

Class			
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period			

Theme (1) Ecosystems and sustainability of life

Chapter(1):- *Chemical reactions and their effect on water quality*

Objectives:- At the end of the lesson the student should be able to :-

- *Identify the water cycle.
- *Deduce the chemical composition of water.
- *Acquire mental skills of scientific thinking.

Strategy of learning: -

Brain storming ————— Playing roles

Teaching aids :-

Distilled water - Toothpaste - Lemon juice - Litmus paper - Electronic PH meter

Learning activity

*Water is not just a transparent liquid, but rather a medium in which many chemical compounds may interact, affecting the quality of the water and the health of the organisms that depend on it.

* **Water has unique properties that support life.....?**

- As**
- 1-Water can dissolve many chemicals
 - 2-It can exist in all three states of matter: solid, liquid, and gaseous, within the temperature range known on Earth.

***Water is essential for life on Earth.....?**

All life forms have a **membrane** that separates the organism from its environment
It's importance water passes from the environment into the living cell through this membrane, carrying the materials needed to produce energy and also to remove waste to the outside.

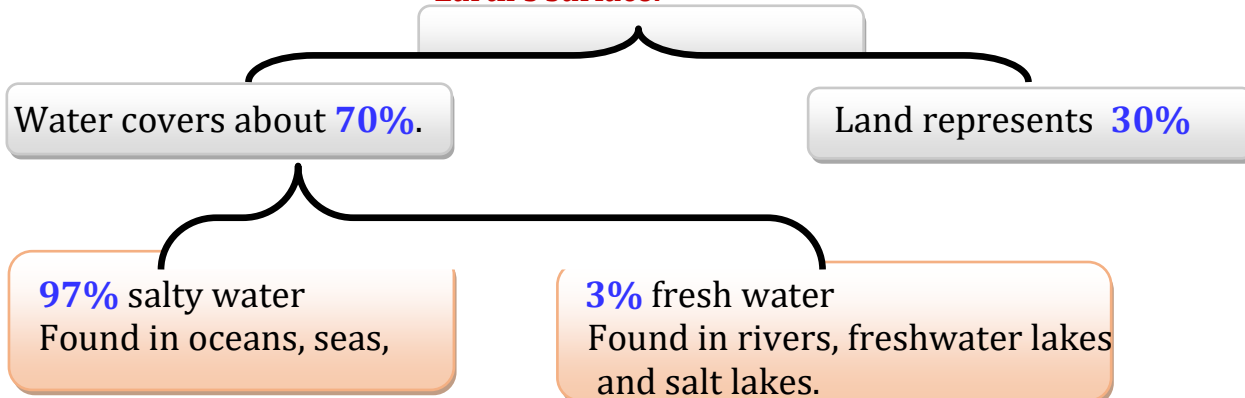
Different climates on Earth

Hydrosphere

***The hydrosphere** distinguishes Earth from other planets in the solar system.

***Hydrosphere** refers to the **liquid water** on the planet.

Earth's surface.



Water cycle in nature

Evaluation

Write the scientific explanation

* **Water has unique properties that support life.....?**

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Theme (1) Ecosystems and sustainability of life

Chapter(1):- Aquatic ecosystem

Objectives:- At the end of the lesson the student should be able to :-

- *The main properties of water.
- *Deduce the results of hydrolysis of water.
- *Acquire mental skills of scientific thinking.

Strategy of learning: -

Brain storming

Playing roles

Teaching aids :-

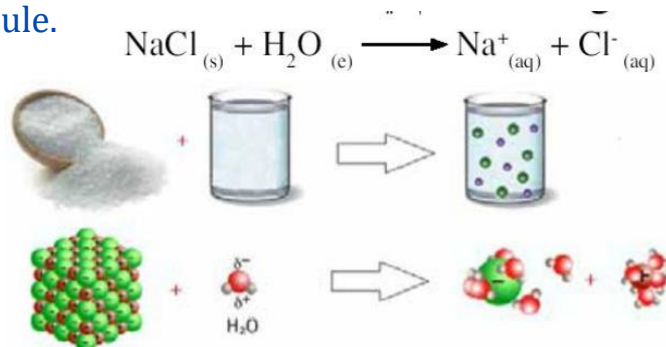
Distilled water - Toothpaste - Lemon juice - Litmus paper - Electronic PH meter

Learning activity

The main properties of water are:

1- Polarity of water:

The oxygen atom is characterized by its higher electronegativity than the hydrogen atom, so the bond electrons are attracted towards the oxygen atom, forming a partial negative charge on the oxygen atom and a partial positive charge on the hydrogen atom, which is known as the polarity of the water molecule.

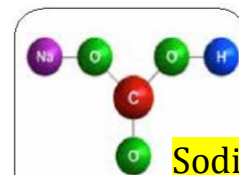


2- Hydrolysis (hydration)

A small percentage of water molecules are in the form of hydrogen ions (H) and hydroxide ions (OH), and as a result of chemical reactions with various compounds, some salts present in natural waters are hydrolyzed, which affects the balance of these ions, causing the acidity or basicity of the water.

Practical example

When table salt (NaCl) is added to water, it dissociates into sodium ions (Na) and chloride ions (Cl), and the salt ions remain in the solution without binding to the water ions



Sodium bicarbonate

3- Acid-base balance

Acid-base balance in water depends on, the relationship between the concentration of hydrogen ions (H) and hydroxide ions (OH).

This relationship can be identified through the value of what is called the pH of the solution.

Evaluation:- Explain scientifically the reason of rising of water boiling point

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Theme (1) Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Objectives:- At the end of the lesson the student should be able to :-

- *Identify acid and base solutions.
- *Compare between PH values of different sources .
- *Acquire mental skills of scientific thinking.

Strategy of learning: -

Brain storming

Playing roles

Teaching aids :-

Table salt powder - Electronic PH meter - 4 beakers - sea water

Learning activity

3- Acid-base balance

- *Acid-base balance in water depends on, the relationship between the concentration of hydrogen ions (H) and hydroxide ions (OH).
- *It is a graduated scale that takes values from 0 to 14.
- *If the concentration of H⁺ increases, the water becomes acidic and the pH value is less than 7, and if the concentration of OH⁻ increases, the water becomes basic and the pH value is greater than 7.
- *While if the concentration of the two ions is equal, the water is neutral and the pH value is equal to 7.
- *Pure water has a pH of about 7, which is considered neutral. However, this number can vary in natural environments, affecting the organisms that live in them.

pH value of water from different sources

1.Seawater

The pH value of seawater generally ranges between 7.5 and 8.4 depending on the area in which the sea is located and the surrounding environmental factors.

2.Fresh water rivers and lakes have a pH value that varies and usually naturally ranges between 6.5 and 8.5.

3.Distilled water: Has a pH value of about 7, because it is free of most of the impurities and ions that contribute to the acidity or basicity of other natural water sources.

4.Groundwater: The pH of groundwater varies from one area to another depending on several factors, the most important of which is the rock composition of the area. Groundwater is either neutral or basic, and its pH value varies due to exposure to calcium carbonate or magnesium carbonate rocks.

5.The pH of clouds is generally slightly acidic, with values ranging from 4.5 to 5, due to the presence of carbon dioxide and other acidic gases dissolved in the water droplets. These values can vary depending on different environmental factors, human activities in that area which can affect the pH level when clouds or rainwater are formed.

Evaluation

Suggest ways to improve the water quality in the River Nile?

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Theme (1) Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Objectives:- At the end of the lesson the student should be able to :-

- *Deepening Understanding of Scientific Phenomena:
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

-Collaborating learning - Brain storming _____ Playing roles

Teaching aids :-

Learning video - smart board – Ice cubes – Beakers

Learning activity

Lesson (2)

Physical properties of water and their role in the distribution of living organisms

*Water has unique properties that distinguish it from other liquids as:-

- 1-Its density decreases when it reaches the freezing point.
- 2-Rising of its specific heat which affects many natural phenomena and the distribution of living organisms in different environment.



Density

It is the mass of unit volume of matter at a certain temperature.

Factors affecting the density

- a. The mass of molecules. b. Distances between molecules. c. Temperature.

The density of a substance or the relative density is measured using **Hydrometer**

Hydrometer

Density of water and ocean currents

Factors affecting the density

*Density of water in oceans is affected by the pressure inside it.

As the **pressure increases** with depth, the water molecules are closer together so the **density increases**

*The amount of dissolved salts (salinity) in it.

As the **higher salinity** of water **the higher density** of water .

-The normal salinity of water in ocean is **35 gm/liter** of water (equivalent of two tea spoons per a cup of water.

Evaluation

Give scientific explanation

*Occurrence of ocean currents???

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Theme (1) Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Objectives:- At the end of the lesson the student should be able to :-

- *Deepening Understanding of Scientific Phenomena:
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

-Collaborating learning - Brain storming — Playing roles

Teaching aids :-

Learning video - smart board

Learning activity

Lesson (3) Oxygen and carbon dioxide in the aquatic environment and carbon dioxide in the aquatic environment

1-Naturally, rivers and seas contain sufficient levels of oxygen and carbon dioxide..... (G.R.)

To sustain aquatic life, including marine organisms as plants, animals, fish, and microorganisms such as bacteria and algae

2-Oxygen dissolves in small amounts in water.

-The main source of oxygen in water:-

Solubility of oxygen and Carbon dioxide gases in water

*The **concentration** of oxygen gas in the air is about 500 times higher than the concentration of carbon dioxide gas.

The effect of increasing the percentage of dissolved oxygen gas in water.

- 1-Enhancing respiration :-
- 2-Improve metabolism :-
- 3-Increasing the activity:-
- 4-Maintaining environmental balance:-

Sources of Carbon dioxide in the aquatic environment:-

- 1-Atmosphere
- 2-Marine organisms:-
- 3-Human activities

Evaluation

Deficiency of CO₂ leads to deficiency of energy produced by aquatic plants and affecting the overall productivity of the ecosystem.....????

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Theme (1) Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Objectives:- At the end of the lesson the student should be able to :-

- *Deepening Understanding of Scientific Phenomena:
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

-Collaborating learning - Brain storming _____ Playing roles

Teaching aids :-

Learning video - smart board - Some pictures

Learning activity

Lesson (3) Oxygen and carbon dioxide in the aquatic environment and carbon dioxide in the aquatic environment

The effect of increasing the percentage carbon dioxide in water on aquatic organisms

- *The negative effects of increasing percentage carbon dioxide in water on aquatic organisms

1-Acidification :-

When carbon dioxide levels increase in atmosphere , it dissolves in a greater concentration in water producing more **Carbonic acid** leads to **decreasing of PH value** of water that harms many aquatic species especially those with sensitive life stages as eggs and larval stages

2-Difficulty in breathing:-

3-Reduction of calcification :-

Increasing of CO₂ level in water leads to conversion of calcium carbonate in water into soluble calcium bicarbonate **SOOOO** the aquatic organisms as corals ,mollusks and some species of plankton can't use calcium carbonate (Scarcely dissolves in water) to build their shells and solid skeletons or keeping them



The effect of deficiency the percentage carbon dioxide in water on aquatic organisms

1-Decreasing of photosynthesis process

2-Impact on food chains :-

3-PH imbalance :-

Evaluation

Write the scientific explanation

Increasing of CO₂ level in water affect negatively on corals and mollusks?

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Theme (1) Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Lesson(4) Biological adaptations of living organisms in the aquatic environment

Objectives:- At the end of the lesson the student should be able to :-

- *Deepening Understanding of Scientific Phenomena:
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

-Collaborating learning - Brain storming _____ Playing roles

Teaching aids :-

Learning video - smart board – 2 beakers – glass funnel

Learning activity

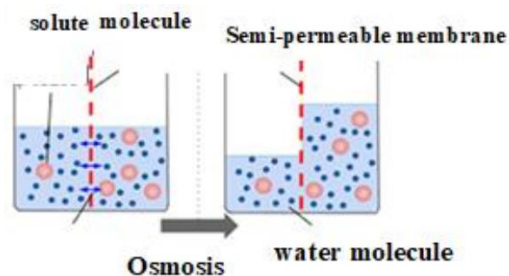
Physiological (functional) adaptation:

Osmosis and osmotic pressure:

Osmotic pressure is the pressure created in a solution due to the difference in solute concentration in the solution

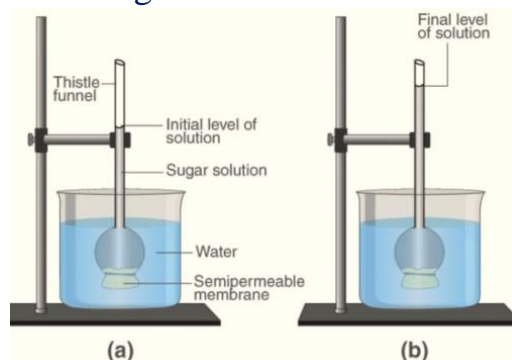
Practical activity:

Physiological adaptations of freshwater organisms to low osmotic pressure



Behavioral adaptations:

Behavioral adaptations include certain actions or behaviors that organisms use to avoid extreme conditions or to better utilize available resources. For example, some fish migrate between fresh and salt water to reproduce and survive.



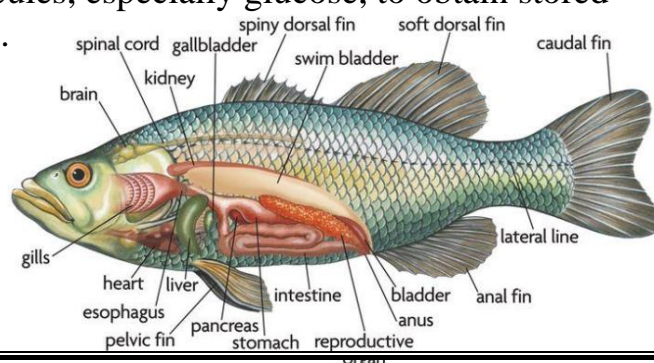
Structural adaptations

Gas exchange and cellular respiration:

Gas exchange is when an organism obtains oxygen from atmospheric air or the surrounding environment and removes carbon dioxide. Cellular respiration is a vital process in which the organism breaks down the bonds in food molecules, especially glucose, to obtain stored energy.

Evaluation

Some physiological adaptations require the occurrence of certain structural adaptations. Give one example.



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Theme (1) Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Lesson(5)

The effect of temperature on the marine environment

Objectives:- At the end of the lesson the student should be able to :-

- *Deepening Understanding of Scientific Phenomena:
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

-Collaborating learning - Brain storming _____ Playing roles

Teaching aids :-

Learning video - smart board – 2 beakers – 2 Themometers

Learning activity

Heat and temperature

In everyday conversation, some people confuse the concepts of “amount of heat” and “temperature.” Although they are related

Specific heat of matter (c)

The amount of heat gained by 1 kg of a substance that causes its temperature to rise by 1 K is called the specific heat of this substance, and its measuring unit is J/kg. K

The amount of heat gained or lost by an object (Q_{th}) can be calculated from the relationship: $Q_{th} = m c \Delta t$ Where m : the body mass , Δt : the amount of change in body temperature

Calculate the amount of heat required to raise the temperature of 0.3 kg of copper from 20 degrees Celsius to 70 degrees Celsius given that the specific heat of copper = 385 J/kg. K.

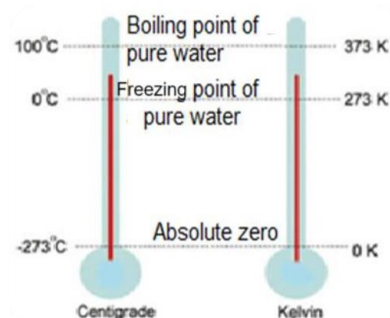
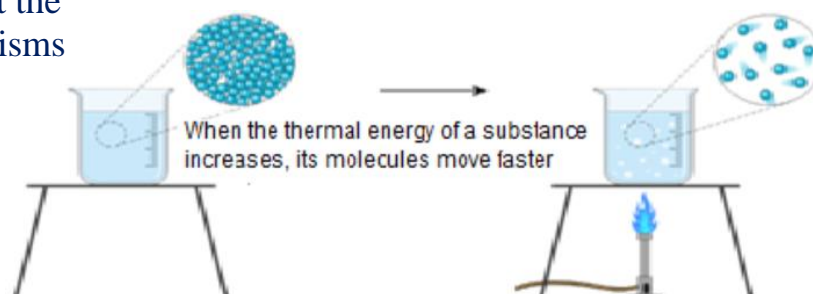
$$Q_{th} = m c \Delta t = 0.3 \times 385 \times (70-20) = 5775 \text{ J}$$

The importance of the high specific heat of water:

The effect of temperature changes on marine organisms:

Temperature changes in the oceans affect the distribution of marine organisms. Organisms that live in warm surface waters may be unable to survive in colder depths.

For example, coral reefs need specific temperatures to survive, and a change in temperature due to climate change may lead to their death.



Evaluation

1. Given the different specific heats of land and seawater, explain the phenomenon of the sea breeze

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Theme (1) Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Lesson(6)

The effect of light and solar radiation on aquatic

Objectives:- At the end of the lesson the student should be able to :-

- *Deepening Understanding of Scientific Phenomena:
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

-Collaborating learning - Brain storming _____ Playing roles

Teaching aids :-

Learning video - smart board

Learning activity

Solar radiation refers to the energy produced by the sun, some of which reaches the Earth. It serves as the primary source of energy for most processes in the atmosphere, hydrosphere, and biosphere.

Solar radiation reaching Earth can be classified into two categories:

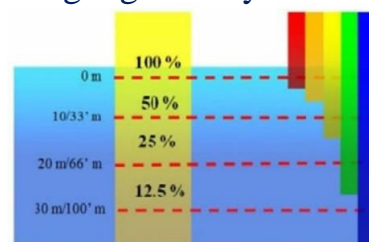
- Direct solar radiation: This is the radiation that reaches the Earth's surface without scattering.
- Indirect solar radiation: This is the light which scattered while passing through the atmosphere.

Solar radiation and its effect on water: Solar radiation is the primary source of energy on Earth, and it directly affects the various layers of water.

light zones in water: As water depth increases, the intensity of light gradually decreases.

Photosynthesis in the aquatic environments:

Many autotrophic organisms, such as aquatic plants, algae, and phytoplankton, rely on photosynthesis to convert solar energy into chemical energy



Solar radiation and ecological Balance:

The Effect of Solar Radiation on Ecological Balance in Aquatic Environments:

The role of solar radiation in the distribution of marine organisms:

The effect of solar radiation on water temperatures:

Changes in solar radiation intensity:

The effect of solar radiation on ocean currents:

Evaluation

Why is photosynthesis important for maintaining ecological balance in the oceans?

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Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Lesson(7)

The effect of water pressure on living organisms

Objectives:- At the end of the lesson the student should be able to :-

- *Deepening Understanding of Scientific Phenomena:
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

-Collaborating learning - Brain storming — Playing roles

Teaching aids :-

Learning video - smart board

Learning activity

Pressure at a point inside a liquid

A liquid has a pressure at any point inside it equal to the weight of the liquid column above that point acting on the unit area of that point. If an object is at that point

$$F = P \times A.$$

Where P is the pressure at a point in N/m^2 , and A is the surface area in m^2 exposed to the pressure.

The pressure of a liquid (P_{liquid}) at a point inside this liquid, located at a depth (h) from its surface is calculated from the relation

$$P_{liquid} = \rho g h$$

The Factors affecting the magnitude of the liquid pressure at a point inside it:

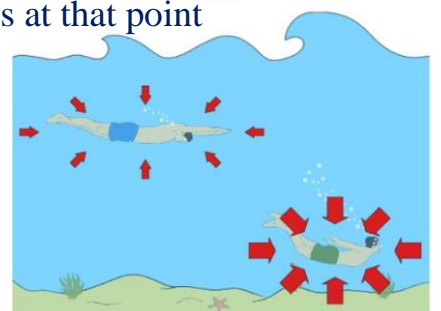
$$1 \text{ Bar} = 10^5 \text{ Pascal} = 10^5 \text{ N/m}^2$$

Properties of liquid pressure

Example An aquarium base of an area of 1000 cm^2 contains water of the weight 4000 N , what is the magnitude of water pressure acting on the bottom of the aquarium?

$$=4000$$

$$1000 \times 10^{-4} = 4 \times 10^4 \text{ N/m}^2$$



Water pressure

The effects of pressure on the biological adaptations of creatures

Second: Bony and cartilaginous skeletons:

Third: Cellular membranes

Evaluation

Why does living in the deep sea require specific physiological adaptations?

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Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Lesson(8)

The role of solutions and concentrations in the movement of water and the distribution of living organisms

Objectives:- At the end of the lesson the student should be able to :-

- *Deepening Understanding of Scientific Phenomena:
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

-Collaborating learning - Brain storming _____ Playing roles

Teaching aids :-

Learning video - smart board

Learning activity

1 -Aqueous solutions

2 - The effect of concentration on the density of water:

3 - The colligative properties of water

First: the vapor pressure of the liquid:

Second: Boiling point

A liquid boils when its vapor pressure reaches the value of atmospheric air pressure at the surface of the liquid

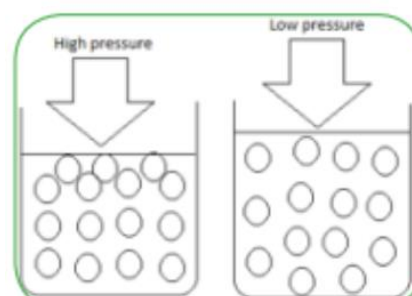
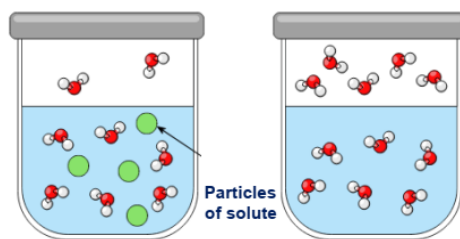
Third: Freezing point

The freezing point of the solution is always lower than the freezing point of pure water because the attraction forces between water molecules and solute molecules hinder the freezing process and

Life application:

Salt is sprinkled on roads in cold areas after rainfall so that the rainwater turns into a salt solution, and its freezing point is lower than the freezing point of water.

Thus, the amount of ice formed on the road's decreases, which reduces the chances of accidents on the road



Investigative activity

Measure the boiling point of several solutions of different salts which have the same concentration, such as: Sodium chloride solution, sodium bicarbonate solution.

Evaluation

Give reason for:- The freezing point of the solution is always lower than the freezing point of pure water

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Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Lesson(8)

The role of solutions and concentrations in the movement of water and the distribution of living organisms

Objectives:- At the end of the lesson the student should be able to :-

- *Deepening Understanding of Scientific Phenomena:
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- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

Learning video - smart board

Learning activity

The distribution of organisms in aquatic environments is influenced by the following factors:

1 - Water type (Fresh versus salt water) Living organisms are distributed based on the type of water. For example, freshwater fish cannot survive in saltwater, and vice versa. **2 - Osmotic adaptations** Living organisms need special adaptations according to the concentration of salts in their environment and the osmotic pressure of water.

Marine organisms are adapted to high levels of salt, while freshwater organisms are adapted to avoid absorbing excess water.

3 - Concentration of nutrients and pollutants

The concentration of nutrients and pollutants affects the diversity of organisms. Resource-rich environments support greater diversity, while polluted environments may lead to lower diversity.

4 - Seasonal changes Different seasons of the year affect the abundance of water, which affects the distribution of organisms. For example, certain types of organisms may move to new areas during dry or flood season.

5 - Water currents Currents in water bodies affect the distribution of oxygen and nutrients, affecting the gathering and feeding areas of organisms.

Evaluation

1. How do concentrations of solutes affect the density of water?
2. What is the relationship between the concentration of dissolved substances and the movement of water currents?
3. How do chemical solutions in water affect the distribution of marine organisms?

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Ecosystems and sustainability of life

Chapter (1):- Aquatic ecosystem

Lesson(9)

Environmental balance and role of human in preserving the sustaining

Objectives:- At the end of the lesson the student should be able to :-

- *Deepening Understanding of Scientific Phenomena:
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

Learning video - smart board

Learning activity

Importance of ecological balance in aquatic systems:

Ecological balance is a state of dynamic stability that occurs when organisms in an ecosystem interact in a way that maintains the continuity of life. This balance involves maintaining **the balance of nutrients, the diversity of organisms, and the flow of energy through food webs**

1- Nutrient balance:

2. Balance between organisms:

3. Energy flow through the food web:

Example of the ecological balance in aquatic systems:

Coral reefs and marine ecosystems: Coral reefs provide a habitat for many marine organisms. Predatory fish help maintain the balance of coral reefs by controlling the numbers of small organisms such as sea urchins, which can destroy reefs if their numbers increase unnaturally.

The effect of human activities on the aquatic life:

Pollution:

Overfishing:

Environmental destruction:

The role of humans in maintaining the ecological balance:

These are some of the roles that humans can play to maintain the ecological balance: 1.

Preserving natural resources:

2. Environmental awareness and education:

4. Participation in environmental policies:

5. Switching to eco-friendly practices:

Evaluation Write the scientific term

a state of dynamic stability that occurs when organisms in an ecosystem interact in a way that maintains the continuity of life.

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Ecosystems and sustainability of life

Chapter (2):- Atmosphere

Lesson(1)

Atmosphere, its layers and components

Objectives

At the end of the lesson the student should be able to :-

- *Explain the composition of the atmosphere and its main components and their effect on the earth's surface.
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

Learning video - smart board

Learning activity

The atmosphere is composed of a mixture of several gases, the most important of which are: -
Nitrogen (N₂): represents about 78% of the volume of the atmosphere, and it is a largely inert gas that does not easily react with other gases and elements, and needs special conditions such as lightning or very high temperatures to react, so its oxides are very small in the air.

Oxygen (O₂): represents about 21% of the volume of the atmosphere and is an essential gas in the respiration process of all living things.

Argon (Ar): an inert gas that makes up about 0.93% of the volume of the atmosphere.

Carbon dioxide (CO₂): Makes up about 0.04% of the volume of the atmosphere and is essential for plant photosynthesis.

Water vapor (H₂O): Its percentage varies from one place to another in the near layer of the atmosphere,

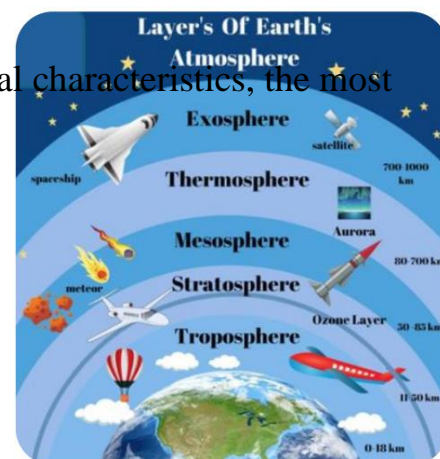
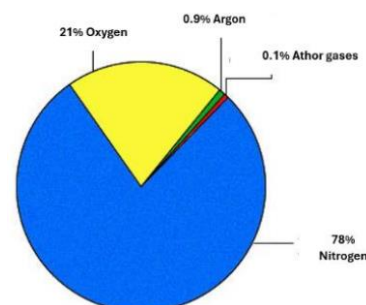
Ozone gas (O₃): The ozone layer is found at an altitude of approximately 10 km - 55 km

Layers of the atmosphere:

The atmosphere is divided into several layers, each of have special characteristics, the most important of which are:

① Troposphere:

The layer closest to The Earth's surface, with a thickness of about 18 km at the equator and 8 km at the two poles. It is thicker at the equator due to the presence of hot convection currents



Evaluation

What is the percentage of oxygen in the atmosphere?

Why is this percentage important?

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Ecosystems and sustainability of life

Chapter (2):- Atmosphere

Lesson(1)

Atmosphere, its layers and components

Objectives

At the end of the lesson the student should be able to :-

- *Explain the composition of the atmosphere and its main components and their effect on the earth's surface.
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

Learning video - smart board

Learning activity

② Stratosphere:

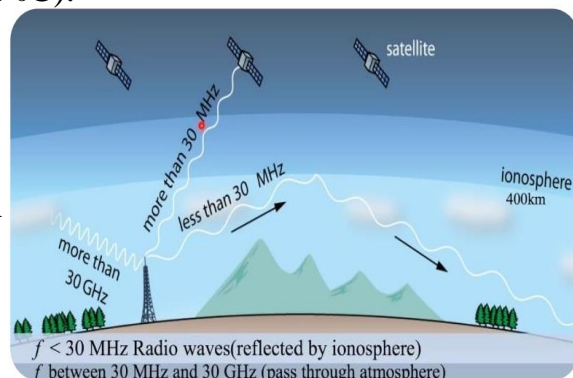
The layer above the troposphere, its height up to 50 km above sea level, contains the ozone layer. The temperature does not change through the stratosphere layer until an altitude of 20 km, then the temperature starts to rise as we go higher due to the presence of ozone gas in the upper part of the stratosphere. Air movement is horizontal, so this layer is preferred for airplane flights.

③ Mesosphere: A layer about 30 km thick is the lowest layer of the atmosphere with the lowest temperature (-90 °C).

Most meteors falling from space burn up as they pass through this layer, which protects the Earth from them.

④ Ionosphere

Extending approximately to 640 km above sea level, it is an electrically charged layer as a result of ionization of atmospheric atoms due to solar radiation, so it is used in long-distance radio communications due to its ability to reflect radio waves



Evaluation

Choose the correct answer

(1) Which layer of the atmosphere contains the most Ozone?

- Ⓐ Troposphere Ⓑ Stratosphere Ⓒ Mesosphere Ⓓ Ionosphere

(2) Which layer of the atmosphere do most atmospheric phenomena such as rain and wind occur?

- Ⓐ Mesosphere Ⓑ Ionosphere Ⓒ Troposphere Ⓓ Stratosphere

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Ecosystems and sustainability of life

Chapter (2):- Atmosphere

Lesson(2)

Objectives

2.2 Physical Factors in the Atmosphere

At the end of the lesson the student should be able to :-

- *Explain the composition of the atmosphere and its main components and their effect on the earth's surface.
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming

Playing roles

Teaching aids :-

Learning video - smart board

Learning activity

The physical factors and their effect on the atmosphere:

◆ First: Heat

◆ Measuring air temperature

Mechanisms of heat transfer .

Heat is generally transferred in three ways :

1- **Conduction:** heat is transferred in a solid object or between two objects in contact,

2- **Convection:** Heat is transferred through fluids by convection currents,

3- **Radiation** is the transfer of heat in the form of electromagnetic radiation. Thermal radiation propagates in all directions without the need for material medium.

Second - Atmospheric Pressure: Atmospheric pressure affects weather and climate.

Third - Humidity

Humidity is the amount of water vapor in the air

The effect of humidity on living organisms:

Fourth: Wind Speed:

The movement of air from areas of high atmospheric pressure to areas of low atmospheric pressure.

The effect of climate factors on living organisms

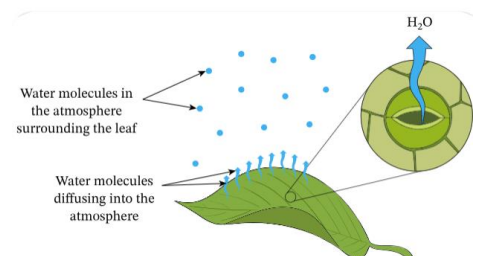
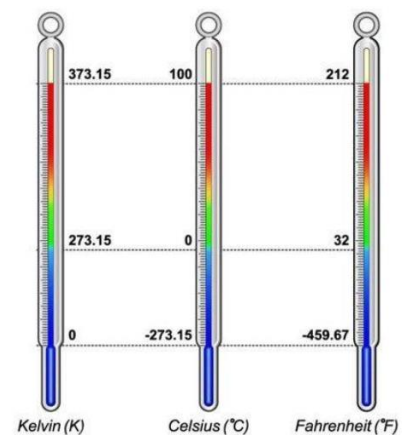
1. Adaptation to Freezing:

The Wood Frog - Antarctic Icefish:

2. Adaptation to High Temperatures: Desert Lizards

Evaluation

What is the relation between atmospheric pressure and temperature in the atmosphere?



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Ecosystems and sustainability of life

Chapter (2):- Atmosphere

Lesson(3) Chemical Reactions in the Atmosphere

Objectives At the end of the lesson the student should be able to :-

- *Explain the composition of the atmosphere and its main components and their effect on the earth's surface.
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

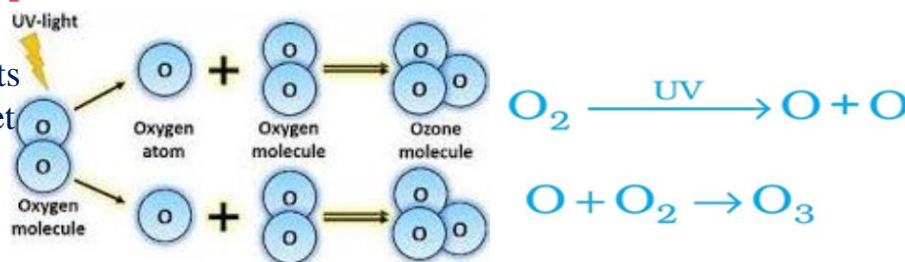
Learning video - smart board

Learning activity

Chemical reactions in the atmosphere:

1. The importance of ozone:

Ozone acts as a shield that protects the Earth from harmful ultraviolet radiation. Without this layer, life on Earth would be severely damaged by these rays.



The negative impact of ozone in the troposphere:

- **Air pollution:**
- **Health issues:**
- **Environmental effects:**
- **Greenhouse gas effect:** Ozone is one of the greenhouse gases in the troposphere that contribute to the greenhouse effect.

2. Air Pollution

Air pollution can originate from **natural sources**, such as volcanoes and wildfires, or from **human activities**, such as factory smoke and vehicle emissions.

Air Pollution and Climate Change Some air pollutants, like carbon dioxide (CO₂) and other greenhouse gases, contribute to global warming, leading to significant climate changes such as polar ice melting and rising sea levels.

Air Pollution and Human Health

1. **Respiratory Diseases:**
2. **Child Development:**
3. **Cancer Risk:**

Air Pollution and Ecosystems

Evaluation

Give reason Ozone is essential for life on earth

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Ecosystems and sustainability of life

Chapter (2):- Atmosphere

Lesson(4) Atmospheric changes and their impacts

Objectives At the end of the lesson the student should be able to :-

- *Explain the composition of the atmosphere and its main components and their effect on the earth's surface.
- *Developing Critical Thinking and Analytical Skills:
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

Learning video - smart board

Learning activity

Changes in the atmosphere and their effects on everyday life:

◆ Global warming

Global warming is defined as the continuous rise in the temperature of the air surrounding the Earth's surface.

Greenhouse gases that cause global warming include carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, and water vapor

Negative effects of global warming:

Melting ice: A large amount of fresh water is frozen in frozen rivers and icebergs at the poles, and with the increase in the earth's temperature, ice blocks separate from them repeatedly, which threatens the risk of flooding the coasts,

Solutions to air pollution and climate change:

First: expand the use of renewable energy:

Second: Planting:

How does the Earth hold on to atmospheric gases?

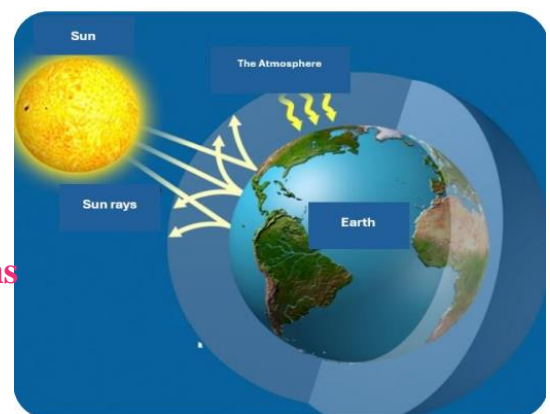
Escape velocity

The effect of atmospheric change on living organisms

1- Change in temperatures

2- **Changes in humidity:** Some plants, such as tropical plants, need high humidity to grow, while desert plants grow better in low humidity.

3- **Air pollution** Air pollution negatively affects the general health of humans and causes many diseases of the respiratory system



Evaluation

How do changes in the atmosphere affect everyday life?

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Ecosystems and sustainability of life

Chapter (3):- Soil

Lesson (1) Soil composition and its importance in the ecosystem

Objectives At the end of the lesson the student should be able to :-

- *Describe the composition of soil and its main elements such as minerals, organic matter, water, and air
- *Devise ways to develop soil conservation plans
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

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Learning activity

Soil:

Soil is not just the clay under our feet; it is a complex system made up of several key components. Soil is the upper, loose surface layer that covers the earth's crust and is formed by the weathering and crumbling of all types of igneous, sedimentary, and metamorphic rocks of the earth's crust by the effect of different surface physical factors, and their interaction with various environmental factors.

Soil formation:

Soils are formed continuously, but very slowly, through weathering processes that lead to the fragmentation and decomposition of rocks.

Physical weathering:

Chemical weathering:

Biological weathering:

Minerals:

Organic matter

A variety of plants and animals remains such as insects, earthworms, microorganisms such as fungi, bacteria, and other living and dead organisms that mix with the soil and are known as humus

Water

Gases

Soil profile:

The soil surface or horizon (A):

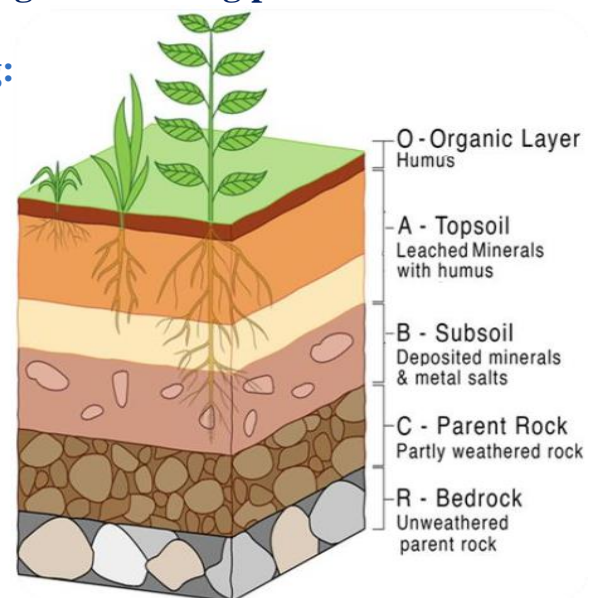
The subsoil surface or horizon (B):

The parent rock or horizon (C):

Evaluation

Oils that are characterized by their ability to hold water, but are poorly aerated are:

- Ⓐ clay soils Ⓑ calcareous soils Ⓒ sandy soils Ⓓ loamy soils



Soil profile showing the different layers or horizons.

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Ecosystems and sustainability of life

Chapter (3):- Soil

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Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

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Learning activity

Soil types and their physical properties :

1. Clay soil :

Clay soils are fine sediments, and the spaces between the sediments are very small, which makes them dense and poorly ventilated,

. Sandy soil :

Sandy soils consist of relatively large and coarse sandy deposits.

3. Alluvial soils (silt soils):

-Alluvial soils are a mixture of clay, sand, and silt of fine size, but slightly larger than clay soil grains,

The role of soil in the ecosystem:

• Supporting plant growth

• Regulating the water cycle:

-Soil absorbs and stores rainwater, helping to provide water to plants during dry periods.

• Nutrient cycling

-Soil contains microorganisms such as bacteria and fungi that break down dead organic matter, turning it into nutrients that plants can use.

• Supporting biodiversity and ecological balance

• Climate regulation

• Maintaining the structure of the Earth and preventing erosion

Evaluation

Which type of soil contains uniformly sized sediments, making it a poor water holding soil?

Ⓐ clay soils

Ⓑ sandy soils

Ⓒ Humic soils

Ⓓ Alluvial soils

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Ecosystems and sustainability of life

Chapter (3):- Soil

Lesson (2) The effect of human practices on soil

Objectives At the end of the lesson the student should be able to :-

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Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

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Learning activity

Effect of agricultural activities on soil quality :

Agricultural activities are one of the main reasons that affect soil quality, which can lead to:

1. Soil compaction:

2 -Salination :

It means the increase of salt level in the soil. The soil is salted due to the accumulation of excess salts, usually visible to the naked eye on the surface of the soil.

3- Lack of nutrients in the soil :

The effect of industrial activities on soil quality

Industrial activities contaminate the soil with chemicals and heavy metals, causing serious environmental Problems.

1 - Soil contamination with heavy metals:

2 - Soil contamination with toxic chemicals: Toxic chemicals seep into the soil from industrial areas, such as those around oil refineries and petrochemical factories that lead to soil pollution,

3 - Soil contamination with nitrate compounds: In agricultural areas that rely heavily on manufactured nitrogen fertilizers to increase crop yields,

Methods of soil conservation

In order to preserve the quality of the soil and protect it from degradation, you can adopt.

- Sustainable agricultural practices such as organic farming,
- Using crop rotation techniques.

Evaluation

The use of petrochemical compounds to kill insects leads to:

- (A) Blue Baby Syndrome
- (B) liver cancer
- (C) accumulation of salts in the soil
- (D) increase of heavy metals in the soil

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Ecosystems and sustainability of life

Chapter (3):- Soil

Lesson (3) The effect of Acid Rain on Soil

Objectives At the end of the lesson the student should be able to :-

- *Describe the composition of soil and its main elements such as minerals, organic matter, water, and air
- *Devise ways to develop soil conservation plans
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

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Learning activity

First: Acid Rain and Its effect on Soil

Acid rain is an environmental phenomenon that occurs when air pollutants such as sulfur oxides (SO_x) and nitrogen oxides (NO_x) react with water vapor in the atmosphere to form acids (sulfuric acid and nitric acid)

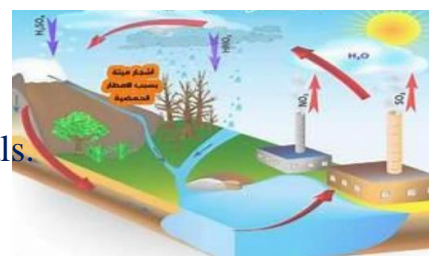
Effects of Acid Rain on Soil:

1. Soil Degradation:

- **Erosion of Essential Minerals:** Acid rain can erode essential minerals in the soil, such as calcium and magnesium, reducing soil fertility.
- **Release of Toxic Metals:** Acid rain stimulates the deposition of toxic metals like aluminum in the soil

Effects on Plants:

- **Toxic Effects:** Acid rain can negatively impact plant health by eroding and poisoning roots with toxic metals.
- **Reducing Growth:** Lower nutrient levels in the soil can reduce plant growth and weaken overall plant health.
- **Decreasing Crop Yield:** Deterioration of soil quality due to acid rain can affect crops, result in lower agricultural productivity.
- **Crop Damage:** Acid rain can directly damage crops by reducing their ability to absorb essential nutrients.



Acid rain formation

Reducing the Effects of Acid Rain on Plants and Soil:

Evaluation

What is the primary cause of acid rain?

- (A) Evaporation of water from oceans
- (B) Reaction of sulfur dioxide with water vapor
- (C) Air pollution by plastic pollutants
- (D) Accumulation of dust in the atmosphere

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Ecosystems and sustainability of life

Chapter (4):-The role of science in environmental sustainability

Lesson(1) The concept of sustainability and the role of the environment

Objectives At the end of the lesson the student should be able to :-

- *Explain the concept of sustainability and the importance of preserving the environment for future generations.
- *Analyze how human activities affect the sustainability of natural resources.
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

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Learning activity

◆ **The concept of sustainability**

Sustainability: It means using natural resources in a way that enables current generations to meet their needs without affecting the ability of future generations to meet their needs.

First: The importance of sustainability and preserving the environment for future generations:

- | | |
|----------------------------------|----------------------------------|
| 1. Protecting natural resources: | 2. Protecting biodiversity: |
| 3. Fighting climate change: | 4. Improving the quality of life |
| 5. Promoting social justice: | 6. effect on future generations: |

Example

Using solar energy as an alternative to fossil fuels

Second: The effect of human activities on the sustainability of natural resources

a) Depletion of natural resources

Minerals and energy:

Water:

The effect of natural resource depletion on organisms and ecosystems

- | | |
|----------------------------------|---|
| 1. The impact of water depletion | 3. Impact of soil depletion |
| 2. Impact of deforestation | 4. Impact of mineral resource depletion |
| 5. Impact of ocean depletion | |

Evaluation What is the concept of sustainable development?

- Ⓐ Meeting the needs of current generations without considering the needs of future generations
- Ⓑ Excessive use of resources without regarding the environmental impacts
- Ⓒ Meeting the needs of current generations without compromising the ability of future generations to meet their needs
- Ⓓ Achieving rapid economic growth without regard to environmental consequences

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Ecosystems and sustainability of life

Chapter (4):-The role of science in environmental sustainability

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Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

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Learning activity

b) Environmental pollution

Air: Emissions from factories, transportation, and industrial activities release toxic gases and fine particulate matter into the air, leading to air pollution and climate change.

Water: The discharge of industrial waste and untreated sewage into water bodies causes water pollution, affecting aquatic life and human health.

Soil: The intensive use of soil in agriculture without considering the rest cycle of the soil affects its fertility and causes erosion. The use of fertilizers and pesticides can also lead to soil contamination,

c) Destruction of natural habitats

Deforestation: removing and deforestation for agricultural or industrial purposes destroys natural habitats, leading to loss of biodiversity and increasing carbon dioxide emissions.

Urbanization: Construction and land development affects natural habitats and leads to soil erosion and habitat destruction.

d) Climate change

e) Loss of biodiversity

Overfishing:

Habitat destruction:

Third: Environmental protection strategies:

- Renewable energy:
- Waste minimization:
- Protecting natural habitats:
- Recycling:

Evaluation Which of the following is considered a sustainable practice in agriculture

- (A) Using fertilizers and pesticides in large quantities
- (B) Growing the same crop in the same soil every season
- (C) Using organic farming techniques and crop rotation
- (D) Deforestation to expand agricultural land

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Ecosystems and sustainability of life

Chapter (4):-The role of science in environmental sustainability

Lesson(2) The Effect of Pollutants on the Environment and Human Health

Objectives At the end of the lesson the student should be able to :-

- *Explain the concept of sustainability and the importance of preserving the environment for future generations.
- *Analyze how human activities affect the sustainability of natural resources.
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

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Learning activity

First: The effect of chemical pollutants on the environment and the health of living organisms

Chemical pollutants: Toxic substances that can enter the environment and cause damage. They include:

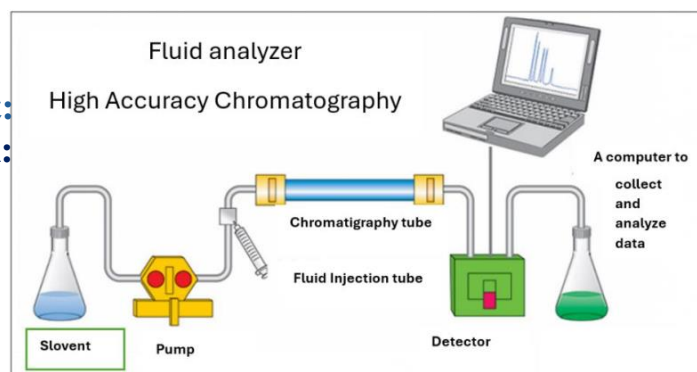
- Pesticides:
- Volatile organic compounds:
- Heavy metals:

The effect of pollutants on the environment:

- Water pollution:
- Air pollution:
- Soil pollution:

Effects of pollutants on human health:

- Respiratory diseases:
- Nervous system disorders:
- Chronic diseases such as cancer:



Second: How to measure pollution levels and identify pollution sources

Analytical techniques: 1. Chromatography 2. Spectroscopy:

Third: Chemical solutions to treat pollutants in the environment

1. Chemical treatment of water

Using activated carbon: Use of ozone:

2. Biological treatment The use of microorganisms:

3. Recycling and waste management:

Chemical waste recycling:

Evaluation What is the main effect of lead exposure on human health?

- (A) Increased physical ability
- (B) Development of nervous system issues
- (C) Improved bone health
- (D) Reduced cancer incidence

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Ecosystems and sustainability of life

Chapter (4):-The role of science in environmental sustainability

Lesson(3) Biodiversity and species protection

Objectives At the end of the lesson the student should be able to :-

- *Explain the concept of sustainability and the importance of preserving the environment for future generations.
- *Analyze how human activities affect the sustainability of natural resources.
- *Promoting Experiential Learning

Strategy of learning: -

Collaborating learning - Brain storming — Playing roles

Teaching aids :-

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Learning activity

Biodiversity is the foundation upon which the balance of ecosystems is based and supports life on Earth.

First: The importance of biodiversity in maintaining the balance of ecosystems

Chemical pollutants: toxic substances that can enter the environment and cause damage.

These include:

Pesticides: Chemicals used to control insects and the diseases they cause, such as Dieldrin and chlordane

Heavy metals: such as lead, mercury, and cadmium, that accumulate in the environment and in the cells of living organisms

Volatile organic compounds: such as benzene, formaldehyde, and chloroform, which can evaporate into the air and pollute it

1. Stability of ecosystems:

2. Supporting food chains:

3. Disease resistance:

4. Pollination and seed dispersal:

5. Climate regulation:



Strategies for the Protection of Endangered Species:

1. Establishing nature reserves:

2. Captive breeding programs:

3. Laws and legislation.

4. Awareness and education:

5. Habitat rehabilitation (Restoring natural habitats):

Successful examples of conservation strategies

1. Bald Eagle:

2. Southern White Rhinoceros:

Evaluation What is meant by genetic diversity?

(A) Differences in colors between plants within a species

(B) Genetic differences between individuals

(C) The number of species in a given area

(D) Differences in species between different environments

