Unit 2- Module 1- Lesson 1: Exploring Life

Textbook Pages 8-25

SUBTOPICS

- What are living things?
- How many cells do living things have?
- Characteristics of Life
- Types of cells

Key Words (practice on Quizlet)

Cells
Cell theory
Light microscope
Electron microscope
Unicellular organisms
Reproduction
Homeostasis
Prokaryotic cells
Eukaryotic cells
Organelles

Student Expectations

- ★ Gather evidence that living things are made up of cells
- ★ Describe how organisms use the characteristics of life.
- ★ Investigate different types of cells
- ★ Understand the scale/sizes of cells
- ★ Explore engineered solutions for observing cells
- ★ Explain the relationship between cells, tissues, organs, and organ systems in an organism

What are Living Things?

Living things are Organisms that work in a coordinated way to obtain energy, grow, move, respond, reproduce, and maintain internal balance (Homeostasis).

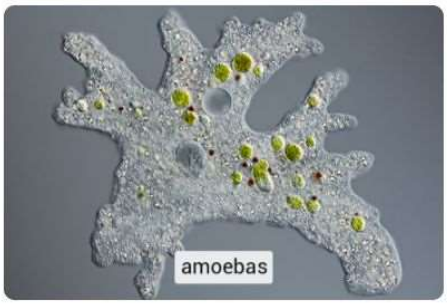
ALL LIVING THINGS HAVE THIS 6 CHARACTERISTICS

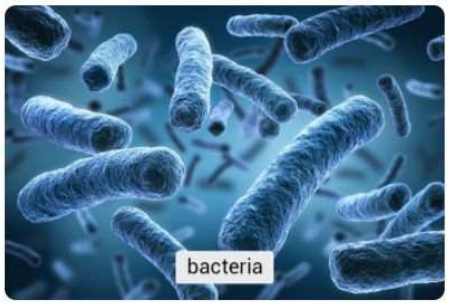
- Living things are made of cells.
- Living things are organized.
- Living things grow and develop.
- Living things respond to their environment.
- Living things reproduce.
- Living things use energy.

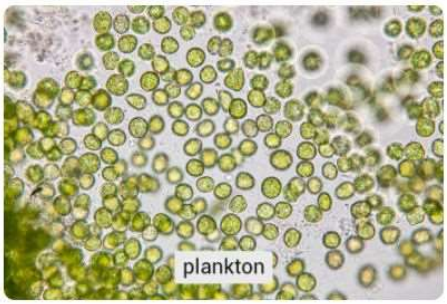
ORGANIZATION:

Organisms are made up of cells. Organisms can be UNICELLULAR (one cell) or MULTICELLULAR (many cells).

Unicellular organisms are made up of only one cell. Examples of unicellular organisms include:







Multicellular organisms are made up of two or more cells. Examples of multicellular organisms include:

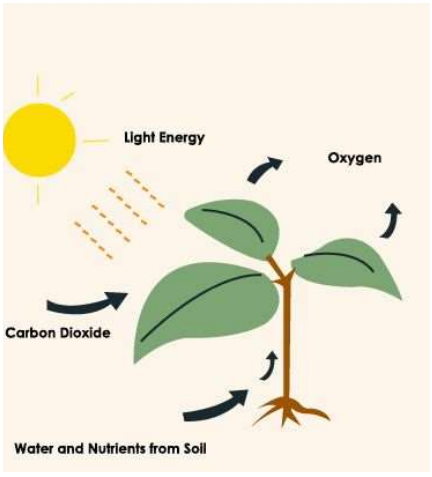
Living things grow, develop, and reproduce: Living things grow, or increase in size and produce more of their kind.

For a unicellular organism, the size of its cell increases.

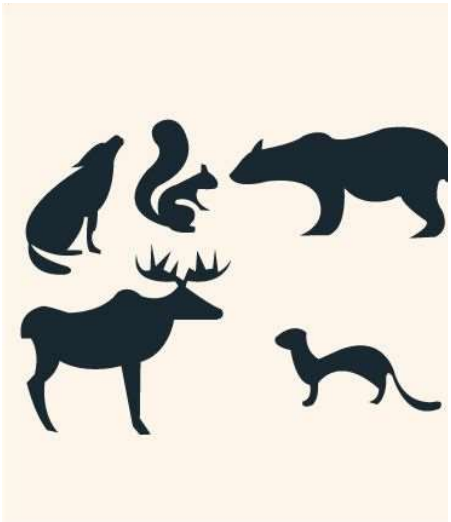
For a multicellular organism, the number of its cells increases.

Living things use energy.
All living things need energy to survive.

Producers are organisms that make their own Food from Sunlight



Consumers are organisms that obtain energy from other organisms.



Responding to Stimuli

Organisms react to changes in the environment.

On a hot sunny day, you sweat to keep cool, you are thirsty and search for a drink. Your body is responding to stimuli.

Animals would respond quickly if they felt a very hot object near them.

Plants need sunlight to produce their own food. Most plants grow in the direction of sunlight.

Living things have Homeostasis.

All living things need to keep internal conditions just right.

HOMEOSTASIS is how organisms maintain a relatively stable internal environment even when the outside environment changes

What are Cells?

A CELL is the smallest unit of life.
ALL LIVING THINGS ARE MADE OF CELLS

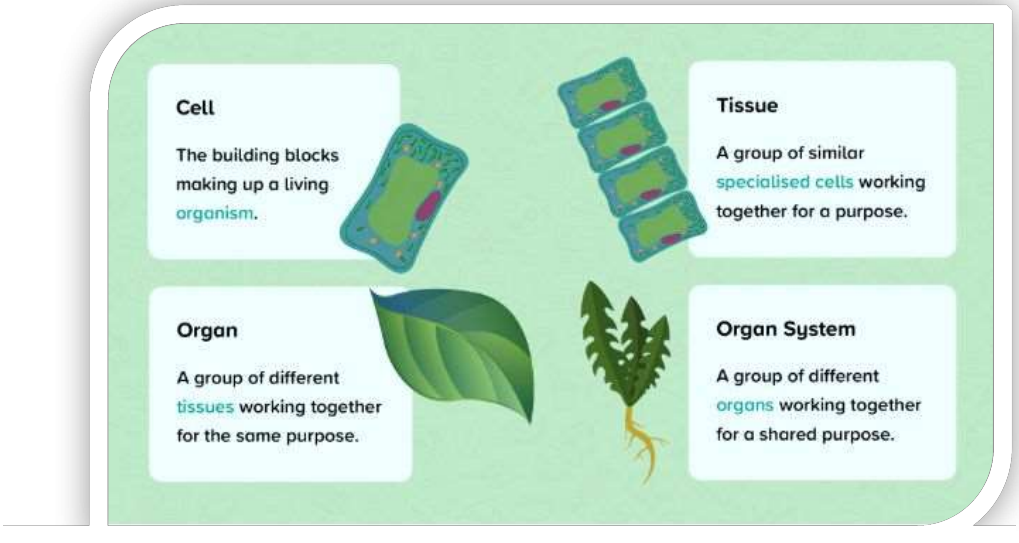
CHARACTERISTICS OF CELLS

- All cells are surrounded by an outer structure called a cell membrane.

- The cell membrane keeps substances such as macromolecules inside the cell.
  It also helps protect cells by keeping harmful substances from entering.

- About 70 percent of the inside of a cell is water.

- Many of the substances inside a cell are dissolved in water, they move easily within the cell.



CELLS ---> TISSUES ---> ORGANS ---> ORGAN SYSTEMS

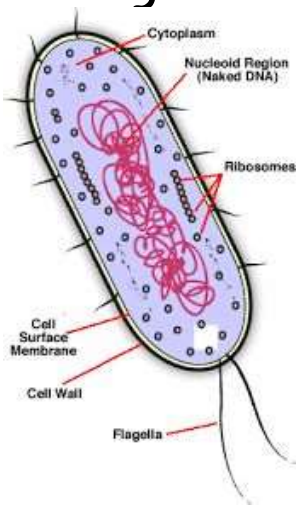
TYPES OF CELLS

ORGANELLES are the parts of the cell inside it.

There are two types of cells. Prokaryotic and Eukaryotic

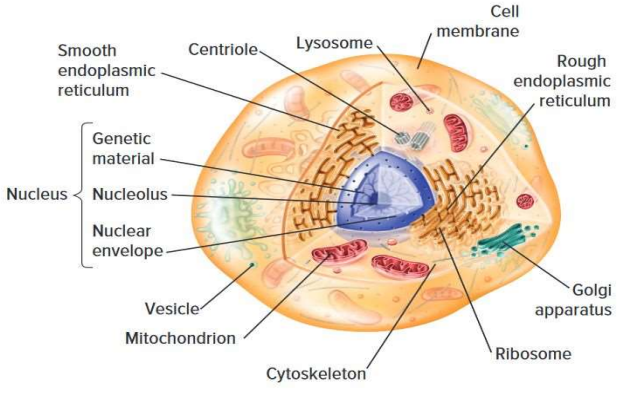
PROKARYOTIC CELLS are cells without a nucleus or other membrane-bound organelles.

- Organisms with prokaryotic cells are called prokaryotes.
- Most prokaryotes are unicellular organisms, such as bacteria.
- They are usually very small



EUKARYOTIC CELLS are cells with a nucleus and other membrane-bound organelles.

- Most living organisms are eukaryotes.
- The eukaryotic cells have many structures that are not in a prokaryotic cell.
- They are many times bigger than prokaryotes

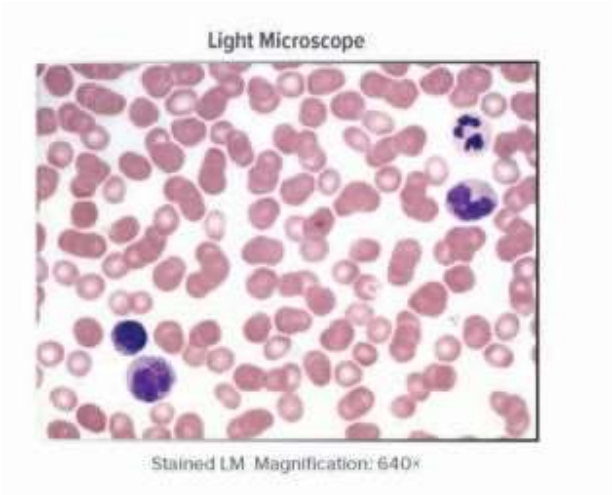


Eukaryotic Cell

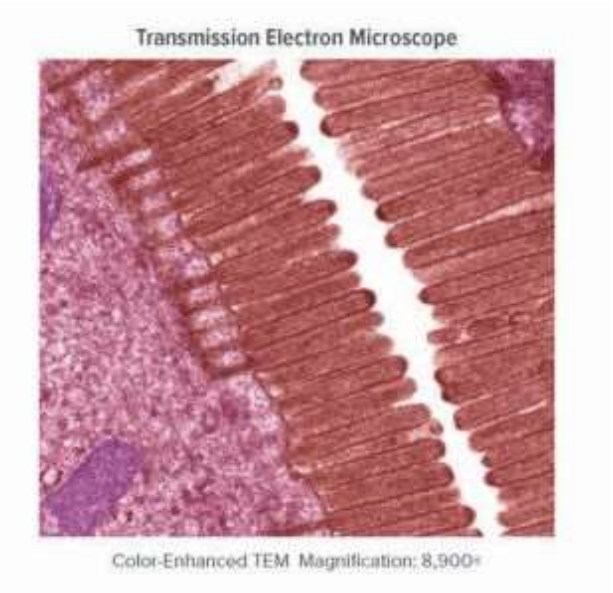
INVESTIGATING CELLS

We use Microscopes to investigate Cells.
We can use a LIGHT Microscope or an ELECTRON Microscope

LIGHT MICROSCOPE uses light and lenses to enlarge the image of an object by 1,500 times. Can study shapes of cells but not details.



ELECTRON MICROSCOPE uses a beam of electrons to magnify objects by 100,000 times. Can study details of cells like surface and organelles.



Unit 2- Module 1- Lesson 2: Cell Structure and Function

Textbook Pages 26-##

SUBTOPICS

- Parts of the cell
- Difference between plant and animal cells
- Function of different cells

Key Words (practice on Quizlet)

Cell membrane cell wall
Cytoplasm
Proteins Ribosomes
Endoplasmic Reticulum (ER)
Vacuole
Golgi apparatus
Mitochondria
Cellular respiration
Chloroplast
Nucleus

Student Expectations

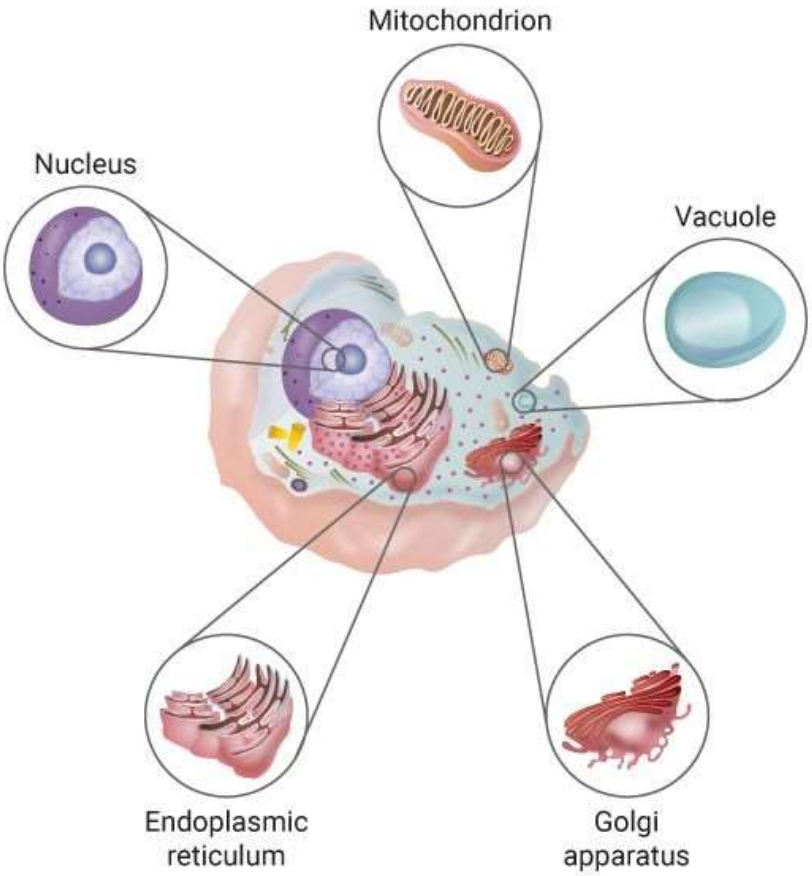
- ★ Describe the function of a cell as a whole and explore ways parts of cells contribute to the function
- ★ Develop and use models to enhance their understanding of these concepts
- ★ Explain relationships between or among the structure and function of the cells, tissues, organs, and organ systems in an organism.

PARTS OF THE CELL

AN ORGANELLE is any part inside the cell that has a specific function.

Some specific functions of organelles include information storage, waste removal, and energy production. Most organelles are surrounded by a membrane.

MOST IMPORTANT PARTS OF EUKARYOTIC CELLS



cell membrane surrounds the cell and controls what moves in and out of the cell

cell wall is the rigid outer layer of a plant cell

many **mitochondria** produce energy for cells

chloroplasts capture the Sun's energy to make food for the plant

nucleus is the brain of a cell and contains DNA

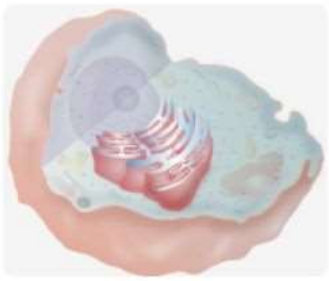
vacuoles store extra water, food and waste

Golgi apparatus prepares and packages proteins

ribosomes produce proteins

lysosomes break down waste material from the cell

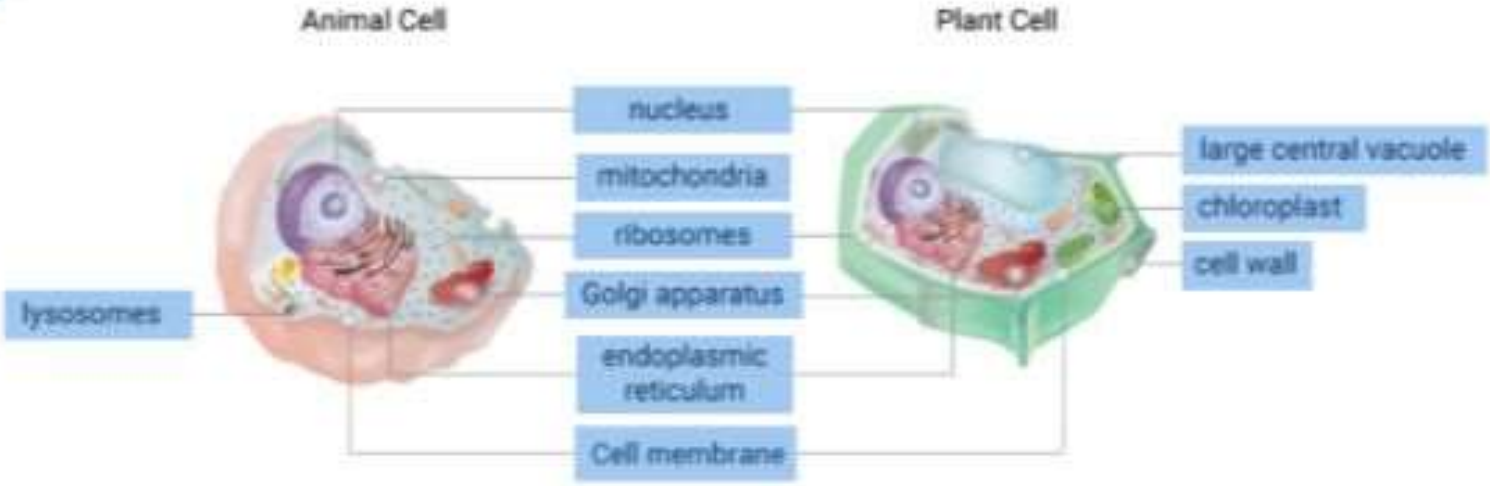
There are two types of endoplasmic reticulum: smooth and rough.



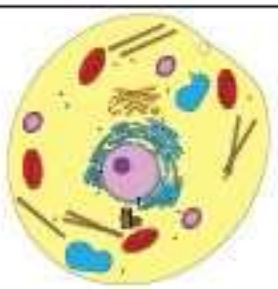
smooth endoplasmic reticulum produces lipids

rough endoplasmic reticulum contains ribosomes for making proteins

PLANT VS ANIMAL CELLS



Animal Cell vs Plant Cell

Plant Cell	Animal Cell
	
Plant cell is large and has a fixed rectangular shape.	Animal cell is small and irregular or round in shape.
Cell wall is present.	Cell wall is absent.
The nucleus lies on one side of the cell.	The nucleus lies in the center.
Mitochondria are present in fewer numbers.	Mitochondria are present in large numbers.
Plastids are present.	Plastids are absent.
Centrosomes are absent.	Centrosomes are present.
One large central vacuole is present.	Many small vacuoles are present.

TYPES OF CELLS AND STRUCTURE

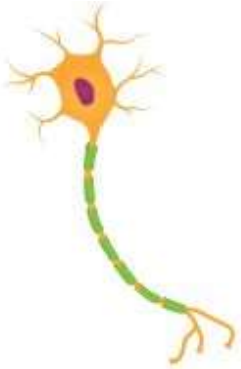
Multicellular organisms have different types of cells with different functions that allow them to survive.

These cells come in many shapes and sizes.

- Red blood cells are disk-shaped to help them move

- Xylem cells are tubelike so they can transport water from the roots to the leaves of plants.

- Neuron cells are bran[illegible]mits impulses from different parts of the body.



Each cell is unique but works with other cells as body functions are carried out.

Unit 1- Module 1- Lesson 1: Photosynthesis & Cellular Respiration

Textbook Pages 26-##

SUBTOPICS

- Photosynthesis
  - Definition
  - Where it happens
  - Importance
- Cellular Respiration
  - Definition
  - Where it happens
  - Importance
- How Photosynthesis and Respiration are related

Key Words (practice on Quizlet)

Photosynthesis
Respiration
Glycolysis
Chloroplast
Mitochondria
Cytoplasm

Student Expectations

★ Describe or compare how different organisms obtain energy.

★ Explain using evidence, how light energy is used to make sugars from carbon dioxide and water through the process of photosynthesis

★ Understand that in organisms, food moves through a series of chemical reactions and the molecules are rearranged to support growth or release energy.

Lesson	Textbook Reference	Resources
Module 1: Matter and Energy in Ecosystem **Unit 1: Interactions within Ecosystems** **Lesson 1: Photosynthesis and Cellular Respiration**	**Page 46-59**	
https://youtu.be/UPBMG5EYydo https://youtu.be/eBl3U-T5Nvk https://youtu.be/rXzN89I4_Yk		
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1) Chloroplasts are the location of photosynthesis.

- ○ True
- ○ False

2) Sucrose molecules break down during cellular respiration.

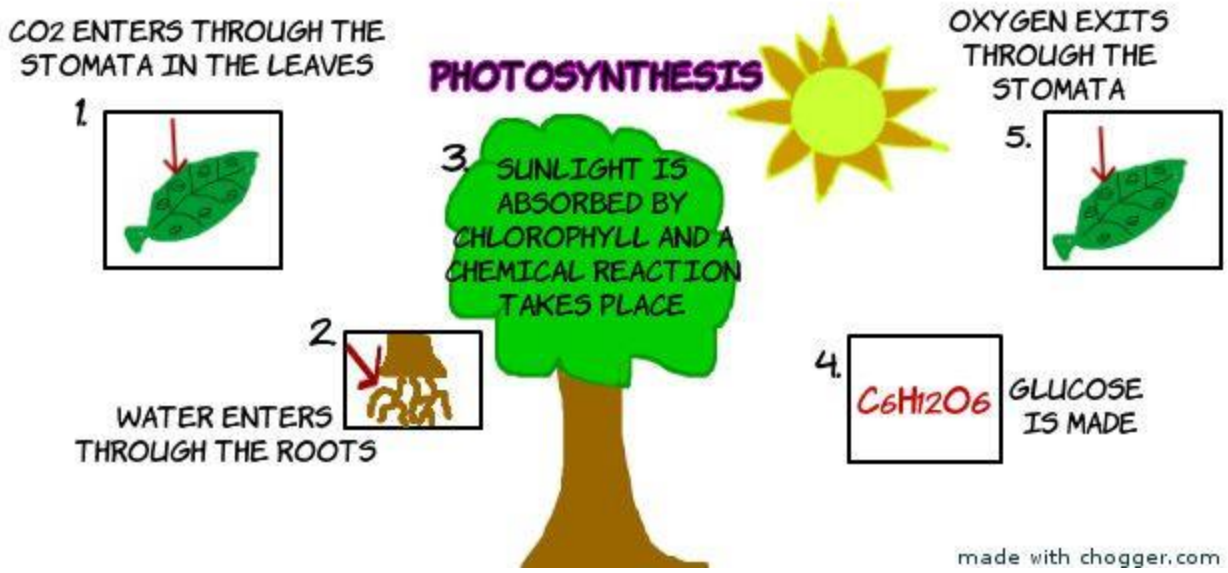
- ○ True
- ○ False

3) Water is a product of cellular respiration.

- ○ True
- ○ False

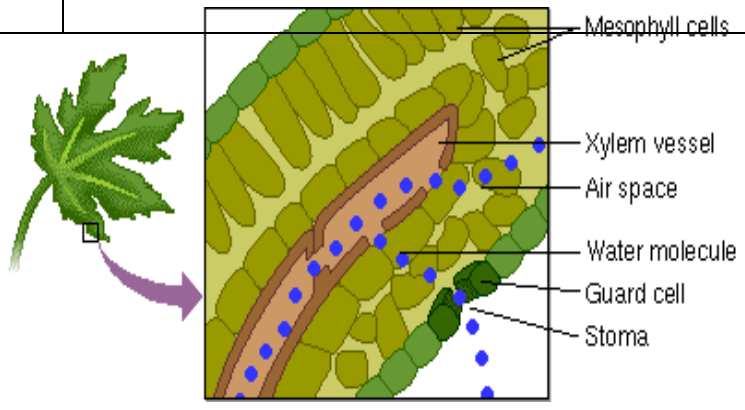
4) Cellular respiration is the process in which organisms break down food to release _____.

- ○ **A)** energy
- ○ **B)** nutrients
- ○ **C)** sugar
- ○ **D)** oxygen

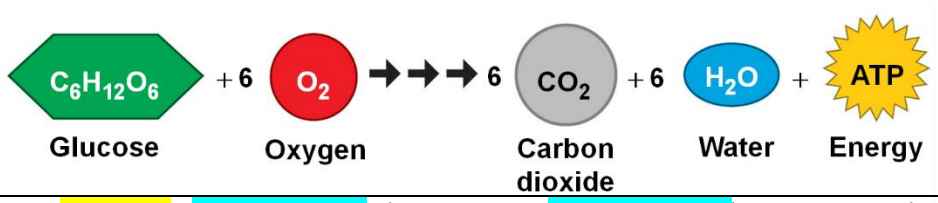


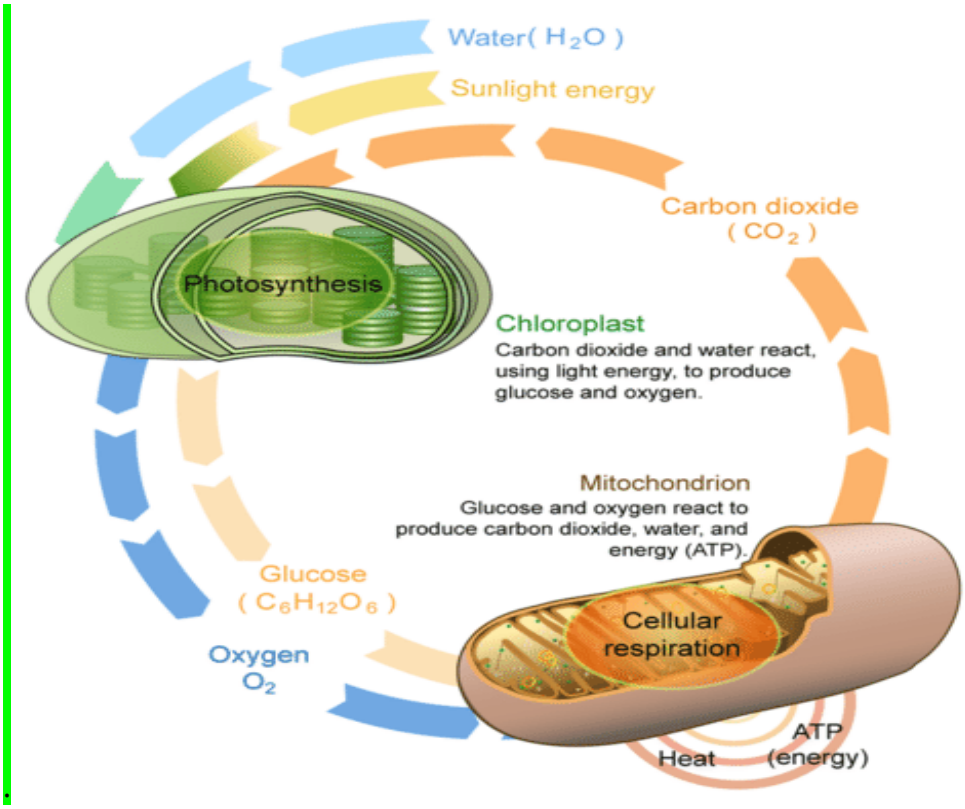
Photosynthesis is the process that leaves make food

Photosynthesis	
Definition	is the process that leaves make food
Organelle	Chloroplast
need	Water CO2 Light
products	Sugar (Glucose) C6H12O6 + O2
Formula	$6CO_2$ Carbon dioxide + $6H_2O$ Water $\xrightarrow{\text{Light}}$ $C_6H_{12}O_6$ Sugar + $6O_2$ Oxygen
steps	1- Step 1: Water splits apart and releases oxygen into atmosphere (need light) 2- Step 2: Making sugar: carbon dioxide + hydrogen → sugar (do not need light)



Cellular respiration is the process by which cells in plants and animals break down sugar and turn it into energy

Cellular respiration	
Definition	the process by which cells in plants and animals break down sugar and turn it into energy
Organelle	Mitochondria
need	Sugar (Glucose) C6H12O6 + O2
products	Water CO2 Energy (ATP)
Formula	
steps	1- Step 1: Glycolysis (occur in cytoplasm) glucose (sugar) break down and produce an ATP. No need for O_2 2- Step 2: (occur in mitochondria) $C_6H_{12}O_6$ (sugar) + $6O_2 \rightarrow 6CO_2 + 6H_2O$ +large amount of ATP need O_2



Unit 1- Module 1- Lesson 2: Flow of Energy

Textbook Pages 26-##

SUBTOPICS

- How different organisms get energy
  - Producers
  - Consumers
  - Detritivores
  - Composting
- How energy moves in the environment
  - Food chain
  - Food web
  - Energy Pyramid

Key Words (practice on Quizlet)

Producers
Consumers
Herbivores
Omnivores
Carnivores
Detritivores
Compost
Food chain
Food Web
Energy Pyramid

Student Expectations

★ Students will describe how the environment and interactions between organisms can affect the number of species and the diversity of species in an ecosystem.

★ Develop models that describe how energy is transferred between producers, consumers, and decomposers in ecosystems.

How Different Organisms get Energy

Energy flows from producers to consumers in an Ecosystem. We can show how energy flows through food chains, food webs and energy pyramids.

The main source of energy for most life on Earth is the Sun. Unlike matter, energy does not cycle through ecosystems, instead it flows in one direction. In most cases, energy flow begins with the Sun, and moves from one organism to another. Many organisms get energy by eating other organisms.

PRODUCERS make food using energy from the sun.
PLANTS are PRODUCERS

CONSUMERS do not make food. They eat producers or other consumers to get energy.
ANIMALS are CONSUMERS

HERBIVORES are animals that eat only plants
INSECTS, SHEEP are HERBIVORES

OMNIVORES are animals that eat plants AND animals
BIRDS, FROGS HUMANS are OMNIVORES

CARNIVORES are animals that eat only animals
LIONS, TIGERS SHARKS are CARNIVORES

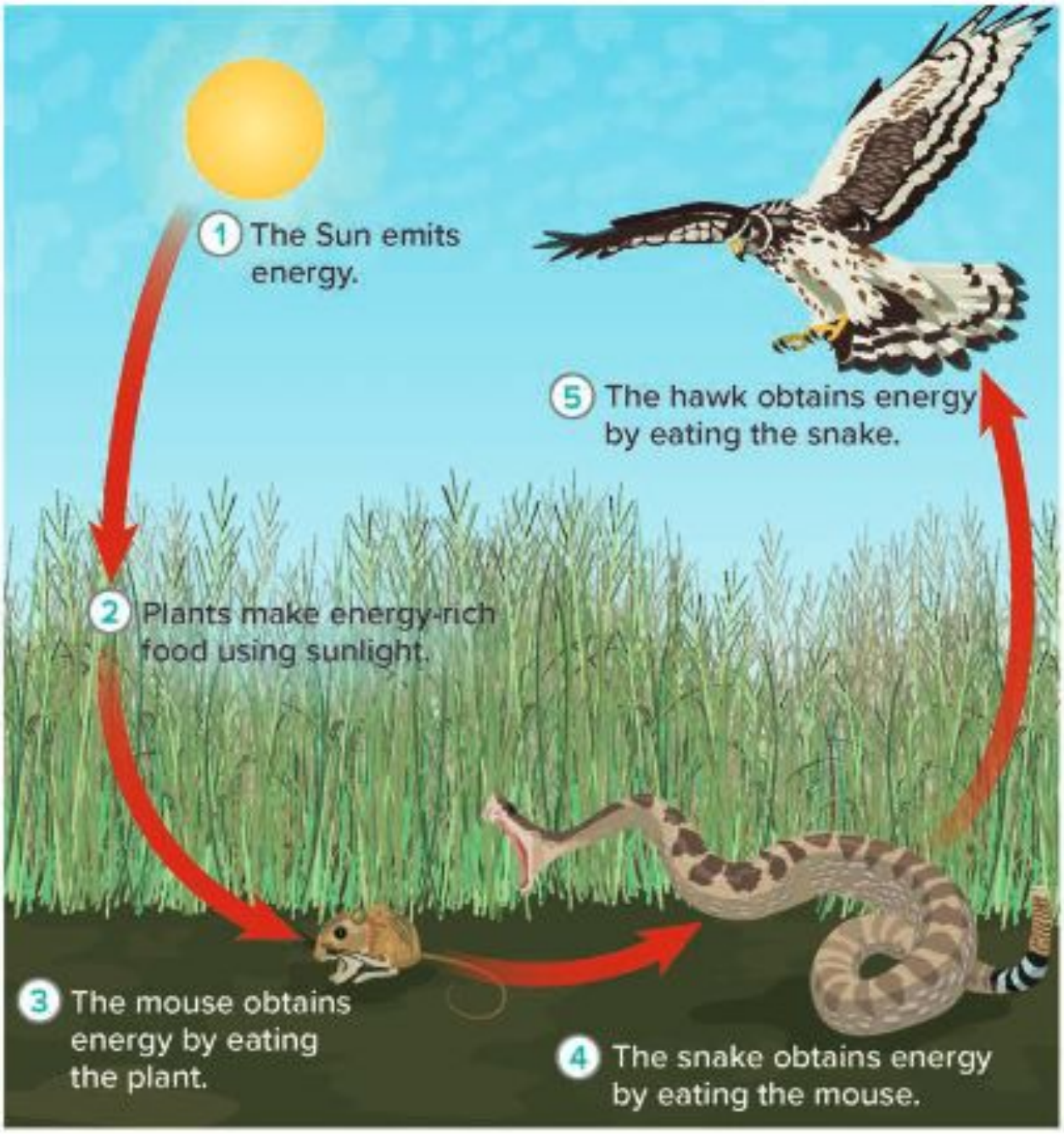
DETRITIVORES eat animals and plants that are dead.
WORMS, BACTERIA are DECOMPOSERS

COMPOSTING is using of decayed plants, animals and other organic matter to make plant fertilizer. Detritivores help make compost.

FOOD CHAINS

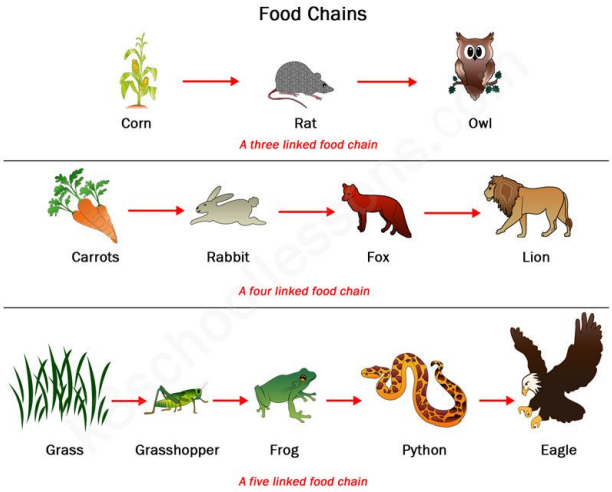
A FOOD CHAIN is the path that energy follows in an ecosystem.

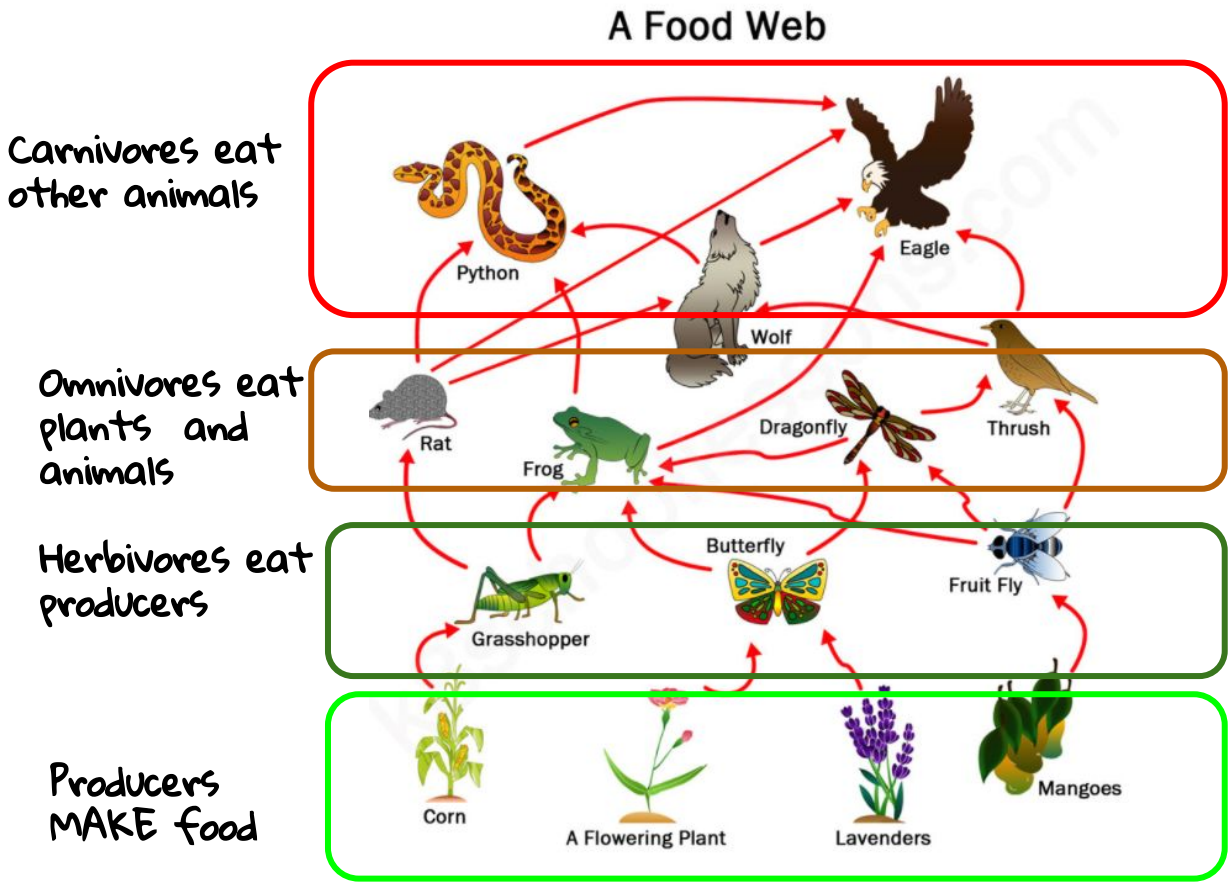
Energy in an ecosystem always starts with the SUN



FOOD WEB

A FOOD WEB is the links between different food chains in an ecosystem.





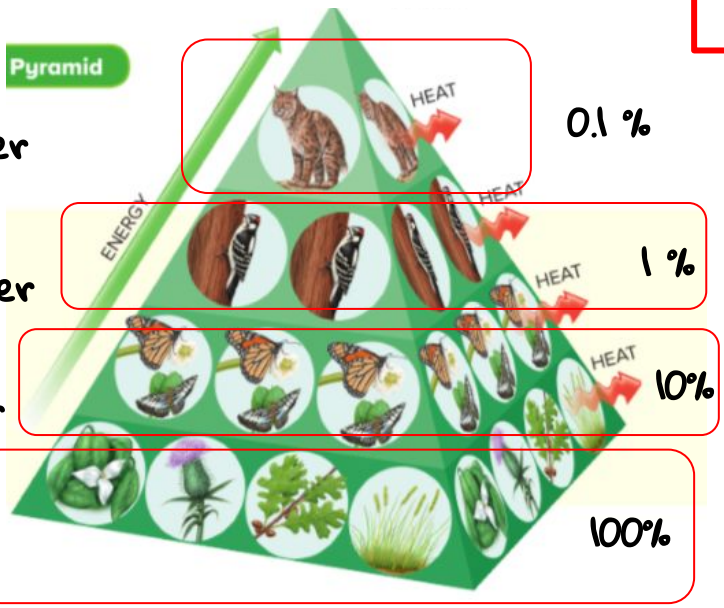
PREDATORS are living things that HUNT & KILL other living things for food

PREY are organisms that are EATEN by predators

ENERGY PYRAMIDS

AN ENERGY PYRAMID is a diagram that shows how much energy there is in the ecosystem.

LEAST energy



Consumer 3
Tertiary consumer

0.1 %

Consumer 2
Secondary consumer

1 %

Consumer 1
Primary consumer

10%

Producer

100%

MOST energy

A zero is lost as you move up the energy pyramid

If producer has 5,000
consumer 1 will have 500
consumer 2 will have 50
consumer 3 will have 5

Energy is always the MOST at the bottom of pyramid

Producers are always at the bottom of the Pyramid

Producers always have the MOST energy.

DETRITIVORES are on every level
because things die on each level.

Unit 1- Module 1- Lesson 3: Cycling of Matter

Textbook Pages 26-##

SUBTOPICS

- How matter cycles in the environment
  - Carbon Cycle
  - Water Cycle
  - Nitrogen Cycle
  - Oxygen Cycle

Key Words (practice on Quizlet)

Carbon cycle
Combustion
Decomposition
Water cycle
Condensation
Precipitation
Nitrogen Cycle
Nitrogen Fixation
Oxygen Cycle
Greenhouse gas

Student Expectations

- ★ Students will describe how matter in the atmosphere cycles through other Earth systems.
- ★ Students will trace the flow of energy through an ecosystem.
- ★ Develop models to describe how matter cycles through living and nonliving parts of the ecosystem
- ★ Understand that atoms are conserved as they cycle through the ecosystem.

CYCLING OF ECOSYSTEMS

PAGE 74 – 85

WHAT DO YOU MEAN BY CYCL

When atoms like carbon, nitrogen and oxygen are continuously moved from atmosphere to organisms to soil and back to the atmosphere, its known as cycling of matter.

WHAT ARE THE DIFFERENT CYCLES IN NATURE?

1. CARBON CYCLE
2. WATER CYCLE
3. NITROGEN CYCLE
4. OXYGEN CYCLE

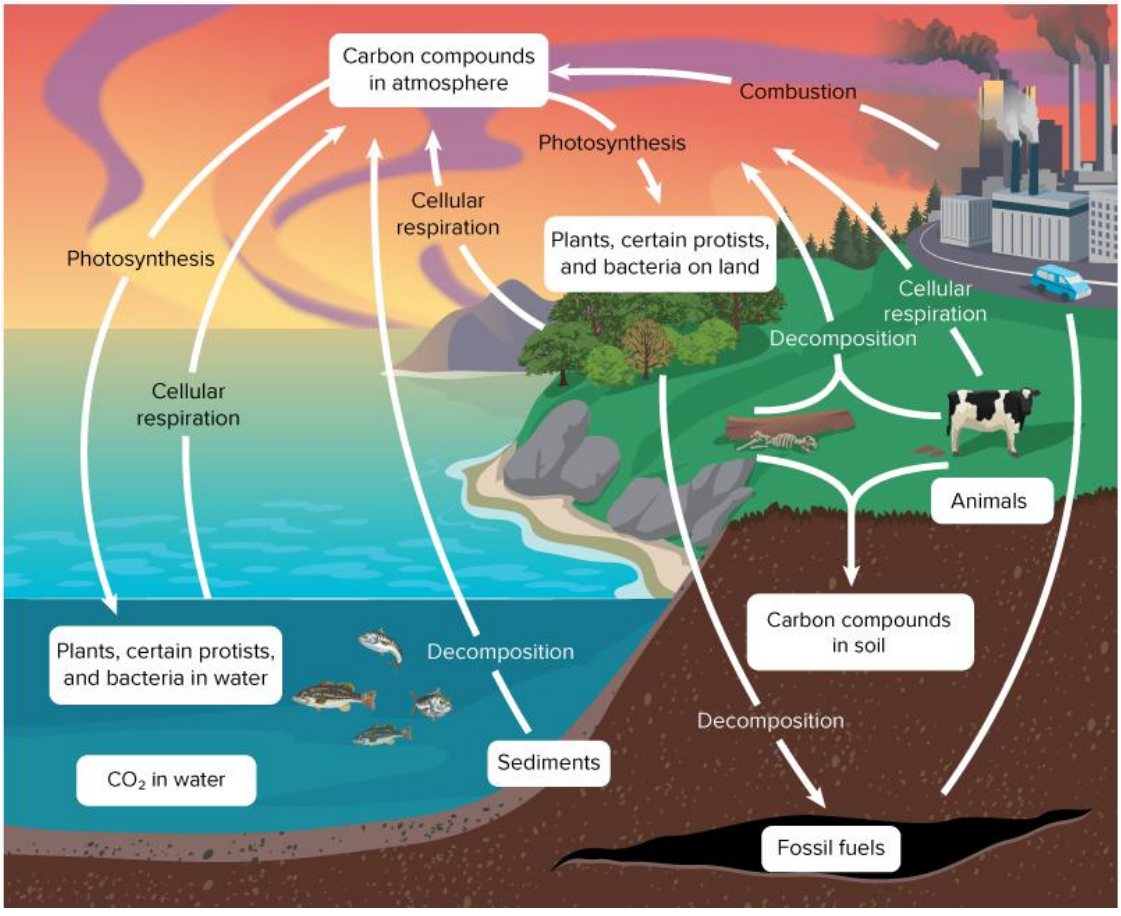
CARBON CYCLE

HOW IS CARBON USED IN NATURE?

- ✓ Tiny ocean plants called phytoplanktons absorb carbon dioxide from the air.
- ✓ The carbon dioxide can be converted to calcium carbonate to make skeleton of some phytoplanktons.
- ✓ Carbon is also present in coal and is also used to make diamond.

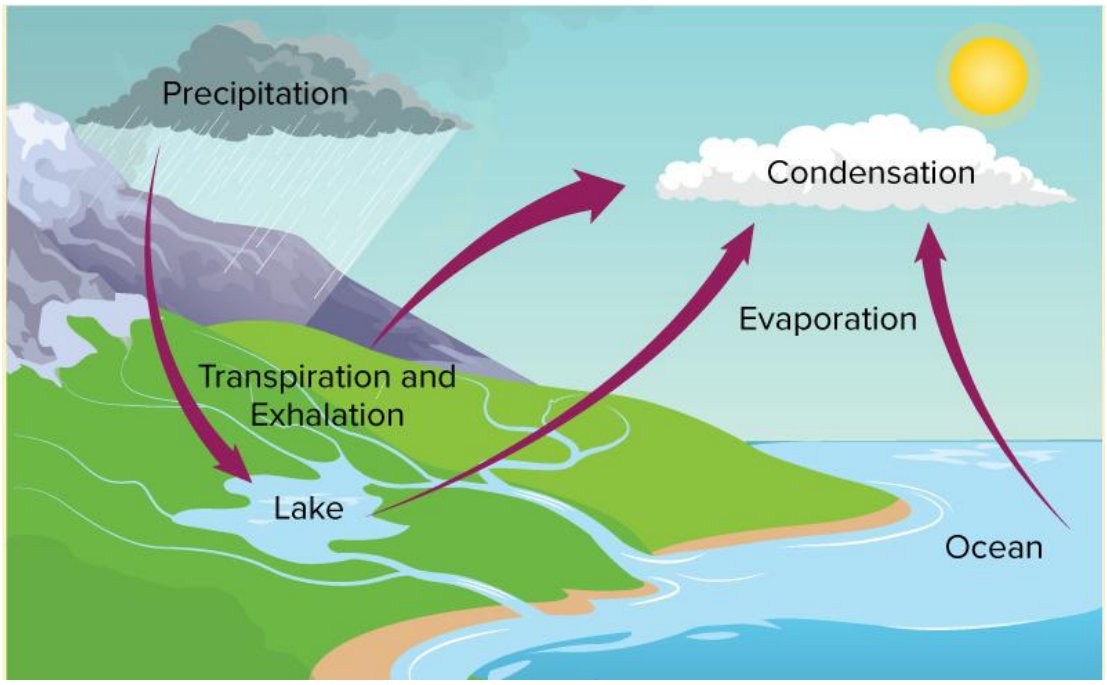
CARBON CYCLE

- Animals and humans obtain carbon from the food they eat.
- When they die, carbon mixes with the soil and releases carbon dioxide into the air.
- The carbon dioxide is absorbed by plants for photosynthesis.
- Carbon is also present in fossil fuels like coal.
- When coal or petroleum is burnt, it releases carbon compounds into the air.



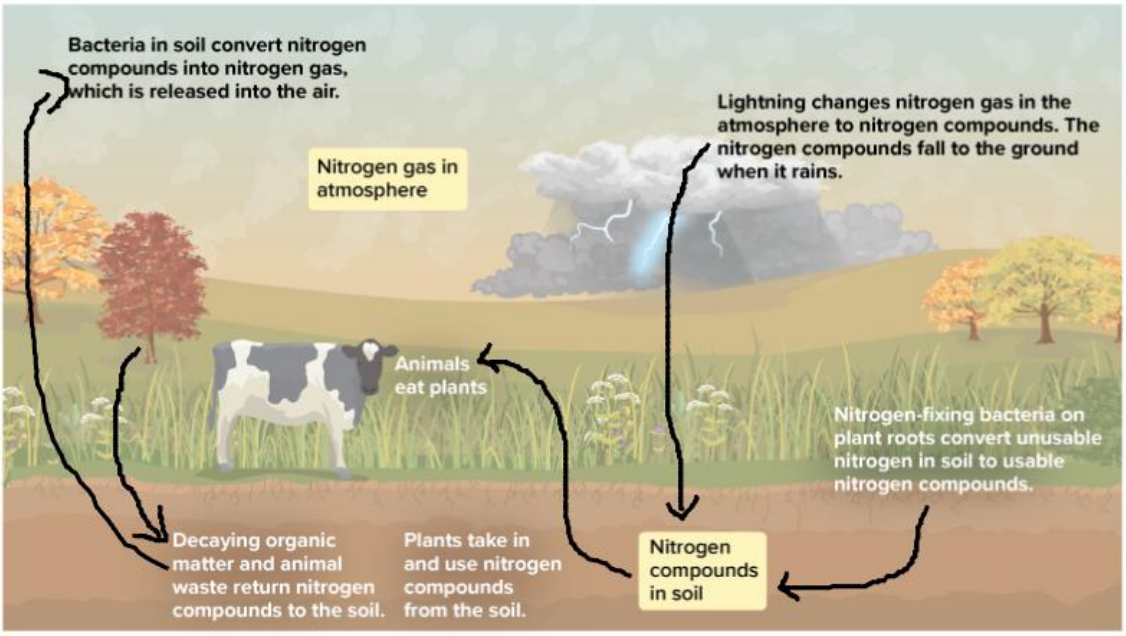
WATER CYCLE

- The movement of water in the environment from water bodies like oceans and rivers to the atmosphere and back is water cycle.
- **Evaporation:** liquid water in oceans and rivers is heated by the Sun. the water is converted to gas or water vapor.
- **Condensation:** as the water vapor rises, it cools down and forms clouds.
- **Precipitation:** when clouds get heavier, the water comes down as rain. Precipitation also comes in the form of hail, snow or sleet.



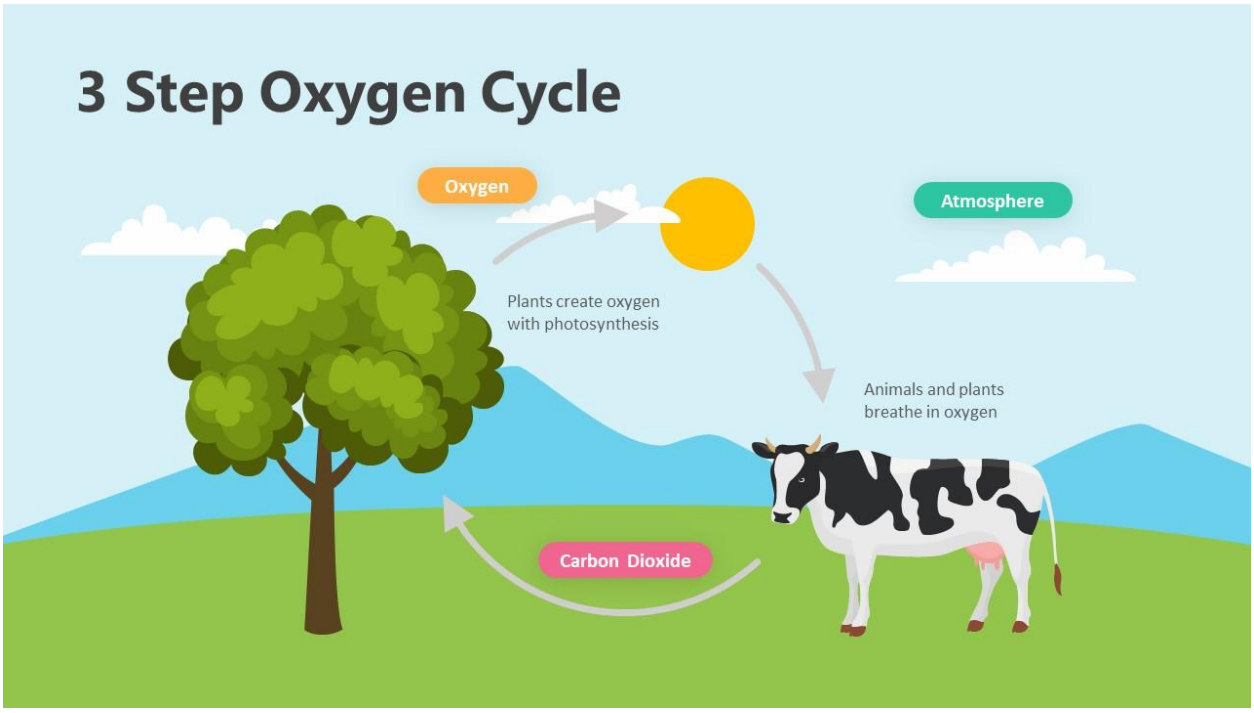
NITROGEN CYCLE

- Nitrogen is an element that is required for all organisms to stay alive.
- The air is mostly made up of nitrogen. However, this nitrogen cannot be used directly by human, plants or animals.
- The process that changes nitrogen in the atmosphere into nitrogen compounds is known as nitrogen fixation.
- Plants and other organisms take these converted nitrogen from soil and water.
- When plants and animals die, the nitrogen gets back into the soil.
- Bacteria in the soil convert the nitrogen compounds back into nitrogen and release it into the air.



OXYGEN CYCLE

- Photosynthesis is the primary source of oxygen.
- The oxygen produced is used by plants and living organisms to breathe.
- The animals and humans convert the oxygen back into carbon dioxide and release it into the air.


3 Step Oxygen Cycle
Oxygen
Atmosphere
Plants create oxygen
with photosynthesis
Animals and plants
breathe in oxygen
Carbon Dioxide

Unit 1- Module 2- Lesson 1: Resources in Ecosystems

Textbook Pages 26-##

SUBTOPICS

- Levels of Organization in an Environment
- How Resources affect populations
  - Limiting Factors
  - Effects of Limiting Factors
- How big populations get
  - Biotic potential
  - Carrying Capacity
  - Overpopulation
  - Population Decrease

Key Words (practice on Quizlet)

Biosphere
Population
Species
Community
Limiting factor
Biotic potential
Carrying Capacity
Overpopulation
Extinction
Endangered / Threatened

Student Expectations

★ Describe how the environment and interactions between organisms can affect the number of species and the diversity of species in an ecosystem.

★ Analyze and interpret data to explore how organisms depend on interactions with living and nonliving factors.

★ Understand the effects of different limiting factors like resource availability and population size.

Review: Grade 6:

Module 2: Dynamic Ecosystems

Lesson 1- Resources in Ecosystems

Learning Objectives:

The students will be able to:

1. Analyse and interpret data to explore how organisms are dependent on their interactions with living and non-living factors in their environment
2. Understand the effects of different limiting factors such as resource availability on organisms and populations in an ecosystem

Lesson Vocabulary
1. Biosphere : The parts of the Earth and the surrounding atmosphere where there is life is called biosphere.
2. Population : A population is all the organisms of the same species that live in the same area at the same time.
3. Species : A species is a group of organisms that have similar traits and are able to produce fertile offspring.
4. Community : A community is all the populations of different species that live together in the same area.
5. Limiting Factor : A limiting factor is anything that restricts the size of a population.
6. Biotic Potential: Biotic potential is the potential growth of a population if it could grow in perfect conditions with no limiting factors.
7. Carrying Capacity : It is the largest number of individuals of one species that an ecosystem can support over time.
8. Overpopulation : Overpopulation is when a population's size grows so large that it causes damage to the environment.

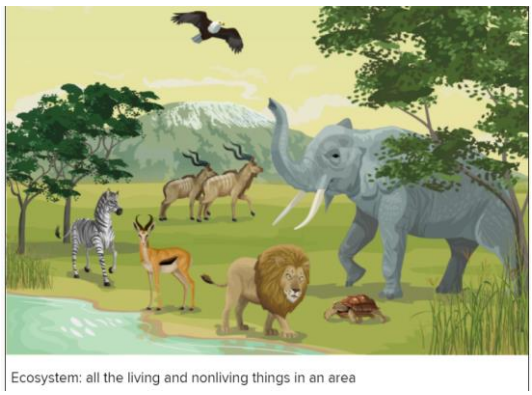
Availability of resources is one of the most important factors that makes organisms live in a certain area.

Levels of organisation in an environment:


Individual: a single member of a species


Population: all members of a species in an area at the same time


Community: all the populations in an area at the same time


Ecosystem: all the living and nonliving things in an area

Biosphere

How do resources affect populations?

Limiting Factors Environmental factors, such as available water, food, sunlight, and temperature, are possible limiting factors for a population. A limiting factor is anything that restricts the size of a population. Populations can increase and decrease in size, but limiting factors might affect the number of individuals an ecosystem can support.

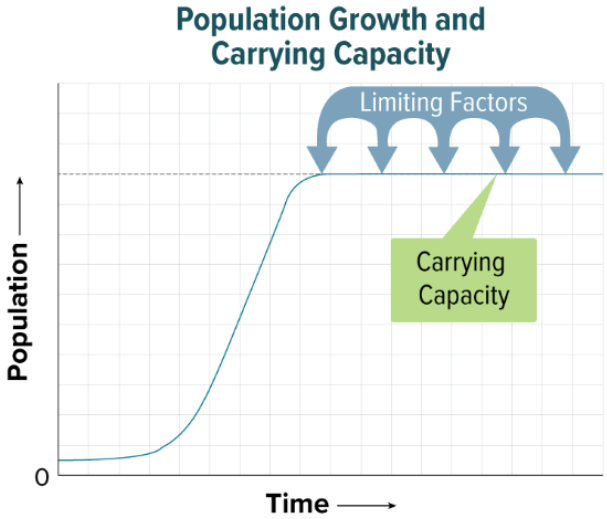
How Limiting Factors Affect Populations As you discovered in the Lab, *Fishy Population Changes*, the amount of space affects a population's size. Space is a limiting factor, just like available water, food, sunlight, and temperature. With too few resources, populations may migrate to new areas or even die out. Other factors that you will learn about may also limit how many individuals survive. Now, examine some limiting factors in a population of pikas.

Limiting factors:

- Predators
- Space
- Disease
- Competition
- Availability of resources such as food and water.

Without limiting factors, populations would keep growing until they reached their biotic potential. **Biotic potential** is the potential growth of a population if it could grow in perfect conditions with no limiting factors.

Almost no population reaches its biotic potential. Instead, it reaches its carrying capacity. **Carrying capacity** is the largest number of individuals of one species that an ecosystem can support over time. F



What does the graph say about population growth?

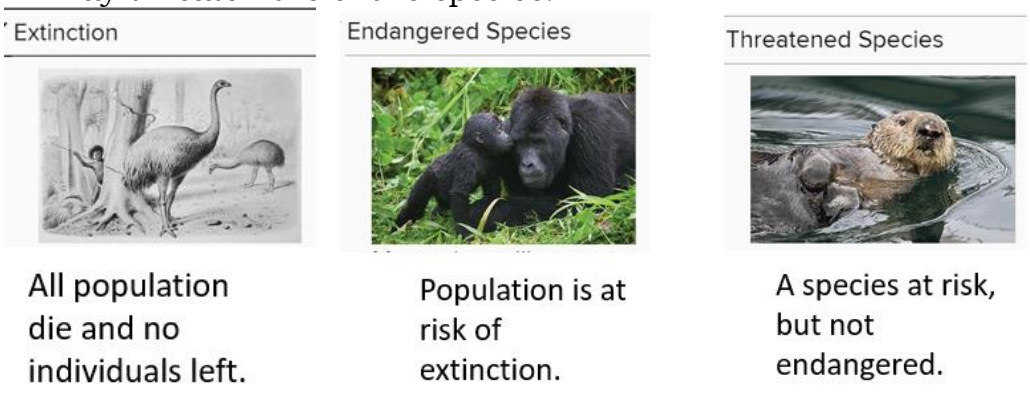
The graph shows that the population increases as time passes but becomes steady at its carrying capacity because of the limiting factors. If there were no limiting factors, the population would reach biotic potential.

Sometimes a population becomes too large for its ecosystem to support. **Overpopulation** is when a population's size grows so large that it causes damage to the environment

- Overpopulation can cause problems for organisms. For example, a population of birds eats spiders. An overpopulation of birds causes the size of the spider population in that community to decrease. Populations of other animals that eat spiders also decrease when the number of spiders decreases.

Decrease in population:

- Population size can increase, but it also can decrease.
- For example, a population of field mice might decrease in size in the winter because there is less food.
- Natural disasters such as floods, fires, or volcanic eruptions also affect population size.
- Sometimes, a population's size can decrease to such an extent that it may threaten the entire species.



Explain the phenomenon:

Claim: The animals in the park were gathering near water because water is an important resource

for all of them.

- Evidence A: Evidence explains how the animals in the park in Namibia are organized in their ecosystem includes observations that different organisms of the same species make up populations. Further, the populations of organisms interact in a community with each other and with nonliving resources in the ecosystem.
- Evidence B : Evidence explains that the population will only grow upto the carrying capacity. After which, the animals will compete and may die due to limiting factors.

Lesson review 2: Page 103

2. A population of coyotes lives in a habitat with plentiful food and no predators. Analyze the graph and interpret what is happening to their population size at the one year mark.

○ A The population size is increasing.	○ C The population size is remaining the same.
○ B The population size is decreasing.	○ D The population size cannot be inferred from the graph.

Answer : Option A

Lesson review 2: Page 103

2. A population of coyotes lives in a habitat with plentiful food and no predators. Analyze the graph and interpret what is happening to their population size at the one year mark.

○ A The population size is increasing.	○ C The population size is remaining the same.
○ B The population size is decreasing.	○ D The population size cannot be inferred from the graph.

Answer : Option A

Unit 1- Module 2- Lesson 2: Interactions within Ecosystems

Textbook Pages 26-##

SUBTOPICS

- How living things interact
- Symbiotic Relationships
  - Commensalism
  - Parasitism
  - Mutualism
- Other Relationships
  - Cooperative
  - Predator-Prey
  - Competitive

Key Words (practice on Quizlet)

Symbiosis
Commensalism
Parasitism
Mutualism
Cooperative Relationships
Predator-Prey Relationships
Competitive Relationships

Student Expectations

★ Explore patterns of interactions among organisms

★ Explain the nature of these relationships and understand that they may be symbiotic or nonsymbiotic

★ Learn that while the species involved vary, the patterns of interactions are shared

INTERACTIONS WITHIN ECOSYSTEMS

Symbiosis: It is a close, long-term relationship between 2 species that involves an exchange of food or energy.

Types of symbiotic relationship

Commensalism: A symbiotic relationship that benefits one species but does not harm or benefit the other.

E.g., Epiphytes on trees

Parasitism: A symbiotic relationship that benefits one species and harms the other.

E.g., The mosquito and humans

Mutualism: A symbiotic relationship that benefits both partners.

E.g., Clown fish and sea anemones

Other types of relationships

Cooperative relationships: organisms in a population will be in close relationship as they cooperate each other.

E.g., Elephants cooperate with each other to raise young and watch for predators.

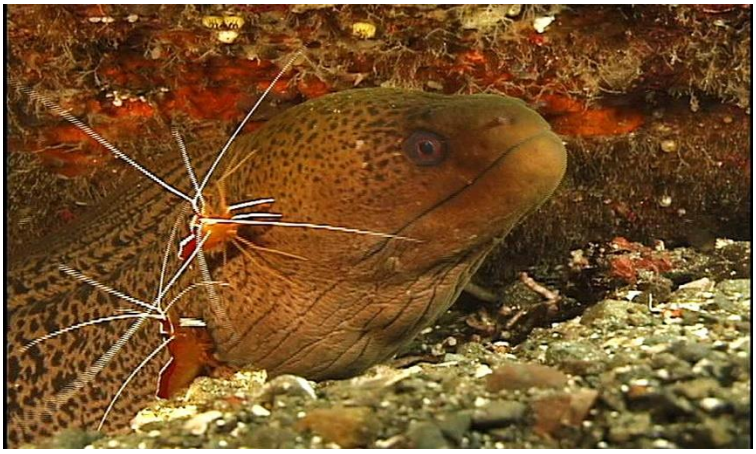
Predator-prey relationships/Predation: It is a relationship in which one organism, the predator, eats another, the prey.

E.g., Lion and deer

Competitive relationships/Competition: Organisms that share the same habitat often compete for resources.

E.g., Trees compete for sunlight/Wolves compete with Ravens for meat.

1.What sort of relationship do the cleaner shrimp and the moray eel have? Explain.



2.Match the type of relationship with its examples

Commensalism	Barbell fish and hippo
Parasitism	Tiger and deer
Mutualism	Hunting wasp and spider
Predation	Epiphyte and the tree

Unit 1- Module 2- Lesson 3: Changing Ecosystems

Textbook Pages 26-##

SUBTOPICS

- How land Ecosystems Change
  - Succession (Ecological, Primary, Secondary)
  - Ecosystems and Time
  - Eutrophication
- How changing Ecosystems affect Populations
  - Dynamic Equilibrium
  - Effects of Change
- How human activity changes Ecosystems
  - Resource extraction
  - Pollution
  - Nonnative species
  - Human Impact

Key Words (practice on Quizlet)

Ecological Succession
Primary Succession
Secondary Succession
Climax community
Eutrophication
Dynamic Equilibrium
Pollution
Nonative species

Student Expectations

★ Explore the dynamic nature of ecosystems, focusing on both natural changes and human disruptions

★ Evaluate how and argue that changes to physical or biological components of an ecosystem affect populations within the ecosystem

Module: Dynamic Ecosystems

Lesson 3: Changing Ecosystems

How do land ecosystems change?

Ecological Succession *The process of one ecological community gradually* Ecological succession occurs in a series of steps.

- These steps can be predicted.

A climax community is the final stage of ecological succession in a land ecosystem.

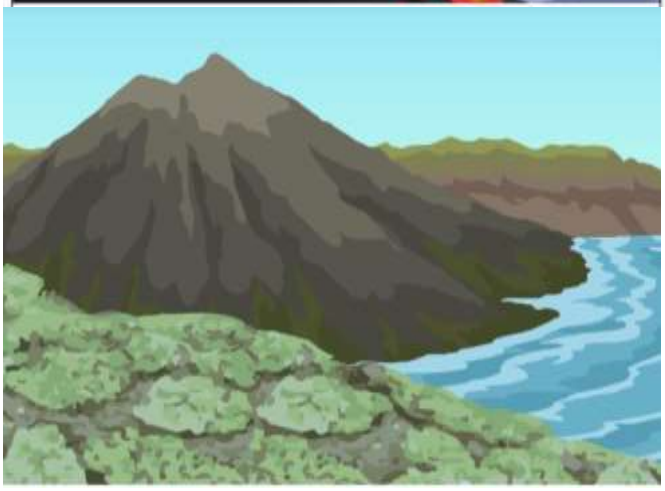
- *A climax community is a stable community that no longer goes through major ecological changes.*
- Climax communities differ depending on the type of biome they are in.
- Climax communities are usually stable over hundreds of years

Primary Succession

Ecological succession in new areas of land with little or no soil—such as on a lava flow, a sand dune, or an area of exposed rock—is called primary succession.

- The first species that colonize new or undisturbed land are pioneer species.
- Lichens and mosses are examples of pioneer species.

A volcano erupts. Molten lava flows over the ground and into the water. The eruption ends. The lava cools and hardens into bare rock



Lichen spores are carried on the wind. They settle on the rock. Lichens release acid that helps break down the rock and create soil. As they die and decay, lichens add nutrients to the soil

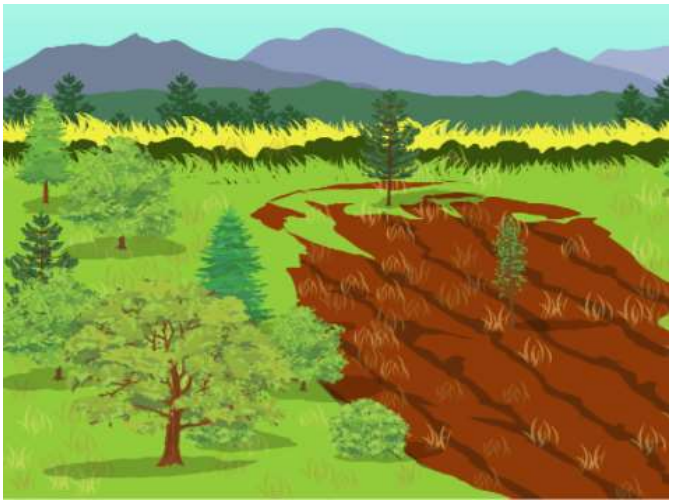
Airborne spores from mosses and ferns settle on the thin soil. When the spores die, they add to the soil. The soil becomes thick enough to hold water. Insects and other small organisms begin living in the area.

After many years, the soil is deep. It has enough nutrients for grasses, wildflowers, shrubs, and trees to grow. The new ecosystem provides habitats for animals. Eventually, a climax community develops

Secondary Succession **Secondary succession occurs in areas where existing ecosystems have been disturbed or destroyed.**

The figures below and on the next page show what happens to an area of land as it is cleared and after it is cleared.

Settlers in New England cleared the land hundreds of years ago. Some of the cleared land was not planted with crops. This land gradually grew back to a climax forest community of beech and maple trees



Seeds of plants, such as grasses and wildflowers, began to sprout and grow. Shrubs and trees started growing. These plants were habitats for insects and other small animals, such as mice.

The first trees in the area to grow tall were white pines and poplars. They provided shade and protection for other trees. These other trees, such as beeches and maples, grew more slowly.

Eventually, a climax community of beech and maple trees grew. Older trees died. However, new beech and maple trees grew and replaced them.

How do aquatic ecosystems change?

Freshwater ecosystems change over time. They change in a natural, predictable process. This process is called aquatic succession.

Aquatic succession begins with a body of water, such as a pond, lake, or wetland.

Over time, the soil builds up at the bottom of the pond, lake, or wetland. The soil begins to fill the body of water.

Eventually, the body of water fills completely with soil. The water disappears. The area becomes land. A land ecosystem

Environmental Connection

Eutrophication Like sediment, decaying organisms fall to the bottom of a body of water.

- **They add nutrients to the water. Eutrophication *is the process of a body of water becoming nutrient rich.***
- **Eutrophication is a natural part of aquatic succession**

How do changing ecosystems affect populations?

Dynamic equilibrium *is the balance between different parts of the ecosystem.*

Effects of Change

- Natural disruptions can cause massive amounts of damage to an ecosystem. Natural disruptions include forest fires, floods, volcanic eruptions, and disease.
- For example, a drought might reduce plant growth.
- Suppose that a forest fire forces animals to live closer together in the remaining forest. This disruption might give predators easier access to prey. Prey populations might decrease.

How does human activity cause disruptions in ecosystems?

- **Resource Extraction** Resource extraction refers to any activity that takes resources from nature.
- **Pollution** Pollution occurs when contaminants are brought into an environment and cause negative change Eg: Oil spills also happen while oil is being transported to factories. If ships spill oil, aquatic ecosystems are harmed. Oil can kill fish, birds, and other organisms.
- **Nonnative Species** A nonnative species is a species that is living outside of its natural range. Often, people introduce nonnative species into an ecosystem intentionally.