2. From sources of fresh water are ..... , ... and .....
3. From sources of salt water are ..... and .....

conserving fresh water الحفاظ على المياه العذبة

percentage

Exercises on Lesson 1

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. The basic liquid matter which is needed by humans, animals and plants to survive is .....
   a. milk. b. water. c. oil. d. alcohol.
2. Water can control the ..... of living organisms bodies.
   a. length b. height c. temperature d. volume
3. All the following are from sources of water on the Earth, except .....
   a. aquifers. b. ponds. c. glaciers. d. molten rocks.
4. Among the ways of conserving fresh water is .....
   a. taking a quick shower.
   b. keep faucet opening during wash your hair.
   c. drinking more water instead of juice.
   d. taking a long shower.
5. Among the sources of water which human can use for drinking .....
   a. seas. b. oceans. c. saltwater lakes. d. rivers.
6. Human can use water in all the following purposes, except .....
   a. fishing. b. transportation.
   c. generating electricity. d. weathering of rocks.
7. The amount of salt water on the Earth is ..... the amount of fresh water.
   a. larger than b. smaller than c. equal to d. half

2 Put (✓) or (✗) :

1. Water makes about two-thirds of human body. ( )
2. Among the sources of fresh water are rains. ( )
3. The percentage of fresh water is higher than that of salt water, so we should conserve salt water. ( )
4. Turning off the water tap, while washing your hair is from the ways to conserve water. ( )
5. Oceans are considered as saltwater bodies. ( )
6. We can drink the water of seas. ( )

3 Write the scientific term of each of the following :

1. It is the liquid that makes up about two-thirds of the human body. (.....)
2. A type of water which is suitable for drinking. (.....)

4 Complete the following sentences :

1. In High Dam, water is used to generate .....
2. Rivers contain ..... water, while oceans contain ..... water.
3. Glaciers are sources of fresh water which have a ..... state of matter.
4. We must take a quick shower to conserve .....

5 Give reasons for :

1. We must conserve fresh water.

   .....

2. You should turn off water tap during brushing your teeth.

   .....

6 What happens if ...?

People don't conserve fresh water.

.....

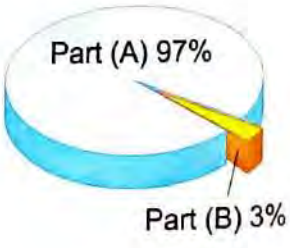
.....

7 Put (F) in front of the sources of fresh water and (S) in front of the sources of salt water :

1. Nile River. (.....)
2. Seas. (.....)
3. Water streams. (.....)
4. Lake Assal. (.....)
5. Aquifers. (.....)
6. Oceans. (.....)

8 Look at the opposite graph, then complete the sentences below :

1. Part ..... represents fresh water, while part ..... represents salt water.
2. The type of water which human can drink, is represented by part .....
3. Ocean is an example of water bodies which is included in part .....
4. We must conserve the type of water that is represented by part ....., because .....



LESSON 2

Activity 4 Water of Earth

▸ **Look at the opposite picture, then put (✓) or (x) :**

1. River is considered from sources of fresh water. ( )
2. Fresh water represents 3% of water area on the Earth's surface. ( )

River

▸ **Most of Earth is covered with water, where :**

- Rivers, streams, ponds, ... etc. contain fresh water.
- Oceans and seas contain salt water.
- Also, there is some water underground.

▸ **In this activity,** we will study some water bodies in details.

1 A river

- **Type of water :** Fresh water.
- **Location :** Mountains.
- **How is a delta formed ?**

A river often starts in the mountains as a stream → Fast moving water in a river can erode deep valleys. → As the water moves quickly across the land, it picks up sediments. → The flow of a river ends when it meets a sea or a larger river. → The water slows down and sediments are deposited at the river's endpoint forming a **delta**.

Note

Delta is a triangular-shaped area of mud and other sediments that forms when a river meets a sea or a larger river.

Delta of Egypt

mountains	جبال	deep valleys	وديان عميقة
sediments	رواسب	deposite	تترسب

2 A lake

- **Type of water :** Most of lakes contain fresh water.
- **Location :** Low-lying areas.
- A lake is a large body of water surrounded by land.
- A lake forms when water collects in a low-lying area.

3 A wetland

- **Type of water :** Fresh water or salt water.
- **Location :** Land partially covered with water.
- **From kinds of wetlands :** Swamps (marshes) and ponds (bogs).

4 An estuary

- **Type of water :** Salt water mixes with fresh water.
- **Location :** Where a river meets a sea or an ocean.
- Estuaries are home to thousands of plants and animals.

5 Groundwater

- **Type of water :** Fresh water.
- **Location :** In the cracks and spaces of underground rocks.
- There is more amount of groundwater on Earth than the water in rivers and lakes.

6 Oceans

- **Type of water :** Salt water.
- **Location :** Oceans surround the continents.
- All of the oceans are connected to each other.
- The ocean's floor has mountains, plains and plateaus.

low-lying areas	المناطق المنخفضة	partially	جزئى	swamps	مستنقعات
plains	سهول	ponds	برك	cracks	شقوق
plateaus	هضاب				

Check your understanding

▸ Classify the following water bodies in the following table :

(oceans – rains – seas – glaciers – groundwater – rivers)

Salt water	Fresh water
.....	.....
.....	.....
.....	.....
.....	.....

Activity 5 Earth's Fresh Water

- You have learned from the previous activities that you must protect the freshwater environments on Earth, where fresh water is needed for drinking, irrigation, agriculture, industry, generating electricity, ... etc.
- More than 10% of the world's animal species live only in freshwater habitats.
- Fresh water scarcity and quality are two main risks that are threatened the world.
- **Poor quality of fresh water leads to :**
  - The death of thousands of living organisms every year.
  - The extinction of some species live in fresh water such as some fish and amphibians.

Give a reason for :

Poor quality of fresh water has dangerous effects on living organisms.

Because poor quality of fresh water leads to the death of some living organisms and the extinction of some living organisms live in fresh water.

Check your understanding

▸ Put (✓) or (✗) :

1. Fresh water scarcity and quality are two main risks that are threatened the world. ( )
2. Poor quality of fresh water leads to extinction of some species live in fresh water. ( )
3. More than 10% of the world's animal species live only in freshwater habitats. ( )

▸ Mention four uses of fresh water.

1. .....
2. .....
3. .....
4. .....

In the Assessment Book :
Try to answer :
Self-Assessment (7)

irrigation	ري	industry	صناعة	scarcity	ندرة / نقص
quality	جودة	amphibians	برمائيات	risks	مخاطر
threaten	يهدد	extinction	أنقراض		

Exercises on Lesson 2

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. Delta is formed when .....
   a. the speed of water increases.
   b. the speed of water decreases.
   c. the amount of river's water decreases.
   d. the river's water dry up.

2. At the end of Nile River Delta, there is a/an ..... between Nile River and Mediterranean sea.
   a. lake b. wetland c. ocean d. estuary

3. ..... are formed when water collects in low-lying areas.
   a. Seas b. Oceans c. Lakes d. Rivers

4. Among the kinds of wetlands are .....
   a. swamps and lakes. b. marshes and bogs.
   c. ponds and oceans. d. swamps and estuaries.

5. Estuary is formed when the water of ..... meets the water of .....
   a. a river – a sea. b. a river – groundwater.
   c. a sea – an ocean. d. a sea – a wetland.

6. The floor of ..... may contain mountains and plateaus.
   a. wetland b. oceans c. rivers d. lakes

7. Among the examples of freshwater bodies in which more than 10% of the world's animal species live are .....
   a. rivers and seas. b. streams and seas.
   c. oceans and seas. d. rivers and streams.

8. The type of water that is found in the sea is .....
   a. salt water only. b. fresh water only.
   c. salt and fresh water. d. neither salt nor fresh water.

9. People obtain their needs of ..... that is found in lakes, rivers, streams and groundwater.
   a. oxygen gas b. seaweed c. salt water d. fresh water

10. Among the risks that threaten lots of water areas on Earth are.....
    a. conservation and scarcity. b. scarcity and poor quality.
    c. conservation and poor quality. d. conservation and extinction.

2 Put (✓) or (✗) :

1. Rivers often start in mountains in the form of estuaries. ( )
2. Valleys can be formed by rivers due to fast movement of river's water. ( )
3. Assal lake is surrounded by land and it is a low-lying area. ( )
4. The type of water in wetlands is salt water only. ( )
5. There is an estuary between Nile River and Mediterranean Sea. ( )
6. Groundwater is formed in the cracks and spaces between underground rocks. ( )
7. Ocean's floor may have mountains, plains and plateaus. ( )
8. High quality of fresh water leads to the death of marine organisms live in it. ( )
9. Scarcity and conservation of fresh water are two main risks that threaten fresh water on Earth. ( )

3 Write the scientific term of each of the following :

1. A water body that often starts in the mountain as a stream. (.....)
2. A triangular-shaped area of mud and other sediments that forms when a river meets a sea. (.....)
3. The large water body that is surrounded by land. (.....)
4. The water bodies that surround the continents. (.....)
5. It is a land area which is partially covered with water. (.....)
6. A water body which contains a mixture of sea water and river water. (.....)
7. The water that is stored in the cracks and spaces between underground rocks. (.....)

4 Complete the following sentences :

1. When the speed of water stream becomes high, it can erode deep ....., while when speed of water becomes low it can form .....
2. Deltas are formed by the deposit of ..... at the end of .....
3. The land that is partially covered with water is called .....
4. When a river meets a sea, an ..... is formed.
5. When the water is stored in the cracks and spaces of underground rocks, ... is formed.
6. The extinction of some species that live in fresh water is due to the poor ..... of fresh water.
7. The type of water that is found in rivers, most of lakes and streams is a ..... water.

5 Give reasons for :

1. Deltas are formed at the river's end.

.....

2. Groundwater is called by this name.

.....

3. The quality of fresh water affects the life of living organisms live in it.

.....

6 What happens if ...?

1. Water is collected in a low-lying area.

.....

.....

2. The quality of fresh water becomes poor.

.....

.....

3. The river water meets the sea water.

.....

.....

LESSON 3

Activity 6 Fresh Water : A Precious Resource

▸ **Look at the following pictures, then put (✓) or (✗) :**

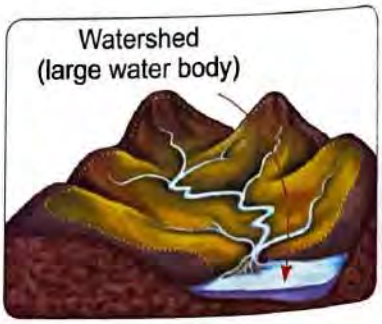
1. Fresh water is an important resource, because humans and animals can only drink fresh water. ( )
2. Plants need fresh water to survive and grow. ( )

- Much of the study of water is focused on fresh water due to its vital importance to humans.
- Finding and preserving fresh water is one of the major challenges of this century.
- Fresh water resources on Earth are limited, so without the right balance of using fresh water in a community leads to the occurrence of water imbalance causing droughts or floods that impact many organisms.
- **Humans use some strategies to control and conserve fresh water for their needs such as :**
  - building dams across rivers.
  - diverting (changing) the path of water to irrigate crops.
- **These human activities cause imbalance of water that leads to :**
  - drought (shortage of water) in some places.
  - flooding in some other places.

▸ **Now,** we will study what would happen if there is imbalance of water in a watershed ?

Watershed :

It is an area of land where water from different sources flows towards a common location usually an ocean, a sea or other large water body.



precious resource	مورد ثمين	century	القرن	common location	مكان مشترك
major challenges	تحديات رئيسية	occurrence	حدوث	imbalance	عدم توازن
drought	جفاف	watershed	مستجمع المياه	flood	فيضان
focus on	يركز على	vital importance	أهمية حيوية		

The study of freshwater systems focuses on the balance of water in a watershed, where :

- When there is more rainfall, the level of water in rivers or streams will increase causing floods.
- When there is too little rainfall, the level of water in rivers or streams will decrease, so these water bodies may dry up causing drought.

• **But,** when there is water balance, rivers or streams will have a constant source of fresh water.

Check your understanding

Complete the following sentences using these words :

(flooding — watershed — drought — decrease — increase)

1. An area of land where all the water flows to a common location is called .....
2. When there is more rainfall, the level of water in rivers or streams will ..... causing .....
3. When there is too little rainfall, the level of water in rivers or streams will ....., so these water bodies may dry up causing .....

Activity 7 Watershed Predictions

- A watershed can help scientists understand how the water bodies in an area interact with one another.

▸ **Now,** we will study some human activities that take place in some water bodies as tributaries and affect people, plants and animals that live near or in these tributaries.

Tributaries

Tributaries :

They are small water bodies such as small creeks or streams that flow into bigger rivers.

- **As you have studied before that water bodies are connected with each other, we can conclude that :**

Tributaries as small creeks or streams → flow into → bigger rivers → flow into → larger water bodies as bays, seas and oceans.

- What happens upstream in a watershed affects the water bodies downstream.

Notes

1. Upstream is the place where a river starts.
2. Downstream is the place where a river ends.

▸ **We are going to use the following figure that represents a watershed map to show how water bodies will be affected by some human activities that occur nearer to upstream and downstream such as :**

Remember

The blue color on maps represents water bodies

Watershed map

1 If a factory is built near a tributary at the area Ⓐ.

- The factory waste will affect the tributary at area Ⓐ.
- Water in tributary at area Ⓐ carries the factory waste to other water bodies connected to it causing water pollution.

predictions	تنبؤات	tributaries	روافد نهر	small creeks	جداول صغيرة
downstream	المصب	streams	جداول المياه	bays	الخلجان
upstream	المنبع	factory	مصنع	waste	مخلفات

(2) If a dam is built across a tributary at area (B).

- The dam will hold the water behind it and this causes a change in the amount of water in other water bodies connected to this tributary.

(3) If there is a farm using chemical fertilizers near a tributary at area (C).

- The farm waste will affect the tributary at area (C).
- The water in tributary at area (C) carries the farm waste that leak to other water bodies connected to it causing water pollution.

(4) If a trash dump is established near a tributary at area (D).

- The litter of a trash dump will be blown into the water of tributary at area (D).
- On windy days, the water in tributary at area (D) carries the litter into other water bodies connected to it causing water pollution.

Check your understanding

▸ **Put (✓) or (✗) :**

1. The human activities that take place in water cannot affect people, plants and animals that live near or in water streams. ( )
2. Small water bodies such as creeks or streams that flow into bigger rivers are called tributaries. ( )
3. Downstream is the place where a river ends. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (8)

chemical fertilizers الأسمدة الكيماوية
trash dump مستودع النفايات
leak تسرب
litter قمامة

Exercises on Lesson 3

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. Most of water on Earth is .....
   a. a mixture of fresh and salt water that is found in estuaries.
   b. fresh water that is found underground.
   c. salt water that is found in oceans and seas.
   d. fresh water that is found in lakes.
2. The area of land where all the water flows to a common location as ocean is called .....
   a. tributary. b. estuary. c. wetland. d. watershed.
3. The level of water in a river may increase causing flooding, when there is more .....
   a. rainfall. b. wind. c. sunlight. d. sediments.
4. Tributary usually ends by the flowing of its water into bigger .....
   a. ocean. b. sea. c. river. d. lake.
5. The correct flowing of water bodies that are connected with others is .....
   a. bigger rivers ⟶ tributaries ⟶ oceans.
   b. tributaries ⟶ bigger rivers ⟶ oceans.
   c. oceans ⟶ tributaries ⟶ bigger rivers.
   d. bigger rivers ⟶ oceans ⟶ tributaries.
6. All the following reasons cause water pollution in a river, except .....
   a. litter of a nearby trash dump.
   b. waste of a nearby factory.
   c. chemical fertilizers of a nearby farm.
   d. building a dam across the river.
7. Which of the following can pollute the water of a tributary by the effect of wind blowing ? .....
   a. Liquid waste materials of factories. b. Water that flows through dams.
   c. Light litter of trash dumps. d. Sediments in the water of rivers.

2 Put (✓) or (✗) :

1. We must conserve fresh water, because it is limited on Earth. ( )
2. Building factories is from human strategies to control and conserve fresh water. ( )

3. When there is more rainfall, the level of water in rivers will decrease causing flooding. ( )
4. The water of tributaries flow directly into seas and oceans. ( )
5. Upstream is the place where a river starts. ( )
6. Waste produced from factories that are built near a watershed can affect the quality of water in downstream. ( )
7. Dam can hold the water behind it which causes a change in the amount of water in a water body. ( )

3 Write the scientific term of each of the following :

1. It is an area of land where all the water flows to a common location usually an ocean, a sea or other large water body. (.....)
2. They are small water bodies such as small creeks or streams that flow into bigger rivers. (.....)
3. A building established across a river which can hold water behind it. (.....)

4 Complete the following sentences using the words below :

(chemical fertilizers – bays – decrease – creeks – imbalance – seas – dams – streams – drought)

1. Some human activities may cause water ..... , that leads to drought or flooding of water bodies.
2. When the rate of rainfall decreases, the level of water in rivers will ..... causing .....
3. Tributaries are considered as small ..... or ..... that flow into bigger rivers then into large water bodies as ..... and .....
4. A farm that is found near a tributary may cause pollution to the water body if this farm using .....
5. Building ..... across a tributary can change the amount of water in it.

5 Give reasons for :

1. Scientists tend to preserve freshwater sources on Earth.

.....

2. Farms near tributaries may cause water pollution.

.....

6 What happens if ... ?

1. The rate of rainfall increases on a river.

.....

2. A trash dump is established near a tributary that is connected with a river.

.....

7 **Look at the opposite watershed map that shows a river and its tributaries, then choose the correct answer :**

1. If there is a factory built near area (A), water in area ..... will be polluted due to factory waste.
   a. (B) only
   b. (B) and (D) only
   c. (C) and (B) only
   d. (B), (C) and (D)

2. If a ..... is built near area (B), the amount of water in other areas will change.
   a. factory b. trash dump c. dam d. farm

3. If there is ..... at area (C), floods may happen in the other areas.
   a. less rainfall b. more rainfall c. drought d. wind blowing

4. The type of water which is found in areas (A), (B) and (C) is .....
   a. fresh water. b. salt water. c. frozen water. d. mixed water.

LESSON 4

Activity 8 Conservation, Preservation and Sustainability

There are many things we use every day that are made from natural resources, so it is very important to conserve these resources.

The following table shows some things made from natural resources :

Natural resources	Objects made from natural resources
Trees :	Paper is made from trees. 
Oil products :	Plastic is made from oil products. 
Plant and animal products :	Clothes are made from plant such as cotton and animal products such as wool of sheeps. 

Humans can conserve natural resources in different ways such as :

1. Preservation.
2. Sustainability.

1 Preservation

Preservation of resources means restricting access (control reaching) of humans to these natural resources or using them.

Example of resources preservation :

Countries prevent using or developing of natural resources in some protected areas of land such as :

- Ras Mohammed Protectorate in South Sinai.
- Wadi Al-Hitan Protectorate in Fayoum.

restricting	تقييد	access	التمكن من
products	منتجات	protectorate	محمية طبيعية

- **The following table shows the results of overusing (depletion) some natural resources more quickly than they can be replaced :**

Natural resources	Results when using them more quickly
Fish :	If fish are eaten by humans (overfishing) more than they are replaced by their reproduction in oceans and seas, they become rare and fishing will decrease.
Groundwater :	If groundwater of wells are used faster than they are replaced by rains, the groundwater will run out and the wells will become dry.

2 Sustainability

- Sustainability is an important way of resources conservation.
- Sustainability means using resources in a way that does not negatively affect the future supply of these resources.

Note

Preservation of natural resources means prevent using or developing natural resources in special areas.
But, when people manage the use of the natural resources without negative affect their amount in future this is called sustainability.

Example of resources sustainability :

Cows feeding (grazing) on grass in a field where grass grows slowly.

Unsustainable situation

If cows are placed in many small areas of grass they began eating all grass before new grass could grow in these areas.

This causes the disappearance of grass in these areas and the cows will be very hungry.

Sustainable situation

If cows are placed in one large area of grass so, the cows still have more food.

This causes the grass to grow back in other areas.

depletion استنزاف
negatively سلبى
overfishing صيد السمك الجائر
wells آبار
manage تدبير / يدير
disappearance الاختفاء
unsustainable غير مستدام
run out
grazing
situation

Note

Resource sustainability is affected by many factors such as :
- Overpopulation.
- Unequal distribution of resources.
- Overuse (overconsumption) or damage of resources.
- Pollution.

Renewable does not mean unlimited

Natural resources can be classified into:

- Renewable resources such as water, plants, animals ... etc.
- Nonrenewable resources such as oil, coal ... etc.

Renewable resources can be used up if people don't use them wisely.

Examples :

- When fresh water (renewable resource) on Earth is polluted, it becomes undrinkable.

- Pollution from burning of nonrenewable resources like coal and oil leads to soil pollution that causes the death of plants and animals (renewable resources).

- Cutting down too many trees (renewable resource) leads to deforestation so, water and wind can carry away soil causing soil erosion.

unequal	غير متساوى	used up	تستهلك	undrinkable	غير صالح للشرب
death	موت	deforestation	إزالة الغابات	erosion	التعرية
overconsumption	الإفراط فى الإستهلاك	distribution	توزيع	unlimited	غير محدود

Check your understanding

▸ Put (✓) or (✗) :

1. Control reaching of humans to natural resources leads to conservation of these resources. ( )
2. Sustainability don't require management of how a resource is used. ( )

▸ Write the scientific term of each of the following :

1. The action of control reaching of humans to the natural resources or using them. (.....)
2. It means using resources in a way that does not negatively affect the future supply of these resources. (.....)

Activity 9 How Much Water Do You Use?

- From the previous activity you have learned that water is considered a renewable natural resource.
- Drinking water is important for humans to survive, but there are many activities in our daily life that require water such as :

- Taking a shower.
- Cooking food.
- Flushing a toilet.
- Washing hands.
- Brushing teeth.
- Watering plants.

▸ **The following tables show how you can calculate the average amount of water that a person use in some daily activities by two different methods :**

- **First method :**

Activity requires water	Number of minutes to do this activity each time	Multiply	Amount of water used each minute	Equal	Total amount of water used to do this activity each time
Taking a shower	10 minutes	×	7 liters	=	70 liters
Brushing teeth with water running	4 minutes	×	6 liters	=	24 liters

- **Second method :**

Activity requires water	Number of times you repeat this activity in one day	Multiply	Amount of water used to do this activity each time	Equal	Total amount of water used to do this activity in one day
Flushing a toilet	4	×	5 liters	=	20 liters
Washing hands	6	×	4 liters	=	24 liters

flushing تدفق مائى
average متوسط
watering plants يسقى النباتات
require يتطلب

▸ **The following table shows the average of total amount of water used by a family formed of 4 members :**

Activity requires water	Total amount of water used to do this activity in one day (from previous table)	Multiply	Number of family members	Equal	Total amount of water for the family to do this activity in one day
Flushing a toilet	20 liters	×	4	=	80 liters
Washing hands	24 liters	×	4	=	96 liters

▸ From the previous tables we can observe that many people use much water in their daily activities so, we must conserve water during our daily activities by changing our habits such as :

- Decrease the time of some activities like taking a shower.

- Turn off water during some activities like brushing teeth.

Check your understanding

▸ **If you have only 40 liters of water to do all activities in one day.**

Choose three from the following activities you will do by this little amount of water .....

a. washing hands.
b. washing clothes.
c. brushing teeth.
d. washing dishes.
e. flushing a toilet.

In the Assessment Book :
Try to answer :
Self-Assessment (9)

members أفراد habits عادات

Exercises on Lesson 4

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. Paper of books are made from .....
   a. oil products. b. wool of sheeps. c. trees. d. cotton.
2. Plastic cup is made from ..... products.
   a. plant b. animal c. oil d. human
3. Prevent developing of Ras Mohammed Protectorate is considered as an example of .....
   a. preservation b. pollution c. sustainability d. consumption
4. If some rabbits are placed in only one large area of grass, this is considered as an example of ..... of green areas.
   a. deforestation b. preservation c. sustainability d. pollution
5. Among the factors that help us to make resources sustainability is .....
   a. overpopulation. b. overuse of resources.
   c. damage of resources. d. pollution control.
6. Cutting down too many trees of forests leads to .....
   a. deforestation and soil deposition. b. overpopulation and soil erosion.
   c. deforestation and soil erosion. d. overpopulation and soil deposition.
7. Family (A) consists of 3 members and family (B) consists of 4 members, if you know that each member use 20 liters to washing hand daily, so the total amount of water that is used by family (A) is ..... that is used by family (B).
   a. more than b. less than c. double d. equal to

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Cotton	a. can be used in making plastic.
2. Oil products	b. can be used in making paper.
3. Trees	c. can be used in making clothes.
	d. can be used in making cans.

1. ..... 2. ..... 3. .....

3 Put (✓) or (✗) :

1. Preservation and sustainability are ways to conserve natural resources. ( )
2. When people manage the use of natural resources to make them available in future, this is called sustainability. ( )

3. Placing cows in many small grass areas is considered as unsustainable situation. ( )
4. Soil pollution causes the death of plants and animals. ( )
5. You must decrease the time of taking your shower to conserve water. ( )
6. You can conserve water by leaving the tap open during brushing your teeth. ( )

4 Write the scientific term of each of the following :

1. The action of control reaching of humans to the natural resources or using them. (.....)
2. It means using resources in a way that does not negatively affect the future supply of these resources. (.....)

5 Complete the following sentences :

1. Groundwater is replaced by .....
2. The run out of ..... causes wells to become dry.
3. Plastic is made from ....., while paper and wood are made from .....
4. Clothes can be made from ..... products or ..... products.
5. If we use fossil fuels wisely without negative affect their amount in future, this is called .....
6. To conserve water, we can ..... time of washing our hands.

6 Give reasons for :

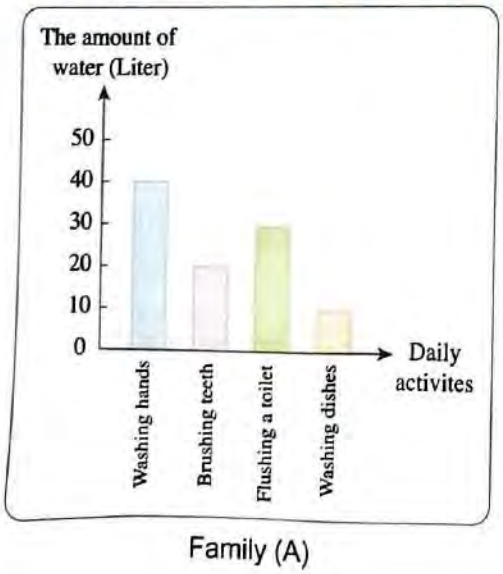
1. Countries prevent using or developing natural resources in some protected areas of land.

.....

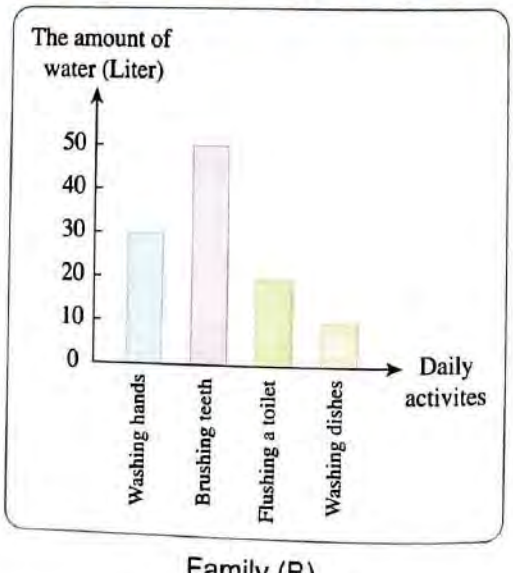
2. We should turn of water during washing dishes.

.....

7 Look at the following graphs which show the amount of water that is used by two families to do some of the same daily activities, then choose the corrcet answer :



Family (A)



Family (B)

1. Family (A) uses largest amount of water in ....., while family (B) uses largest amount of water in .....
   a. washing hands – washing dishes.
   b. brushing teeth – flushing a toilet.
   c. flushing a toilet – brushing teeth.
   d. washing hands – brushing teeth.
2. The total amount of water that is used by family (A) in brushing teeth and flushing a toilet is equal to that is used by family (B) in .....
   a. washing hands and brushing teeth.
   b. brushing teeth and flushing a toilet.
   c. washing hands and flushing a toilet.
   d. washing dishes and washing hands.
3. The total amount of water that is used by family (A) is ..... that is used by family (B).
   a. larger than b. smaller than c. equal to d. two times
4. If you know that the two families have the same number of members, so according to the previous graphs .....
   a. family (A) conserves water more than family (B).
   b. family (B) conserves water more than family (A).
   c. both families do not conserve water.
   d. both families use the same amount of water.

LESSON 5

Activity 10 Drinking Water

Look at the opposite picture, then put (✓) or (✗) :

1. When fresh water on Earth is polluted it becomes undrinkable. ( )
2. Water is considered nonrenewable natural resource. ( )

From the previous lessons, you have learned that :

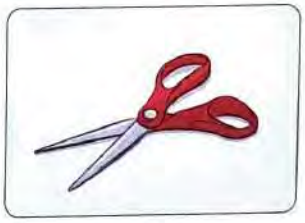
- Fresh water is a limited renewable natural resource which is very important for all living organisms to survive including human who uses water in many activities in his daily life.
- Human creates many methods to filter water to recycle wastewater or polluted water to be used again in some other purposes.

Note

Recycle wastewater means removing harmful materials from water.

Now, we will make a water filter using some simple materials in order to remove harmful waste materials from polluted water.

Tools

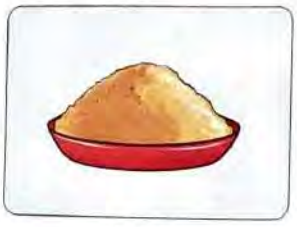


Scissors

Plastic bottle

Cotton balls

Charcoal



Sand

Dirty water

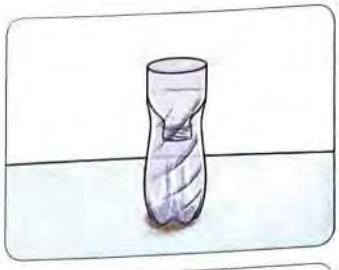
Note

You can make dirty water by adding some mud to clear water.

filter	مُنقى	removing	إزالة	mud	طين
purposes	أغراض	harmful	ضار	charcoal	فحم
clear	صافى	materials	مواد		

Steps

1. Cut off the bottom of the plastic bottle and place it upside down on the other part of the bottle as shown.



2. Make a layer of cotton balls in the cut bottle.
3. Put charcoal above the cotton balls and put the sand above the charcoal.

4. Pour the dirty water in the filter.

Observations

- The filter removes most of dirt from dirty water.
- The filtered water moves down at the bottom of the container.

Conclusion

Water filters are used to remove harmful materials from polluted water to get filtered water that human can use in many purposes.

Check your understanding

Choose the correct answer :

1. We can use all the following objects to make a simple water filter, except .....
   a. cotton. b. mud. c. charcoal. d. sand.
2. The role of water filter is .....
   a. adding waste materials into water.
   b. moving polluted water to other place.
   c. removing waste materials from water.
   d. increasing the amount of polluted water.

In the Assessment Book :
Try to answer :
Self-Assessment (10)

layer	طبقة	role	دور
container	وعاء	above	أعلى

Exercises on Lesson 5

Understand · Apply · Analyze · Evaluate · Create

1 Choose the correct answer :

1. ..... can be used to recycle wastewater to be used again in human activities.
   a. Bottles b. Filters c. Dams d. Generators
2. All the following materials can be used to filter wastewater in simple water filter, except .....
   a. cotton. b. wood. c. charcoal. d. sand.
3. In simple water filter, wastewater must pass through .....
   a. cotton $\xrightarrow{\text{then}}$ charcoal $\xrightarrow{\text{then}}$ sand.
   b. cotton $\xrightarrow{\text{then}}$ sand $\xrightarrow{\text{then}}$ mud.
   c. charcoal $\xrightarrow{\text{then}}$ cotton $\xrightarrow{\text{then}}$ sand.
   d. sand $\xrightarrow{\text{then}}$ charcoal $\xrightarrow{\text{then}}$ cotton.
4. ..... process is used to get filtered water from polluted water.
   a. Recycling b. Sustainability c. Preservation d. Conservation
5. Sand, charcoal and cotton can be used to remove all the following materials from wastewater, except .....
   a. small pieces of plastic. b. salt dissolves in water.
   c. small particles of mud. d. small pieces of rocks.

2 Put (✓) or (✗) :

1. Recycling of wastewater means removing wast materials from it. ( )
2. Cotton can be used as a filter to remove waste from water. ( )
3. Water is considered as a nonrenewable natural resource. ( )
4. Adding some of mud to a clear water can pollute it. ( )
5. Dams can be used to filter polluted water to be used again. ( )

3 Complete the following sentences using the words below :

(harmful – charcoal – mud – filter – sand)

1. Human can ..... water to recycle wastewater to be used again.
2. Cotton, ... and ..... can be used in making a simple water filter.
3. Water filters are used to remove ..... materials from polluted water.
4. Clear water can be polluted if it is mixed with .....

4 Give a reason for the following :

- Scientists recycle fresh wastewater to get filtered water again.

.....

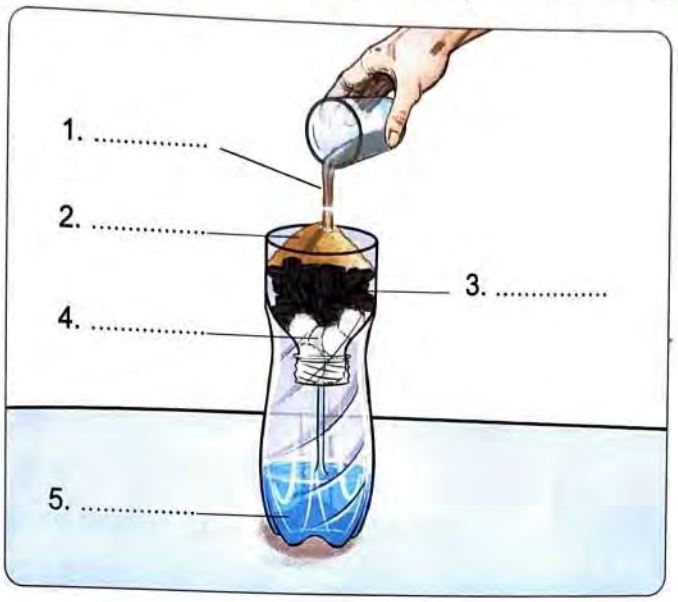
.....

5 **What happens if you mix clear water with small amount of mud ?**

.....

.....

6 **Look at the following figure, then answer the questions below :**



A. Label the figure using the following words :

(Charcoal – Wastewater – Cotton – Filtered water – Sand).

B. The tool above shows a simple ....., and it is used to remove ..... materials from wastewater. **(Complete)**

LESSON 6

Activity 11 Record Evidence Like A Scientist

In this concept, you have learned a lot about water as a valuable natural resource and its importance for living organisms on Earth.

Now, try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learned in the first concept.

Step 1 The Question

Why is water considered a valuable natural resource on Earth ?

Step 2 My Claim

.....

.....

.....

.....

.....

Step 3 My Evidence

.....

.....

.....

.....

.....

Step 4 My Scientific Explanation

.....

.....

.....

.....

.....

claim فرضية scientific explanation تفسير علمى evidence دليل

Activity 12 STEM in Action

▸ **Put (✓) or (✗) :**

1. Conserving water occurs by changing our habits such as increasing the time of taking a shower. ( )
2. Recycle wastewater means removing harmful materials from water. ( )

▸ **From the previous lessons, you have learned that :**

- Human uses water in many activities in his daily life such as washing dishes, cleaning cars, brushing teeth, cooking food ... etc.
- We must conserve water during our daily activities by changing our habits.

▸ **In this activity,** we will study another way to conserve water by recycling water and reuse it.

Recycling water

- Solar energy plays an important role in the water cycle in nature where, solar energy helps the Earth to recycle and reuse water.
- Human also can recycle wastewater and reuse it in many purposes.

Water cycle

Note

Wastewater is the water that has already been used in homes and different industries.

Wastewater engineers

They are special kinds of scientists and some of them work in water treatment plants such as Bahr Al-Baqar wastewater treatment plant in Egypt.

▸ **The role of wastewater engineers in recycling wastewater :**

- They design tools that provide us with clean water.
- They always observe the water quality and check for the amount of pollutants in water.
- They decide where to build water treatment plants, observe and check each step in water treatment process.

After water treatment process occurs, wastewater engineers test the treated water to make sure it is safe before the water is released to rivers and lakes or used by humans.

kinds	أنواع	treatment	معالجة	tools	أدوات
design	يصمم	reuse	إعادة استخدام	cycle	دورة
check	يفحص	engineers	مهندسين	pollutants	ملوثات
decide	يقرر	treated water	المياه المعالجة	safe	آمن

Notes

1. Water treatment plants recycle wastewater by removing harmful materials from wastewater to reuse it.
2. **There are other works of wastewater engineers such as :**
   - They design ways to protect a community from floods.
   - They calculate the amount of drinking water that a community needs.

Check your understanding

▸ Put (✓) or (✗) :

1. Wastewater engineers design tools to clean water. ( )
2. Water treatment plants are built to pollute clean water. ( )

Activity 13 Review : Water as a Valuable Natural Resource

We can summarize this concept in the following main points :

All living organisms need water to survive.

Uses of water :

Water is used in :

- Drinking.
- Cleaning vegetables and fruits.
- Transportation.
- Agriculture.
- Bathing.
- Fishing.
- Generating electricity.
- Irrigation.

Sources of fresh water :

- Rivers.
- Glaciers.
- Groundwater (Aquifers).
- Rains.
- Ponds.
- Streams.

Sources of salt water :

- Oceans.
- Seas.

- Most of lakes contain fresh water and some contain salt water.

Wayes to conserve fresh water :

- Drinking more juice instead of water.
- Turning off water tap during brushing your teeth.
- Taking a quick shower.
- Turning off the water, while washing your hair.

The following table shows most important facts about some water bodies :

Water body	Type of water	Location	Other information
A river :	Fresh water	Mountains	When a river meets a sea or a larger river, the sediments picked up by the river are deposited at the river's endpoint forming a delta.
A lake :	Most of lakes contain fresh water	Low-lying areas	A lake is a large body of water surrounded by land.

A wetland :	Fresh water or salt water.	Land partially covered with water.	From kinds of wetlands : swamps (marshes) and ponds (bogs).
An estuary :	Salt water mixes with fresh water.	Where a river meets a sea or an ocean.	Estuaries are home to thousands of plants and animals.
Groundwater :	Fresh water.	In the cracks and spaces of underground rocks.	There is more groundwater on Earth than the water in rivers and lakes.
An ocean :	Salt water.	Oceans surround the continents.	The ocean's floor has mountains, plains and plateaus.

- Fresh water scarcity and quality are two main risks that are threatened the world.

Watershed :

It is an area of land where water from different sources flows towards a common location usually an ocean, a sea or other large water body.

- **The study of freshwater systems focuses on the balance of water in a watershed, where :**
  - When there is more rainfall, the level of water in rivers or streams will increase causing flooding.
  - When there is too little rainfall, the level of water in rivers or streams will decrease, so these water bodies may dry up causing drought.
  - But, when there is water balance, rivers or streams will have a constant source of fresh water.

Tributaries :

They are small water bodies such as small creeks or streams that flow into bigger rivers.

- Preservation of resources means restricting access (control reaching) of humans to these natural resources or using them.
- Sustainability means using resources in a way that does not negatively affect the future supply of these resources.

- Water is considered a renewable natural resource.
- Human uses water in many activities in his daily life such as :
  - Taking a shower.
  - Flushing a toilet.
  - Washing hands.
  - Brushing teeth.
- We must conserve water during our daily activities by changing our habits such as :
  - Decrease the time of some activities like taking a shower.
  - Turn off water during some activities like brushing teeth.

- Wastewater is the water that has already been used in homes and different industries.
- Wastewater engineers are special kinds of scientists and some of them work in water treatment plants which remove harmful materials from water.

In the Assessment Book :

Try to answer :
- Self-Assessment (11)
- Model Exam on Theme (3)

Exercises on Lesson 6

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. Water cycle is considered as an example of .....
   a. recycling water. b. preservation of water.
   c. overusing water. d. conservation of water.
2. ..... are special kinds of scientists who work on recycling water in water treatment plants.
   a. Hydrologists b. Aquatic biologists
   c. Wastewater engineers d. Marine biologists
3. All the following may happen to the treated water, except that .....
   a. it is used again by humans. b. it is released into air.
   c. it is released to rivers. d. it is released to lakes.
4. All the following are from works of wastewater engineers, except that they .....
   a. design ways to protect a community from floods.
   b. calculate the amount of drinking water that a community needs.
   c. design tools that provide us with clean water.
   d. always check for the amount of fish in water.

2 Put (✓) or (✗) :

1. Hydrologists are scientists that work on recycling wastewater in water treatment plants. ( )
2. Wastewater engineers decide where to build water treatment plants. ( )
3. Wastewater engineers do not test the treated water after finishing the water treatment process. ( )
4. In water treatment plants, harmful materials are removed from wastewater to reuse it again. ( )

3 Write the scientific term of each of the following :

1. It is the water that has already been used in homes and different industries. (.....)
2. Scientists who work in water treatment plants. (.....)
3. They are stations which recycle wastewater by removing harmful materials from wastewater to reuse it. (.....)

4 Complete the following sentences :

1. Wastewater engineers work in ..... plants, and design tools that provide us with clean .....
2. Wastewater engineers can test the quality of ..... by check for the amount of ..... in water.
3. After water treatment process, ... engineers test the ..... water to make sure it is safe.
4. Water treatment plants recycle the ..... by removing harmful materials from it to reuse again.
5. Wastewater engineers design ways to protect communities from .....

5 Give a reason for the following :

Wastewater engineers test the treated water.

.....

.....

6 Look at the following figure, then complete the sentences below :

1. This figure represents the ..... in nature.
2. The process that takes place in this figure is similar to the ..... process which takes place in water treatment plants.
3. Scientists which responsible for doing this process inside the water treatment plants are called .....

Model Exam on Concept (3.2)

Total mark: 20

1 (A) Choose the correct answer : (5 marks)

1. The level of water in a river may increase causing flooding, when there is more .....
   a. rainfall. b. wind. c. sunlight. d. sediments.
2. Plastic cup is made from ..... products.
   a. plant b. animal c. oil d. human
3. The natural resource which is important to the survival of all living organisms is .....
   a. soil. b. oil. c. water. d. grass.
4. ..... are formed when water collects in low-lying areas.
   a. Seas b. Lakes c. Rivers d. Oceans

(B) Give a reason for the following :

Scientists tend to preserve freshwater sources on Earth.

.....

.....

2 (A) Write the scientific term of each of the following : (5 marks)

1. The water bodies that surround the continents. (.....)
2. It means using resources in a way that does not negatively affect the future supply of these resources. (.....)
3. They are small water bodies such as small creeks or streams that flow into bigger rivers. (.....)
4. It is a land area which is partially covered with water. (.....)

(B) Put (F) in front of the sources of fresh water and (S) in front of the sources of salt water :

1. Nile River. (.....)
2. Seas. (.....)
3. Water streams. (.....)
4. Lake Assal. (.....)
5. Aquifers. (.....)
6. Oceans. (.....)

3 **(A) Put (✓) or (✗) :** *(5 marks)*

1. Dams can be used to filter polluted water to used again. ( )
2. You can conserve water by leaving the tap open during brushing your teeth. ( )
3. Upstream is the place where a river starts. ( )
4. The type of water in wetlands is salt water only. ( )

(B) What happens if ...?

The river water meets the sea water.

.....

.....

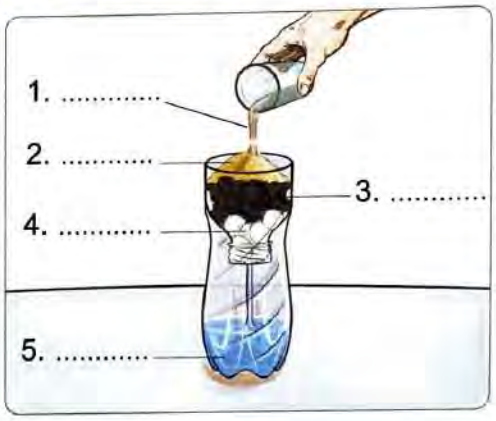
4 **(A) Complete the following sentences using the words below :** *(5 marks)*

(electricity – quality – rains – dam)

1. Building a ..... across a tributary can change the amount of water in it.
2. The extinction of some species that live in fresh water is due to the poor ..... of water.
3. In High Dam, water is used to generate .....
4. Groundwater is replaced by .....

(B) Look at the opposite figure, then answer the questions below :

1. **Label the figure using the following words :**
   (Charcoal – Wastewater – Cotton – Filtered water – Sand).
2. The tool above shows a simple ....., and it is used to remove ..... materials from wastewater. **(Complete)**



Assess Your Learning

Questions of the School Book on Theme (3)

Choose the correct answer :

1. Fresh water that leaks into Earth through a layer of porous rock is .....
   a. Mediterranean Sea water. b. Bahr Al-Baqar plant water.
   c. Lake Assal. d. groundwater.

2. Which of the following is considered as an example of the interaction between the biosphere and the atmosphere? .....
   a. Estuaries. b. Still water. c. Exhaled air. d. Atmospheric air.

3. Catfish can survive in ..... water environment.
   a. salt and still b. fresh and fast
   c. salt and current d. fresh and still

4. ..... are part of geosphere.
   a. Plants b. Rocks c. Gases d. Water bodies

5. Coral reefs live in ..... of aquatic ecosystem.
   a. frozen area b. abyssal zone c. fresh water d. shallow areas

6. An area of land where water flows in a specific path from a high altitude area to a lower altitude area is .....
   a. river. b. sea. c. lake. d. ocean.

7. It results from hydrosphere and atmosphere interaction: .....
   a. Availability of oxygen gas. b. Soil fertility.
   c. Increased pollution. d. Photosynthesis.

8. Moses fish are found in .....
   a. Nile river. b. Lake Burullus. c. streams. d. ponds.

9. An example of salt water ecosystem is .....
   a. Nile river. b. Lake Assal. c. a glacier. d. Lake Nasser.

10. The exchange of energy and matter during the interaction between ..... is an evidence for lake formation.
    a. biosphere and atmosphere b. geosphere and hydrosphere
    c. biosphere and geosphere d. hydrosphere and atmosphere

11. The suitable ecosystem for lilies is an aquatic ..... ecosystem.
a. salty and waved
b. fresh and current
c. salty and still
d. fresh and still

12. Most of fresh water on Earth is found in the form of .....
a. groundwater. b. rivers. c. glacier. d. streams.

13. A group of plants and animals which line together in a large area characterized by its climate is called .....
a. atmosphere. b. hydrosphere. c. biome. d. geosphere.

14. There are many salty aquatic environments in Egypt, such as .....
a. Lake of Wadi Al-Rayan.
b. Nile river estuary.
c. Lake Qaroun.
d. Lake Burullus.

15. Crayfish survive in .....
a. still pounds. b. cool streams. c. wide seas. d. fast flow rivers.

16. There are many fresh aquatic environments in Egypt, such as .....
a. Lake Burullus.
b. Nile river estuary.
c. Lake Qaroun.
d. Lake Manzalah.

17. Respiration of catfish is an example of reaction between ..... systems.
a. atmosphere and hydrosphere
b. biosphere and hydrosphere
c. biosphere and atmosphere
d. geosphere and biosphere

18. All of the followings are examples of goesphere elements, except .....
a. minerals. b. helium. c. rocks. d. molten rocks.

19. Weathering of rocks by water indicates an interaction between .....
a. hydrosphere and goesphere.
b. biosphere and hydrosphere.
c. biosphere and atmosphere.
d. atmosphere and hydrosphere.

20. Insects lay their eggs in systems that are found in .....
a. streams. b. ponds. c. sea. d. rivers.

21. The result of the interaction between hydrosphere and geosphere is .....
a. glaciers. b. atmosphere. c. salty lakes. d. wastewater.

22. Water that covers most of the Earth's surface is .....
a. fresh water in rivers.
b. salty water in seas and oceans.
c. fresh water in glaciers.
d. fresh water in groundwater.

23. Wadi Al-Hitan protectorate is one procedure of .....
    a. sustainability of natural resources. b. depletion of natural resources.
    c. the quality of natural resources. d. preservation of natural resources.

24. Seas and oceans water meet rivers water at .....
    a. watershed. b. esturay. c. surface canal. d. underground.

25. ..... of resources, requires managing its usage methods.
    a. Depletion b. Sustainability c. Renewability d. Scarcity

26. Gold is one of the ..... resources on Earth.
    a. natural b. industrial c. renewable d. sustainable

27. Formation of streams is an example of .....
    a. conservation of water resources.
    b. sustainability.
    c. renewability.
    d. interaction between hydrosphere and geosphere.

28. Efforts which were done in Red Sea to get rid of plastic wastes that threaten coral reefs are called .....
    a. scarcity. b. preservation. c. poor quality. d. restoration.

29. Overfishing of small fish in Nile River results in .....
    a. scarcity of catfish in Egypt. b. poor quality of fish.
    c. resources restoration. d. preservation of trout fish.

30. Pollution is one of the problems to achieve (affect) ..... of resources.
    a. preservation b. sustainability c. restoration d. renewability

31. There are many concerns that threaten lots of water areas on Earth such as .....
    a. scarcity and poor quality. b. sustainability and poor quality.
    c. poor quality and availability. d. availability and quality.

32. Pollution of sea water leads to .....
    a. pollution of water of a tributary. b. pollution of oceans water.
    c. pollution of water streams. d. wetland pollution.

33. Rationalizing consumption of groundwater, so that its consumption rate does not exceed the rate of its compensation from rain, is a form of .....

a. sustainability of water resources. b. preserving water resources.

c. restoration of water resources. d. depletion of water resources.

34. ..... is an evidence of limiting the possibility of using and accessing resources.

a. Lake Qaroun b. Natural protectorates

c. Well water d. Biome systems

35. Ponds and swamps are from .....

a. watershed. b. estuaries.

c. underground aquifers. d. wetlands.

36. There are many factors that negatively affect the sustainability of resources including .....

a. quality of management way. b. population increase.

c. resource recovery. d. natural protectorates.

37. Wastewater engineers work in Egypt in .....

a. Wadi El-Hitan protectorate. b. lake Qaroun.

c. Bahr Al-Baqar plant. d. electrical power plant.

Theme Four : Change and Stability

UNIT 4 Patterns in the Sky

Get Started

What I Already Know

- **When you look at the sky during the day or at night, you can observe some celestial objects such as the Sun, the moon and stars.**
- **You can also observe the changes in the shape of the moon along the month.**

- **The Sun and stars are celestial objects that give off light. But, the light of the Sun only causes the formation of shadows of different objects on Earth's surface.**
- **The changes in the length of the shadow and its location depends on the direction of the sunlight that falls on the object.**

- **In this unit, you are going to study :**
  - Patterns of motion of celestial objects in the sky.
  - The effects of gravity and how this force affects the movement of objects and holds our solar system together.
  - The movement of Earth in space and how this movement affects some patterns like the seasons, the position of stars in the sky, and so on.
  - The role of the sunlight in the formation of shadows of objects.

- **Unit Project : "Sundial"**

  At the end of this unit, you will design and test a model of a "sundial" to detect the time using what you know about the movement of the Sun across the sky and how it affects the formation of shadows of objects.

Sundial


Concept
4.1
Effects of Gravity

Learning outcomes

By the end of this concept, your child will be able to :

- Describe patterns in objects experiencing gravitational force on small scales, and large scales.
- Argue from evidence that the gravitational force Earth exerts on objects is directed downward, toward the center of Earth.
- Plan and conduct an investigation to produce data to show evidence of the effects of gravity and air resistance on different objects.

Key vocabulary

- Air resistance
- Ellipse
- Force
- Friction
- Gravity
- Magnetism
- Motion
- Orbit
- The apparent motion of the Sun

Notes For Parents On Concept [4.1]

Lessons	Activities	What you should do with your child
1	Activity 1	Discuss with your child how gravity affects the movement of objects.
	Activity 2	Discuss with your child the cause of motion in the images.
	Activity 3	Discuss with your child what would happen if there were no gravity.
	Activity 4	Explain to your child the effect of mass on gravitational force and the effect of distance between two objects on gravitational force between them.
2	Activity 5	Discuss with your child the cause and the effect of some different types of forces.
	Activity 6	Explain to your child the meaning of gravity.
	Activity 7	Discuss with your child the relationship between gravity and mass.
3	Activity 8	Help your child do an activity to investigate the angle at which an object is pulled toward the ground by the force of gravity.
4	Activity 9	Discuss with your child different types of forces such as magnetism, friction and air resistance.
5	Activity 10	Help your child do an activity to investigate the effect of gravity and air resistance on different objects.
6	Activity 11	Discuss with your child what keeps the planets revolve around the Sun in fixed orbits.
	Activity 12	Digital extension activity.
	Activity 13	Help your child to think like a scientist by answering a question about one of the main points of this concept then write his/her claim, evidence and the scientific explanation.
	Activity 14	Digital extension activity.
	Activity 15	Let your child review the main points in this concept.

LESSON 1

Activity 1 Can You Explain ?

Skydivers

Planets

Tides

- Gravity is the force that pulls objects with mass toward the center of Earth.
- Also, gravity is the force of attraction between objects.

How does gravity affect the movement of objects ?

- The force of gravity pulls objects down toward the ground, such as skydivers that fall down toward the ground.
- The force of gravity between the Sun and objects in the solar system keeps the planets revolve in fixed orbits.
- The gravity of the moon affects the ocean tides.

In this concept, we will study :

- The force of gravity.
- Gravity and mass.
- Magnetism, friction and air resistance.
- Gravity and the law of motion.
- The revolving planets.

skydivers	هواة القفز بالمظلات	pull	يسحب / يجذب	solar system	النظام الشمسى
tides	المد والجزر	mass	كتلة	magnetism	المغناطيسية
			اتجاه	friction	الاحتكاك
				resistance	مقاومة الهواء

Activity 2 Gravity

▸ **Look at the opposite picture, then put (✓) or (✗) :**

1. When a pencil is dropped, it will fall down toward the ground. ( )
2. Gravity is the force that keeps all objects on the Earth's surface. ( )

Girl on bike falling over

Pouring oil

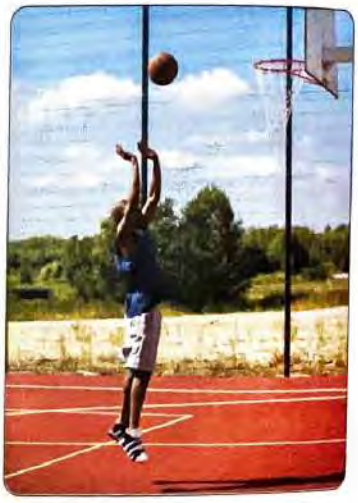
In the images above, we can observe that :

- Both images are similar in that something is going down toward the ground.
- The motion of the girl and the oil toward the ground is due to gravity.

Give a reason for :

In basketball game, each time the ball is thrown into the air, it falls down toward the ground.

Due to gravity that pulls the ball down toward the ground.



Check your understanding

▸ **Put (✓) or (✗) :**

1. We see gravity when people skydive. ( )
2. The moon is revolving around Earth due to gravity between them. ( )

pour يصب similar متشابه motion حركة
oil زيت throw يرمى

Activity 3 The Effect of Gravity on the Movement of Objects

Girl on a slide

- The force of gravity is pulling the girl and, as a result, she moves down the slide.

- If there were no gravity :
  - There would be no force that pulls the girl downward.
  - The girl would also not be held to the slide.

Revolving of the moon around Earth

- The force of gravity is pulling the moon, as a result, the moon still revolves in its orbit around Earth.
- If there were no gravity between the moon and Earth, the moon would just float off into space.

Check your understanding

▸ Complete the following sentences using the words below :

(orbit — gravity — float)

1. When a boy moves down a slide, this is due to the force of .....
2. Without the force of gravity, the moon would ..... off into space.
3. Earth is pulling the moon, keeping it in its ..... around Earth.

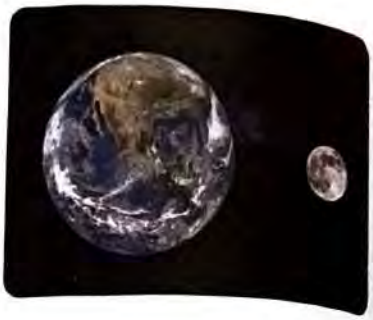
▸ Put (✓) or (✗) :

1. The tides are affected by the gravity of the moon. ( )
2. The planets in the solar system remain in their orbits due to gravity. ( )

slide	زحلوقة	hold	يمسك / يثبت	orbit	مدار
float	يسبح	space	الفضاء	revolve	يدور

Activity 4 What Do You Already Know About the Effect of Gravity ?

Gravity



- Gravity pulls objects toward the center of Earth.
- Gravity affects two objects even when they do not touch each other, such as the moon and Earth.
- There is gravitational attraction (or gravitational pull) between Earth and the moon.

Mass and gravitational force

Gravitational force (gravity) of an object increases, as its mass increases and vice versa.

What happens if ...?

The mass of the moon becomes twice its real mass.

The moon would have more gravity, so it would pull closer to Earth and it might even crash into Earth.

Distance and gravitational force

Gravitational force (gravity) decreases, when the distance between two objects increases and vice versa.

What happens if ...?

The distance between the moon and Earth becomes twice than it is.

The gravitational attraction between them would become smaller.

Check your understanding

▸ Put (✓) or (✗) :

1. Gravity pushes objects toward the center of Earth. ( )
2. If the mass of an object increases, its gravitational pull will increase. ( )
3. If the distance between two objects decreases, the gravitational pull toward each other will decrease. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (12)

touch	يلمس	closer	أقرب	real	حقيقي
twice	ضعف	vice versa	والعكس صحيح	crash	يصطدم
distance	مسافة				

Exercises on Lesson 1

Understand · Apply · Analyze · Evaluate · Create

1 Choose the correct answer :

1. A boy on a slide moves down toward the ground due to the effect of .....
   a. the boy's height. b. gravity.
   c. friction. d. the temperature of air.
2. Gravity keeps the moon in orbit around .....
   a. Sun. b. Earth. c. itself. d. another moon.
3. Gravitational force of Earth is affected by .....
   a. mass and time. b. mass and distance.
   c. mass only. d. distance only.
4. If there is no Earth's gravity, the moon would .....
   a. revolve faster around Earth. b. still orbit Earth.
   c. attract to Earth. d. float off into space.
5. All the following are properties of Earth's gravity, except .....
   a. it pushes objects upward. b. it affects the moon.
   c. it pulls objects downward. d. it is a type of attraction force.
6. Earth attracts objects towards .....
   a. its center. b. the sky. c. the moon. d. the Sun.
7. Which of the following examples does not clearly explain how the force of gravity pulls objects toward the center of Earth ? .....
   a. An apple falls down from a tree onto the soil.
   b. A skydiver jumps out of an airplane.
   c. A pen moves on a table and drops onto the floor.
   d. A rocket moves up toward the sky.

2 Put (✓) or (✗) :

1. Gravity pulls objects toward the center of Earth. ( )
2. Objects are pushed away of each other due to gravity. ( )
3. Planets in the solar system revolve in fixed orbits due to the gravity between the Sun and planets. ( )
4. If the gravity of Earth disappears the moon will float off into space. ( )
5. The gravity of moon affects the ocean tides. ( )

- 6. As the mass of an object increases, its gravitational attraction decreases. ( )
- 7. Gravity affects the movement of objects. ( )
- 8. If two objects don't touch each other, there is no gravity between them. ( )
- 9. The gravitational force of Earth to a person in a flying airplane is smaller than it when the same person stands on the ground. ( )

3 Write the scientific term of each of the following :

- 1. A force that pulls object down toward the Earth's surface. (.....)
- 2. A celestial body that orbits the Earth. (.....)
- 3. A phenomenon takes place in oceans and seas due to gravity of moon. (.....)

4 Complete the following sentences :

- 1. Objects move down from high place toward the ground due to the effect of .....
- 2. The moon moves around ..... due to gravity.
- 3. Gravity pulls objects toward the ..... of Earth.
- 4. When the distance between the moon and the Earth increases, the gravitational attraction between them .....
- 5. The gravity of the moon affects the phenomenon of ocean .....
- 6. If the mass of the moon increases than its real mass, its gravitational attraction will .....

5 What happens if ...?

1. The distance between the moon and Earth increases to twice.

.....

2. The mass of the moon decreases to half.

.....

6 Give reasons for :

- 1. The moon is attracted to Earth.

.....

- 2. The gravity between two objects is affected by the distance between them.

.....

3. The force of gravity has an important role in the solar system.

.....

.....

7 **The opposite figure shows two apples, one of them has a mass of 50 gm while the mass of the other is 80 gm.**

1. Which one of these apples is affected by Earth's gravity more than the other ?

Give a reason for your answer.

.....

Because : .....

.....

2. **Choose the correct answer :**

The gravity of Earth is affected by all of the following, expect .....

a. the mass of the fruit.

b. the distance between the fruit and the Earth's surface.

c. the type of the fruit.

8 **Look at the opposite figure then choose the correct answer from those between brackets :**

a. The force that causes skydivers to move down is called .....

(gravity of Earth – gravity of moon – gravity of Sun)

b. When skydivers open their parachuts they are attracted to .....

(Earth's center – moon's surface – the sky)

LESSON 2

Activity 5 Forces

▸ Look at the following pictures, then put (✓) or (✗) :

1 The kick is a force that causes the ball to move. ( )

2 The paper clips can be attracted to the magnet, if the magnet does not touch them. ( )

- Forces are needed to make things move.

Force :

It is a pull or a push that is applied to an object.

- Forces can affect different objects in two ways which are contact force and noncontact force, where :
  - **In contact force,** the two objects need to contact each other for the motion of one object, as when you kick a ball, your foot must contact the ball to make it move.
  - **In noncontact force,** the two objects do not need to touch or contact each other for the motion of one object, as the magnet does not need to touch the paper clips to attract them.

Motion : means a change in the position of an object compared to another object.

How things move

- Forces can pull or push objects in different directions.
- Some forces are weak, like the push force needed to move a toy car, while other forces are strong, like the push force needed to move a real car.

kick	ركلة	paper clips	دبابيس الورق	attract	يجذب
push	يدفع	apply	يطبق	contact	التماس
noncontact	عدم التماس				

Types of forces

The following examples show the cause and the effect of some different types of forces.

Examples :

1 - Magnet has a kind of invisible force that cannot be seen, known as magnetism.

Magnetism :

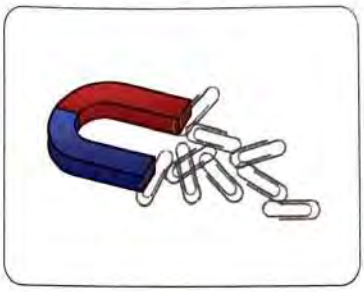
It is the force of attraction or repulsion between two magnets or between a magnet and an object.

- Magnet can exert a pulling force or a pushing force using the force of magnetism as follows :

• Pulling force of magnet :

Cause : A magnet pulls paper clips up.

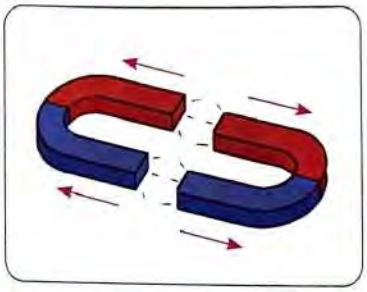
Effect : Paper clips move to the magnet.



• Pushing force of magnet :

Cause : A magnet pushes away another magnet.

Effect : The other magnet is pushed away.

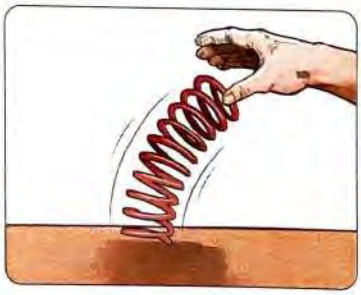


2 **Cause :** Wind pushes on the blades of a wind turbine.

Effect : Wind turbine blades move.

3 **Cause :** You squeeze a spring.

Effect : The spring pushes back when you leave it free.



cause	سبب	invisible	غير مرئى	exert	يبذل
blades	ريش / أذرع	effect	نتيجة	repulsion	تنافر
squeeze	يضغط	spring	زنبرك		

4 **Cause :** Gravity pulls a cup you drop to the floor.

Effect : The cup falls to the ground.

Note

Gravity can exert only a pulling force, while a magnet can exert a pulling or pushing force.

Check your understanding

▸ Put (✓) or (✗) :

1. Objects don't need force to move. ( )
2. The magnet can exert a pull or a push force. ( )
3. If you drop a cup to the floor, it will fall down toward the ground due to gravity. ( )

Activity 6 What Is Gravity ?

- We find the effect of gravity in everything around us.

Gravity :

It is the force of attraction that exists between objects that have mass.

- We know gravity is a force because we can see its effects around us, such as when something falls.

For example :

- An egg could slip out of your hand and fall to the floor.
- When you drop a ball or a book, it falls down toward the ground.
- The force of gravity keeps us from floating into space like that happens with astronauts.
- In space, there are big and small planets, where bigger planets have more gravity than that of smaller planets.
- The force of gravity keeps the planets revolve in their orbits or on fixed paths around the Sun.

Like the gravity of planets in space, we can say that :

On the Earth's surface, objects with large masses have more gravity than that of objects with small masses.

Check your understanding

▸ Complete the following sentences :

1. Gravity is the ..... of attraction between objects that have .....
2. When an egg slips out of your hand, ... pulls it toward the ground, so the egg breaks.
3. Big objects have ..... gravity than small objects.

slip ينزلق
paths مسارات
astronauts رواد الفضاء
fixed ثابت

Activity 7 The Force of Gravity

You have learned that gravity is the force of attraction between objects.

What goes up, must come down

Gravity changes the direction of anything you throw into the air.

Example :

- If you throw a ball into the air, the ball will go up into the air and then fall down back to the ground every time.
- As the ball flies through the air, its movement changes where, at first the ball is moving up, then its direction changes as it starts falling down toward the ground.

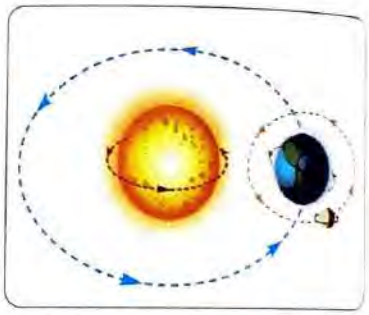
- The ball's direction changes because the gravity force is acting on the ball.

Note

Gravity does not only act on falling or moving objects but also, it acts on objects that do not move, such as a boy sits on a chair or a book on a shelf.

Gravity and mass

- All objects have gravity because they all have mass.
- Objects with greater mass exert greater force on objects around them as in the Earth-and-moon system, where :
  - Earth is bigger than the moon and it has more mass so, Earth has stronger gravity than the moon.
  - Also, the gravity of the moon causes the attraction of Earth toward the moon.



The Earth-and-moon system

- The moon stays in a fixed orbit around Earth due to the gravitational force of Earth.

Check your understanding

▸ **Put (✓) or (✗) :**

1. Gravity does not change the object's direction. ( )
2. All objects that have mass, must have gravity. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (13)

shelf رف
come down يسقط
go up يرتفع لأعلى

Exercises on Lesson 2

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. Which force pulls a basketball to fall into the basketball hoop ? .....
   a. Magnetism.
   b. Friction.
   c. Gravity.
   d. Motion.

2. Magnetism is a kind of ..... force.
   a. attraction only
   b. repulsion only
   c. visible
   d. invisible

3. A person can exert a weak force to move .....
   a. a big truck.
   b. a toy car.
   c. a real car.
   d. a very big rock.

4. Wind turbine blades move by the effect of .....
   a. magnetism.
   b. wind.
   c. electricity.
   d. water vapor.

5. All the following are properties of magnetism, except .....
   a. it is an invisible force.
   b. it happens only between two touched objects.
   c. it may be pushing or pulling force.
   d. it may push another magnet away.

6. Which of the following statements describes gravity in a correct way : .....
   a. Gravity pulls objects only.
   b. Gravity is found on Earth only.
   c. Gravity pushes objects away from each other.
   d. Gravity increases between small objects.

7. In contact force, the two objects need to ..... each other.
   a. attract
   b. repel
   c. touch
   d. break

8. Any object has mass must have .....
   a. gravity force.
   b. definite color.
   c. definite shape.
   d. electric charge.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Motion	a. is the force between two objects that touch each other.
2. Contact force	b. is a pull or push that affects an objects.
3. Non contact force	c. is the change of an object location due to force.
4. Force	d. is the force between two objects that don't touch each other.
	e. is the change of an object mass due to gravity.

1. ..... 2. ..... 3. ..... 4. .....

3 Put (✓) or (✗) :

1. Magnet must touch objects to attract them. ( )
2. Force is the reason of motion of any body. ( )
3. The change of an object position is called force. ( )
4. Magnet has an invisible force called magnetism. ( )
5. The force of magnet is always attraction force only. ( )
6. Gravity is similar to magnetism because both of them has only pulling force. ( )
7. After leaving a squeezed spring, it has no force to return back to its original state. ( )
8. Gravity is attraction or repulsion force between two objects. ( )
9. Planets revolve around the Sun in fixed orbits due to the effect of gravity. ( )
10. Small planets have bigger gravity than big planets. ( )
11. Gravity affects only on the moving objects but doesn't affect the objects at rest. ( )
12. The moon stay in fixed orbit around Earth due to the gravity between them. ( )

4 Write the scientific term of each of the following :

1. The effect that pull or push an object to make it move. (.....)
2. The change of an object position related to another object. (.....)
3. The force that is found between two magnets or between the magnet and an object. (.....)
4. The pulling force that causes object to fall down toward Earth's surface. (.....)
5. The force of attraction that changes the direction of a moving object in air towards the ground. (.....)

5 Complete the following sentences :

1. The object at rest needs ..... to move.
2. The force that arises between two objects when they touch each other is called ..... force.
3. When an object changes its position, this object is in a state of .....
4. Force may push or ..... the object to make it move.
5. The force that is needed to move a small bike is ..... than that needed to move a truck.
6. Magnet can attract some objects by a force called .....
7. The force of magnetism may pull objects towards the magnet or ..... objects away from it, while ..... force can pull objects toward Earth.
8. The astronauts float in space due to the absence of .....
9. The gravity of Earth is ..... than that of the moon because the Earth has ..... mass.
10. When a ball is thrown into the air, it moves back down, so its ..... changes due to the effect of .....
11. Any body that has a mass must have .....

6 Give reasons for :

1. Paper clips are pulled toward the magnet.

.....

2. The ball changes its direction after we throw it upwards.

.....

3. Gravity of Earth is greater than gravity of the moon.

.....

7 What happens if ...?

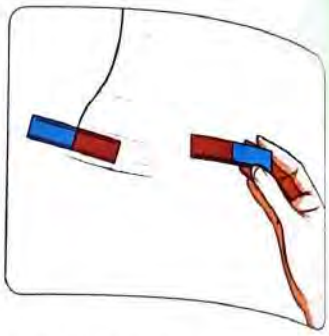
1. You squeeze a spring then leave it free.

.....

2. There is no gravity on Earth.

.....

8 Look at the opposite figure then choose the correct answer.



1. The force between the two magnets is called .....
   a. gravity. b. magnetism.
   c. contact force. d. wind force.
2. If there is a repulsion force between these two magnets so, they will move .....
   a. away from each other. b. toward each other.
   c. to the Earth's surface. d. to the space.

9 Arrange the following bodies ascendingly according to the gravity force they exert :

(The Sun – Bowling ball – Truck – The moon – Earth – An egg)

1. ..... 2. .....
3. ..... 4. .....
5. ..... 6. .....

LESSON 3

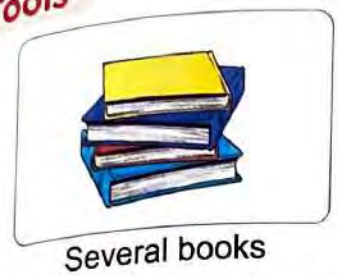
Activity 8 What Does Down Mean ?

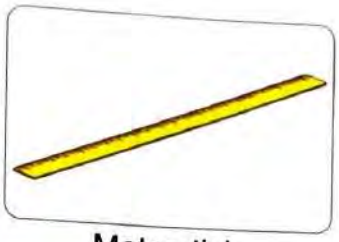
Put (✓) or (✗) :

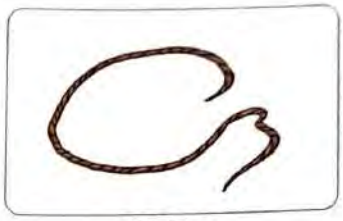
1. If you jump up into the air, you will land on the ground. ( )
2. Gravity cannot affect the direction of objects. ( )

In this activity, we will investigate the angle at which an object is pulled toward the ground by the force of gravity.

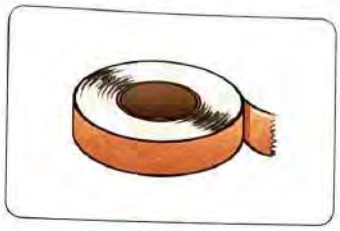
Tools

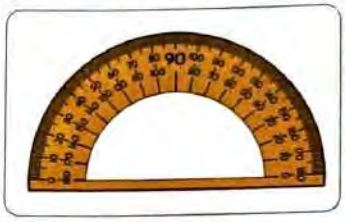

Several books


Meterstick


String


Small weight

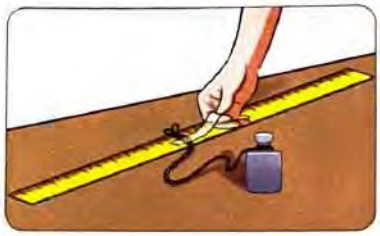

Tape



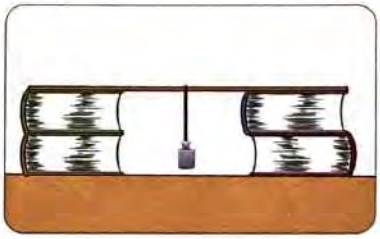
Protractor

Steps

1. Tie the string to the meterstick and use a piece of tape to hold it in place, then attach the weight to the end of the string.



2. Suspend the meterstick horizontally between the books, so that the string and the weight can move freely.



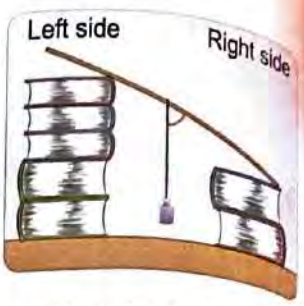
3. Measure the angle between the meterstick and the string using the protractor.

Observation

The angle will be 90° (because gravity always pulls objects downward).

angle	زاوية	meterstick	عصا مترية	horizontally	أفقيًا
string	خيط	tape	شريط لاصق	protractor	منقلة
several	عدة	suspend	يعلق	attach	يربط
weight	ثقل				

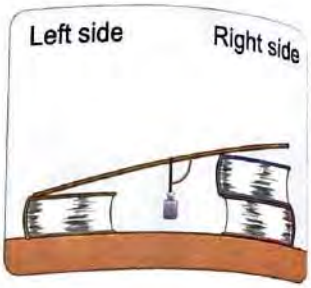
4. Use several more books at the left side to tilt the meterstick up, then measure the angle between the meterstick and the string at the right side using the protractor.



Observation

When the meterstick is tilted upward, the angle between the meterstick and the string is less than 90° (acute angle).

5. Move some books away from the left side to tilt the meterstick down, then measure the angle between the meterstick and the string at the right side using the protractor.



Observation

When the meterstick is tilted downward, the angle between the meterstick and the string is more than 90° (obtuse angle).

Note

In this activity, the factors that cause the change of the angle measurements are :

1. The tilt of the meterstick up and down.
2. The movement of the string.

Conclusions

- All objects on or near Earth's surface are pulled down toward the center of Earth.
- As the tilt of the meterstick changed, the angle changed because the weight is always being pulled toward the ground.

Check your understanding

Put (✓) or (✗) :

1. Any object is pulled toward the ground due to Earth's gravity. ( )
2. The direction of Earth's gravity is always toward the center of Earth. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (14)

tilt يميل acute حادة obtuse منفرجة

Exercises on Lesson 3

Understand · Apply · Analyze · Evaluate · Create

1 Choose the correct answer :

1. ..... force acts on all objects on Earth.
   a. Gravity b. Speed c. Electric d. Magnetism
2. Gravity depends on the ..... of a body.
   a. speed b. mass c. length d. age
3. Which of the following examples shows the effect of gravity clearly ? .....
   a. A paper clip moves toward a magnet.
   b. A ball slows down while rolling on the ground.
   c. A car speeds up on a road.
   d. A ball falls down toward the ground.
4. A table stands on the ground needs ..... to move.
   a. sunlight b. mass c. force d. air
5. All the following sentences are related to gravity, except .....
   a. it is a pulling force.
   b. it can change the direction of a moving object.
   c. it increases the mass of an object.
   d. it arises between Earth and the moon.

2 Put (✓) or (✗) :

1. All objects on Earth's surface is affected by magnetism force. ( )
2. Gravity of Earth push objects towards its center. ( )
3. The direction and mass of an object are changed due to gravity. ( )
4. All objects are pulled toward the ground due to the effect of gravity. ( )
5. Any object on Earth's surface is affected by repulsion force of gravity. ( )

3 Complete the following sentences using words below :

(direction – gravity – center – pulling)

1. The direction of Earth's gravity is always toward ..... of Earth.
2. The force of gravity is always ..... force, and it changes the ..... of movement.
3. Any object has ..... depending on its mass.

4 Give a reason for the following :

You always land on the ground when you jump up.

.....

.....

5 What happens if ...?

The gravity of Earth is a repulsion force not an attraction force.

.....

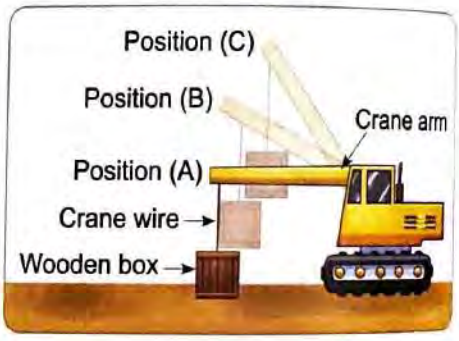
.....

6 Read the following statements, then classify them according to the effect of gravity on them.

1. A pencil rolling on a table.
2. A ball thrown up into the air.
3. A car moves along a straight road.
4. A paper airplane is thrown through the air.

Gravity will cause a change in direction	Gravity will not cause a change in direction
.....	.....
.....	.....
.....	.....

7 The opposite figure shows a crane lifting up a wooden box from position (A) through positions (B) and (C).



(A) Choose the correct answer :

1. The force of Earth that acts on the box is known as ..... force.
   (magnetism – gravity – electric – repulsion)
2. This force attracts the wooden box at positions .....
   (A & B only – B & C only – A & C only – A, B and C)

(B) Put (✓) or (✗) :

1. When the crane arm moves from position (A) to position (B), the angle between the crane arm and the crane wire increases. ( )
2. If the crane arm return back from position (C) to position (A) the angle between the crane arm and the crane wire increases. ( )

LESSON 4

Activity 9 Pull and Gravity Around Us

Look at the opposite picture, then put (✓) or (✗) :

1. When a car slows down its motion, this is due to gravity. ( )
2. Gravity is a pushing force only, while magnetism is a pushing or pulling force. ( )

Gravity

- Gravity is a force of objects with more mass that pulls objects with less mass toward them.
- You cannot see gravity, but you know it is there because you can see its effects.

Examples :

- The Sun pulls all planets toward it.
- Gravity keeps our planet in an orbit around the Sun.
- Gravity keeps our atmosphere around Earth.
- On Earth, gravity pulls everything (such as humans, rocks, water bodies, animals, chairs, ... etc.) and holds them to the ground toward the center of Earth.
- Skydivers and their parachutes are pulled downward toward Earth's surface.

? Give a reason for :

Objects like balls drop to the ground after being thrown up into the air.

Due to Earth's gravity that pulls them down toward the ground.

Magnetism, friction and air resistance

Magnetism

Magnetism is a force that attracts metal objects made of iron, nickel or cobalt by pulling on them.

Example :

Some iron nails can be attracted to a magnet due to its pulling force on them.

effects	تأثيرات	parachutes	مظلات	iron	معدن الحديد
atmosphere	الغلاف الجوى	metal	معدنى	nails	مسامير
nickel	معدن النيكل	cobalt	معدن الكوبلت		

Friction

- Friction is a force generated between two touching surfaces.
- Friction slows the movement of objects.

Friction :

It is a force that opposes the motion of a body across a solid surface or through a gas or liquid.

Example :

A bicycle brake pulls back the movement of the tires by friction when the bicycle brake rub against the tires.

Air resistance

Air resistance is considered as a type of friction force.

Air resistance :

It is a force that opposes the movement of an object as it passes through air.

Example :

Skydiver releases parachute to slow his drop, where :

- When the skydiver open his parachute, it gets filled with air due to the upward flow of wind forming air resistance to the parachute.
- The air resistance pulls the skydiver backward and slows his fall to Earth's surface.

Check your understanding

▸ Complete the following sentences using the words below :

(air resistance — force — friction)

1. When an object falls or slows down, there must be a ..... that acts on the object.
2. The force that slows the movement of objects across solids, liquids or gases is called .....
3. The force that opposes the movement of objects as they pass through air is called .....

In the Assessment Book :
Try to answer :
Self-Assessment (15)

generate	تنشأ	brake	فرامل
oppose	يقاوم	tires	إطارات

Exercises on Lesson 4

Understand · Apply · Analyze · Evaluate · Create

1 Choose the correct answer :

1. Friction force ..... the movement of objects.
   a. slows down b. increases c. speeds up d. doesn't affect
2. Magnetism is a force that attracts objects made of the following materials, except .....
   a. iron. b. nickel. c. wood. d. cobalt.
3. The force that opposes the movement of objects as they pass through air is known as .....
   a. magnetism. b. gravity. c. electric. d. air resistance.
4. All the following sentences shows the effect of gravity, except .....
   a. the moon orbits the Earth.
   b. the planets orbit the Sun.
   c. the atmosphere is kept around the Earth.
   d. the repulsion between two magnets.
5. ..... is considered as a type of friction force.
   a. Air resistance b. Magnetism c. Gravity d. Electric force
6. Which the following objects has the least attraction force ? .....
   a. The moon. b. The Earth. c. The Sun. d. The magnet.

2 Put (✓) or (✗) :

1. Gravity is not affected by the mass of an object. ( )
2. Gravity of Earth does not change the direction of a body that is thrown up into the air. ( )
3. Earth pulls living organisms only toward its center. ( )
4. Force of gravity can be seen easily, but we cannot see its effects. ( )
5. When using the bicycle brake, the bicycle stops due to the friction force between the brake and the tires. ( )
6. Magnetism is a type of friction force. ( )
7. Skydiving sport depends on gravity force and air resistance force. ( )
8. Friction force opposes the movement of an object. ( )
9. Air resistance slows down the speed of parachutes. ( )
10. Magnetism is the force that attracts some metals. ( )

3 Complete the following sentences :

1. An object with more mass that pulls another object with less mass has a force known as .....
2. A magnet has ..... force that attracts and pulls metal objects toward it.
3. A parachute in air is affected by ..... that acts against the ..... force of Earth.
4. A person can control the speed of his bike by using ..... to slow down its movement.
5. The force that arises between the bicycle brake and the tires is called ..... which slows down the movement of the bicycle.
6. Air resistance is a type of ..... force.
7. The direction of ..... force opposes the direction of a body moves through air.
8. The attraction force between the Sun and Earth is ..... than that between Earth and the moon because the Sun has ..... mass.

4 Write the scientific term of each of the following :

1. The force that slows down the movement of objects through air. (.....)
2. The force by which metals are attracted or pulled to a magnet. (.....)
3. A type of friction force that opposes the movement of an object as it passes through air. (.....)
4. The tool that is used by skydiver to slow his drop. (.....)

5 Give reasons for :

1. Skydiver opens his parachute during landing.

.....

2. When you press the bicycle brake, its speed will stop moving after few seconds.

.....

3. Some iron nails are attracted to a magnet.

.....

6 What happens to ...?

1. Planets if the gravity of the Sun disappears.

.....

2. The speed of skydiver if he opens his parachute during landing.

.....

3. The gravity pulling force between two bodies when their masses decreases.

.....

LESSON 5

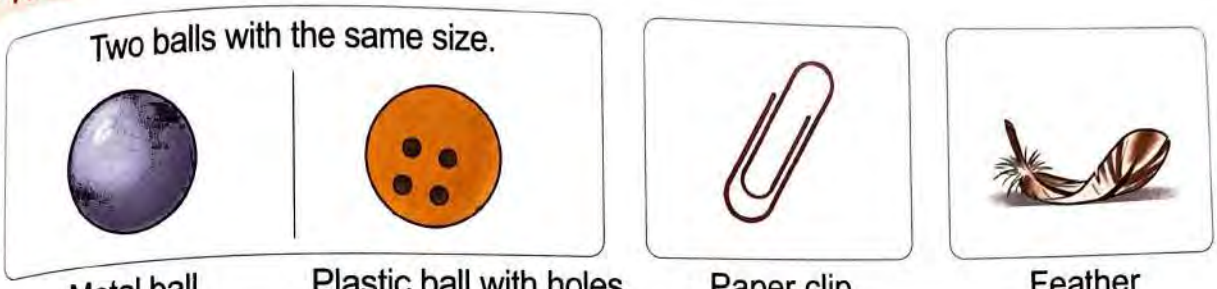
Activity 10 Gravity and the Law of Motion

Put (✓) or (×) :

1. Air resistance can fast the falling down of an object toward Earth's surface. ( )
2. While gravity is pulling an object down, the force of the air is pushing in the opposite direction. ( )

In this activity, we will investigate the effect of gravity and air resistance on different objects.

Tools



Metal ball (a heavy mass object)

Plastic ball with holes (a light mass object)

Paper clip

Feather

Steps

1. Stand on a chair and drop the two balls at the same time from the same height, then observe which ball will reach the floor first.

Observation

The metal ball will reach the floor first.

2. Stand on a chair and drop the paper clip and the feather at the same time from the same height, then observe which one will reach the floor first.

holes ثقوب height ارتفاع feather ريشة

Observation

The paper clip will reach the floor first.

Conclusions

1. The plastic ball with holes took longer time to reach the floor, because it was slowed by upward-flowing air more than the metal ball.
2. The feather took longer time to reach the floor, due to its shape as the feather is affected by air resistance more than the paper clip.

- So that, air resistance is a factor that can slow down the falling objects.

Law of Motion :

The force of gravity is constant and acts on all objects in the same way.

- **Imagine that there is no air resistance on Earth :**

So, according to the Law of Motion, if we drop a hammer and a paper at the same time from the same height, they will reach the floor at the same moment because gravity acts on all objects in the same way, where the mass or the shape of the objects would not matter.

Check your understanding

Complete the following sentences using the words below :

(faster – air resistance – constant)

1. Law of Motion states that the force of gravity is ..... and acts on all objects in the same way.
2. If a pencil and a paper fall at the same time from the same height, the pencil will reach the floor ..... than the paper that is more affected by .....

In the Assessment Book :
Try to answer :
Self-Assessment (16)

upward-flowing air الهواء المتدفق لأعلى hammer مطرقة constant ثابت

Exercises on Lesson 5

Understand · Apply · Analyze · Evaluate · Create

1 Choose the correct answer :

1. If you have two balls which are different in mass. Which one of them will reach the ground first if we drop both of them from the same height ? .....
   a. The ball with bigger mass.
   b. The ball with smaller mass.
   c. The two balls will reach the ground at the same moment.
   d. One ball will reach the ground while the other moves upward.

2. What is the effect of air resistance on the speed of an object when it falls downward due to gravity ? .....
   a. Air resistance speeds up the object as it falls.
   b. Air resistance doesn't affect the speed of an object as it falls.
   c. Air resistance slows an object as it falls.
   d. Air resistance changes the direction of an object as it falls.

3. When a basketball falls down from a height, it is affected by .....
   a. air resistance force only.
   b. gravity force only.
   c. air resistance and gravity force.
   d. air resistance and electric force.

4. If there is no air resistance on Earth and we drop an iron cube and wooden cube at the same time from the same height, they will .....
   a. reach the floor at the same moment.
   b. reach the floor at different time.
   c. be affected by magnetic force during falling.
   d. move upward against gravity force.

5. ..... is a factor that acts against gravity force.
   a. Magnetism
   b. Mass of an object
   c. Air resistance
   d. Shape of an object

6. Which of the following objects will take longer time to reach the ground if they are dropped from 5 meter height at the same time ? .....
   a. An iron ball.
   b. A feather.
   c. A plastic ball.
   d. A hammer.

2 Put (✓) or (✗) :

1. Air resistance is a factor that speeds up the falling abjects toward the Earth. ( )
2. All objects on Earth's surface are affected by gravity force which pulls objects downward. ( )
3. There is no air in space so, air resistance slows down the movement of objects through space. ( )
4. If there is no air resistance on Earth, all objects will reach the Earth's surface at the same moment when dropping them from the same height. ( )
5. Air resistance force acts in the opposite direction of gravity force. ( )
6. Heavier objects reach Earth's surface before smaller objects due to the effect of air resistance which affects their movement. ( )
7. Air resistance is a type of pulling force. ( )

3 Complete the following sentences using the words below :

(Law of Motion – slows down – gravity – air resistance – longer – shorter – constant)

1. The force that pulls objects down toward Earth's surface is called .....
2. When the skydiver opens his parachute the force of ..... makes its speed .....
3. When throw a plastic ball with holes from 5 meter height, it will take ..... time to reach the ground while a paper clip takes ..... time when it is thrown from the same height.
4. The law which states that the force of gravity is ..... and acts on all objects in the same way is called .....

4 Give reasons for :

1. Air resistance affects the movement of an object which falls from a height.

.....

.....

2. A pencil takes a longer time to reach Earth's surface than a large rock if they are thrown from the same height.

.....

.....

5 What happens if ...?

1. A metal ball and a feather are fallen down from a tower.

.....

.....

2. You throw two iron balls have the same mass from the same height.

.....

.....

3. There is no air resistance and two objects with different masses are thrown from the same height.

.....

.....

6 **Imagine that jar (A) contains air while jar (B) doesn't contain air.**

(A) Choose the correct answer :

1. The two bodies in jar (A) are affected by .....

a. gravity force only.

b. friction force only.

c. air resistance and gravity.

d. gravity and electricity.

Figure (A)

Figure (B)

2. The two bodies in jar (B) are affected by .....

a. gravity force only.

b. air resistance only.

c. air resistance and gravity.

d. gravity and electricity.

3. In jar (A), the rock reaches faster than the feather because it has .....

a. more mass.

b. higher temperature.

c. less mass.

d. lower volume.

(B) Put (✓) or (✗) :

1. In jar (B), the rock will reach first. ( )

2. In jar (A), air resistance affects the feather more than the rock during falling downward. ( )

3. In jar (A) the rock falls before the feather due to the absence of air resistance. ( )

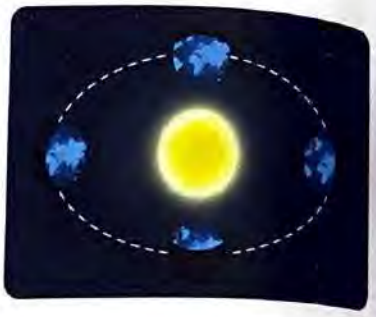
LESSON 6

Activity 11 The Revolving Planets

▸ Put (✓) or (×) :

1. Friction is a force of attraction between objects. ( )
2. The force of gravity keeps the planets on their paths around the Sun. ( )

- Our solar system consists of the Sun and a group of planets revolve around it.
- In 1543, a scientist called Nicolous Copernicus stated that Earth revolves around the Sun.
- In the solar system, each planet revolves around the Sun in a fixed path called an orbit.
- The orbit of each planet has an ellipse (oval) shape.
- Earth revolves around the Sun at a speed nearly equals 107000 km per hour.



But, what keeps the planets revolve around the Sun in fixed orbits ?

- Gravity is the invisible attraction or pulling force that holds all the planets in their places.
- The great gravitational pulling force of the Sun keeps the planets revolving in fixed orbits.
- If there were no gravity, the planets would fly off into space.

Give a reason for :

The Sun is the only center of motion in the solar system.

Because the Sun is much bigger than all the other objects in the solar system, so its gravity pulls the other planets toward it.

The solar system

Check your understanding

▸ Complete the following sentences :

1. The planets revolve around the Sun in ..... paths.
2. The only center of motion in the solar system is the .....

Digital Extension Activity

Activity 12 **" Gravity and Other Forces "** in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

ellipse شكل بيضاوى invisible غير مرئى

Activity 13 Record Evidence Like A Scientist

In this concept, you have learned about the effects of gravity.

Now, try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learned in the first concept.

Step 1 The Question

How does gravity affect the movement of objects ?

Step 2 My Claim

.....

.....

.....

Step 3 My Evidence

.....

.....

.....

.....

Step 4 My Scientific Explanation

.....

.....

.....

.....

.....

.....

Digital Extension Activity

Activity 14 " **Gravity and Mechanical Engineers** "in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

claim فرضية evidence دليل scientific explanation تفسير علمى

Activity 15 Review : Effects of Gravity

▸ We can summarize this concept in the following main points :

- Gravity pulls objects toward the center of Earth.
- Gravity affects two objects even when they do not touch each other, such as the moon and Earth.
- There is gravitational force between Earth and the moon.
- **Mass and gravitational force :**
  Gravitational force of an object increases, as its mass increases and vice versa.
- **Distance and gravitational force :**
  Gravitational force decreases, when the distance between two objects increases and vice versa.

Force :

It is a pull or a push that is applied to an object.

- Forces can affect different objects in two ways which are contact force and noncontact force.
- Forces can pull or push objects in different directions.
- Magnet has a kind of invisible force that cannot be seen, known as magnetism.

Magnetism :

It is the force of attraction or repulsion between two magnets or between a magnet and an object.

- Gravity can exert only a pulling force, while a magnet can exert a pulling or pushing force.

Gravity :

It is the force of attraction that exists between objects that have mass.

- We know gravity is a force because we can see its effects around us, such as when something falls.
- In space, there are big and small planets, where bigger planets have more gravity than that of smaller planets.
- The force of gravity keeps the planets revolve in their orbits or on fixed paths around the Sun.
- On the Earth's surface, objects with large masses have more gravity than that of objects with small masses.
- Gravity changes the direction of anything you throw into the air.

Gravity and mass :

- All objects have gravity because they all have mass.
- Objects with greater mass exert greater force on objects around them as in the Earth-and-moon system, where :
  - Earth is bigger than the moon and it has more mass so, Earth has stronger gravity than the moon.
  - Also, the gravity of the moon causes the attraction of Earth toward the moon.
- All objects on or near Earth's surface are pulled down toward the center of Earth.
- Friction is a force generated between two touching surfaces.
- Friction slows the movement of objects.

Friction :

It is a force that opposes the motion of a body across a solid surface or through a gas or liquid.

- Air resistance is considered as a type of friction force.

Air resistance :

It is a force that opposes the movement of an object as it passes through air.

- Air resistance is a factor that can slow down the falling objects.

Law of Motion :

The force of gravity is constant and acts on all objects in the same way.

- Our solar system consists of the Sun and a group of planets revolve around it.
- In 1543, a scientist called Nicolous Copernicus stated that Earth revolves around the Sun.
- In the solar system, each planet revolves around the Sun in a fixed path called an orbit.
- The orbit of each planet has an ellipse (oval) shape.
- Earth revolves around the Sun at a speed nearly equals 107000 km per hour.
- The great gravitational pulling force of the Sun keeps the planets revolving in fixed orbits.

In the Assessment Book :

Try to answer :

- Self-Assessment (17)
- Model Exam on Concept (4.1)

Exercises on Lesson 6

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. The force of ..... keeps the planets on their paths around the Sun.
   a. air resistance b. friction c. gravity d. electricity
2. Gravity is ..... force that holds all objects in their places.
   a. visible pulling b. visible pushing
   c. invisible pulling d. invisible
3. The planets revolve around the Sun in fixed ..... orbits.
   a. oval b. irregular c. rectangular d. triangular
4. The speed of Earth's revolution around the Sun is nearly ..... km per hour.
   a. more than 100,000 b. more than 200,000
   c. less than 100,000 d. less than 50,000
5. ..... is (are) the center of the solar system.
   a. The Earth b. The Sun
   c. The moon and Earth d. The Sun and Earth

2 Put (✓) or (✗) :

1. The Sun revolves around Earth. ( )
2. The planets revolve around the Sun by the effect of gravitational pushing force. ( )
3. Gravity is an attraction force that can be seen easily. ( )
4. The orbit of each planet has an ellipse shape. ( )
5. The Earth's gravity keeps all planets in their orbits. ( )
6. The scientist Nicolaus Copernicus stated that Earth revolves around the Sun. ( )

3 Complete the following sentences :

1. The Sun locates at the center of .....
2. In the solar system, all planets revolve in fixed paths called .....
3. The force that keeps all planets around the Sun is called .....
4. The scientist Nicolaus Copernicus stated that the ..... revolves around the .....

5. Gravity is the attraction or pulling force that keeps all ..... in their orbits around the Sun.

6. The Earth revolves around the Sun in a fixed path that has ..... shape.

4 Give a reason for the following :

Planets revolve around the Sun in fixed orbits.

.....

.....

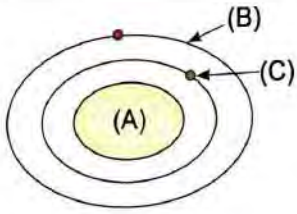
5 What happens to ...?

The planets if the Sun has no gravity.

.....

.....

6 Look at the opposite figure, which illustrates a part of the solar system then answer the following questions :



1. The body (A) is called .....

a. the Sun. b. the Earth. c. the moon. d. a magnet.

2. The shape of the path (B) is .....

a. ellipse. b. circular. c. rectangular. d. triangular.

3. The body (C) may be .....

a. the Sun. b. the moon. c. a planet. d. a magnet.

4. The body (C) revolves around the body (A) due to the effect of ..... force.

a. electric b. gravity c. air resistance d. repulsion

Model Exam on Concept (4.1)

Total mark: 20

1 (A) Put (✓) or (✗) : *(5 marks)*

1. Gravity pulls objects toward the center of Earth. ( )
2. Magnetism is a type of friction force. ( )
3. There is no air in space, so air resistance slows down the movement of objects through space. ( )
4. The scientist Nicolaus Copernicus stated that Earth revolves around the Sun. ( )

(B) Give a reason for the following :

Gravity of Earth is greater than gravity of the moon.

.....

.....

2 (A) Complete the following sentences : *(5 marks)*

1. The gravity of the moon affect the phenomenon of ocean .....
2. A person can control the speed of his bike by using ..... to slow down its movement.
3. The force that keeps all planets around the Sun is called .....
4. When the distance between the moon and the Earth increases, the gravitational attraction between them .....

(B) What happens if ...?

You throw two iron balls have the same mass from the same height.

.....

.....

3 (A) Write the scientific term : *(5 marks)*

1. The force by which metals are attracted or pulled to a magnet. (.....)
2. The tool that is used by sky diver to slow his drop. (.....)
3. A celestial body that orbits the Earth. (.....)
4. The law which states that the force of gravity is constant and act on all objects in the same way. (.....)

(B) Correct the underlined word :

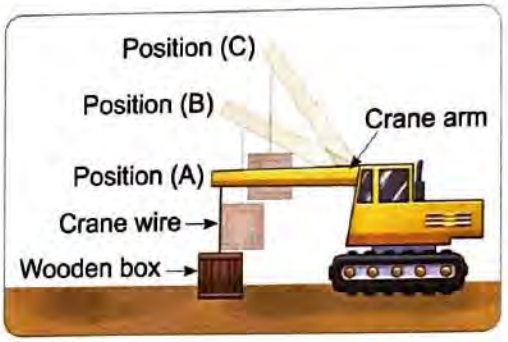
1. Planets orbit Earth due to the gravity between them. (.....)
2. Earth pulls objects towards its moon. (.....)

4 (A) Choose from column (B) what suits it in column (A) : *(5 marks)*

(A)	(B)
1. Motion	a. is the force between two objects that touch each other.
2. Contact force	b. is a pull or push that affects an objects.
3. Non contact force	c. is the change of an object location due to force.
4. Force	d. is the force between two objects that don't touch each other.
	e. is the change of an object mass due to gravity.

1. ..... 2. ..... 3. ..... 4. .....

(B) The opposite figure shows a crane lifting up a wooden box from position (A) through positions (B) and (C).



(1) Choose the correct answer :

a. The force of Earth that acts on the box is known as ..... force.
(magnetism – gravity – electric – repulsion)

b. This force attracts the wooden box at positions .....
(A & B only – B & C only – A & C only – A, B and C)

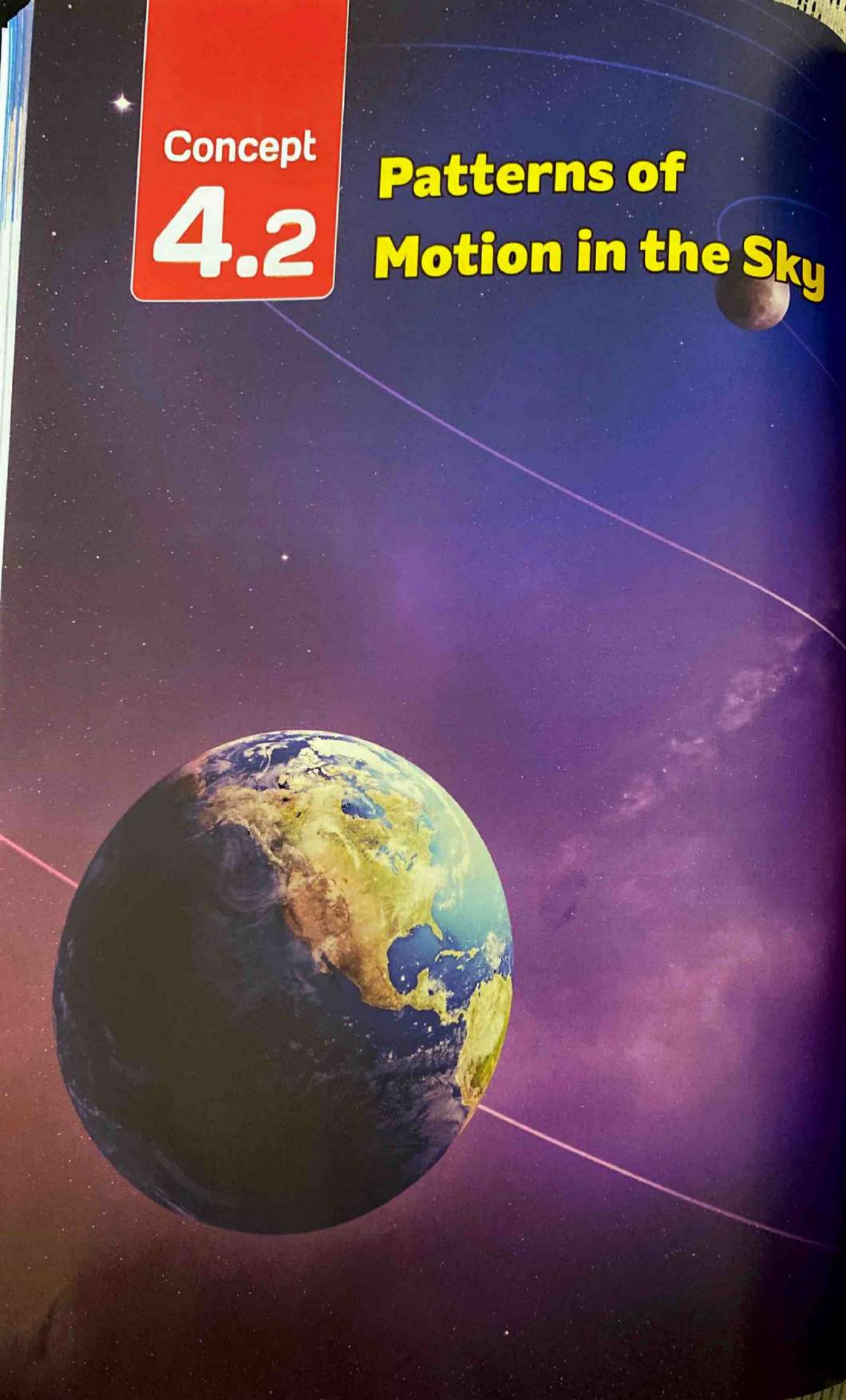
(2) Put (✓) or (✗) :

a. When the crane arm moves from position (A) to position (B), the angle between the crane arm and the crane wire increases. ( )

b. If the crane arm return back from position (C) to position (A) the angle between the crane arm and the crane wire increases. ( )

Concept

4.2 Patterns of Motion in the Sky



Learning outcomes

By the end of this concept, your child will be able to :

- Develop models that describe how the movement of Earth in space causes cyclical patterns of night and day, seasons and the apparent movement of the Sun, planets and stars.
- Analyze and interpet data to evaluate the claim that sunrise times differ in different cities and over time and describe patterns in sunrise times.
- Model patterns of daily changes in the length and direction of shadows, day and night and the appearance of changes in the moon in the night sky.

Key vocabulary

- Axis
- Constellation
- Cycle
- Orbit
- Revolution
- Rotation
- Tilt

Notes For Parents On Concept [4.2]

Lessons	Activities	What you should do with your child
1	Activity 1	Discuss with your child what causes the cycle of day and night and why do the Sun, planets and stars appear to move across the sky.
	Activity 2	Discuss with your child that Earth's rotation causes the regular pattern of day and night.
	Activity 3	Discuss with your child that the Sun changes its direction in the sky during the day.
2	Activity 4	Discuss with your child how the cycle of Earth's rotation causes the patterns of day and night.
	Activity 5	Explain to your child the reasons that cause different sunrise and sunset times each day on Earth.
3	Activity 6	Explain to your child that Earth's rotation causes objects in the sky appear to move across the sky from east to west.
	Activity 7	Help your child to make a sundial that used to collect data about shadows.
4	Activity 8	Explain to your child the meaning of constellations and their positions in the night sky throughout the year.
	Activity 9	Discuss with your child that constellations are visible at different times of the year.
5	Activity 10	Help your child to make model of Earth-moon-Sun system.
6	Activity 11	Help your child to know the description and the importance of the Sun and the structure of stars.
	Activity 12	Explain to your child how technology helps human to invent some tools to see distant objects in the space.
7	Activity 13	Help your child to think like a scientist by answering a question about one of the main points of this concept then write his/her claim, evidence and the scientific explanation.
	Activity 14	Explain to your child some informations about a planetarium and the career of planetarium directors.
	Activity 15	Let your child review the main points in this concept.

LESSON 1

Activity 1 Can You Explain ?

- The pictures above show the cycle of day and night throughout the day.
- When you look at the sky during the day and at night, you can observe that some objects like the Sun, moon and some stars appear to move across the sky.

What causes the cycle of day and night and why do the Sun, planets and stars appear to move across the sky ?

- Earth's rotation causes :
  - The cycle of day and night.
  - The Sun, planets and stars appear to move across the sky.
  - Shadows of objects to move throughout the day.

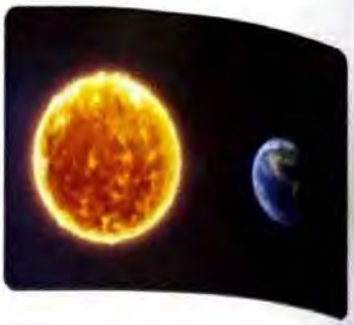
In this concept, we will study :

- Day and night.
- Patterns of motion in the sky.
- Rotation and revolution of Earth.
- Effects of Earth's rotation.
- Constellations visible during different seasons.
- Phases of the moon.
- Planetarium director and the stars.

cycle	دورة	rotation	الدوران المحورى	throughout	طوال
day	نهار	night	ليل	pattern	نمط
revolution	الدوران فى مدار	constellation	تجمع نجمى	seasons	فصول السنة
phase	طور	planetarium	القبة السماوية	director	مسئول العرض

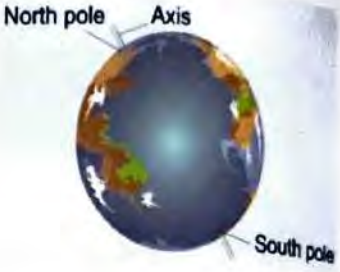
Activity 2 Day and Night

▸ Look at the opposite picture, then put (✓) or (✗) :



1. Earth is spinning in front of the Sun. ( )
2. Sunlight can reach all areas on Earth's surface at the same time. ( )

Day and night



- Earth spins (rotates) all the time.
- We cannot feel Earth spinning, but we know that from the regular pattern of day and night.
- The phenomenon of regular pattern of day and night happens due to Earth's rotation on its axis.

Earth's axis :

It is an imaginary line passing through the North pole and South pole of Earth.

- Earth takes a whole day (24 hours) to make one complete turn on its axis.
- **During Earth's rotation :**
  - Half of Earth faces the Sun, so this part has day.
  - The other half of Earth faces away from the Sun and doesn't receive any light, so this part has night.

Note

The rotation of Earth causes :
- Regular pattern of day and night.
- The appearance of the Sun as it is moving across the sky.

Check your understanding

▸ Put (✓) or (✗) :

1. Earth takes 12 hours to make complete cycle on its axis. ( )
2. The half of Earth's surface that faces the Sun has day. ( )
3. The Sun appears as it is moving across the sky due to the rotation of Earth. ( )

spin	يدور	regular	منتظم	phenomenon	ظاهرة
axis	محور	imaginary	وهمى	South pole	القطب الجنوبى
North pole	القطب الشمالى	whole	كامل	turn	دورة
face	يواجة	appearance	ظهور		

Activity 3 What Do You Already Know About Patterns of Motion in the Sky ?

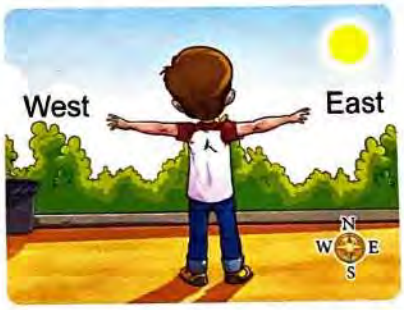
When Earth rotates on its axis, it causes the Sun, moon and stars seem to rise in the east and travel across the sky, then set in the west.

Where is the Sun in the sky ?

- The Sun appears to change its direction in the sky during the day.
- When you are facing the north direction of Earth and stretch your arms, you will see that :

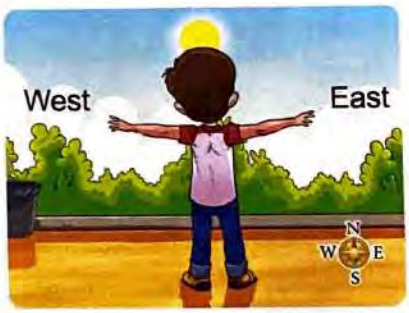
In early morning :

The Sun would be to your right (east), rising in the sky.



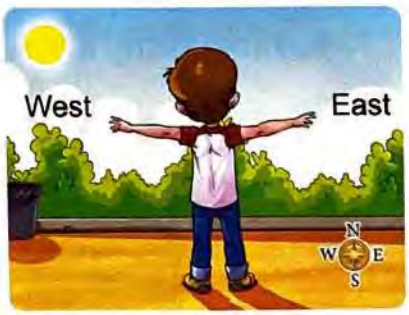
At noon :

The Sun would be above you in the center of the sky.



In late afternoon :

The Sun would be to your left (west), setting in the sky.

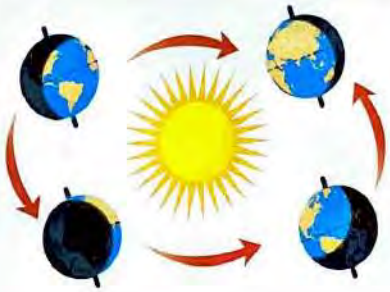


Note

If you change your direction, facing north or south, the Sun will always rise in the east and set in the west.

seem	يبدو	rise	تشرق	set	تغرب
across	خلال	stretch	يمد	noon	وقت الظهيرة

Rotation or revolution

Rotation	Revolution
• It is the spinning of an object around an axis. **Example :** Earth rotates on its axis. 	• It is the orbiting of an object around another object. **Example :** Earth revolves around the Sun in an orbit. 

Check your understanding

▸ Complete the following sentences using the words below :

(revolution – rotates – day – night)

1. Earth ..... on its axis every 24 hours.
2. The surface of Earth that faces the Sun has ..... and the surface of Earth that faces away from the Sun has .....
3. The orbiting of Earth around the Sun is called .....

In the Assessment Book :
Try to answer :
Self-Assessment (18)

orbit مدار

Exercises on Lesson 1

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. Day and night phenomenon occurs due to the rotation of Earth around .....
   a. the Sun. b. its axis. c. the moon. d. the solar system.
2. The Earth rotates around itself once every .....
   a. 24 hours. b. 365 days. c. 365 hours. d. 24 days.
3. The Earth's axis is an imaginary line that passes through .....
   a. the two poles of Earth. b. the center of the moon.
   c. the center of the solar system. d. the center of the Sun.
4. The Sun appears as it moves from ..... to .....
   a. south – north. b. east – west.
   c. west – east. d. north – south.
5. The Sun appears in the ..... during the early morning.
   a. east b. west c. north d. south
6. In the middle of the day (at noon) we can see the Sun in ..... of the sky.
   a. the left side b. the right side
   c. above in the center d. the west direction
7. If you travel from your country to another, the Sun will .....
   a. rise in the west and set in the east.
   b. rise in the south and set in the north.
   c. rise in the east and set in the west.
   d. rise in the north and set in the south.
8. When half of Earth faces the Sun so, it has ..... and the other half has .....
   a. day – day. b. night – day. c. day – night. d. night – night.
9. Which of the following sentences describes the Earth's axis correctly ? .....
   a. It is a real line that passes through the Earth's two poles.
   b. It is an imaginary line that divides the Earth into two unequal parts.
   c. It is an imaginary line that passes through the Earth's two poles.
   d. It is a real line that divides the Earth into two unequal parts.
10. The Sun appears as it moves in the sky due to the .....
    a. revolution of the Sun around Earth.
    b. revolution of Earth around the Sun.
    c. revolution of the moon around Earth.
    d. rotation of Earth on its axis.

2 Write the scientific term of each of the following :

- 1. The phenomenon that occurs due to the rotation of Earth on its axis. (.....)
- 2. An imaginary line that passes through the two poles of Earth. (.....)
- 3. The spinning of Earth on its axis. (.....)
- 4. The orbiting of Earth around the Sun. (.....)
- 5. The phenomenon that occurs when half of the Earth is facing the Sun. (.....)
- 6. The phenomenon that occurs when half of the Earth doesn't receive the sunlight. (.....)

3 Put (✓) or (X) :

- 1. The Earth revolves around the Sun once every 24 hours. ( )
- 2. The Earth's axis is a real line passes through Earth's poles. ( )
- 3. At the beginning of the day, the Sun appears in the west direction. ( )
- 4. If you change your direction on Earth's surface, the Sun will rise from west. ( )
- 5. The spinning of Earth on its axis is called revolution. ( )
- 6. Most of stars don't appear moving in the sky. ( )
- 7. The movement of shadows is due to the movement of Earth around the Sun. ( )
- 8. All parts of Earth receive sunlight at the same time. ( )
- 9. The regular pattern of day and night occurs due to the rotation of Earth around the Sun. ( )
- 10. The Sun rises in the east and sets in the west. ( )
- 11. In the early morning, the Sun would be above you in the center of the sky. ( )
- 12. The Sun appears in the same place in the sky all the day. ( )

4 Give reasons for :

- 1. Occurrence of day and night.

.....

.....

- 2. Half of Earth appears dark at night.

.....

.....

- 3. The Sun appears as it moves across the sky.

.....

.....

5 What happens if ... ?

1. Earth doesn't rotate on its axis.

.....

.....

2. Half of Earth faces the Sun.

.....

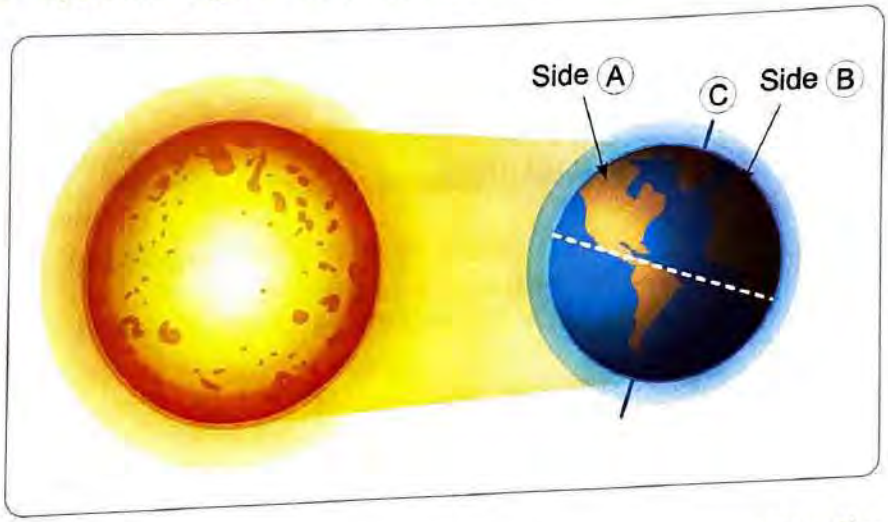
.....

3. Earth completes its spinning on its axis in 12 hours only.

.....

.....

6 Look at the opposite figure then choose the correct answer :

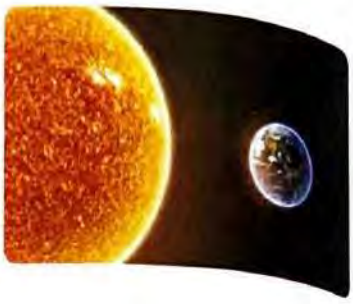


1. Side (A) is at ..... (day time – night time)
2. Side (B) is at ..... (day time – night time)
3. Point (C) is called ..... (Earth's axis – Earth's center)
4. The regular pattern of day and night is due to ..... of Earth on its axis. (rotation – revolution)
5. Due to the rotation of Earth around itself, the Sun appears moving from ..... (north to south – east to west)
6. Earth rotates around itself once every ..... (one day – one year)

LESSON 2

Activity 4 Rotation

▸ Look at the opposite picture, then put (✓) or (×) :



1. If Earth stopped rotating on its axis, the cycle of day and night will happen. ( )
2. Earth revolves around the Sun in an orbit. ( )

Cycle of day and night

- Cycle means a series of events that is repeated in the same order for example :
  - The cycle of day and night.
  - The cycle of seasons.
- Earth rotates counterclockwise on its vertical axis that passes through the two poles of Earth causing the cycle of day and night.

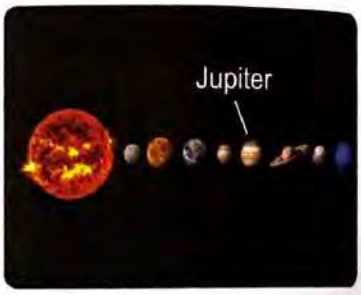
Rotation of Earth

Note

Earth's revolution around the Sun causes the cycle of seasons.

Solar system

- Solar system includes the Sun and eight planets that revolve around the Sun in fixed orbits.
- Planets rotate on their axes at different speeds.
- Jupiter is the fastest planet that rotates on its axis in the solar system (Jupiter is one of the eight planets of solar system).



Solar system

Check your understanding

▸ Complete the following sentences using the words below :

(Jupiter — cycle — Sun)

1. Earth's revolution around the ..... causes the cycle of seasons.
2. The fastest rotating planet in the solar system is .....
3. The series of events that are repeated in the same order is called .....

series	سلسلة	event	حدث	repeat	يكرر
counterclockwise	عكس اتجاة عقارب الساعة	vertical	عمودى	solar system	النظام الشمسى
axes	محاور	Jupiter	كوكب المشترى		

Activity 5 Sunrise

Sunrise and Sunset

- Earth revolves around the Sun in an elliptical orbit (oval path).
- Earth is slightly tilted on its axis.
- As Earth revolves around the Sun, the angle of tilt changes throughout the year.
- The Sun appears to travel across the sky at slightly different speeds each day due to :
  - The elliptical orbit of Earth.
  - The tilt of Earth on its axis.

So, the two reasons above cause different sunrise and sunset times each day on Earth.

Now, let's study the sunrise and sunset in some cities in Egypt.

- The Sun rises from east and sets from west.
- The cities in east see the sunrise before the cities in west.

Egypt map

For example :

The following two tables show the sunrise, sunset and the length of day from Nov. 30 to Dec. 2 in two different cities in Egypt which are :

- Marsa Alam (a city in the far east of Egypt).
- Siwa (a city in the far west of Egypt).

In Marsa Alam

Day	Sunrise	Sunset	Length of day
Nov. 30	6:07 am	4:50 pm	10:42:24
Dec. 1	6:08 am	4:50 pm	10:41:44
Dec. 2	6:09 am	4:50 pm	10:41:05

In Siwa

Day	Sunrise	Sunset	Length of day
Nov. 30	6:53 am	5:19 pm	10:25:44
Dec. 1	6:54 am	5:19 pm	10:24:55
Dec. 2	6:55 am	5:19 pm	10:24:08

elliptical orbit	مدار بيضاوى	oval	بيضاوى	slightly	قليل
tilt	ميل	sunrise	شروق الشمس	sunset	غروب الشمس
far east	أقصى الشرق	far west	أقصى الغرب		

▶ **From the previous tables we can conclude the following informations :**

- Marsa Alam sees the sunrise 46 minutes before Siwa.
- The length of day decreases in Marsa Alam and Siwa from Nov. 30 to Dec. 2
- The length of day in Marsa Alam is always longer than it in Siwa.

International Space Station

- It is a spacecraft in the orbit of Earth.
- It orbits Earth at high speed where it takes 90 minutes to make one turn around Earth, so astronauts of international Space Station see many sunrises in one day (they can see nearly 16 sunrises every 24 hours).

International space station

Check your understanding

▶ Put (✓) or (✗) :

1. The tilt angle of Earth doesn't change throughout the year. ( )
2. The sunrise and sunset occur at the same time every day. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (19)

International Space Station محطة الفضاء الدولية spacecraft مركبة فضائية astronaut رائد فضاء

Exercises on Lesson 2

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. The Earth's axis is .....
   a. vertical. b. horizontal. c. circular. d. real.
2. Orbiting of Earth around the Sun causes the .....
   a. cycle of day and night. b. cycle of seasons.
   c. increasing the speed of Earth. d. decreasing the speed of Earth.
3. The number of stars in the solar system is .....
   a. one. b. eight. c. nine. d. two.
4. The Earth rotates ..... on its axis.
   a. clock wise b. counterclockwise
   c. from north to south d. from south to north
5. The solar system consists of some ..... and one .....
   a. Sun – planets. b. moons – planets.
   c. planets – Sun. d. planets – moon.
6. Jupiter is a ..... and it has ..... on its axis.
   a. moon – highest speed b. planet – lowest speed
   c. star – lowest speed d. planet – highest speed
7. All the following sentences describe the solar system, except .....
   a. it contains the Sun and the eight planets.
   b. its planets revolve around the Sun in fixed orbits.
   c. its planets rotates on their axes at the same speed.
   d. it contains Earth, Jupiter and the Sun only.
8. The fastest planet that rotates on its axis in the solar system is .....
   a. the Sun. b. Earth. c. Jupiter. d. the moon.
9. In different cities, the Sun sets in different times due to .....
   a. the circular path of Earth around the Sun only.
   b. the tilt of Earth on its axis only.
   c. the elliptical orbit of Earth around the Sun only.
   d. the elliptical orbit of Earth and the tilt of Earth on its axis.
10. In Egypt the cities in ..... see the sunrise before the cities in .....
    a. east – west. b. west – east. c. north – south. d. south – north.

11. The spacecraft that orbits Earth takes about ..... to make one turn around Earth.
    a. more than 3 hours
    b. more than one hour
    c. less than 2 hours and more than one hour
    d. less than one hour and more than half an hour

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Jupiter 2. International Space Station 3. Earth 4. The Sun	a. is a spacecraft that orbit the Earth. b. is the center of the solar system. c. is the fastest planet that rotates on its axis. d. is the planet that completes one cycle on its axis in 24 hours. e. is the path in which planets revolve around the Sun.

1. ..... 2. ..... 3. ..... 4. .....

3 Put (✓) or (✗) :

1. All planets of the solar system rotate around the Sun in one orbit only. ( )
2. Earth revolves around the Sun once every one day. ( )
3. The Earth's axis is a vertical axis that passes through the Earth's two poles. ( )
4. Earth's revolution around the Sun causes day and night phenomenon. ( )
5. The repeatition of series of events in the same order is called cycle. ( )
6. Earth rotates on its axis in clockwise direction. ( )
7. The solar system includes the Sun and Earth only. ( )
8. Earth revolves around the Sun in a fixed path. ( )
9. Earth's rotation on its axis causes the cycle of day and night. ( )
10. The Sun doesn't revolve around Earth. ( )
11. The Sun sets at the same time in all cities of Egypt. ( )
12. Planets of the solar system rotate on their axes with different speeds. ( )
13. An astronaut on the International Space Station can observe many sunrises every day. ( )
14. The length of day and night are always equal during the whole year. ( )

4 Correct the underlined word :

1. The center of the solar system is the Earth. (.....)
2. The phenomenon of four seasons occurs due to rotation of Earth on its axis. (.....)
3. The Earth orbits the Sun in a rectangular path. (.....)
4. The Earth spins around its axis once every 28 hours. (.....)

5 Write the scientific term of each of the following :

1. The fastest planet during its rotation on its axis. (.....)
2. The time taken by Earth to complete one rotation on its axis. (.....)
3. A phenomenon occurs due to Earth's revolution around the Sun. (.....)
4. The Sun and eight planets revolving around it. (.....)
5. The series of events that is repeated in the same order. (.....)

6 Complete the following sentences :

1. Solar system includes ..... at its center and eight ..... around it.
2. Cycle of ..... happens due to Earth's rotation on its .....
3. Earth revolves around ..... and the angle of ..... changes throughout the year.
4. The astronauts of ..... station can see many ..... in one day.
5. A series of events that is repeated in the same order is called .....

7 Give reasons for :

1. Occurrence of seasons.

.....

.....

2. Occurrence of different sunrise and sunset times each day on Earth.

.....

.....

3. Astronauts of International Space Station can see many sunrises in one day.

.....

.....

8 What happens if ...?

1. Earth stops spinning on its axis.

.....

2. Earth's axis is not tilted.

.....

3. Both Earth and Jupiter make one cycle on their axis with the same speed.

.....

.....

9 Look at the following figures then choose the correct answer from these between brackets:

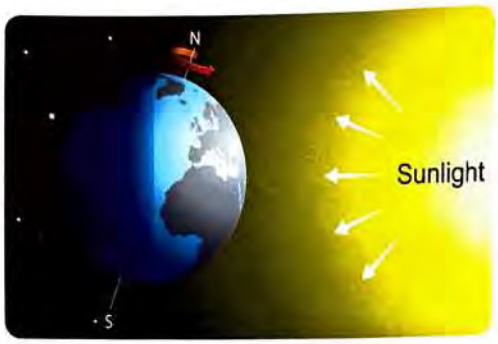


Figure (A)

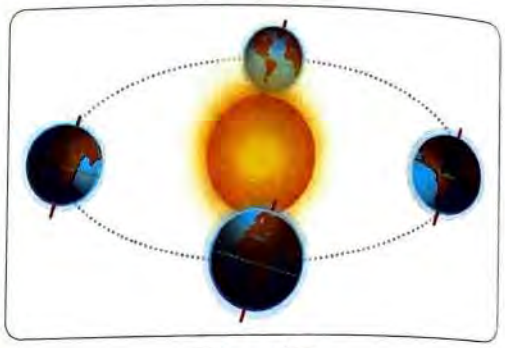


Figure (B)

1. Figure (A) illustrates the cycle of (day and night – four seasons) on Earth.
2. Figure (B) illustrates the cycle of (day and night – four seasons) on Earth.
3. Figure (A) represents the (rotation – revolution) of Earth on its axis every (12 hours – 24 hours – month – year).
4. Figure (B) represents the (rotation – revolution) of Earth around the Sun every (12 hours – 24 hours – month – year).

LESSON 3

Activity 6 Effects of Earth's Rotation

Look at the opposite picture, then put (✓) or (✗) :

1. Stars move in the sky at night. ( )
2. Some stars like the Sun seem to rise and set in the sky. ( )

- Earth rotates on its axis at high speed that reaches more than 1600 kilometers per hour.
- We cannot only feel the high speed of Earth's rotation, but also it seems like Earth is standing still because we are moving with Earth, where everything attached to the surface of Earth moves at the same speed of Earth.

For example :

If you are sitting in a moving car looking out the window at nearby car moving in the same direction with the same speed, you will not feel that you are moving, but in fact you are traveling at many kilometers per hour.

Movement of objects in the sky

- Earth's rotation on its axis causes celestial bodies such as (the Sun and stars) appear to move in the sky such as :
  - The Sun appears to rise in the east and set in the west.
  - Stars seem to move in the sky at night, where some stars seem to rise and set like the Sun.

Give a reason for :

Although Earth rotates on its axis, we don't feel its movement.

Because we are moving with the same speed of Earth.

stand	يقف	still	مازال	nearby	مجاور
attach	يتعلق	celestial body	الجرم السماوى		

Notes

1. The Sun causes the formation of shadows of objects on Earth.
2. As the Sun appears to move in the sky, this causes the movement of shadows of objects which proves that Earth rotates on its axis.

For example : The shadow of a tree.

In morning

In afternoon

Check your understanding

▸ Put (✓) or (✗) :

1. Earth's revolution causes the Sun and stars seem to move in the sky. ( )
2. The shadow moves throughout the day on Earth due to the Sun appears to move across the sky. ( )

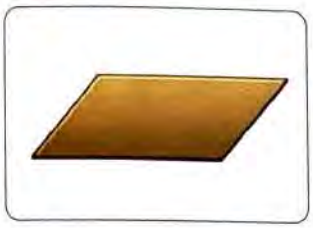
prove يثبت movement حركة shadow ظل

Activity 7 What Can Shadow Tell Us ?

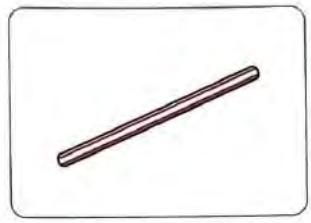
- The Sun appears to move throughout the day, so does the shadow it casts.
- Early, the ancient Egyptians used shadows cast by giant stone to know the time of the day.
- Later, the ancient Egyptians invented the first timepiece that used to know the time called sundial (shadow clock).

In this activity, we will make a sundial that used to collect data about shadows.

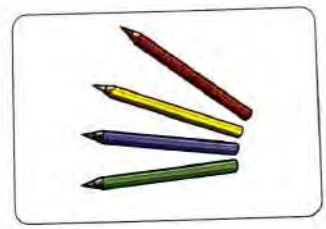
Tools



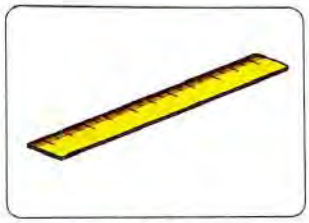
Rectangle-shape carton



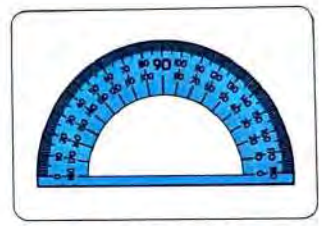
Plastic straw



Colored pencils



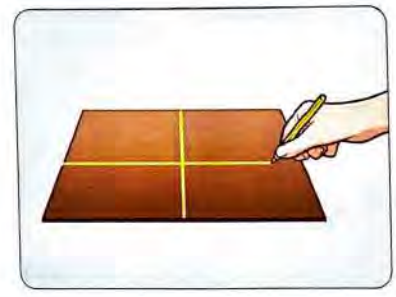
Ruler



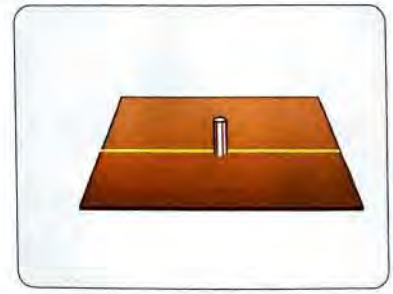
Protractor

Steps

1. Draw two lines that split the piece of carton vertically and horizontally as shown, where the intersection of these lines is the center of the carton piece.



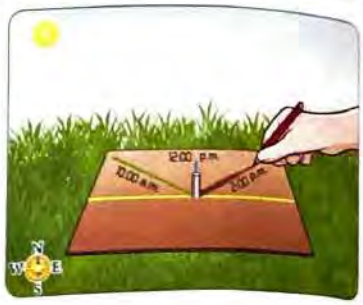
2. Make a small hole at the center of carton piece and fix the plastic straw in it, then erase the verticle line.



cast	يُلقى	giant	عملاق	stone	حجارة
timepiece	ساعة	sundial	الساعة الشمسية	split	يقسم
vertically	عموديًا	horizontally	أفقيًا	straw	شفاطة
protractor	منقلة	erase	يمحى		

3. Put the sundial in an open area facing the north direction and keep it in the same place without moving it during the activity.

4. Trace the shadow of the straw using three different colored pencils at different three hours which are : (10:00 a.m.), (12:00 p.m.) and (02:00 p.m.).



5. • Remove the straw.
   • For each shadow line, detect the following measurements :
     - The length of each shadow line using the ruler.
     - The angle between the shadow line and the horizontal line using the prodrector.
   • The data is recorded as shown in the table below.

Time	Length of shadow	Angle of shadow
10:00 a.m.	12 cm.	40°
12:00 p.m.	4 cm.	90°
02:00 p.m.	11 cm.	130°

Observation

From the previous table we can observe that the lengths of the shadow lines and their angles changed throughout the day.

Conclusion

Throughout the day, the change in the position of the Sun in the sky due to the Earth's rotation affects the lengths and angles of shadows of objects on Earth.

detect يعين record يسجل

Note

There are two factors that affect the length and angle of shadow :

1. The position of the Sun in the sky, where :
   - At noon, the Sun is high and most directly above us in the sky, so it forms the shortest shadows of objects .
   - In morning and afternoon, the Sun is low and at east or west in the sky, so it forms longer shadows of objects.
2. The amount of sunlight that reaches the Earth's surface during different seasons.

Check your understanding

▸ **Complete the following sentences using the words below :**

(long — shortest — changes)

1. The length of shadow of an object ..... throughout the day.
2. At noon, the Sun forms ..... shadows of objects.
3. When the Sun is low in the sky, it forms ..... shadows of objects.

In the Assessment Book :
Try to answer :
Self-Assessment (20)

directly مباشرة

Exercises on Lesson 3

Understand · Apply · Analyze · Evaluate · Create

1 Choose the correct answer :

1. The rotation of Earth ..... at ..... causes day and night phenomenon.
   a. around the Sun – high speed
   b. on its axis – high speed
   c. around the moon – low speed
   d. on its axis – low speed

2. All objects that are attached to the surface of Earth are moving .....
   a. with the same speed of Earth.
   b. with higher speed than that of Earth.
   c. with lower speed than that of Earth.
   d. against the motion of Earth.

3. Rotation of Earth on its axis causes all the following phenomena, except .....
   a. movement of the Sun from east to west.
   b. movement of stars in the sky at night.
   c. some stars seem to rise and set like the Sun.
   d. occurrence of four seasons.

4. Formation of shadows of objects happens due to .....
   a. revolution of Earth around the Sun.
   b. revolution of Earth around the moon.
   c. appearance of stars as they move in the sky.
   d. appearance of the Sun as it moves in the sky.

5. Ancient Egyptians invented ..... which depends on the movement of ..... to know the time of the day.
   a. the balance – time
   b. the sundial – time
   c. the telescope – distance
   d. the sundial – shadows

6. Lengths and angles of shadows of objects are affected by .....
   a. the change in the position of the Sun in the sky.
   b. the distance between Earth and the Sun.
   c. the revolution of Earth around the Sun.
   d. the revolution of the moon around Earth.

7. The shortest shadow of an object happens .....
   a. in morning.
   b. in afternoon.
   c. at noon.
   d. at night.

8. The amount of sunlight that reaches the Earth's surface during the day .....
   a. doesn't change during different seasons.
   b. changes during different seasons.
   c. increases at night.
   d. decreases at noon.

2 Put (✓) or (✗) :

1. Earth rotates on its axis at low speed. ( )
2. We can feel the movement of Earth easily. ( )
3. All objects on Earth's surface move with the same speed of Earth. ( )
4. Movement of objects in the sky is due to the Earth revolution around the Sun. ( )
5. The position of the shadow of Cairo Tower will not change during the day. ( )
6. All people in different countries see the stars in the sky at the same time. ( )
7. The Sun appears to move throughout the day. ( )
8. Ancient Egyptians were able to know the time by inventing the first sundial. ( )
9. Lengths of shadows of different objects don't change during the day. ( )

3 Complete the following sentences :

1. Earth's rotation on ..... causes the Sun seems to rise in ..... direction and sets in ..... direction.
2. Formation of ..... of objects is due to movement of ..... across the sky.
3. The first time piece that is used by ancient Egyptians to know the time is called .....
4. The position of the Sun in the sky affects ..... and ..... of shadows of objects.
5. In morning and ..... the Sun forms longer shadow of an object.
6. At noon the Sun forms ..... shadow of an object.

4 Give reasons for :

1. Although Earth rotates on its axis, we don't feel its movement.

.....

.....

2. The length of the shadow of an object changes throughout the day.

.....

.....

3. In the night sky, some stars seem to rise and set like the Sun.

.....

.....

5 What happen to ...?

1. The length of the shadow of an object at noon.

.....

.....

2. The shadow of an object if the Sun locates at east or west in the sky.

.....

.....

6 Look at the following figures then answer the following questions below :

Figure (A)

Figure (B)

Figure (C)

1. The shadow of the tree will be longer at .....

a. figure (A) only.
b. figure (C) only.
c. figure (B) and figure (C).
d. figure (A) and figure (B).

2. The time at which figure (C) illustrates is .....

a. 12 p.m.
b. 10 a.m.
c. 2 a.m.
d. 3 p.m.

3. At noon the Sun locates above us during its movement that can be represented by .....

a. figure (A) only.
b. figure (C) only.
c. figure (B) and figure (C).
d. figure (A) and figure (B).

4. The correct order of these figures that shows the rising of the Sun till it sets is .....

a. A → B → C.
b. C → B → A.
c. B → C → A.
d. A → C → B.

LESSON 4

Activity 8 Constellations Visible during Different Seasons

▸ **Put (✓) or (✗) :**

1. Stars that we see at night sky are far away from Earth. ( )
2. Stars seem to move across night sky. ( )

Constellations

Constellation :

It is a group of stars that forms a pattern or looks like a certain shape in the sky.

Stars that form a constellation are not connected to each other but, if these stars are connected by imaginary lines, they will look like an object, animal or person.

The Constellation Orion

For example :

The Constellation Orion that ancient Greeks gave it this name relative to a mythical hunter.

Movement of constellations

- In fact, the positions of stars don't change, but they seem to move across the night sky due to Earth's rotation on its axis.
- Constellations appear at different locations in the sky during different times of the year due to Earth's revolution around the Sun, where :
  - We can see different constellations in winter than in summer.
  - Other constellations that we can't see them in the sky, still exist in the sky as they are not visible from where we are located on Earth.
- Every night, new stars appear from east because the part of night sky we see from a certain place on Earth changes a little bit every night, then after one revolution around the Sun, we will see the same part of night sky again and so on.

Check your understanding

▸ **Put (✓) or (✗) :**

1. Every night, new stars appear from west due to Earth's rotation on its axis. ( )
2. We see different constellations in winter than in summer due to Earth's revolution around the Sun. ( )

Constellation Orion	التجمع النجمى أوريون الصياد	visible	مرئى
locate	يقع	little bit	قليلًا

Activity 9 Constellations

Starlight

- Stars make their own light where they are made of hot gases that make them bright.
- Some stars are larger than the Sun while others are smaller than it.
- Planets and moons don't make their own light.
- We see the moon bright in the sky because it reflects light from the Sun.

The moon and stars

Constellations

- Some constellations are always visible in the sky, while other constellations can be seen only during specific seasons.
- Stars closer to the north and south poles move slightly in the sky, so the place of these stars (constellations) changes a little bit in the night sky throughout the year.

Star at the North pole of Earth

Note

Location of constellations in the sky during the year, help us to determine the main directions (north, south, east and west).

Check your understanding

▸ Put (✓) or (✗) :

1. Moons and stars make their own light. ( )
2. All constellations are visible in the sky throughout the year. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (21)

reflect	يعكس	specific	معين
closer	قريب	determine	يحدد

Exercises on Lesson 4

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. The group of stars that make a certain shape in the sky is called .....
   a. solar system. b. universe. c. constellation. d. ecosystem.
2. Constellation appear ..... in the sky during the year.
   a. at different positions b. at the same position
   c. in winter only d. in summer only
3. All the following are from the properties of constellations, except .....
   a. they consist of stars and planets.
   b. they change their positions throughout the year.
   c. they seem to move across the night sky.
   d. they can form certain shapes in the sky.
4. Every night, we can see new stars appear from ..... direction.
   a. north b. south c. east d. west
5. ..... are celestial bodies that make their own light.
   a. Moons and planets b. The Sun and stars
   c. The Sun and planets d. Earth and the Sun
6. Knowing the constellation's position in the sky during the year, helps us to know .....
   a. the time.
   b. the main directions.
   c. the amount of light that reaches Earth.
   d. the location of the moon away from Earth.
7. The Sun and other stars are made up of .....
   a. hot solids. b. cold solids. c. hot gases. d. cold liquids.

2 Put (✓) or (✗) :

1. All celestial bodies make their own light. ( )
2. Constellations have similar shapes in the sky. ( )
3. Constellation Orion is called by this name by ancient Greeks relative to a mythical hunter. ( )
4. Stars seem to move in the sky due to Earth's revolution around the Sun. ( )
5. All constellations can be seen in the sky every day along the year. ( )

6. Earth can make its own light. ( )
7. Sunlight falls on the moon's surface so, it seems bright at night. ( )
8. The Sun is a medium sized star. ( )
9. Stars are made up of hot liquids. ( )
10. The stars we see in each constellation are very close to us. ( )
11. The Sun is the biggest star in the universe. ( )

3 Complete the following sentences :

1. A constellation consists of a group of ..... that form a pattern.
2. Ancient Greeks gave constellation ..... its name relative to a mythical .....
3. Stars seem to move across the night sky due to the ..... of Earth on its axis.
4. Planets and ..... can't make their own light.
5. Stars seem bright because they are made up of .....
6. Location of ..... in the sky during the year, helps up to determine ..... of Earth.

4 Give reasons for :

1. Stars seem to move in the sky.

.....

.....

2. The moon appears bright in the sky at night.

.....

.....

3. If we are travelling in desert, stars may help us to determine our correct way across the desert.

.....

.....

5 What happens if ...?

1. Stars are not made up of hot gases.

.....

2. Sunlight falls on the moon's surface.

.....

6 **The opposite figure illustrates one of the famous constellations :**

1. The name of this constellation is .....
(Orion – Leo)
and it looks like .....
(horse – hunter)

2. This constellation consists of a group of .....
(planets – stars)

3. The position of this constellation seems to appear at different locations due to .....
(Earth's rotation on its axis – Earth's revolution around the Sun)

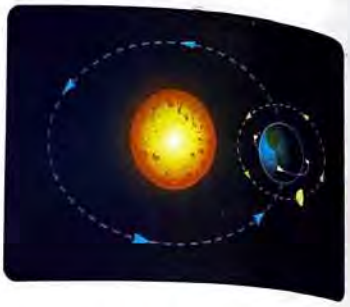
LESSON 5

Activity 10 Phases of the Moon

▸ **Look at the opposite picture, then put (✓) or (✗) :**

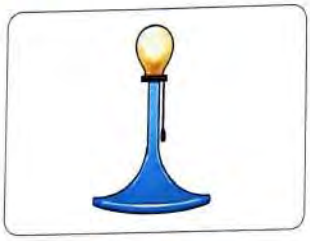
1. The moon reflects the light of the Sun. ( )
2. The moon appears in different shapes in the night sky. ( )

- The moon revolves around Earth in an elliptical orbit.
- **The moon have different phases (shapes) in the night sky due to :**
  - Earth's revolution around the Sun.
  - The moon's revolution around Earth.
  - Both Earth and the moon revolve together around the Sun.

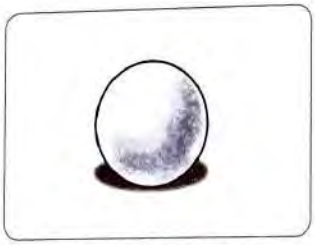


▸ **In this activity, we will identify some phases of the moon by making model of Earth-moon-Sun system.**

▸ Tools



Lamp

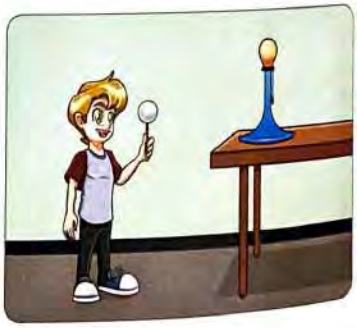


White foam ball

Pencil

▸ Steps

1. Put the lamp on a table, then push the pencil into the middle of foam ball as shown in the picture, where the lamp represents the Sun, foam ball represents the moon, and you represent Earth.



repeat يتكرر middle منتصف

2. - Turn on the lamp, then turn off the room lights.
   - Hold the pencil with ball out at your arm's length as shown in the picture.

Observation

When you look at the ball (moon), you will see that lamp (sunlight) is shining on the side that not facing you from the ball (moon), this phase is "new moon".

3. Turn your hand about 45 degree to the left by keeping your arm extended in front of your body.

Observation

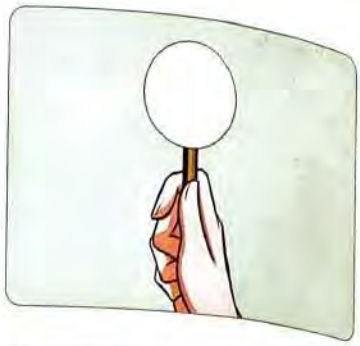
When you look at the ball (moon), you will see that the right edge of the ball (moon) is bright, this phase is "crescent".

4. Turn your hand to the left by keeping your arm extended in front of your body, until the ball (moon) is directly opposite the lamp (the Sun) as shown in the picture.

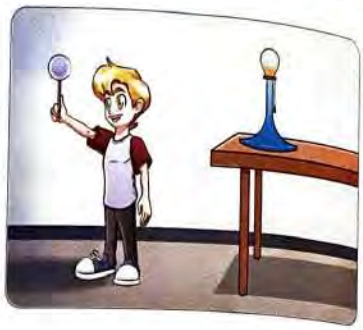
length	طول	shine	مضئ	new moon	المحاق
crescent	هلال	edge	حافة		

Observation

When you look at the ball (moon), you will see that the ball (moon) is completely bright, this phase is "full moon".



5. Turn your hand to the left by keeping your arm extended in front of your body, until you see the phase of "crescent" again on the ball (moon) before you return to the original position that shows the phase of "new moon".



Observation

When you look at the ball (moon), you will see the "left" edge of the moon is bright, this phase is "crescent"

Conclusion

As the moon orbits Earth and both of them orbit the Sun, we can see different parts of the moon are sunlit, where :

- At new moon, we can't see the moon in the sky.
- At full moon, the moon appears like a completely bright circle in the sky.

The moon phases during the lunar month :

- The moon phases are changed during the lunar month which is also known as "Hijri month".
- The cycle of the moon phases (lunar phases) is repeated at the beginning of each lunar month as follows :

full moon بدر sunlit مشمس

lunar month شهر قمری Hijri month شهر هجری

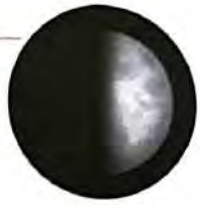
① First crescent :

The edge of the moon's face appears as an illuminated crescent, where its size increases gradually with time.

- This phase is the first phase of the moon phases.

Then →

② First quarter :



One half of the moon's face is illuminated and the other half is darkened.

Then ↓

③ First gibbous :

The brighten part of the moon's face increases gradually and the line separating the lighted part and the darkened part appears curved.

Then ↓

④ Full moon :

The apparent face of the moon that faces Earth is fully illuminated.

- This phase appears in the middle of the lunar month.

Then ↓

⑤ Second gibbous :

The brighten part of the moon's face decreases gradually and the line separating the darkened part and the lighted part appears curved.

← Then

⑥ Second quarter :

One half of the moon's face is darkened and the other half is illuminated.

Then ↑

⑦ Second crescent :

The edge of the moon's face appears as illuminated crescent.

Then ↑

⑧ New moon :

The apparent face of the moon that faces Earth is fully illuminated.

- This phase appears in the last day of the lunar month.

Then ↑

Check your understanding

▸ **Put (✓) or (✗) :**

1. The phases of the moon are repeated every lunar month. ( )
2. The moon appears like a completely bright circle in the sky at new moon phase. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (22)

illuminate	يُنير	second quarter	تربيع ثانى
first quarter	تربيع أول	apparent	ظاهر
gibbous	أحدب		

Exercises on Lesson 5

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. ..... are celestial bodies that revolve around the Sun in fixed paths.
   a. Stars and the moon
   b. The eight planets
   c. The Sun and Earth
   d. The Sun and Jupiter

2. ..... is a celestial body that revolves around Earth and reflects the sunlight.
   a. Planet
   b. The Sun
   c. The moon
   d. Constellation

3. We see the moon shining in the sky, because it .....
   a. absorbs sunlight.
   b. produces light.
   c. lets light pass through.
   d. reflects sunlight.

4. The Sun is a star because it .....
   a. reflects light.
   b. absorbs light.
   c. gives out light.
   d. allows light to pass through.

5. One of the reasons that makes the moon has different phases is that .....
   a. it moves around the Earth.
   b. it moves around constellation.
   c. both the moon and the Sun move around Earth.
   d. both the Sun and Earth revolve around the moon.

6. The moon takes one lunar ..... to complete one cycle around the Earth.
   a. year
   b. week
   c. month
   d. day

7. When the Earth is between the moon and the Sun, it appears in the ..... phase.
   a. half moon
   b. full moon
   c. new moon
   d. crescent

8. ..... is the moon phase that we can see more than half of the moon is illuminated.
   a. Crescent
   b. Full moon
   c. Gibbous
   d. New moon

9. All the following sentences are related to the moon phases, except .....
   a. They occur due to the Earth's revolution around the Sun.
   b. They occur due to the moon's revolution around Earth.
   c. The full moon doesn't occur during winter.
   d. They are repeated every one lunar month.

10. The moon appears completely bright at .....
    a. new moon phase.
    b. crescent phase.
    c. full moon phase.
    d. all phases.
11. The moon seems completely dark at .....
    a. new moon phase.
    b. crescent phase.
    c. full moon phase.
    d. all phases.
12. At the beginning of lunar month we can see the edge of the moon is illuminated at ..... phase.
    a. crescent b. gibbous c. full moon d. new moon

2 Put (✓) or (✗) :

1. The moon seems shiny because it absorbs sunlight. ( )
2. The moon revolves around Earth once every lunar day. ( )
3. The moon phases occur due to the rotation of Earth on its axis. ( )
4. We can see the moon all the day. ( )
5. The moon reflects the sunlight during its revolution around the Earth. ( )
6. At full moon phase, we can't see the moon in the sky. ( )
7. At crescent phase, a part of the moon edge appears bright. ( )
8. The moon has only one phase during the lunar month. ( )
9. Earth rotates on its axis and also orbits around the Sun. ( )

3 Correct the underlined word :

1. The Sun is a <u>planet</u> that can gives out light. (.....)
2. The moon seems bright as it <u>absorbs</u> sunlight. (.....)
3. <u>Earth</u> is the center of the solar system. (.....)
4. Both Earth and the moon complete one cycle around the Sun every <u>24 hours</u>. (.....)

4 Cross out the odd word :

1. Earth – Jupiter – The Sun – The moon. (.....)
2. Crescent – Full moon – Shadow – Gibbous. (.....)

5 Write the scientific term :

1. A dark object that revolves around Earth and reflects the sunlight falling on its surface. (.....)
2. Dark objects revolve around the Sun in fixed orbits. (.....)

- 3. The moon phase at which moon seems completely bright. (.....)
- 4. The moon phase at which moon seems completely dark. (.....)
- 5. The moon phase at which one edge only appears bright. (.....)

6 Complete the following sentences :

- 1. The moon reflects the light of .....
- 2. Through the month, we can see different ..... of the moon in the sky.
- 3. All moon phases are repeated every .....
- 4. The moon orbits ..... and both of them orbit .....
- 5. At ..... phase, the moon appears completely shining in the sky at night.
- 6. We can see only a part of the moon edges bright at ..... phase.
- 7. At the beginning of the moon's revolution around Earth, the moon seems completely dark at ..... phase.
- 8. At ..... phase, the edge of the moon is illuminated, then thickness up as the moon moves.

7 Give reasons for :

- 1. The moon is a dark body but we see it shiny at night.

.....

.....

- 2. Earth and the moon are not considered stars.

.....

.....

- 3. The moon has different phases in the night sky.

.....

.....

8 What happens if ...?

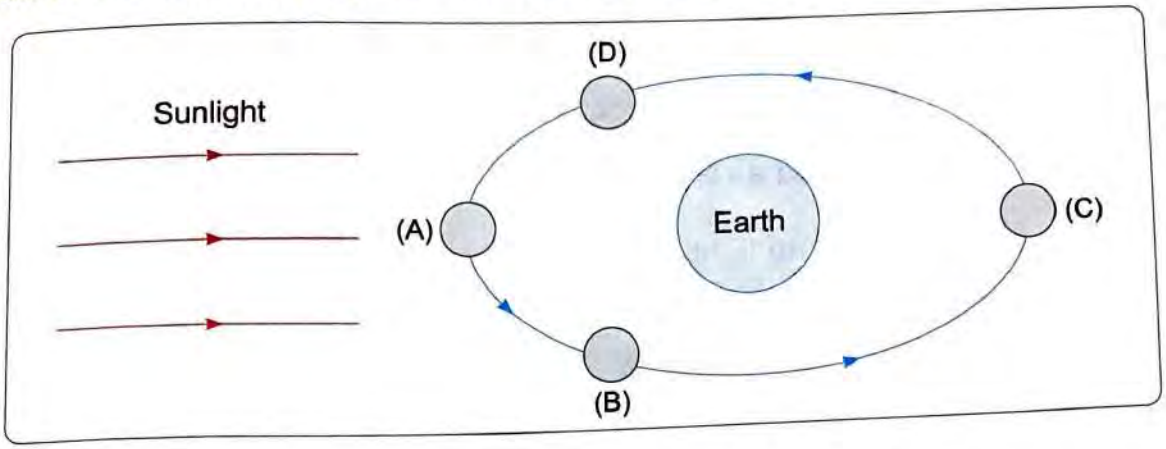
1. The moon completes one revolution around Earth.

.....

2. Half of the moon faces the Sun.

.....

9 **Look at the following figure then choose the correct answer :**



1. The celestial body that revolves around Earth in this figure is .....
(the moon – the Sun – Jupiter)

2. The moon phase position (A) is .....
(full moon – new moon – crescent)

3. The moon phase in position (C) is .....
(full moon – new moon – crescent)

4. Crescent phase will appear in .....
(position A only – positions A and B – positions B and D)

LESSON 6

Activity 11 What Are Stars ?

▸ **Look at the opposite picture, then put (✓) or (✗) :**

1. The Sun is not considered as a star. ( )
2. The Sun gives us heat and light. ( )
3. The Sun is located near Earth. ( )

The Sun

- It is a medium-sized star.
- It is the only star that is located in our solar system, while other stars are farther away from the solar system.
- It appears so bright in the sky, because it is the largest object in the solar system and it is the closest star to Earth.
- It provides Earth with heat and light which are necessary for continuity of life on Earth.

Solar system

▸ **When you look at night sky, you will see a huge number of stars.**

Stars :

They are giant spheres of superhot gases most of them are hydrogen and helium.

- Stars appear bright in the sky due to burning of gases that form these stars.

Observing stars at night

▸ **How does the Sun produce heat (thermal energy) and light energy ?**

Like all stars, the Sun uses the energy produced from reactions between gases inside it to give off heat (thermal energy) and light energy.

- Throughout the ages, scientists have been interested in studying the Sun and how it produces huge amount of heat and light.

medium-sized	متوسط الحجم	superhot gases	غازات شديدة الحرارة	provide	يمد
reaction	تفاعل	necessary	ضرورى	giant	عملاق
continuity	استمرار				

Examples of these scientists :

1. **Copernicus :** He proved that the Sun is the center of our solar system.
2. **Albert Einstein :** He explained how the Sun converts matter directly into energy (light and heat) that reaches planet Earth.

Notes

1. As a result of the huge mass of the Sun, it has a great gravitational pulling force that keeps 8 planets including Earth and more than 200 moons in continuous fixed orbits around the Sun.
2. Some scientists believe that the number of stars is more than all the grains of sand on Earth's beaches.

Check your understanding

▸ Put (✓) or (✗) :

1. Stars are solid objects made up of rocks. ( )
2. Stars are mostly made up of nitrogen and helium gases. ( )

prove يثبت believe يعتقد grains حبات

Activity 12 How Do We Study the Stars ?

- Stars can help us understand how our galaxy and other galaxies formed.

Galaxy :

It is a group of stars, planets and gases held together by gravity.

Our galaxy

- Universe is the wide space that contains celestial objects as stars, galaxies, comets, meteors and human-made satellites like the International Space Station.
- If you look into space, you can see some celestial objects with naked eye but most of these celestial objects appear as small light dots, so it is hard to differentiate between them.

Using technology to study the universe

- As the universe is so big, many objects are too faraway to be seen with the naked eye.
- Astronauts cannot be sent to study these very distant objects like stars.

▸ **So, technology helps human to invent some tools to see distant objects in more details such as :**

Binoculars

Such as Galileo binoculars

Telescopes

Such as Hubble Space Telescope

Note

Some telescopes that are placed on Earth's surface cannot observe very distant celestial objects due to the presence of the atmosphere that acts as a protective layer around Earth, where the atmosphere allows some light waves pass to Earth, while it blocks some other light waves.

galaxy	مجرة	universe	الكون	atmosphere	الغلاف الجوى
meteor	النيزك	comet	المذنب	block	نحجب
binoculars	منظار ثنائى العدسة	telescope	تلسكوب		

Check your understanding

▸ Complete the following sentences using the words below :

(galaxy – atmosphere – universe)

1. The wide space that contains celestial objects is called .....
2. A protective layer around Earth that allows some light waves pass to Earth and blocks other light waves is called .....
3. A group of stars, planets and gases held together by gravity is called .....

In the Assessment Book :
Try to answer :
Self-Assessment (23)

Exercises on Lesson 6

Understand · Apply · Analyze · Evaluate · Create

1 Choose the correct answer :

1. The star that presents in our solar system, is .....
   a. the moon. b. the Sun. c. the Earth. d. the gravitational force.
2. The Sun is a star that gives out a very big amount of .....
   a. heat only. b. light only. c. heat and light. d. heat and sound.
3. Our solar system contains .....
   a. one star. b. one planet. c. one moon. d. no stars.
4. The powerful gravitational pulling force of the Sun is related to .....
   a. the light of the moon. b. the mass of the moon.
   c. the light of the Sun. d. the mass of the Sun.
5. Which of the following statements is correct ? .....
   a. Earth orbits the moon. b. the moon orbits Earth.
   c. Earth orbits two stars. d. the Sun orbits Earth.
6. ..... locate(s) at the center of our solar system.
   a. The moon and the Sun b. The moon and Earth
   c. The Sun only d. Earth only
7. We can observe thousands of ..... in the sky at night that give off heat and light.
   a. moons b. stars c. planets d. satellites
8. When you look at the sky, you can see all the following celestial objects with naked eye, except .....
   a. some stars. b. the Sun. c. the Earth. d. the moon.
9. Most of heat and light energy of the Sun are produced due to the reaction between .....
   a. hydrogen and rocks. b. helium and sand.
   c. hydrogen and helium. d. rocks and sand.
10. Reaction between gases of the Sun gives off .....
    a. light and hydrogen. b. heat and helium.
    c. light and heat. d. comet and meteor.

11. The temperature of the gases that form the Sun is similar to the temperature of .....

a. the Earth. b. the moon. c. some planets. d. some stars.

12. All the following appear like small light dots in the sky at night, except .....

a. a star. b. a meteor. c. a satellite. d. the moon.

13. We cannot send astronauts to study stars, because they are .....

a. so cold. b. faraway. c. too small. d. too large.

14. The International Space Station is considered as a type of .....

a. planets. b. stars. c. binoculars. d. satellites.

2 Put (✓) or (✗) :

1. We can observe the Sun and the moon during night. ( )
2. The scientist Copernicus proved that the Earth is the center of the solar system. ( )
3. The scientist Albert Einstein explained how the Sun converts matter directly into energy. ( )
4. Our solar system contains eight planets. ( )
5. The size of the Sun is greater than the size of Earth. ( )
6. The Sun is bigger than the moon. ( )
7. The Sun is necessary for continuity of life on Earth. ( )
8. The Sun seems smaller, because it is much farther from Earth than other stars. ( )
9. The Sun is located in the center of our galaxy. ( )
10. Superhot gases of the Sun burn producing heat and light energy. ( )
11. The solar system has many more stars than all the grains of sand on Earth's beaches. ( )
12. The International Space Station is a type of human-made satellites. ( )
13. The atmosphere lets all light waves to pass to the Earth. ( )
14. Galileo binoculars helps scientists to see distant objects in space with more details. ( )

3 Write the scientific term of each of the following :

1. It contains the Sun, eight planets and more than 200 moons. (.....)
2. The scientist who discovered that the Sun is the center of our solar system. (.....)
3. The scientist who discovered that how the Sun converts matter directly into energy. (.....)
4. It is a medium-sized star that provides us with heat and light. (.....)
5. They are giant spheres of superhot gases most of them are hydrogen and helium. (.....)
6. It is a group of stars, planets and gases held together by gravity. (.....)
7. It is a wide space that contains celestial bodies as stars, galaxies, comets, meteors and satellites. (.....)
8. It is a protective layer around the Earth that allows some light waves to pass and blocks others. (.....)

4 Complete the following sentences :

1. The Sun is the star that locates in the center of .....
2. The Sun produces ..... energy that warms the Earth.
3. The solar system contains eight ..... and more than 200 .....
4. The great gravity force of ..... keeps the eight planets in their fixed orbits.
5. Although the Sun is a ..... sized star, it looks to us much larger.
6. The Sun is made up of superhot gases most of them are ..... and .....
7. The Earth is surrounded by ..... that allows some light waves to pass through it and blocks others.

5 Give reasons for :

1. The Sun looks much larger to us than other stars.

.....

.....

2. Atmosphere limits the using of some telescopes to see distant celestial bodies.

.....

.....

3. Stars appear bright in the sky at night.

.....

.....

6 What happens to ...?

The gravity of the Sun if its mass decreases than it is now.

.....

7 Study the opposite figure, then choose the correct answer from those between brackets :

1. ..... has the largest mass.

(The moon – The Sun – The Earth)

2. ..... has the smallest size.

(The Sun – The Earth – The moon)

3. ..... has the lowest gravity force.

(The Earth – The moon – The Sun)

LESSON 7

Activity 13 Record Evidence Like A Scientist

- **In this concept,** you have learned about patterns of motion of different celestial bodies in the sky.
- **Now,** try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learned in the first concept.

Step 1 The Question

What causes the cycle of day and night, and why do the Sun, planets and stars appear to move across the sky ?

Step 2 My Claim

.....

.....

.....

Step 3 My Evidence

.....

.....

.....

.....

Step 4 My Scientific Explanation

.....

.....

.....

.....

.....

claim قرض evidence دليل scientific explanation تفسير علمي

Activity 14 STEM in Action

- Planetarium is a place where we can see images of stars, planets, constellations and other celestial bodies.
- People can learn about space from planetariums such as planetarium in Alexandria.
- Planetarium has a projector that displays images on its ceiling that looks like a dome.

Planetarium in Alexandria

- Special computer programs are used in planetarium to show pictures of what the sky looks like during certain times of month, year and also what the sky looked like many years ago.

Planetarium directors

Planetarium directors are scientists who study the properties and behavior of celestial bodies in the space, where :

- They use what they know about space to manage a planetarium building.
- They are responsible for making an amazing realistic show to bring the outer space to Earth.

Check your understanding

▸ **Complete the following sentences using the words below :**

(projector – simulating – scientists)

1. In a planetarium, there is a ..... that displays images on its ceiling.
2. Planetarium directors are ..... who study the behavior of celestial bodies in the space.
3. Planetarium directors are responsible for ..... space.

projector	جهاز عرض	display	يعرض	ceiling	السقف		
dome	القبة	behavior	سلوك	properties	خصائص		
space	الفضاء	manage	يدير	realistic	حقيقى		
simulating	محاكاة	planetarium	القبة السماوية	directors	مديرين		

Activity 15 Review : Patterns of Motion in the Sky

▶ **We can summarize this concept in the following main points :**

- The phenomenon of regular pattern of day and night happens due to Earth rotates counterclockwise on its axis.

Earth's axis :

It is an imaginary line passing through the North and South poles.

- During Earth's rotation, half of Earth that faces the Sun has day and the other half that away from the Sun has night.
- When Earth rotates on its axis, it causes the Sun, moon and stars seem to rise in the east and travel across the sky, then set in the west.
- If you change your direction, facing north or south, the Sun will always rise in the east and set in the west.

Rotation :

It is the spinning of an object around an axis.

For example : Earth rotates on its axis.

Revolution :

It is the orbiting of an object around another object.

For example : Earth revolves around the Sun in an orbit.

- Solar system includes the Sun and eight planets revolve around the Sun in fixed orbits, where Jupiter is the fastest planet of solar system.
- **The Sun appears to travel across the sky at slightly different speeds each day due to :**

  - The elliptical orbit of Earth.
  - The tilt of Earth on its axis.

  So, this causes different sunrise and sunset times each day on Earth.

- International space station is a spacecraft in the orbit of Earth which takes 90 minutes to make one turn around Earth, so astronauts can see nearly 16 sunrises every 24 hours.
- We can't only feel the high speed of Earth's rotation (more than 1600 kilometers per hour) but also it seems like Earth is standing still, because we are moving with Earth.

- When Earth rotates on its axis, the Sun appears to move across the sky, so the shadows of objects move on Earth, where the Sun causes the formation of shadows of objects.

- **The lengths and angles of shadows of objects can be affected by :**
  - The position of the Sun in the sky, where : at noon, the Sun forms the shortest shadow of different objects and at morning and afternoon, the Sun forms longer shadow of different objects.
  - The amount of sunlight that reaches Earth's surface during different seasons.

Constellation :

It is a group of stars that forms patterns or looks like a certain shape in the sky.

- **Constellations appear at different locations at the sky during different times of the year due to Earth's revolution around the Sun, where :**
  - We can see different constellations in winter than in summer.
  - Other constellations that we can't see them in the sky, still exist in the sky as they are not visible from where we are located on Earth.
- Every night, new stars appear from east because the part of night sky we see from a certain place on Earth changes a little bit every night, then after one revolution around the Sun, we will see the same part of night sky again and so on.
- Locations of constellations in the sky during the year, help us to determine the main directions.
- Stars make their own light while planets and moons don't make their own light, where the moon bright in the sky because it reflects light from the Sun.
- Stars closer to the North and South poles move slightly in the sky, so the place of these stars changes a little bit in the night sky throughout the year.

- **The moon has different phases in the night due to :**
  - Earth's revolution around the Sun.
  - The moon's revolution around Earth.
  - Both Earth and moon revolve together around the Sun.

- **Phases of the moon are :**

First crescent $\xrightarrow{\text{Then}}$ First quarter $\xrightarrow{\text{Then}}$ First gibbous $\xrightarrow{\text{Then}}$ Full moon $\xrightarrow{\text{Then}}$

Second gibbous $\xrightarrow{\text{Then}}$ Second quarter $\xrightarrow{\text{Then}}$ Second crescent $\xrightarrow{\text{Then}}$ New moon

• **The Sun :**

- It is a medium-sized star that appears larger and brighter to us than all other stars, because it is the closest star to Earth.
- It appears so bright in the sky, because it is the largest object in our solar system.
- It provides Earth with heat and light.

Stars :

They are giant spheres of superhot gases most of them are hydrogen and helium.

• Universe is the wide space that contains celestial bodies such as stars, galaxies, comets, meteors and human-made satellites.

• **Technology helps human to invent some tools to see distant objects in more details such as :**

- Binoculars. - Telescopes.

• Planetarium is a place where we can see images of stars, planets, constellations and other celestial bodies and it has projector that displays these images on its ceiling that looks likes a dome.

• **Planetarium directors are scientists who study the behavior and properties of celestial bodies in the space, where :**

- They use what they know about space to manage a planetarium building.
- They are responsible for making an amazing realistic show to bring the outer space to Earth.

In the Assessment Book :
Try to answer :
• Self-Assessment (24)
• Model Exam on Theme (4)

Exercises on Lesson 7

Understand Apply Analyze Evaluate Create

1 Choose the correct answer :

1. The building where we can see images of some celestial bodies is called .....
   a. solar system. b. planetarium.
   c. constellation. d. ecosystem.
2. Planetarium directors are .....
   a. scientists who study celestial bodies.
   b. scientists who study marine organisms.
   c. engineers who bulid space stations.
   d. engineers who make computer programs.
3. The ceiling of planetarium has ..... shape.
   a. rectangular b. triangular c. dome d. squar
4. Pictures that can be seen in the planetarium include .....
   a. plants and seas. b. oceans and trees.
   c. planets and stars. d. coral reefs and animals.

2 Put (✓) or (✗) :

1. When we visit planetarium, we will see images about living organisms. ( )
2. Planetarium directors are responsible for making computer programs. ( )
3. The ceiling of the planetarium has a dome shape. ( )
4. The scientists who work in planetarium study the behavior of stars and moons. ( )
5. Planetarium directors can manage planetarium building. ( )
6. The projector of planetarium displays images on its flat ceiling. ( )
7. In planetarium, visitors can see what universe were like in the past. ( )

3 Complete the following sentences :

1. A special building where we can see images of celestial bodies like stars, ... and ..... is called .....
2. Planetarium ..... are responsible for making amazing realistic show to bring the outer space to Earth.
3. In planetarium, we use ..... to display images on the dome ceiling.
4. Planetarium directors are ..... who study the ..... and behavior of celestial bodies in the space.

4 Write the scientific term :

- 1. A special building with dome ceiling and used to see images of celestial bodies. (.....)
- 2. Scientists that manage the planetarium buildings. (.....)

5 Give a reason for the following :

- Planetarium is an important building for space scientists.

.....

.....

6 Look at the opposite figure, then answer the following questions

(A) Put (✓) or (✗) :

1. This place contains pictures about the sky and solar system. ( )
2. We can visit this place in Egypt. ( )
3. There is a projector in this place. ( )

(B) Choose the correct answer :

1. The scientists who mange this building are called .....
   (computer programers – planetarium directors)
2. The scientists who work in this place are responsible for .....
   (making an amazing realistic show outer space – studing the bodies of livi organisms)

Model Exam on Concept (4.2)

Total mark
20

1 (A) Choose the correct answer : *(5 marks)*

1. The group of stars that make a certain shape in the sky is called .....
   a. solar system. b. universe. c. constellation. d. ecosystem.
2. Most of heat and light energy of the Sun are produced due to the reaction between .....
   a. hydrogen and rocks. b. helium and sand.
   c. hydrogen and helium. d. rocks and sand.
3. All the following sentences describe the solar system, except .....
   a. it contains the Sun and the eight planets.
   b. its planets revolve around the Sun in fixed orbits.
   c. its planets rotate on their axes at different speeds.
   d. it contains Earth, Jupiter and the Sun only.
4. Ancient Egyptians invented ..... which depends on the movement of ..... to know the time of the day.
   a. the balance – time. b. the sundial – time.
   c. the telescope – distance. d. the sundial – shadows.

(B) Give a reason for the following :

Earth and the moon are not considered stars.

.....

.....

2 (A) Write the scientific term : *(5 marks)*

1. The phenomenon that occurs due to the rotation of Earth on its axis. (.....)
2. The scientists who are responsible for making amazing realistic show in planetarium. (.....)
3. A dark celestial body that reflects sunlight. (.....)
4. The movement of an object around another object. (.....)

(B) Cross out the odd word :

1. Earth – Jupiter – the Sun – The moon. (.....)
2. Second crescent – First gibbous – Second quarter – Hubble Space Telescope. (.....)

3 (A) Put (✓) or (✗) : (5 marks)

1. Earth rotates on its axis in clockwise direction. ( )
2. Lengths of shadows of different objects don't change during the day. ( )
3. The Sun is the biggest star in the universe. ( )
4. At crescent phase, a part of the moon edge appears bright. ( )

(B) What happens to ...?

The length of the shadow of an object at noon.

.....

.....

4 (A) Complete the following sentences using the words below : (5 marks)

(Projector – Jupiter – Sundial – Orion)

1. The fastest planet on its axis is .....
2. Ancient Egyptians used ..... to know the time.
3. Planetarium has ..... to display pictures on its ceiling.
4. Constellation ..... is one of the most famous constellations in the sky.

(B) Look at the following figures then answer the following questions below :

Figure (A)

Figure (B)

Figure (C)

1. The shadow of the tree will be longer at .....
   a. figure (A) only.
   b. figure (C) only.
   c. figure (B) and figure (C).
   d. figure (A) and figure (B).
2. The time at which figure (C) illustrates is .....
   a. 12 p.m.
   b. 10 a.m.
   c. 2 a.m.
   d. 3 p.m.
3. At noon the Sun locates above us during its movement that can be represented by .....
   a. figure (A) only.
   b. figure (C) only.
   c. figure (B) and figure (C).
   d. figure (A) and figure (B).
4. The correct order of these figures that shows the rising of the Sun till it sets is .....
   a. A → B → C.
   b. C → B → A.
   c. B → C → A.
   d. A → C → B.