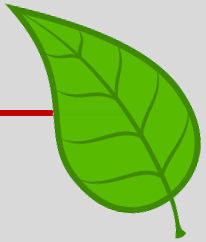
Grade 7
EoT1 Exam Coverage

1	Illustrate the relationships of photosynthesis with light and carbondioxide	textbook and figure	11, 15

Photosynthesis

In plants only



How do plants get their food?

- They make their own food through a process called **photosynthesis**.

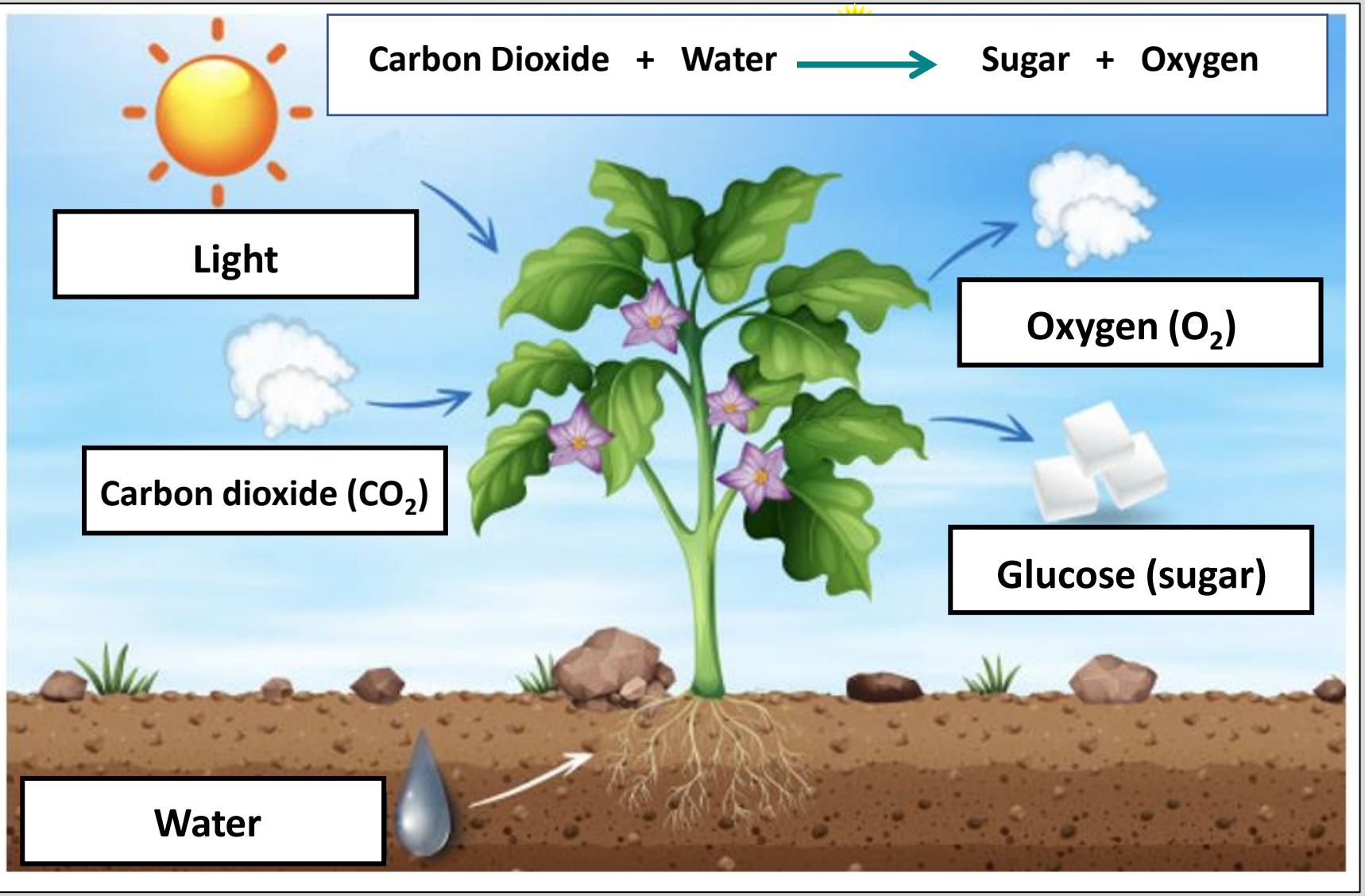
Photosynthesis: is a series of chemical reactions that convert light energy, water, and carbon dioxide into glucose (sugar) and give off oxygen.

Carbon Dioxide + Water  **Sugar + Oxygen**

- ***Leaves*** are the site for photosynthesis.

Photosynthesis

In plants only



Photosynthesis

In plants only

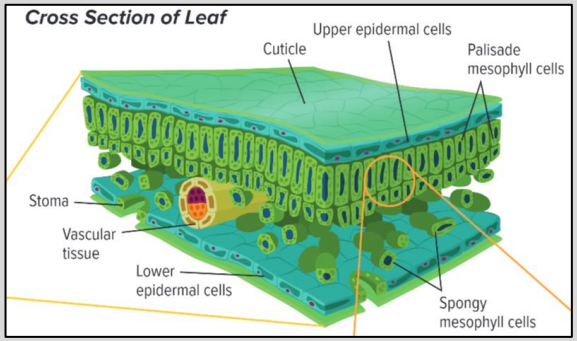
Photosynthesis is a process where plants use **light** from the sun to transform **carbon dioxide** from the air and **water** from the soil into **sugar** to feed the plant and **oxygen** is moved out into the air.

~~water~~ ~~sugar~~ ~~carbon dioxide~~ ~~light~~ ~~oxygen~~

Photosynthesis *In plants only*

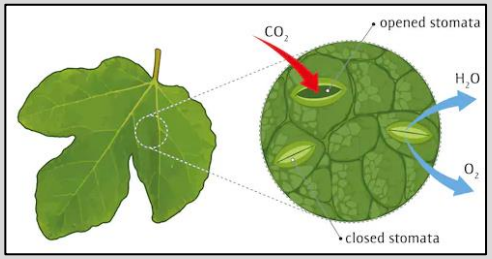
Leaves have many types of cells:

1. **Epidermal cells:**
   - Flat and irregular, make up the upper and lower layers of leaf.
   - Produce a waxy covering called the **cuticle.**



Types:

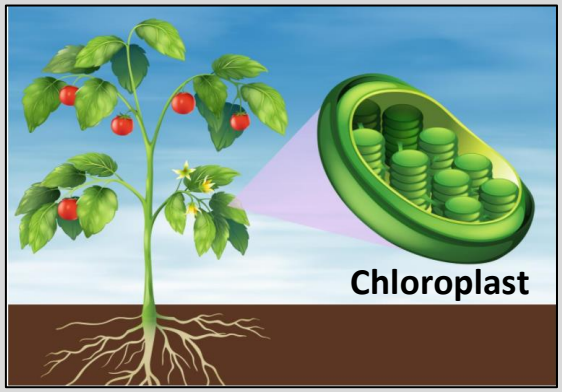
- Upper epidermal cells.
- Lower epidermal cells: Has small openings called **stomata.** Gases like oxygen, carbon dioxide and water vapor pass through **stomata.**

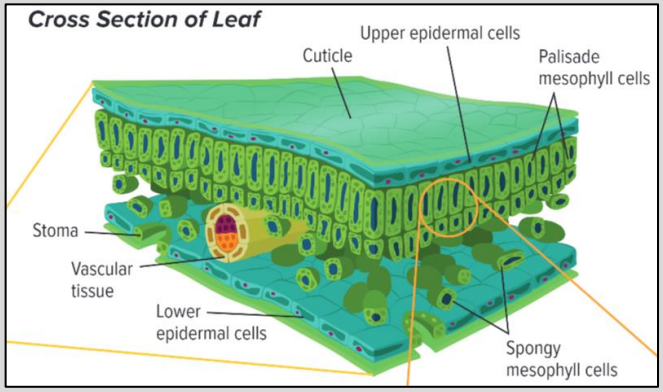


Photosynthesis *In plants only*

2. Mesophile cells:

- Contain chloroplasts, which are the organelles where photosynthesis occurs.





Types:

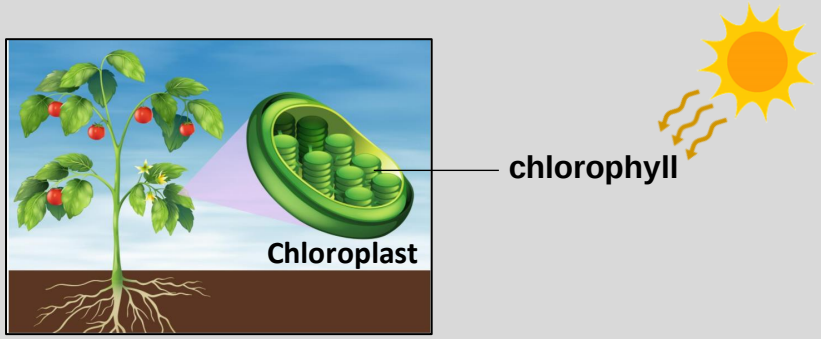
- Palisade mesophyll cells: They are near the top of the leaf packed close together.
- Spongy mesophyll cells: They have open spaces between them. Gases needed for photosynthesis flow through the spaces.

https://wordwall.net/resource/21194813

Steps of Photosynthesis *In plants only*

Photosynthesis is a complex chemical process. It consists of two basic steps:

- ***STEP 1: capturing light energy***
  Chloroplasts capture the light contain plant pigments called **chlorophyll.**



Leaves → **Chloroplast** → **Chlorophyll**

- Most plants appear green in color because chlorophyll reflects green light.

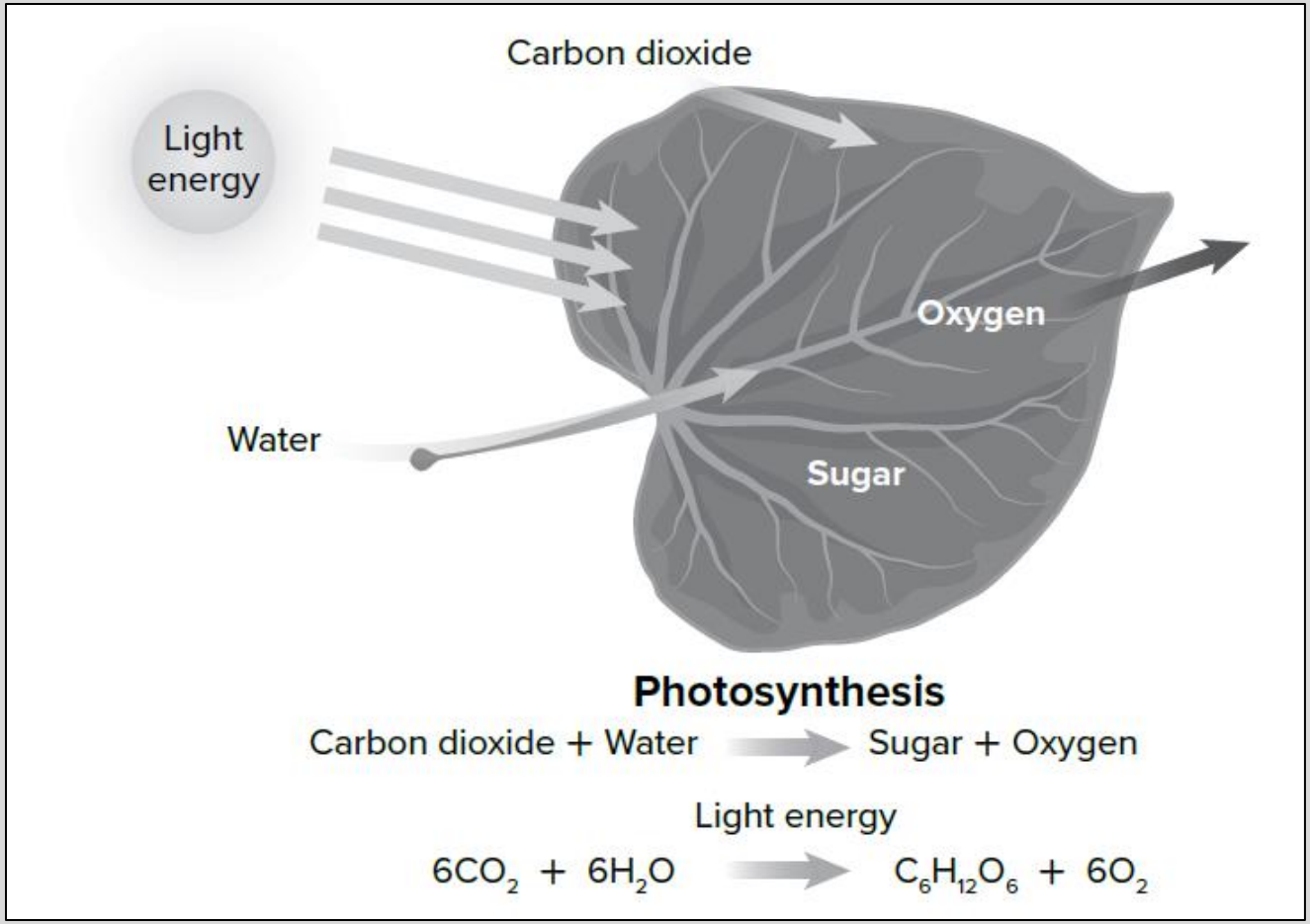
Steps of Photosynthesis *In plants only*

STEP 2: Making sugars

- In chloroplasts, carbon dioxide from the air is converted into sugars by using the energy stored and trapped by chlorophyll.

- Plants can store or use this sugar as an energy sou
  - Potatoes are examples of plant store excess su

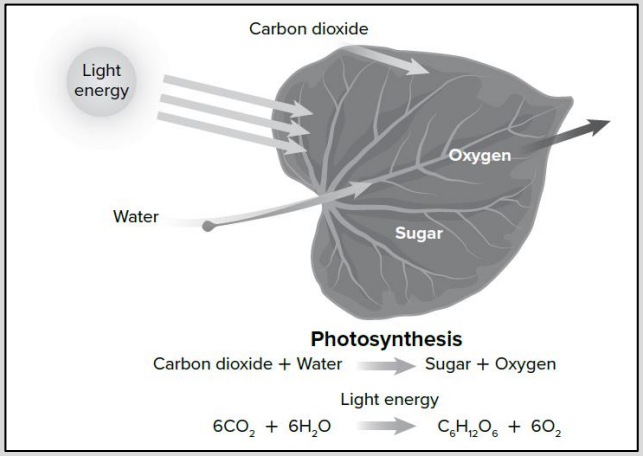
Photosynthesis *In plants only*



Photosynthesis produces most of the oxygen in Earth's atmosphere.

Photosynthesis *In plants only*

What is the best explanation of the change in energy shown in the model?



A New energy is produced by plants during photosynthesis.

B Large amounts of energy are released into the environment during photosynthesis.

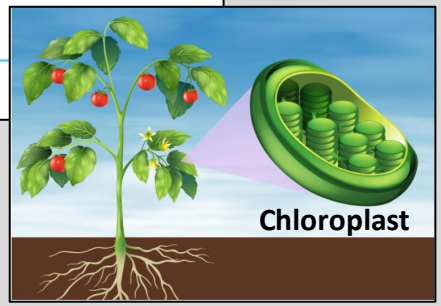
C Energy from sunlight is destroyed as it powers photosynthesis

D Energy input from the environment is stored in food molecules during photosynthesis.

Photosynthesis *In plants only*

4. **Construct an Explanation** A disease that destroys all the chloroplasts in a plant has been found in a plant population near your school. Using what you have learned from the text, what would be the effect of this disease?

If chloroplasts were destroyed, the plant will not absorb light or conduct photosynthesis. Without photosynthesis the plant would not have food and will die. This would reduce oxygen production and be harmful to organisms that feed on this plant.



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2	Describe the cellular respiration two steps process, the molecules (inputs & outputs), and the organelle involved and their functions	textbook and figures	19, 20

Cellular respiration

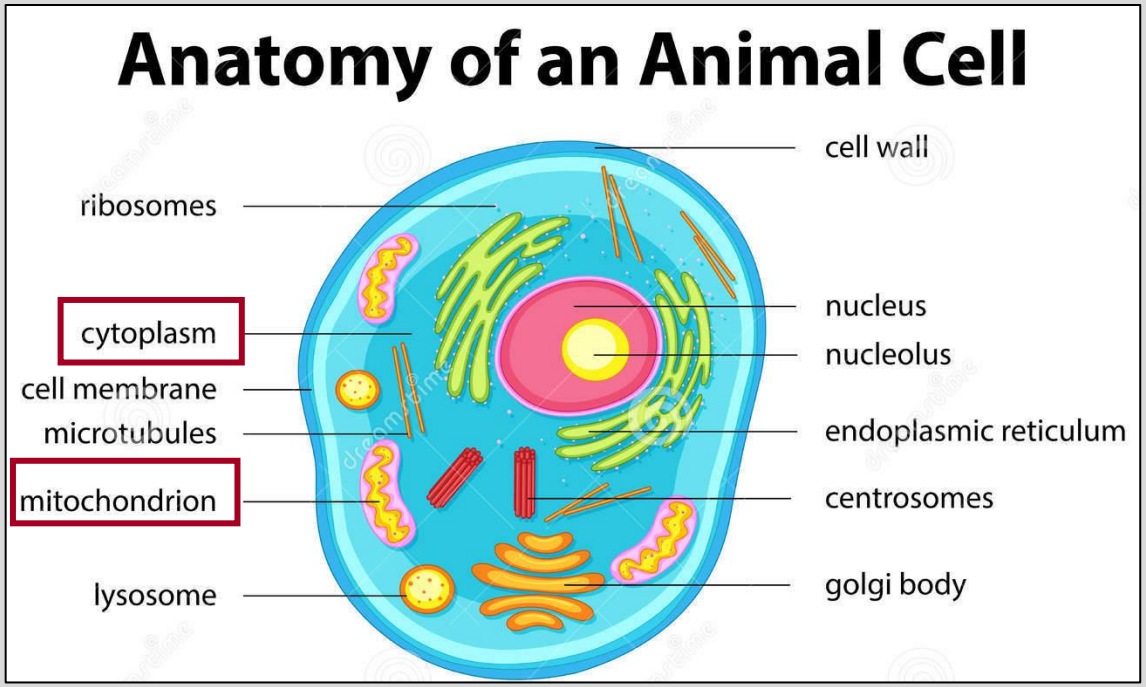
In plants, animals and human

Energy in food molecules become useable through a process called Cellular Respiration

Cellular respiration: is a series of chemical reactions that convert the energy in food molecules into a usable form of energy called ATP.

Cellular respiration occurs in two parts of a cell:

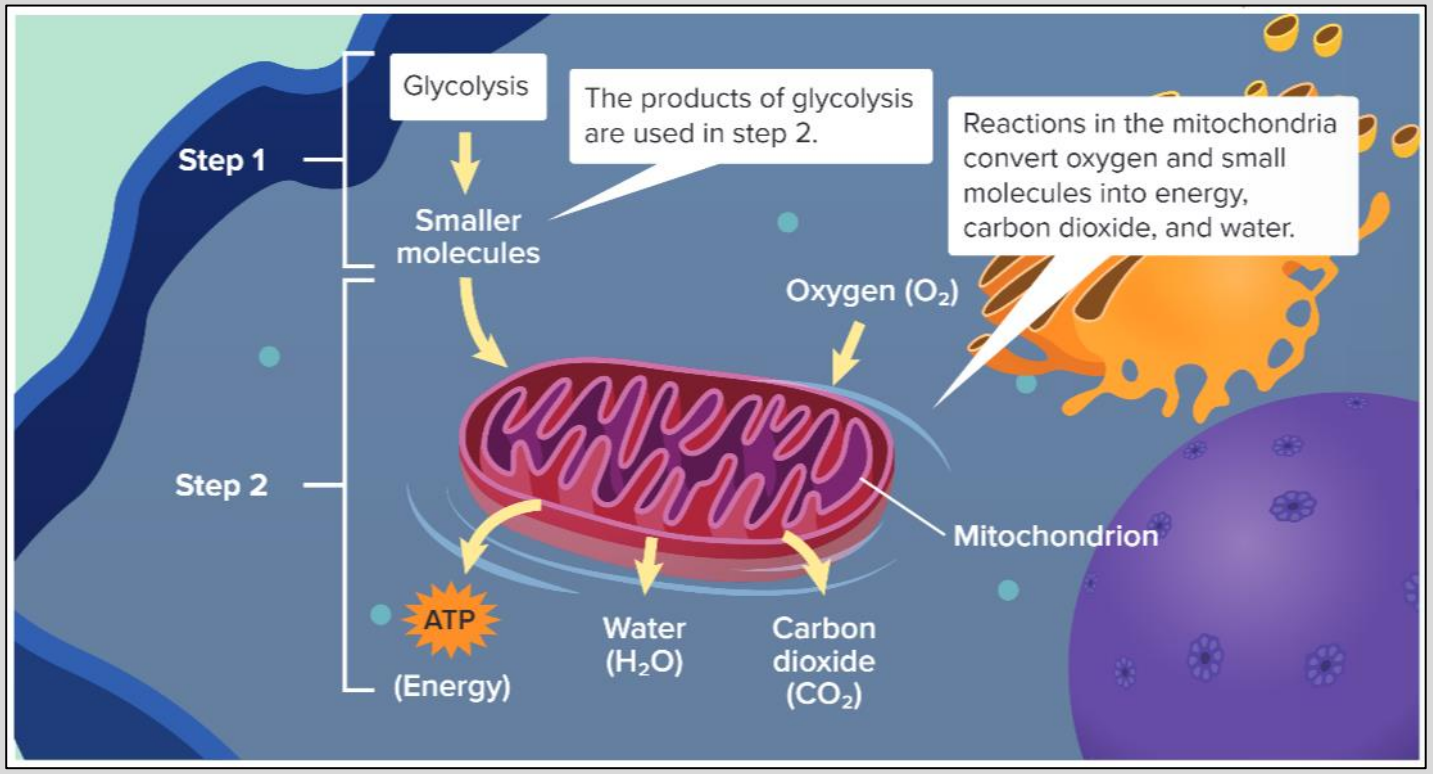
1. Cytoplasm
2. Mitochondria



Cellular respiration

In plants, animals and human

Cellular respiration is important because if your body did not break down food, you would not have energy to do anything.



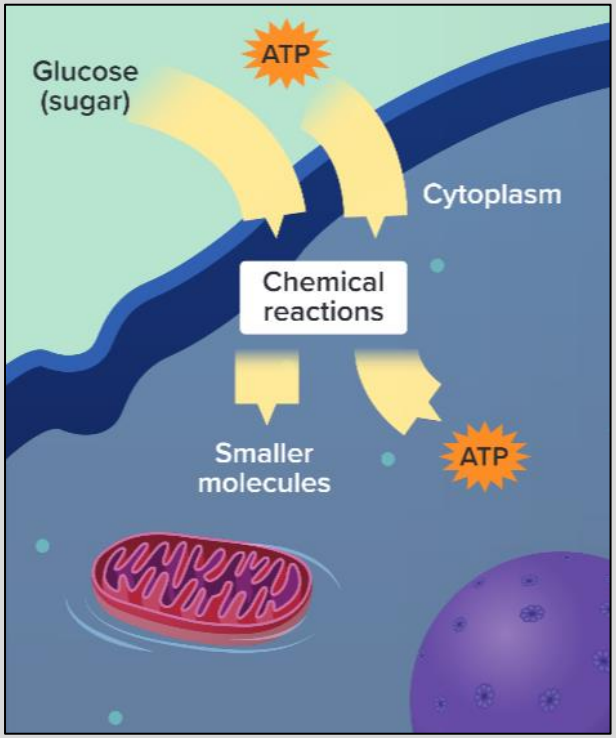
Cellular respiration *In plants, animals and human*

STEP 1:

- **This first step of cellular respiration is called glycolysis.**
  - **Glycolysis: is a process by which glucose (sugar), is broken down into smaller molecules.**

- It occurs in the cytoplasm of cells

STEP 1:



Cellular respiration *In plants, animals and human*

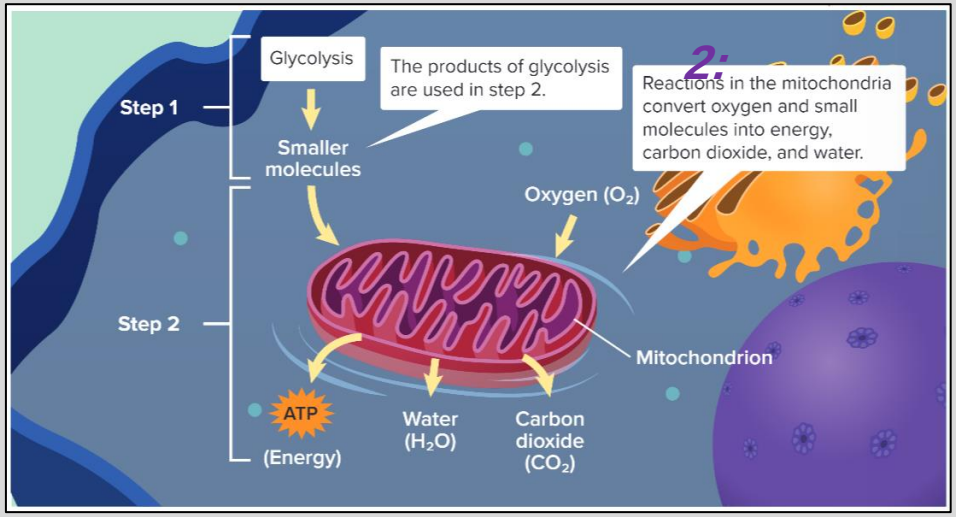
STEP 2:

- It occurs in the <u>mitochondria</u> of cells.

- The smaller molecules (from step 1) and energy are converted into energy (ATP), carbon dioxide and water.

Sugar + Oxygen → Energy (ATP) + Carbon Dioxide + Water

STEP 2:



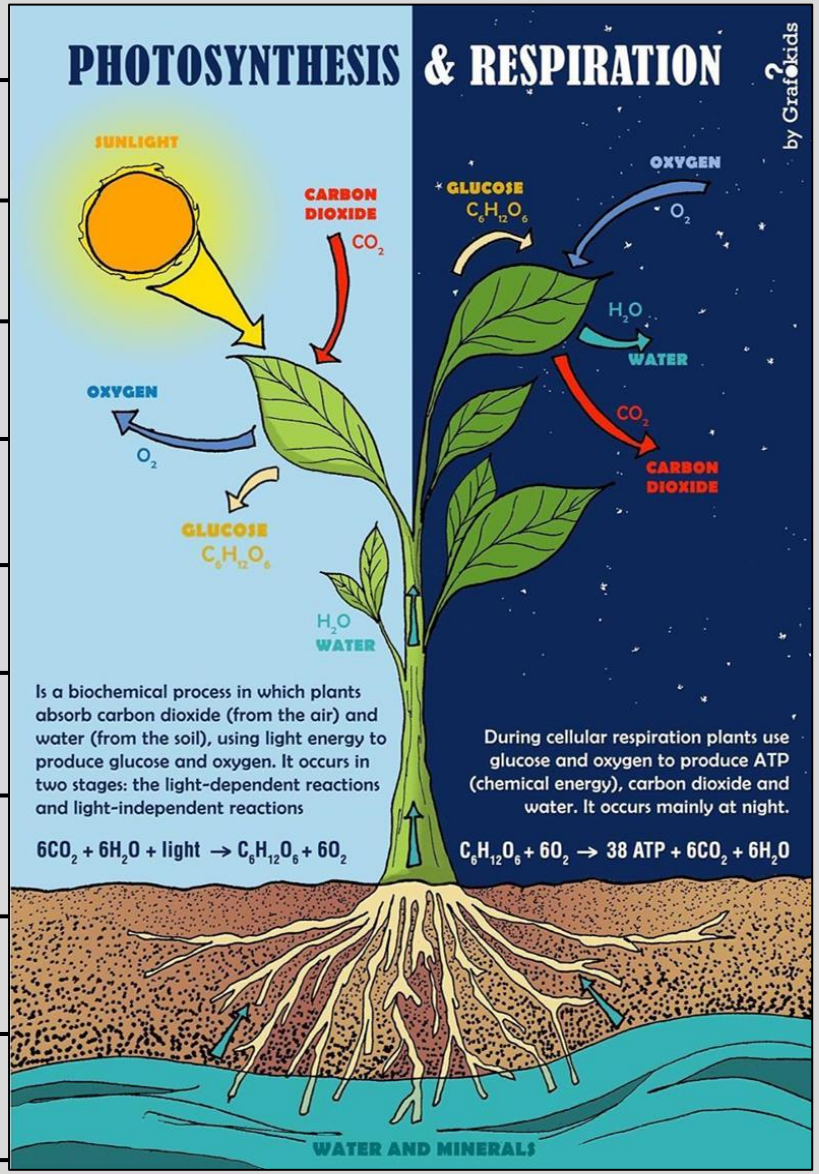
Photosynthesis vs. Cellular respiration

Photosynthesis:

When?	During Day time
Where?	Leaves (Chloroplast - chlorophyll)
In?	Carbon dioxide + water+ sunlight
Out?	Sugar + Oxygen

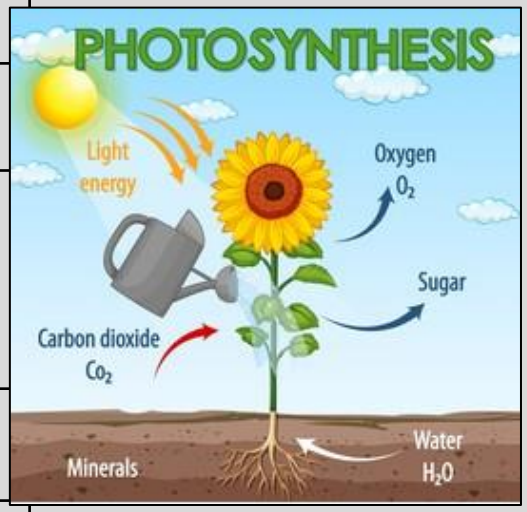
Cellular respiration:

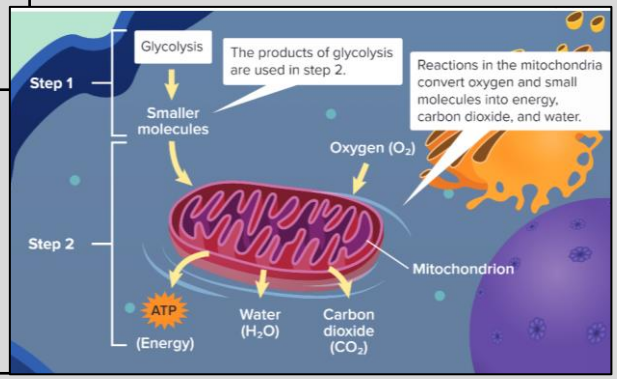
When?	At Night
Where?	Mitochondria + cytoplasm
In?	Sugar + Oxygen
Out?	Carbon dioxide + water + energy



Photosynthesis vs. Cellular respiration

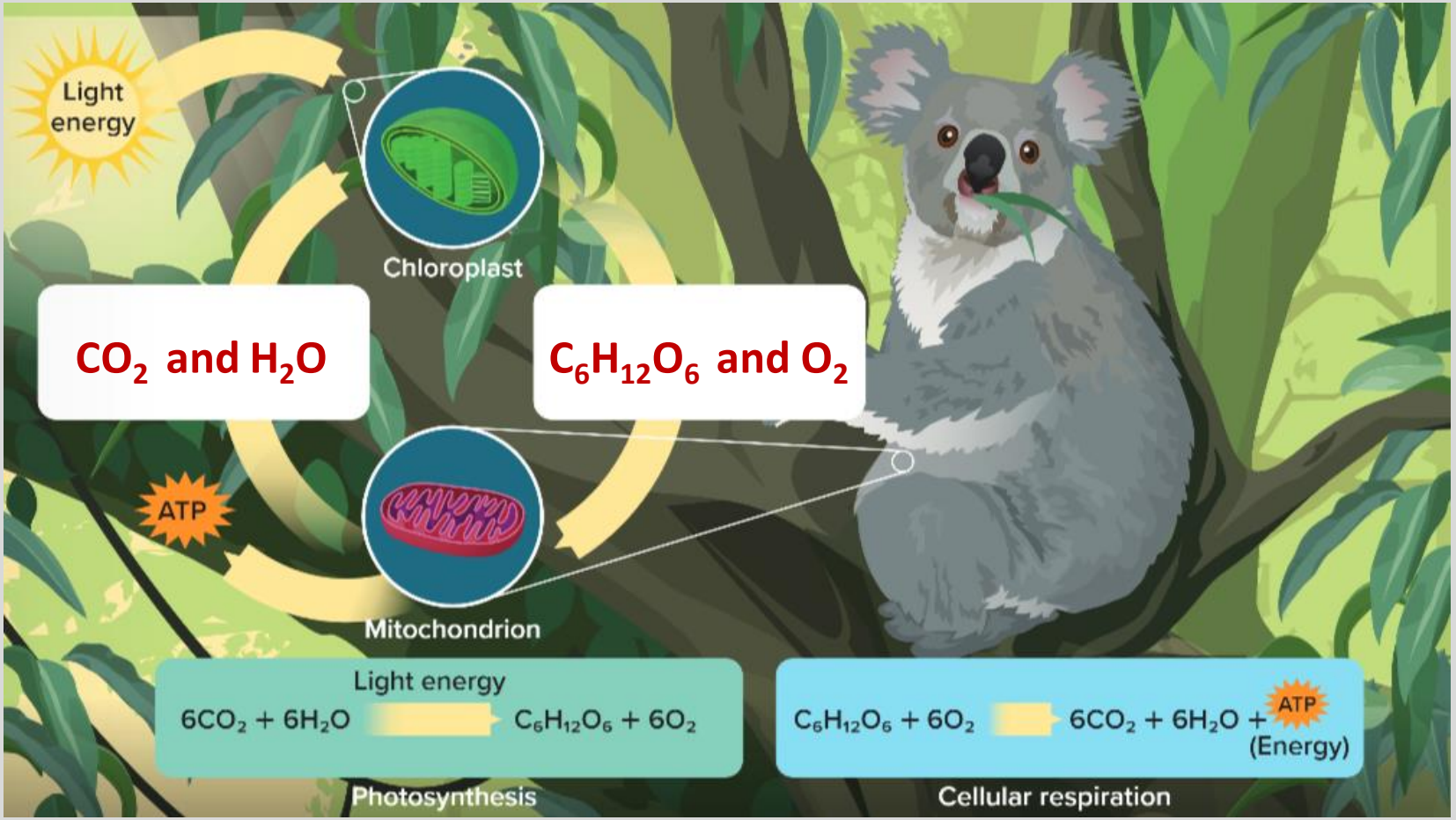
Photosynthesis (Plants and algae)	
Reactants (in)	**Products (out)**
Carbon dioxide (CO_2) Water	Oxygen (O_2) Glucose (sugar)
Cellular respiration (Plants, animals, human)	
Reactants (in)	**Products (out)**
Oxygen (O_2) Glucose (sugar)	Carbon dioxide (CO_2) Water





- The products of **photosynthesis** are used during **cellular respiration.**
- The products of **cellular respiration** are used during **photosynthesis.**

Photosynthesis vs. Cellular respiration



3	Differentiate between producers and consumers, identify and describe with examples the four types of consumers: Carnivores, Herbivores, Omnivores, and Detritivores	textbook and figures	31, 32

How different organisms get energy?

Producers: Living things that make their own food.

Producers can be:

Photosynthetic

They use **light energy** from

to make food

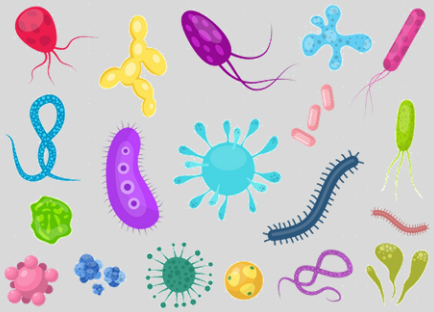
Example: plants

Chemosynthetic

They use **chemical energy**

to make food

Example: bacteria



How different organisms get energy?

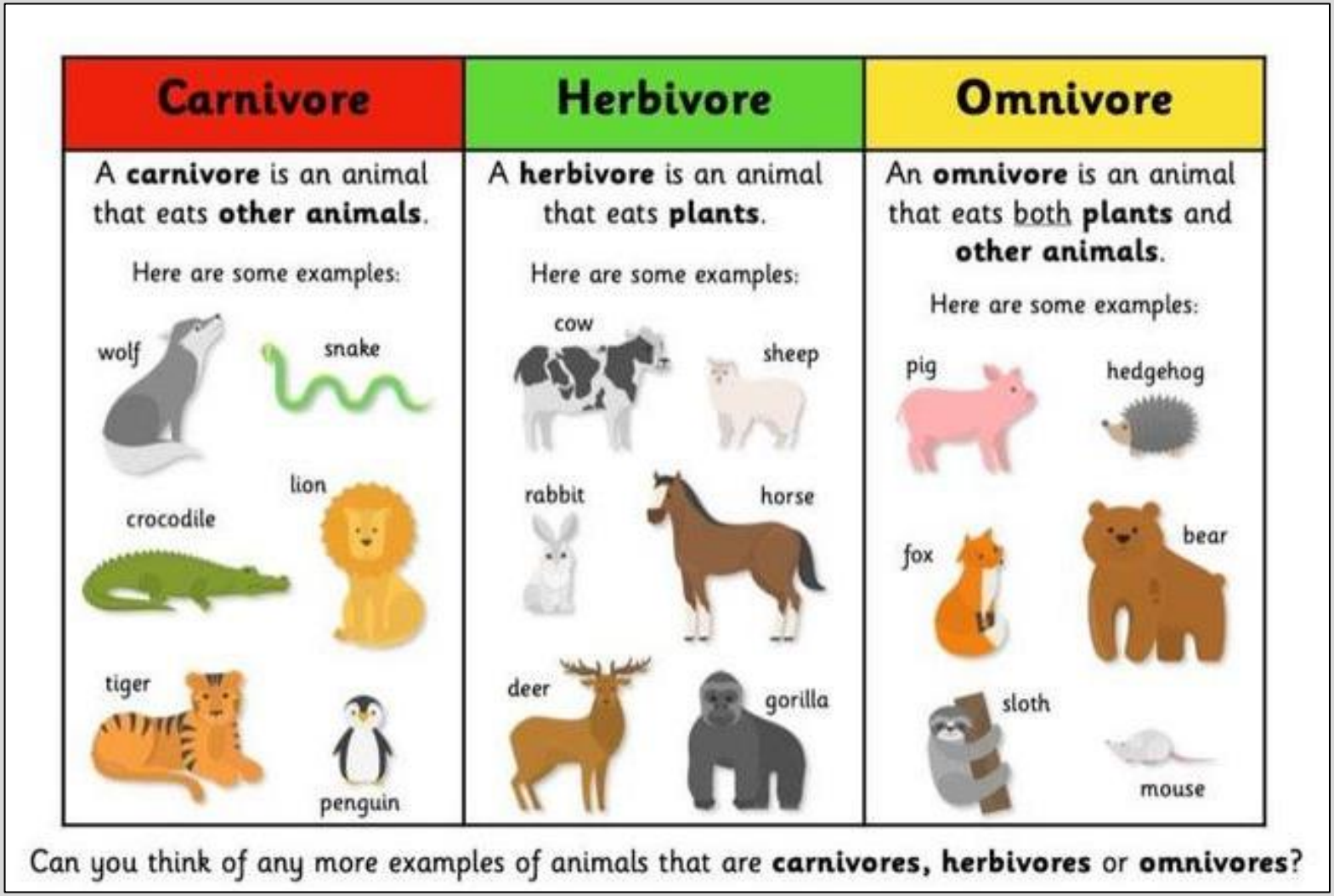
Consumers: ***Do not*** produce their own energy-rich food.

They get energy by consuming other organisms.

Consumers can be:

Herbivore	Carnivore	Omnivore	Detritivore
Eat only producers	Eat other animals	Eat producers and consumers	Eat the remain of other organisms

How different organisms get energy?



How different organisms get energy?

Detritivore (decomposer): get their energy by eating the remains of other organisms.

- Examples:

Mushroom

Bacteria

Mold

- During decomposing, they produce CO_2 that enters the atmosphere.
- They are important because:
  - They help keep ecosystems clean.
  - They add nutrient to the soil.

https://edpuzzle.com/media/613c73268287d8415d7c82c6

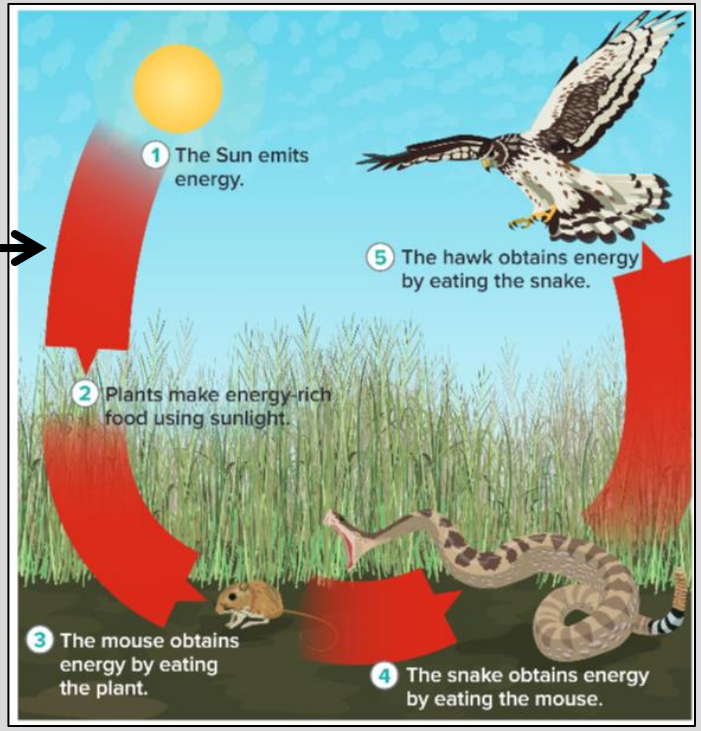
https://www.liveworksheets.com/2-oc1069589ly

4	Demonstrate how energy flows through an ecosystem in food chains, food web, and energy pyramid and differentiate between them	textbook and figures	35, 37, 38

Food chain

Food energy is transferred from one organism to another through feeding relationships.

Arrows show transfer of energy →



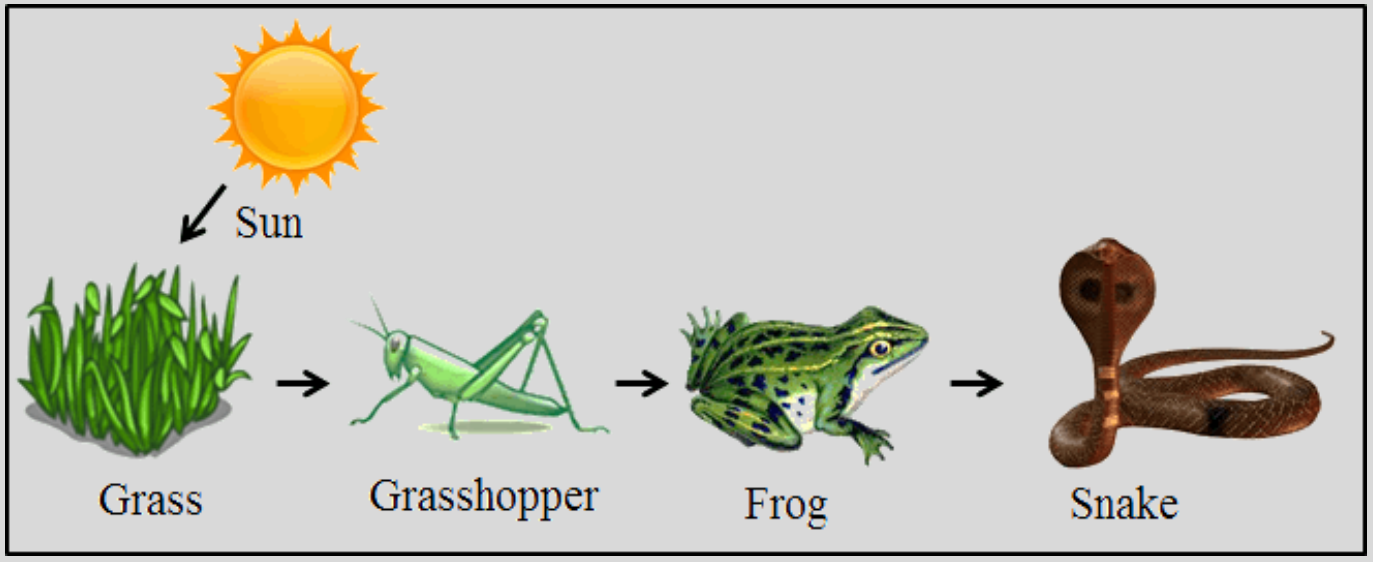
Energy decreases when it transfer from an organism to another

A food chain shows how energy moves from the Sun, to a producer, to one or more consumers through feeding relationships.

Sun → Producer → consumer 1 → consumer 2

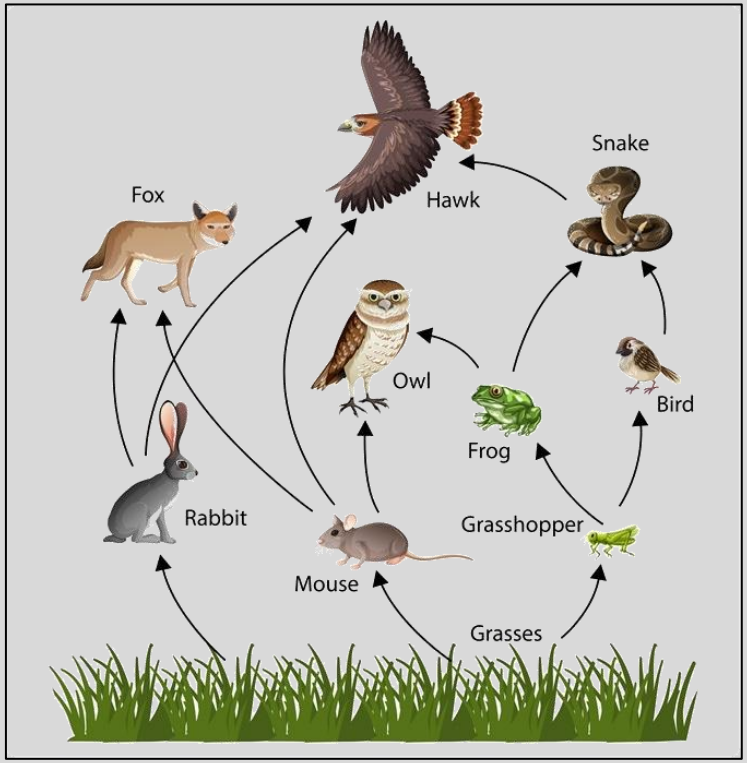
Food chain

Food chain does not show the whole picture of how energy is transferred in an ecosystem. That's because most living things eat more than one kind of food.



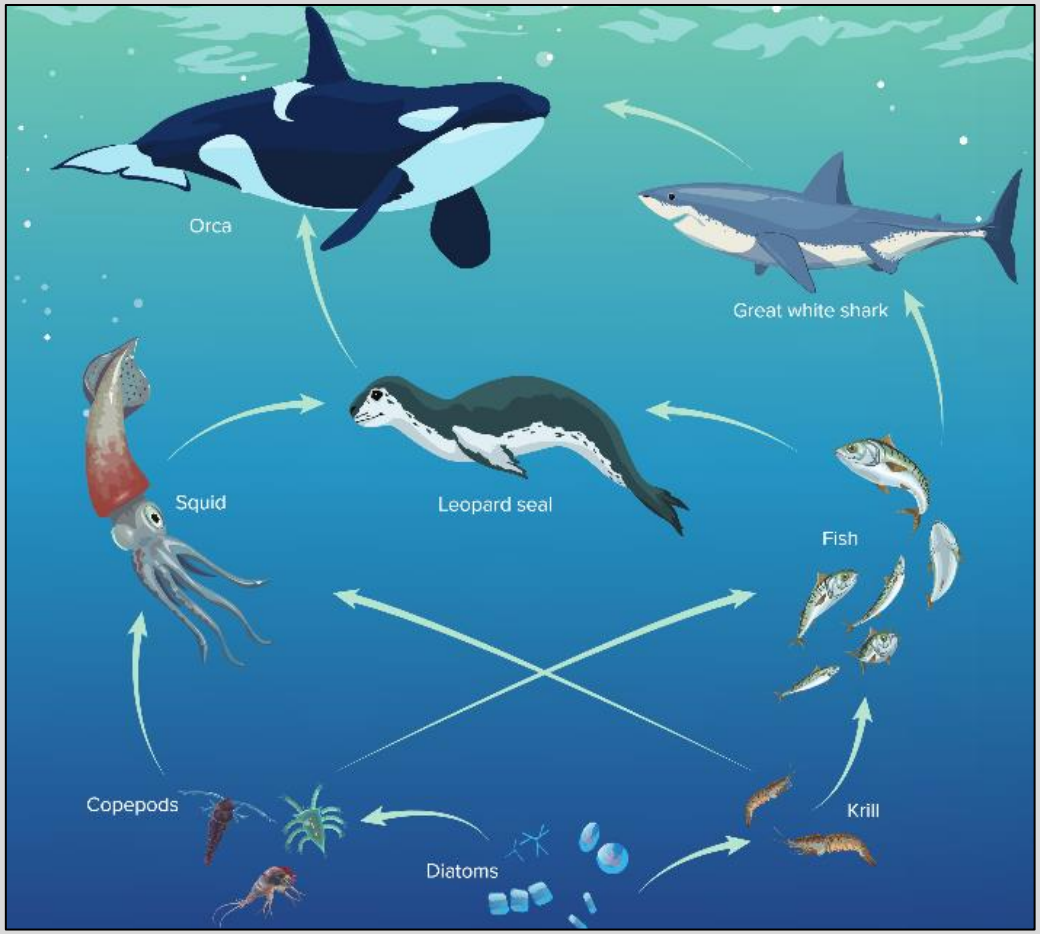
Food web

Food web: is a model of energy transfer that shows how food chains in a community are interconnected.



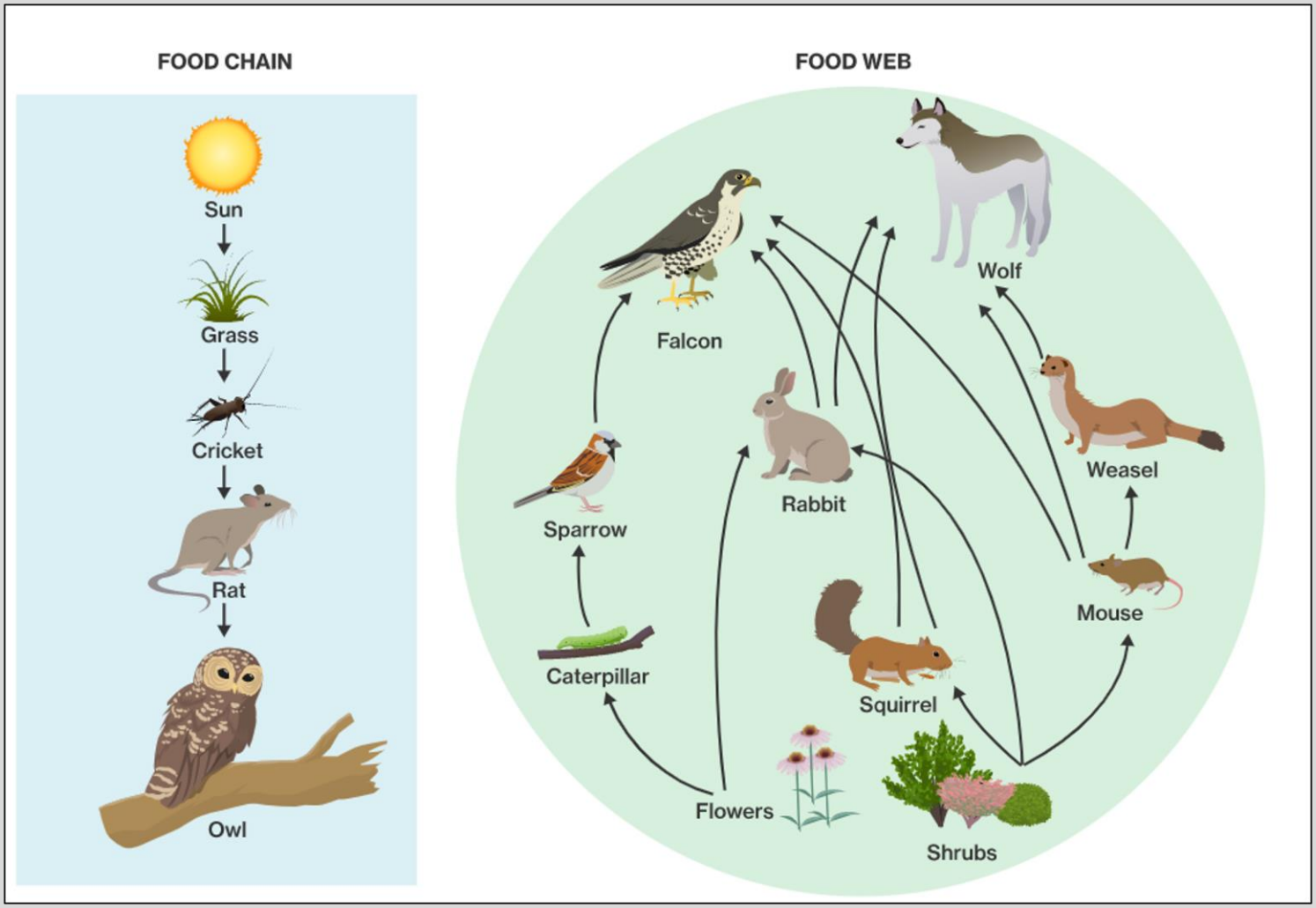
Can you find some food chains from this food web?

Food web



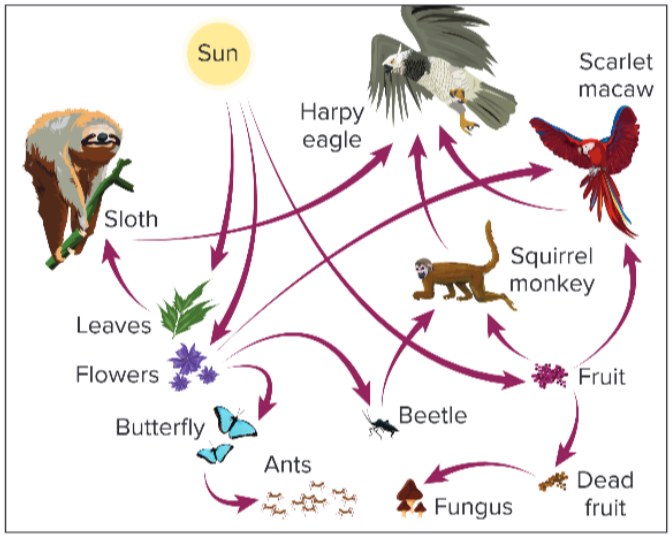
4. **Predict** what the effect would be if all great white sharks were removed from an aquatic ecosystem. Write a short radio ad explaining why sharks should be protected.

Food chain vs. food web



Food chain vs. food web

2. Analyze the food web. Which statement is correct?



A The model tracks the transfer of energy as energy flows in this ecosystem.

B The transfer of matter back into the environment occurs only at the detritivore level.

C The model shows the transfer of matter only.

D The decomposers in the model use matter but not energy for their life processes.

Energy pyramid

Energy pyramid: **to show the amount of energy available in each step of a food chain.**

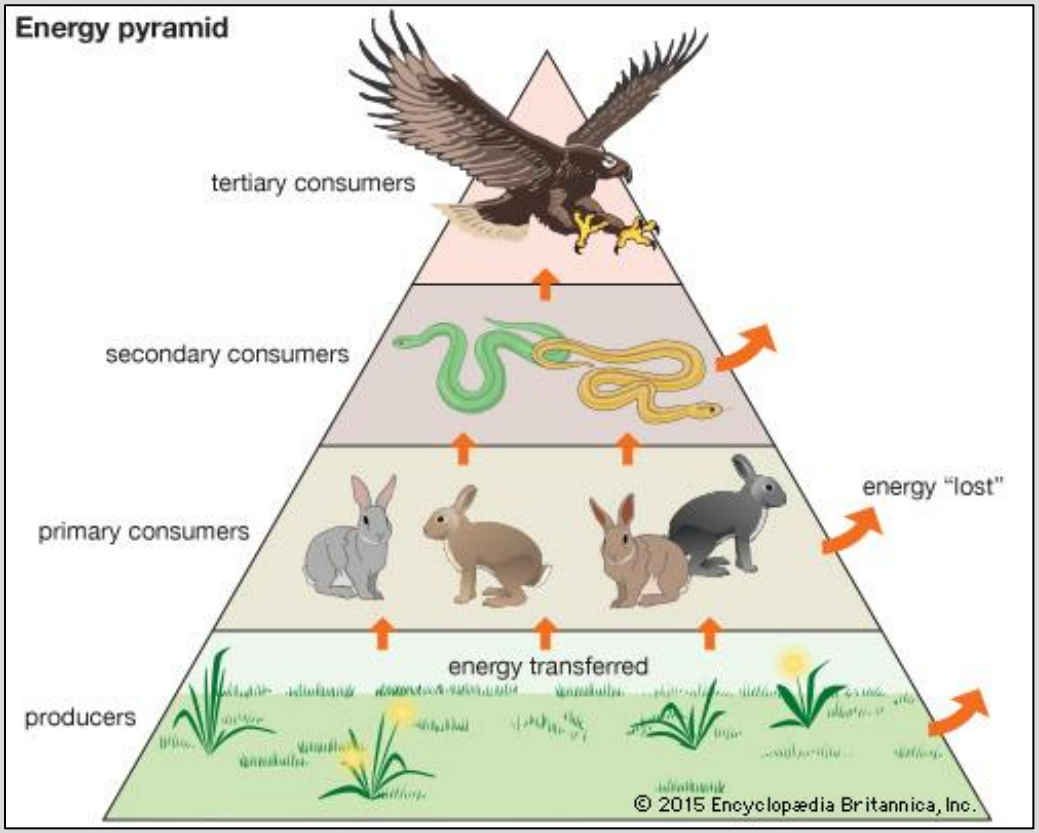
- **The steps of an energy pyramid are called *trophic***

Trophic level 4
0.1 %

Trophic level 3
1 %

Trophic level 2
10 %

Trophic level 1
100 %



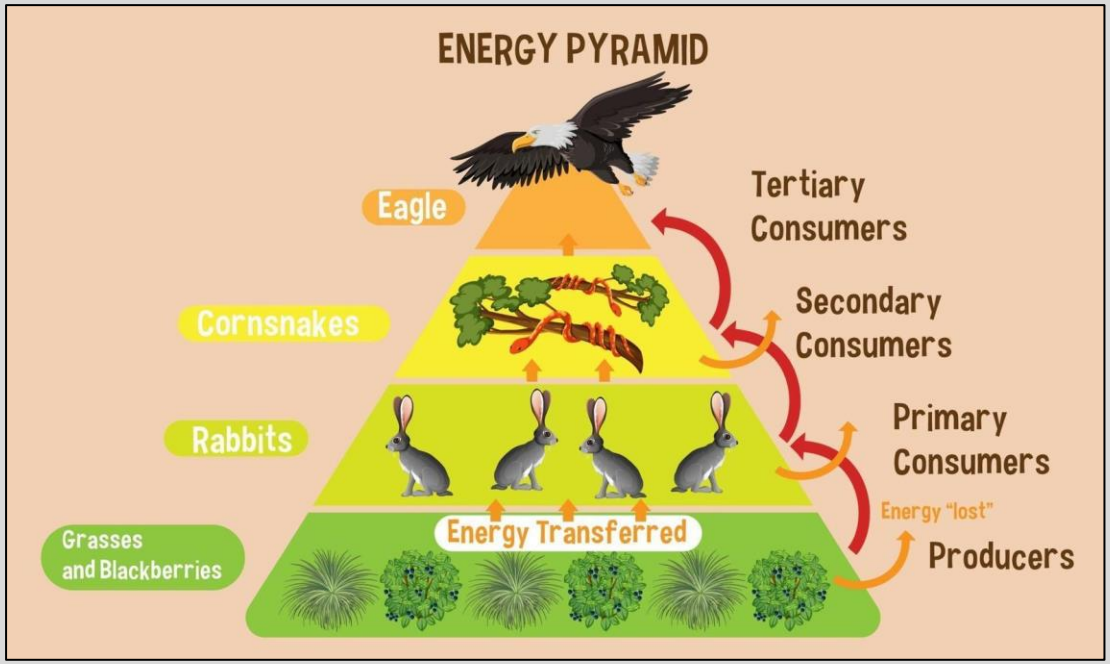
consumers

producer

Energy pyramid

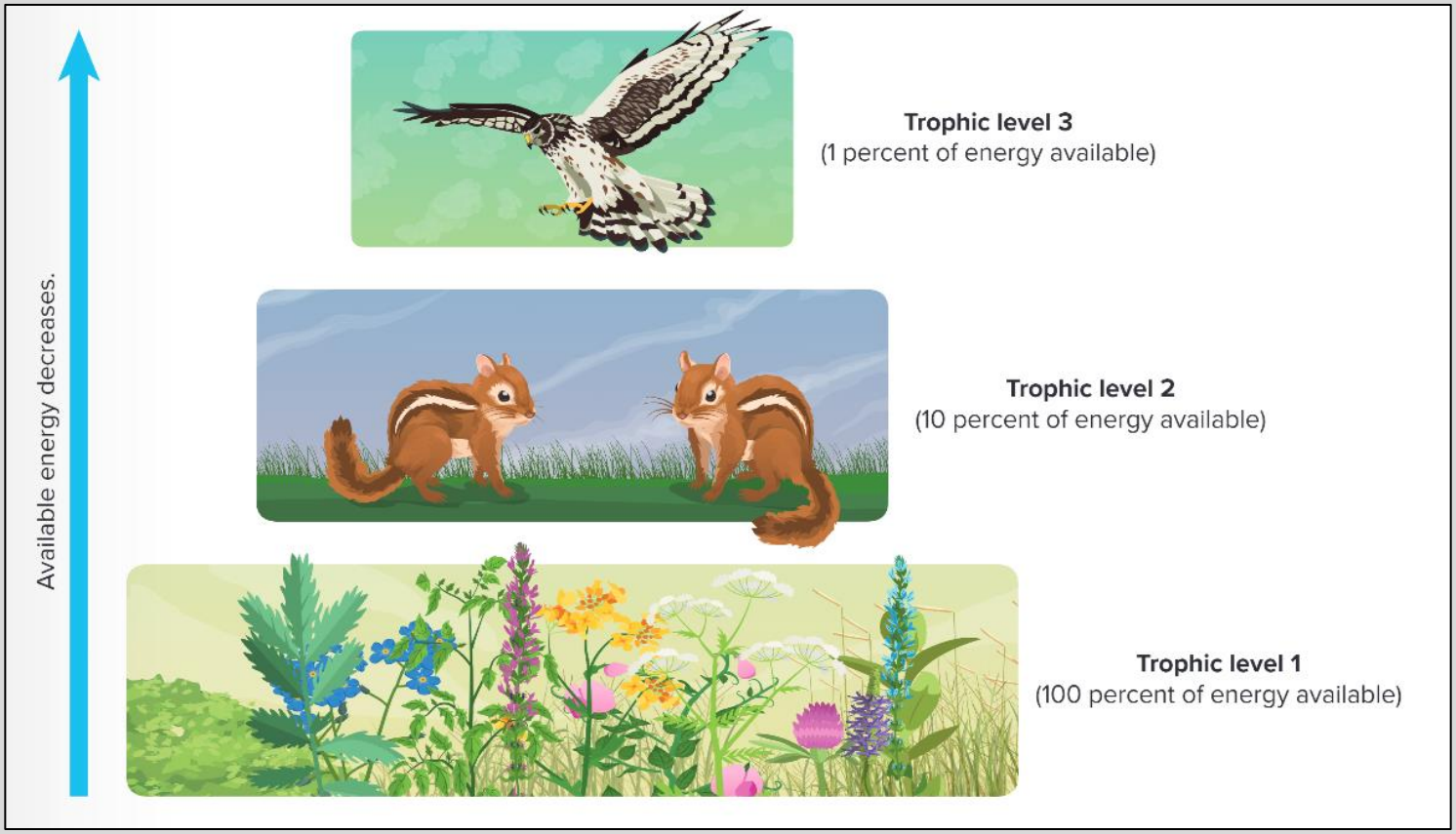
Energy

decreases



- Food pyramid start with _____producers_____.
- Each step of the pyramid is called _____trophic_____.
- ___10___% of the energy transfer form one trophic to the next one.

Energy pyramid



Energy pyramid

3. In an energy pyramid, approximately 10 percent of the energy available in one trophic level is transferred to the next level. Which statement helps explain why this occurs?

A Consumers eat both producers and other consumers.

B Organisms use most of the available energy to fuel their own life processes.

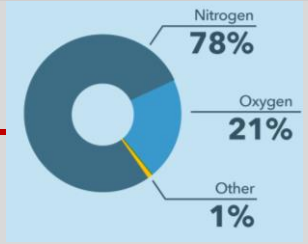
C Predators eat more organisms in their own level than organisms in other levels.

D Producers exist in only the lowest level of the pyramid.

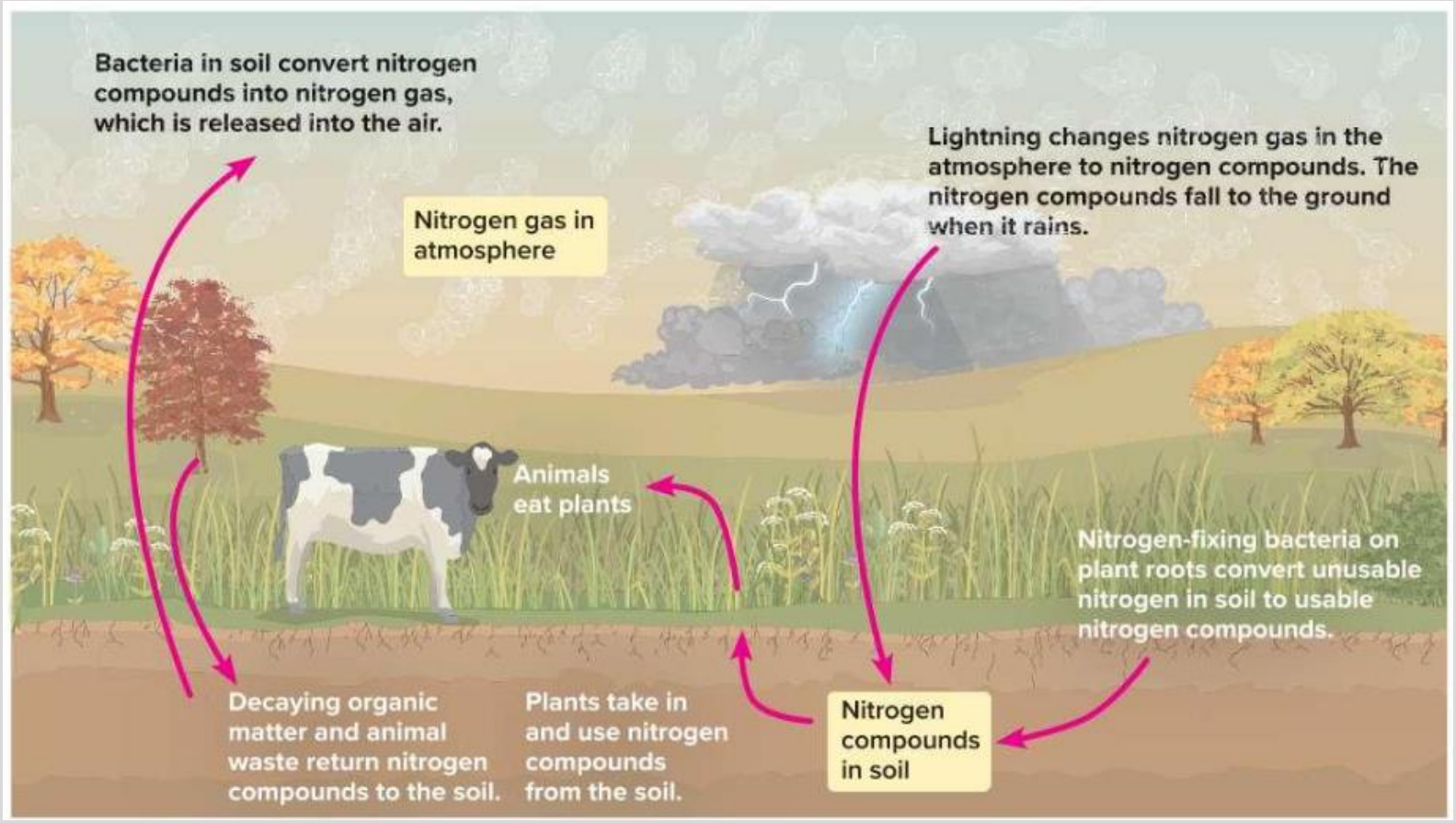
https://quizizz.com/admin/quiz/61402769feb819001d215f62

5	Describe and identify the steps of the nitrogen cycle, Explain what nitrogen fixing is and the different ways that it can occur in	textbook and figures	53

The Nitrogen cycle



The element nitrogen is necessary for life. Nitrogen is part of **Proteins** and **DNA**



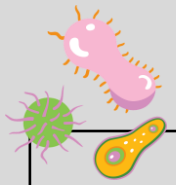
The Nitrogen cycle

Earth's atmosphere is mostly nitrogen. Plants and animals cannot use the form of nitrogen that is in the atmosphere. How do organisms get nitrogen into their bodies?

***The process that changes atmospheric nitrogen into nitrogen compounds that are usable by living things is called* nitrogen fixation.**

The Nitrogen cycle

Sources of nitrogen in environment



Atmosphere

changed into a different form with the help of bacteria that live in soil and water

Dead organisms

Decomposers can break down the tissues of dead organisms and return nitrogen to the environment

Organisms' waste

Called manure. It provides nitrogen to plants for better growth

- **Plants take nitrogen from soil and water**
- **Animals take in nitrogen when eating plants.**

The Nitrogen cycle

4. **Explain** the role of living things, such as yourself, in the nitrogen cycle.

Animals get nitrogen by eating plants. When animal die, they decompose, and nitrogen is released to the soil.

The oxygen cycle

- Almost all organisms need oxygen for cellular respiration.
- Oxygen is part of:

Water (H_2O) Carbon dioxide (CO_2)

- Most of the oxygen in the atmosphere comes from photosynthesis
- Humans and many other living organisms take in oxygen and release carbon dioxide during cellular processes.

Photosynthesis Equation:

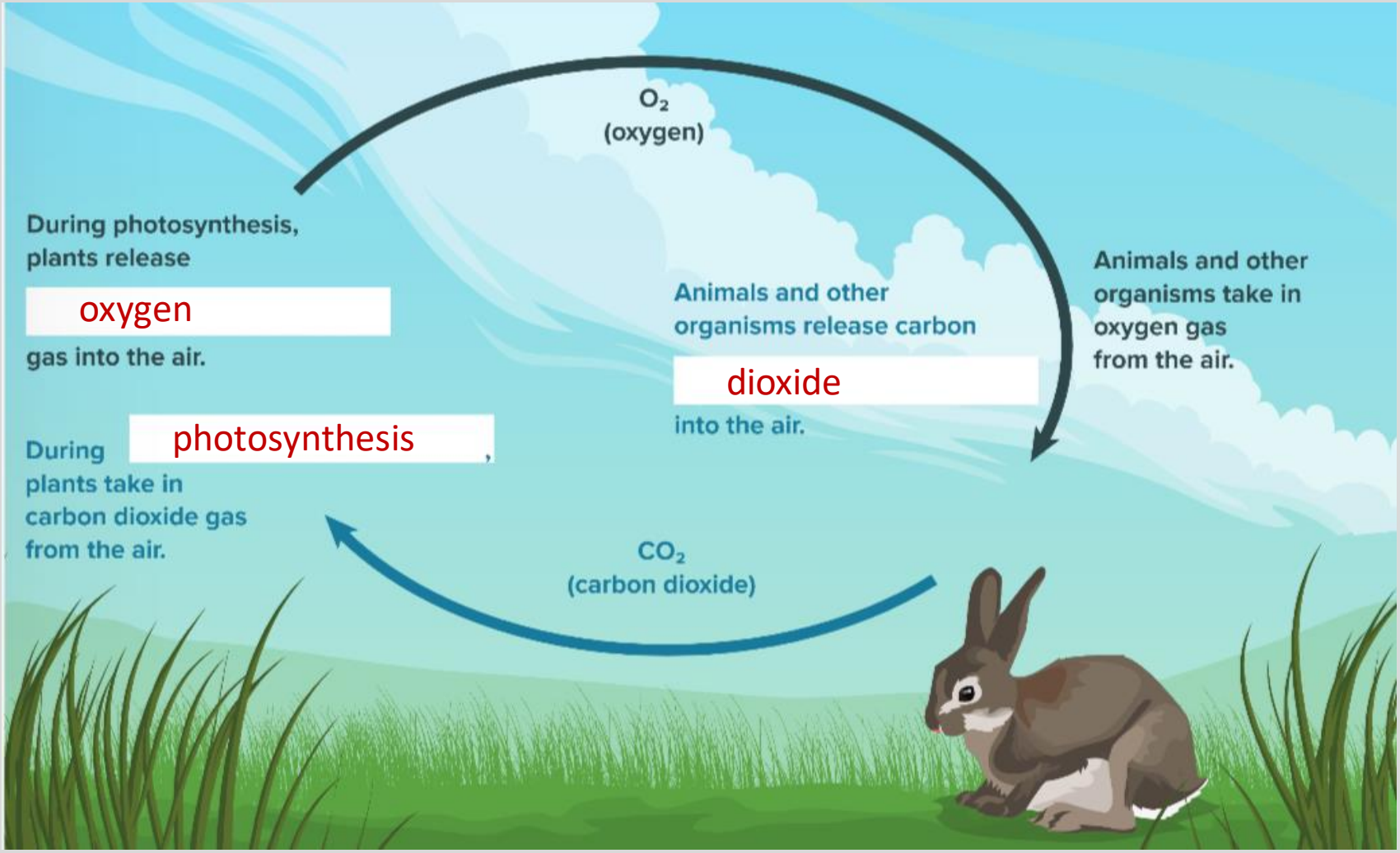
$6CO_2 + 6\ H_2O + \text{sunlight} \rightarrow C_6H_{12}O_6 + 6\ O_2$

Cellular Respiration Equation:

$C_6H_{12}O_6 + 6\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O + ATP$

- Phytoplankton release more than 50% of the oxygen in the atmosphere.

The oxygen cycle



7	Define Biosphere, and list what does it include	textbook and figures	74

Levels of organization in an environment

Can you think of living and nonliving things in your local ecosystem:

Living things:

Grass – palm trees – flowers – birds – cats – camels

Nonliving things:

Rocks – water – soil - sunlight

All the living things and nonliving things in an area make up an ecosystem.

Examples:

All the ecosystem make up biosphere.

Levels of organization in an environment

Organism/ individual: a single member of a species

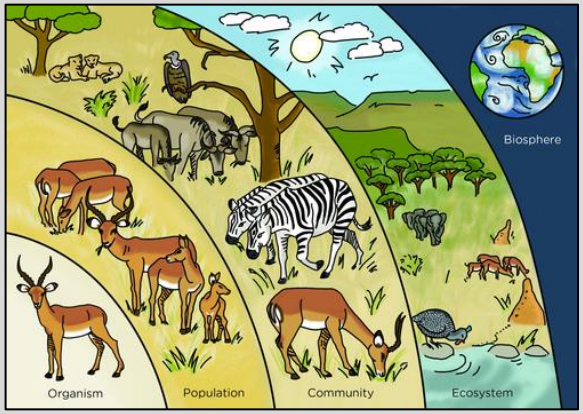
Species: a group of organisms that have similar traits and are able to produce fertile offspring.

Population: All the organisms of the same species they live in the same area at the same time.

Community: All the populations of different species that live together in the same area at the same time.

Ecosystem: All the living and nonliving things in an area.

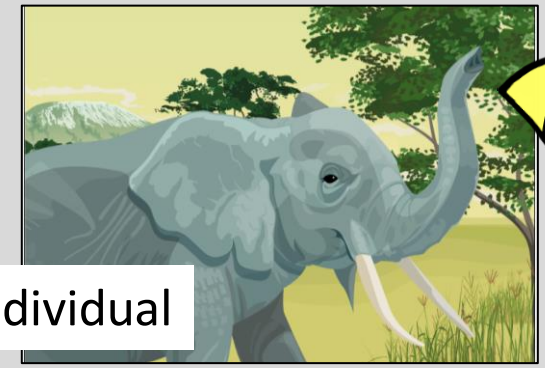
Biosphere: Where life is found.



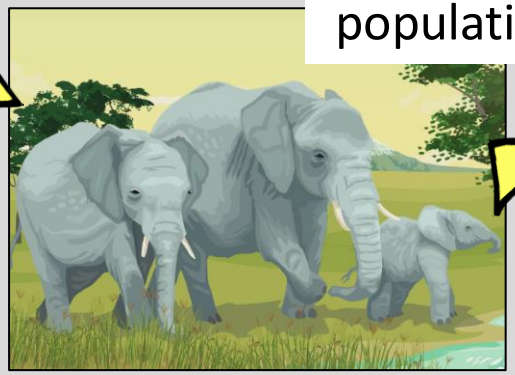
Levels of organization in an environment

Use the word in the box to name each level of organization:

Biosphere – Individual – Community – population – ecosystem



Individual



population

community

ecosystem

biosphere

8	Describe different factors that can affect the size and carrying capacity of a population, Analyze related graphs	textbook and figures	79

Limiting factors

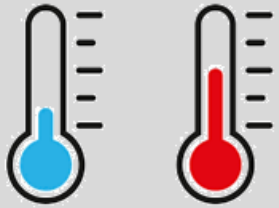
Limiting factor: **is anything that restrict the size of a population (it is anything that affect the number of individual in an ecosystem).**

Examples of environmental factos:

Water

Food

Sunlight



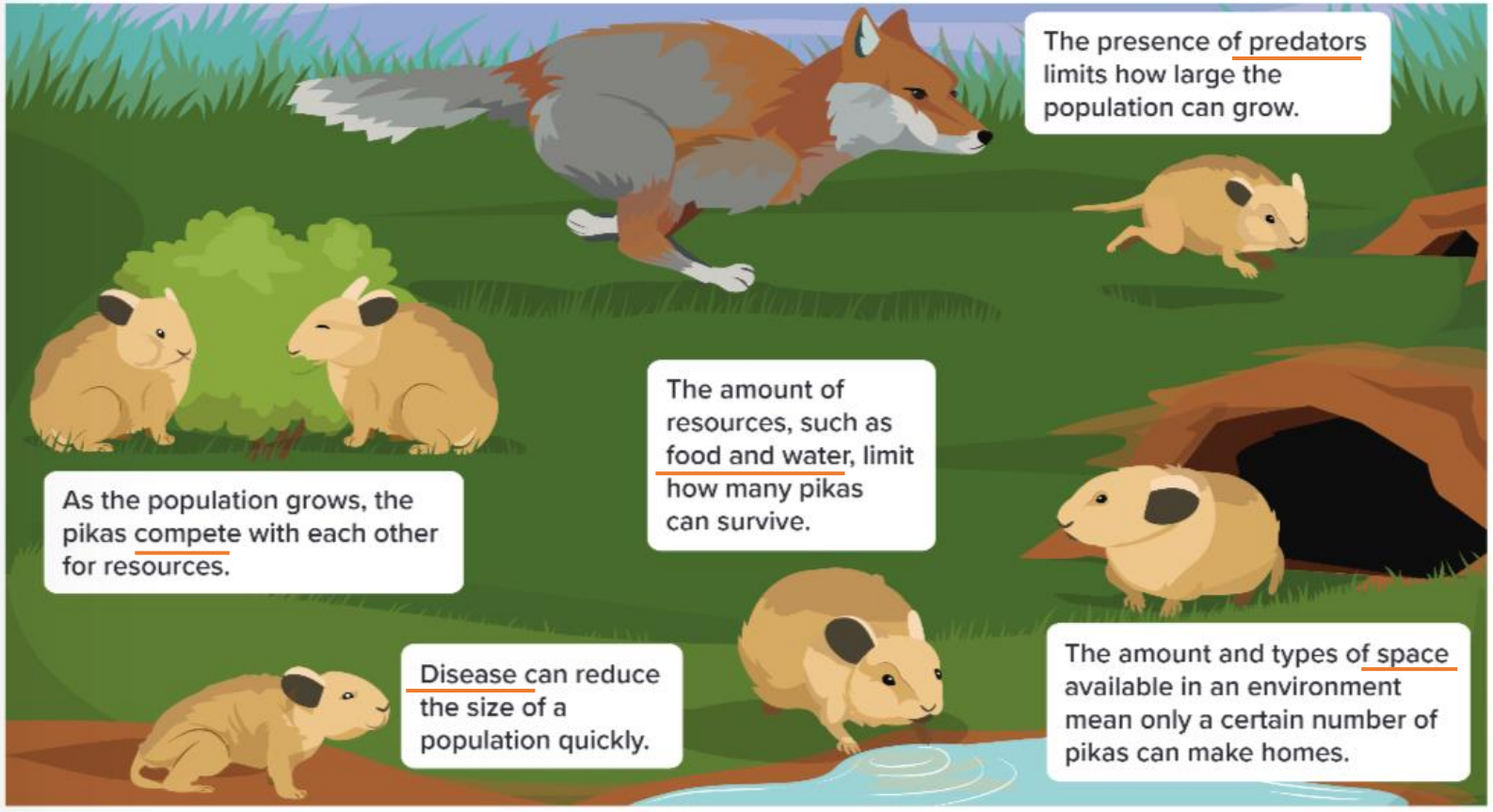
Temperature

How limiting factors affect the organisms?

- They may migrate to new areas
- They may die out

Limiting factors

Examine the figure of a population of pikas below. Read about how limiting factors affect their population and answer the following question.



How big can population get?

Biotic potential: **is the potential growth of a population if it could grow in perfect conditions with no limiting factors.**

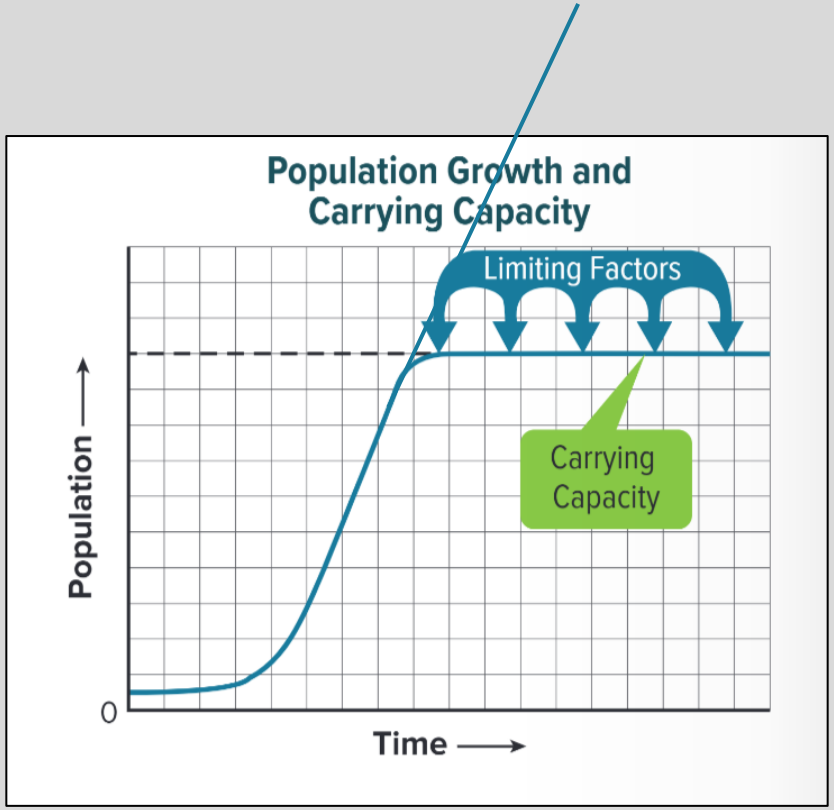
→ **NO POPULATION REACH THE BIOTIC POTENTIAL**

Carrying Capacity: **is the largest number of individuals of one species that an ecosystem can support over time.**

→ **POPULATION REACH THE CARRYING CAPACITY**

How big can population get?

Draw a line indicating a population reaching its biotic potential. Explain the reasoning behind your line:



Biotic potential means that the population will continue to grow without limits

How big can population get?

Study the graph then answer the following questions:

- What happen to the population between day 7 and day 23?

Increased

- What happen to the population after day 23?

Stayed the same

- How much is the carrying capacity?

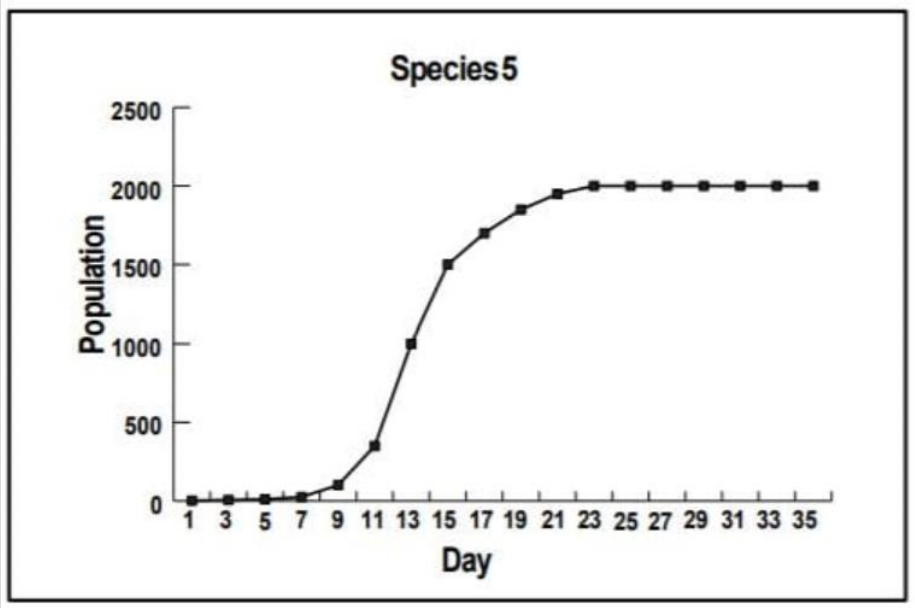
2000

- What was the population at day 15?

Around 1500

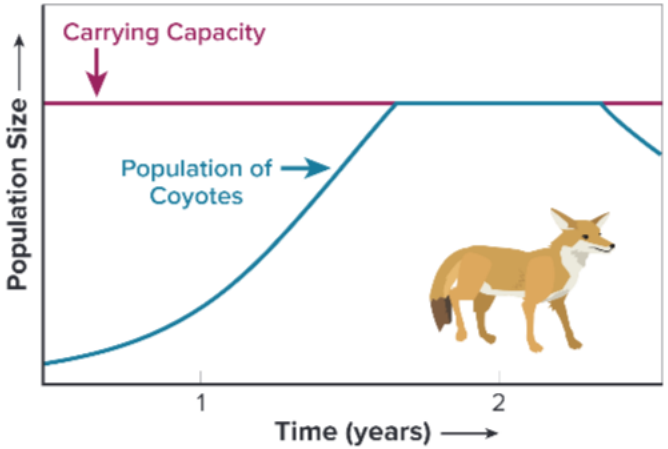
- In which day the population was 500?

Day 12



Limiting factors

Examine the graph, then answer the questions below.



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.

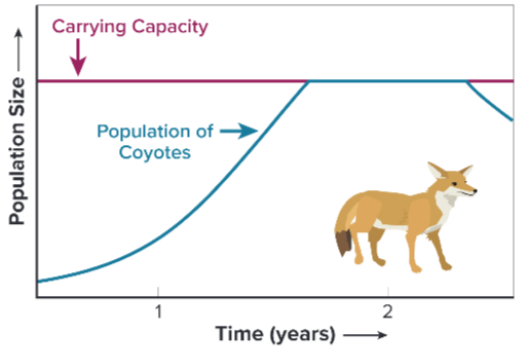
B The population size is decreasing.

C The population size is remaining the same.

D The population size cannot be inferred from the graph.

Limiting factors

Examine the graph, then answer the questions below.



3. Which of the following explains what happened to the coyote population size when it reached its carrying capacity, and why?

A The population size continued to increase because the ecosystem had not changed.

B The population size stopped increasing because it had reached the largest number of coyotes that the ecosystem could support.

C The population size became zero because the ecosystem could no longer support the coyote population.

D The population size can no longer be inferred from the graph once carrying capacity is reached.

Overpopulation

Overpopulation: **is when a <u>population's size grows so large</u> that it causes:**

1. Damage to the environment

2. Problems for other organisms

9	Describe different factors that can affect the size and carrying capacity of a population	textbook	80

Population size decrease

Population size can also decrease, because of things like extreme weather and natural disasters:

Winter "Less food"

Floods

Fires

Volcanic Eruption

Population size decrease

What happen to species that see large decrease in population size?

معرضة للخطر

1

Threatened species

A species at a risk but not yet endangered

sea otter

مهددة بالانقراض

2

Endangered Species

A species whose population is at risk of extension

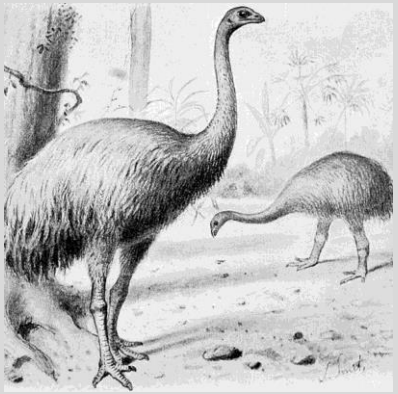
Mountain gorilla

منقرضة

3

Extinction

Is a species that has died out and no individuals are left



Giant Moa

10	Define commensalism and give examples on it	textbook and figures	94
11	Compare and contrast mutualism, commensalism, and parasitism, and give examples	textbook and figures	95

Symbiotic relationships

	Example	Organism 1	Organism 2	Name of the relationship
1		✓ Benefitting	⊖ Not Affected	commensalism
2		✓ Benefitting	✓ Benefitting	mutualism
3		✓ Benefitting	✗ Harmed	parasitism

How do living things interact in an ecosystem

Write any observation you make about characteristic of each relationship:

Cattle egrets live near cattle because the cattle kick up insects and worms while grazing. These are food sources for the bird.

commensalism

Observations:

Egrets: are benefiting

Cattle: Not affected

How do living things interact in an ecosystem

Write any observation you make about characteristic of each relationship:

Bees receive nectar they need to make honey by harvesting it from beebalm flower. Travelling between plants, the bees being pollen from one flower to another resulting in pollution.

mutualism

Observations:

Both organisms are benefitting

How do living things interact in an ecosystem

Write any observation you make about characteristic of each relationship:

Fleas and ticks are tiny animals that can live on cats and dogs. They feed off of the blood of the host they live on which can cause illness in the cat or dog.

parasitism

Observations:

Flea: benefiting

Dogs and cats: harmed

Examples

Mutualism (helped)	**Commensalism** (not affected)	**Parasitism** (harmed)
Ladybugs and plants. The ladybug gets food (aphids) from plants. The plant gets aphids removed.	Barnacles on the skin of a whale.	Ticks, fleas and mosquitoes biting a dog. They eat the blood of animals.
Crocodiles and plovers. The plovers clean food from the crocodiles' teeth.	Cattle egrets and cattle. The cattle egret will eat insects that have been stirred up when the cattle forage.	Tape worms in cattle. The tape worms live and feed inside the cattle and will make them ill.
Cleaner fish (like shrimp) and larger fish (like sharks). The cleaner fish eat food scraps and pieces of dead skin from the bigger fish.	A spider building a web in a tree.	Aphids on a plant. The plant can get sick as the aphids feed off it.

12	Describe the importance of interactions within ecosystems in how to remain a healthy ecosystem	textbook and figures	98

Other types of relationships

Other types of relationships

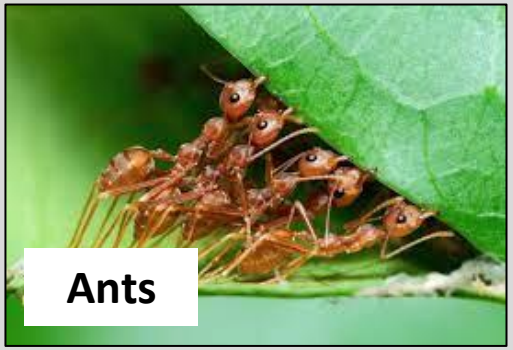
- Cooperative Relationships — علاقة تعاونية
- Predator-Prey Relationships — العلاقة بين المفترس والفريسة
- Competitive Relationships — علاقة تنافسية

Other types of relationships

Cooperative relationships:

- Animals work together in cooperative relationships for their survival.
- Cooperative relationship can be found in many different population.

Examples:



Why do animals cooperate with each other?

- To hunt for food
- To watch for danger
- To raise young

Other types of relationships

Predator - Prey relationships:

مفترس فريسة

- The relationship in which one organism, the **predator**, eats another, the **prey**.
- Predators prevent prey populations from growing too large.
- Predators mostly capture weak or injured preys.

Example:

Predator: Osprey

Prey: Fish

Predator: Fox

Prey: Rabbit

Predator: Lion

Prey: Zebra

Other types of relationships

Competitive relationships:

- It is the interaction between two or more organisms that need the same resource at the same time.
- This happens between organisms that share the same habitat.

Examples:

Trees compete for sunlight

Wolves compete with ravens for meat

13	Identify changes in ecosystems and their causes, identify examples of ecological succession	textbook and figures	108

How do land ecosystems change?

Ecological Succession: is the process of one ecological community gradually changing into another.

- Ecological succession occur in a series of steps.

Example: The growing of plants

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

- Stable communities ⟶ No major changes

How do land ecosystems change?

Ecological succession

Primary succession

Secondary succession

https://edpuzzle.com/media/633db4586710c440df2df4e3

How do land ecosystems change?

Primary succession:

Ecological succession in new areas of lands with little or no soil or plants

Example:

During a volcanic eruption, molten lava flows over the ground and into the water. After the eruption is over, the lava cools and hardens into bare rock.

Lichen spores carried on the wind settle on the rock. They break down the rock which builds up soil. Lichens add nutrients to the soil as they die and decay.

Airborne spores from mosses and ferns settle onto the thin soil and add to the soil when they die. The soil gradually becomes thick enough to hold water. Insects and other small organisms move into the area.

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

Lichen 

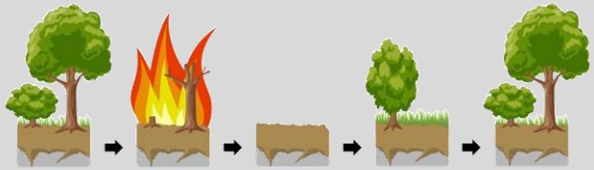
المرحلة الأخيرة –
مرحلة الاستقرار

How do land ecosystems change?

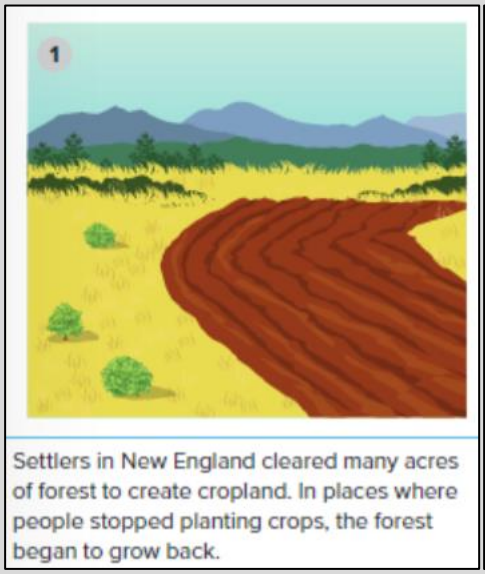
Secondary succession:

Ecosystem → destroyed → New ecosystem

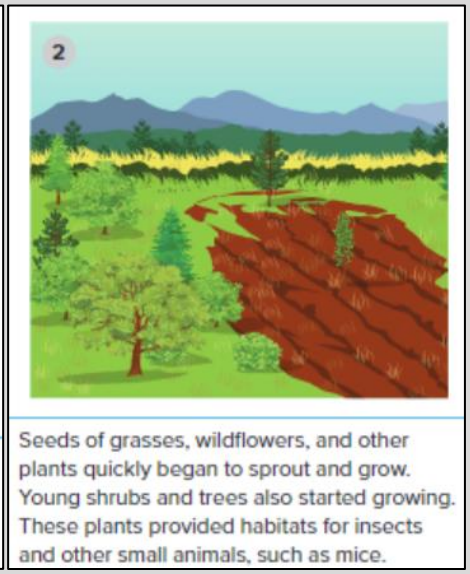
Ecosystems can be destroyed because of fire, floods, removing trees



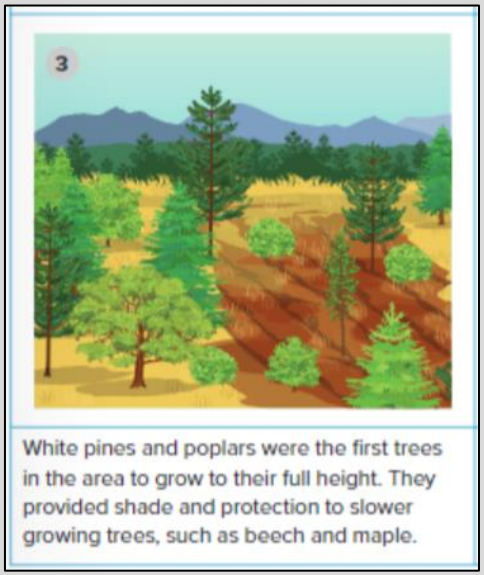
Example:



Settlers in New England cleared many acres of forest to create cropland. In places where people stopped planting crops, the forest began to grow back.



Seeds of grasses, wildflowers, and other plants quickly began to sprout and grow. Young shrubs and trees also started growing. These plants provided habitats for insects and other small animals, such as mice.



White pines and poplars were the first trees in the area to grow to their full height. They provided shade and protection to slower growing trees, such as beech and maple.

Eventually, a climax community of beech and maple trees developed. As older trees died, new beech and maple seedlings grew and replaced them.

المرحلة الأخيرة – مرحلة الاستقرار

How do land ecosystems change?

	Primary	Secondary
Time	Takes longer time	Takes shorter time
Is there soil at the beginning?	NO	YES
Begins as a result of …	Volcanos/ glaciers	Natural disaster/ human activities
What plants come first?	Lichen and moss	Seeds and roots already exist
Final stage	Climax Community	

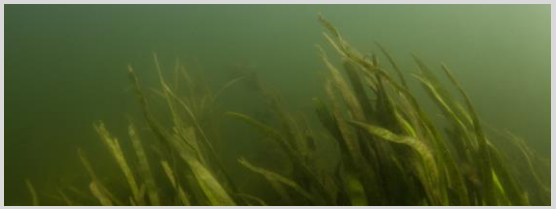
water

How do aquatic ecosystems change?

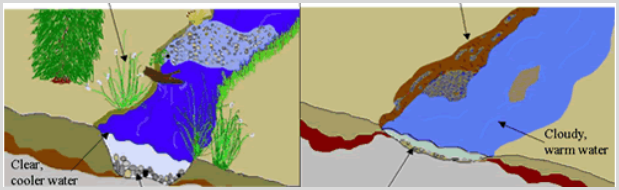
What are the negative impacts of sedimentation?

Habitat loss

Cause flooding

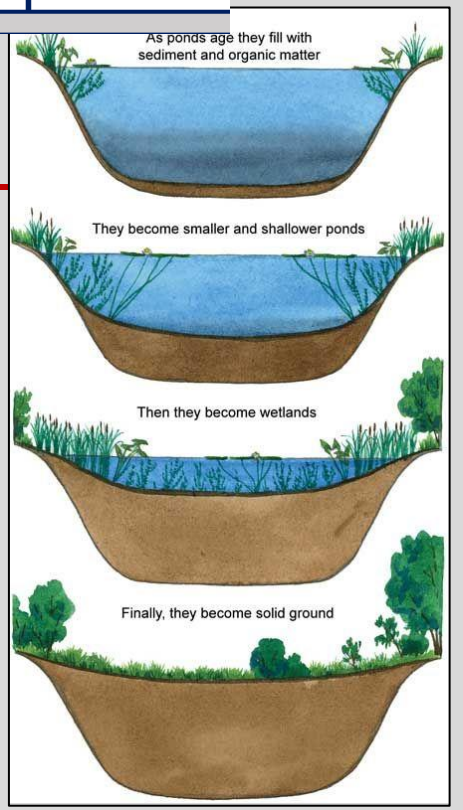


Prevent light from reaching plants



Coastline changes

Reduce visibility → difficult to find food

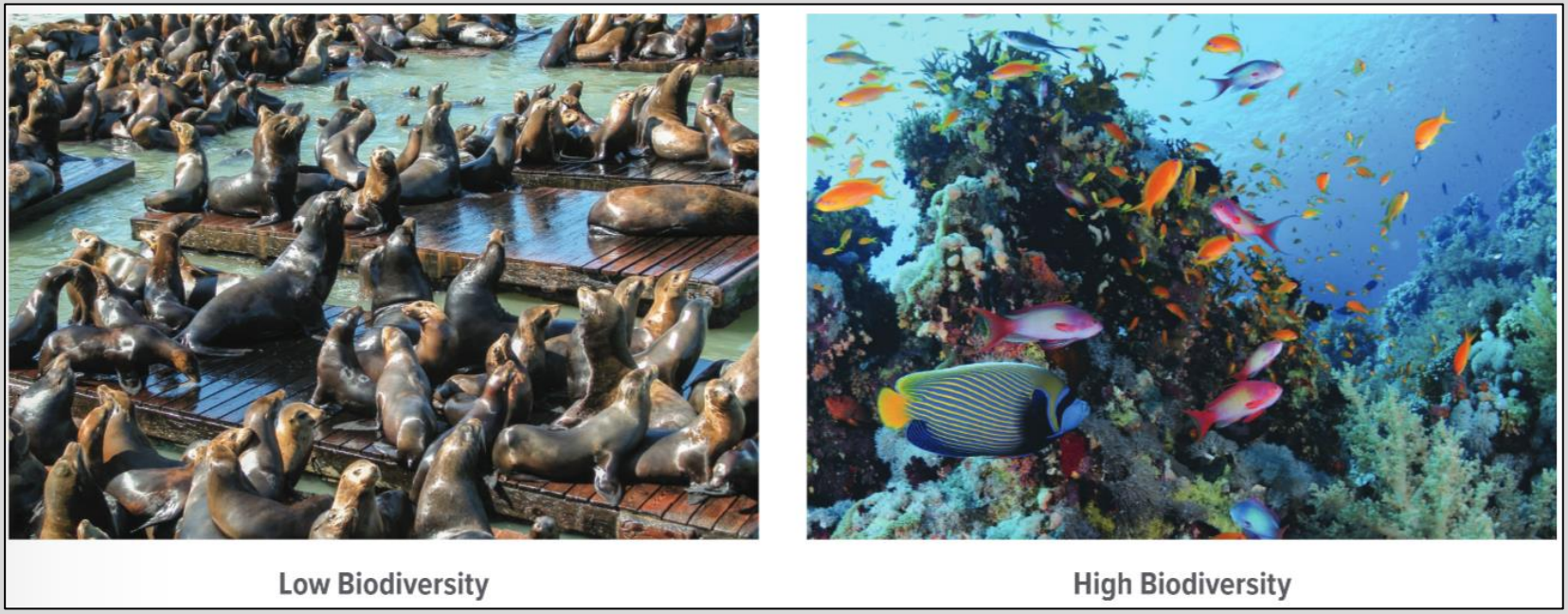


15	Define biodiversity and link it to ecosystem stability, list types of biodiversity with examples	textbook and figures	141

What is biodiversity?

تنوع

Biodiversity: **The number and variety of organisms found in a specific region, such as ponds, grass lands, and desert.**



Low Biodiversity

High Biodiversity

1 type of organisms

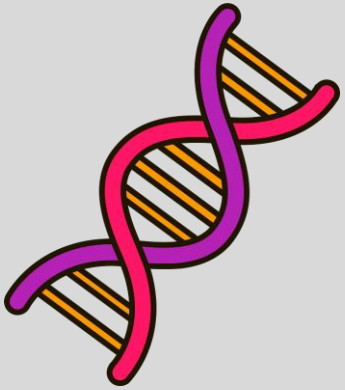
Many types of organisms

More diversity = healthier ecosystem

What is biodiversity?

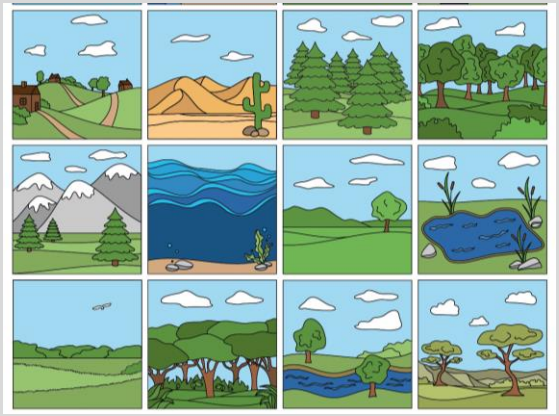
Types of biodiversity

- Genetic Diversity



- Species Diversity

- Ecosystem Diversity



What is biodiversity?

Genetic Diversity: The variety of genes or inherited traits that are present in one population.

- Differences in colors, sizes and patterns

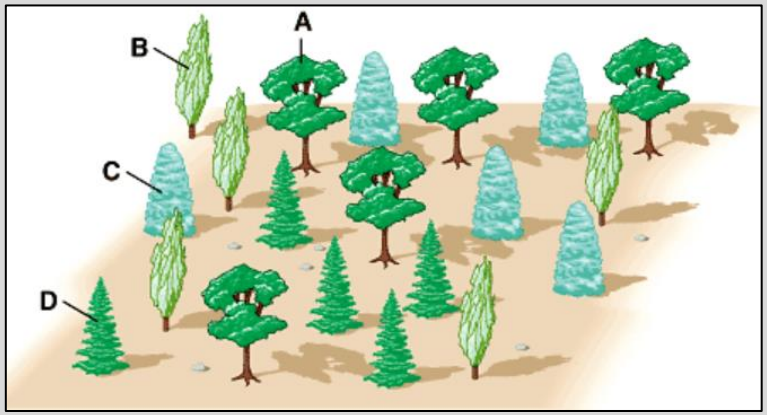
Examples:

Cats

Lady bird beetles

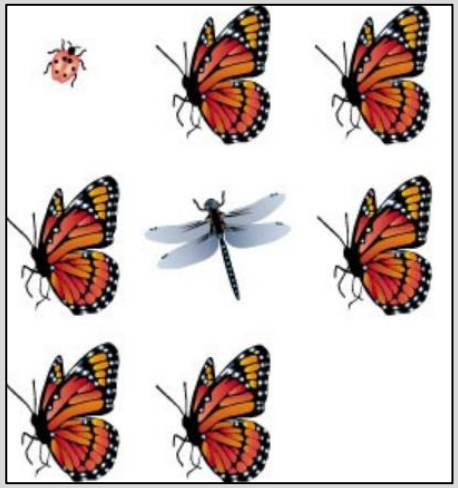
What is biodiversity?

Species Diversity: The number of different species and the quantity of each species in an ecological community.



How many different species ?
4 different species (A, B, C, D)

What is the quantity of each species?
A: 5 B: 5 C: 5 D: 5



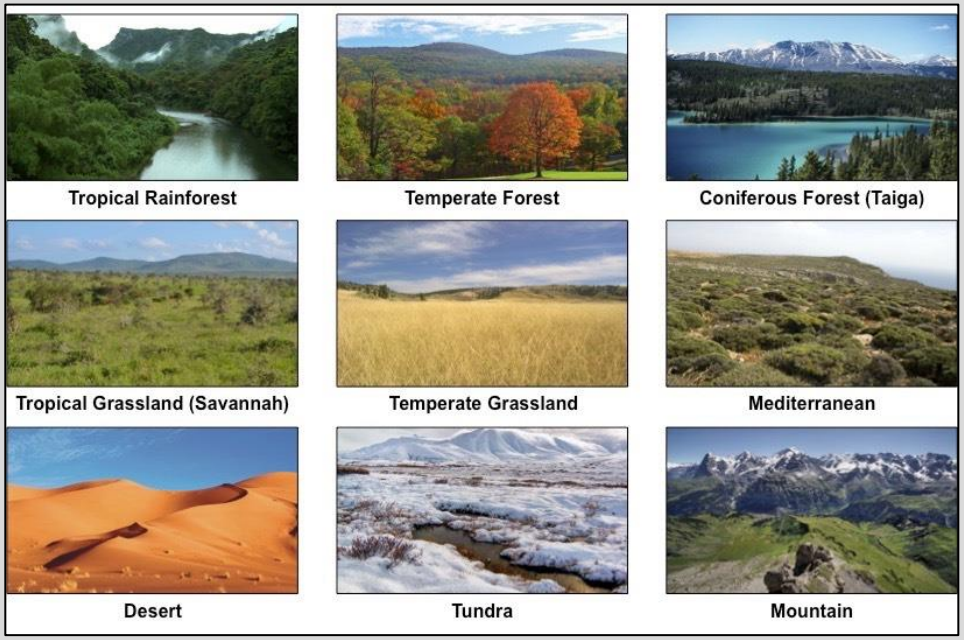
How many different species?
3 different species (ladybug, butterfly, dragonfly)

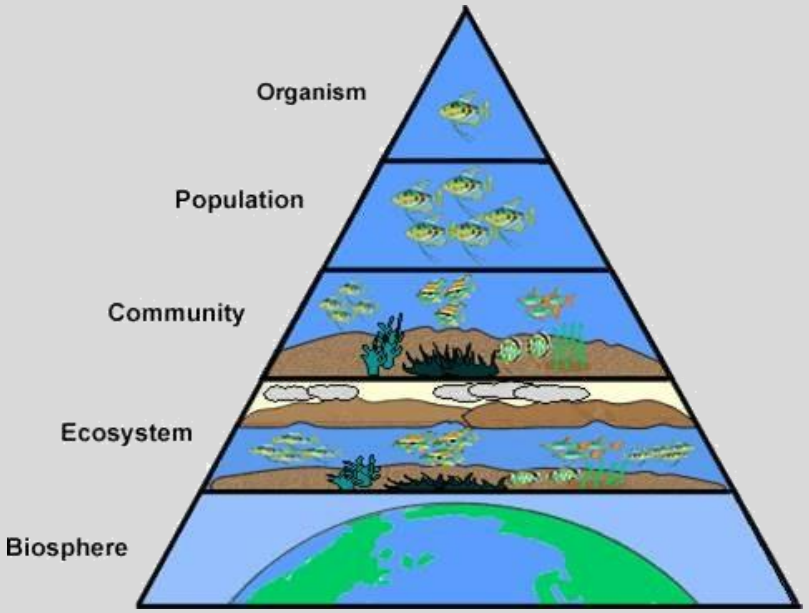
What is the quantity of each species?
Ladybug: 1 Butterflies: 6 Dragonfly: 1

What is biodiversity?

Ecosystem Diversity: The variety of ecosystems in the biosphere.

- Different ecosystems have different abiotic factors that support different types of life.





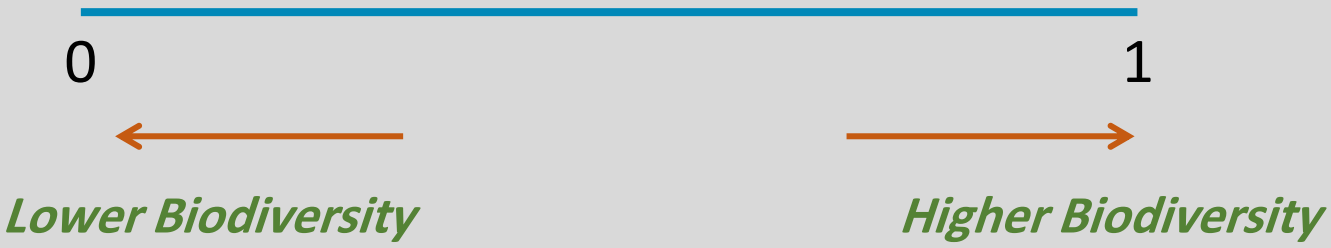
16	Calculate the Biodiversity Index	textbook, Investigation	144 - 145

How do scientists measure biodiversity?

Biodiversity Index:

$$\text{Biodiversity Index} = \frac{\text{Number of species in an area}}{\text{Total number of individuals in the same area}}$$

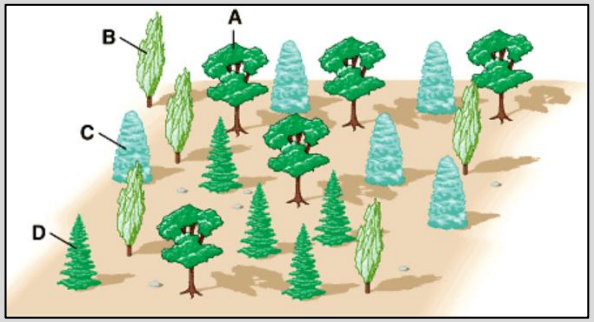
Biodiversity Index ranges from 0 to 1:



How do scientists measure biodiversity?

Biodiversity Index:

$$\text{Biodiversity Index} = \frac{\text{Number of species in an area}}{\text{Total number of individuals in the same area}}$$



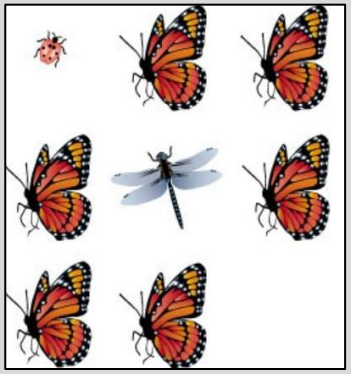
# of species: 4

# of individuals:

A=5 B=5 C=5 D=5

5+5+5+5 = 20

$$\text{Biodiversity Index} = \frac{\text{\# of species}}{\text{\# of individuals}} = \frac{4}{20} = 0.2$$



# of species: 3

# of individuals:

Butterflies=6 Ladybird=1 Dragonfly=1

6+1+1 = 8

$$\text{Biodiversity Index} = \frac{\text{\# of species}}{\text{\# of individuals}} = \frac{3}{8} = 0.375$$

How do scientists measure biodiversity?

Biodiversity Index:

$$\text{Biodiversity Index} = \frac{\text{Number of species in an area}}{\text{Total number of individuals in the same area}}$$

Species or Kinds	Number Observed
A	6
B	4
C	7
D	2
E	3
F	10
G	1
H	7
Total Number of Individual Plants	40

$$\text{Biodiversity Index} = \frac{\text{\# of species}}{\text{\# of individuals}} = \frac{8}{40} = 0.2$$

How do scientists measure biodiversity?

Biodiversity Index:

$$\text{Biodiversity Index} = \frac{\text{Number of species in an area}}{\text{Total number of individuals in the same area}}$$

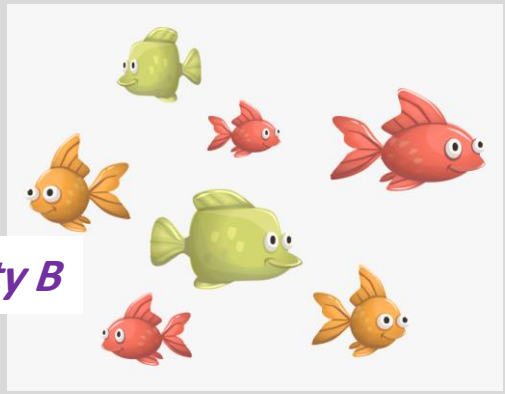
Calculate the biodiversity index of each community to find which one has higher biodiversity:

Community A

# of species: 3
# of individuals: 9

$$\text{Biodiversity Index} = \frac{\text{\# of species}}{\text{\# of individuals}} = \frac{3}{9} = 0.33$$

Community B



# of species: 3
# of individuals: 7

$$\text{Biodiversity Index} = \frac{\text{\# of species}}{\text{\# of individuals}} = \frac{3}{7} = 0.43$$

Community B has higher biodiversity

How do scientists measure biodiversity?

Page 146

Habitat Type	Number of Species	Number of Individuals of Each Species	Total Number of Individuals	Biodiversity Index
Tropical Rain Forest	6	A: 3 B: 2 C: 4 D: 5 E: 4 F: 7	3 + 2 + 4 + 5 + 4 + 7 = 25	$\frac{6}{25} = 0.24$
Coniferous Forest	5	A: 4 B: 7 C: 5 D: 3 E: 6	4 + 7 + 5 + 3 + 6 = 25	$\frac{5}{25} = 0.2$
Deciduous Forest	4	A: 6 B: 7 C: 7 D: 5	6 + 7 + 7 + 5 = 25	$\frac{4}{25} = 0.16$
Desert	3	A: 8 B: 8 C: 9	8 + 8 +9 = 25	$\frac{3}{25} = 0.12$
Grassland	2	A: 12 B: 13	12 + 13 = 25	$\frac{2}{25} = 0.08$

How do scientists measure biodiversity?

Page 145

Suppose scientists have the following data about a 20 m^2 area of a prairie that was surveyed using quadrats.

Number of Species	Number of Individuals of Each Species	Total Number of Individuals	Biodiversity Index
6	Species A = 4 Species B = 30 Species C = 1 Species D = 3 Species E = 1 Species F = 2		

1. **MATH Connection** To find the biodiversity index, first find the total number of individuals by adding up the number of individuals of each species.

   Species A + Species B + Species C + Species D + Species E + Species F = _____

   4 + 30 + 1 + 3 + 1 + 2 = 41

   Record your answer for the total number of individuals in the table above.

2. Then calculate the biodiversity index by dividing the number of species by the total number of individuals.

$$\frac{\text{\# of species}}{\text{\# of individuals}} = \frac{6}{41} = 0.146 \approx 0.15$$

17	Describe the different biomes that make up the biosphere and diffrentiate between them using figures	textbook and figures	152, 153, 154

How does biodiversity differ between ecosystems?

صحراء أمطار قليلة

Deserts A **desert** is a type of biome that receives very little rain.

ثلث كتلة الأرض

- Deserts make up roughly one third of Earth's land mass and are Earth's driest ecosystems.

الأكثر جفافاً

الهطول نادر plants

- Precipitation is scarce in a desert, with vegetation having a difficult time growing there.

- Desert dwelling animals, as well as the plants that grow in deserts, have had to adapt to the hot and dry environment in which they live.

تتكيف

How does biodiversity differ between ecosystems?

الأراضي العشبية — الأعشاب هي النباتات السائدة

Grasslands Areas where grasses are the dominant plants are called **grassland** biomes.

أسماء أخرى للأراضي العشبية:

- Also called prairies, savannas, and meadows, grasslands are natural carbon sinks.

تمتص وتخزن الكربون

أمثلة على نباتات تنمو في الأراضي العشبية

- Rye grass, buffalo grass, wild oats, and foxtail grow well in these areas.

غنية باللافقاريات — ثدييات

Grasslands are rich in invertebrates, as well as birds and mammals.

محاصيل — مساكن

Grasses, rushes, and herbs provide lush crops and habitats for the diverse invertebrate community.

اللافقاريات: حيوانات ليس لها عمود فقري – مثل الديدان والحشرات

How does biodiversity differ between ecosystems?

الغابات الاستوائية المطيرة

Tropical Rain Forests Forests that grow near the equator and experience heavy annual rainfall are called **tropical rain forests**.

تنمو بالقرب من خط الاستواء

أمطار سنوية غزيرة

- These forests are generally warm and moist.

دافئة رطبة

- With a great number of different plants and animals, tropical rain forests feature a high level of biodiversity.

تنوع كبير في الكائنات الحية

- Insects make up the largest group of tropical animals. Larger animals include parrots, toucans, snakes, frogs, flying squirrels, fruit bats, monkeys, jaguars, and ocelots.

أمثلة على كائنات حية تعيش في هذه الغابات – أغلبها حشرات

How does biodiversity differ between ecosystems?

الغابات المعتدلة المطيرة

Temperate Rain Forests Tropical rain forest biomes lie near the equator; however, not all rain forests are within the tropics. Regions of Earth between the tropics and the polar circles are **temperate** regions.

تقع هذه الغابات في المناطق المعتدلة (بين خط الاستواء والدوائر القطبية)

- Temperate regions have relatively mild climates with distinct seasons.

مناخ معتدل — فصول واضحة

- Several biomes are in temperate regions, including rain forests.
- Temperate rain forests are moist ecosystems mostly in coastal areas and are not as warm as tropical rain forests.

رطبة — المناطق الساحلية

- Due to seasonal changes and varied temperatures, temperate rain forests do not feature as much biodiversity as tropical rain forests.

تنوع الكائنات الحية أقل من الغابات الاستوائية المطيرة

How does biodiversity differ between ecosystems?

الغابات النفضية المعتدلة

Temperate Deciduous Forests

Forests that grow in temperate regions where there is more variation in winter and summer temperatures than in temperate rain forests are called temperate deciduous forests.

تنمو في المناطق المعتدلة

- These forests are the most common forest ecosystems in the United States.

أكثر الغابات انتشاراً في الولايات المتحدة

- They contain mostly deciduous trees, which lose their leaves in the fall.

أشجارها نفضية، تفقد أوراقها في الخريف

How does biodiversity differ between ecosystems?

Taiga A **taiga** (TI guh) is a forest biome consisting mostly of cone-bearing evergreen trees.

- A taiga is also known as a boreal forest and exists only in the northern hemisphere.
- Due to colder temperatures fewer reptiles and amphibians can survive, and there are fewer species of mammals and birds.

تسمى بالغابات الشمالية، لأنها تنمو في النصف الشمالي من الكرة الأرضية فقط

Reptiles: زواحف

Amphibians: برمائيات

How does biodiversity differ between ecosystems?

Tundra A tundra biome is cold, dry, and treeless. بدون أشجار

- Most tundra is just south of the North Pole.
- In the tundra, frozen ground makes it difficult for deep-rooted plants to grow.
- The tundra does feature a diverse range of mammalian life; however, reptiles and amphibians are rare.

أراضي جليدية تصعّب نمو البنات

أكثر الحيوانات انتشاراً فيها هي الثدييات

18	model biodiversity's importance to ecosystem stability, and list the benifts (services) of a healthy ecosytem	textbook, investigation, and diagrams	159, 160, 161, 162

How do human benefit from biodiversity?

Ecosystem services: the benefits that healthy ecosystems provide for living organisms.

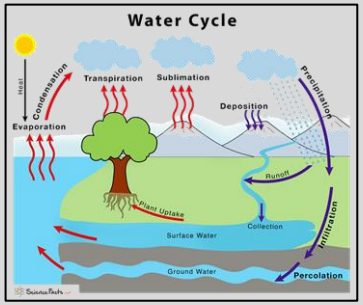
Four main types of ecosystem services:

- Supporting services
- Provisioning services
- Regulating services
- Cultural services

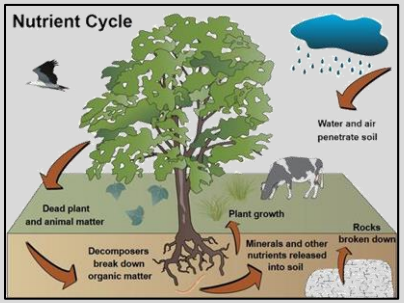
How do human benefit from biodiversity?

1. Supporting services: **are services that allow for the existence of all other ecosystem services.**

Examples:



Water cycling



Nutrient cycling

2. Provisioning services: **are services that provide products from an ecosystem.**

Examples:

Food

Medicine

Water

Energy

How do human benefit from biodiversity?

3. Regulating services: are benefits that are received through the regulation of ecosystems processes.

Examples:

Pollination

Water Purification

Erosion control

Climate regulation

4. Cultural services: are benefits people obtain through their experience with the ecosystem.

- Benefits are nonmaterial, offering value that stems from recreational activities and the artistic appearance of the environment.

How do human benefit from biodiversity?

Classify the following services into four categories:

Photosynthesis – raw materials – biodiversity – protection against natural disasters – Purification of the air – tourism – soil formation – relaxation – fuel

Supporting services

Photosynthesis

biodiversity

soil formation

Provisioning services

raw materials

fuel

Regulating services

protection against natural

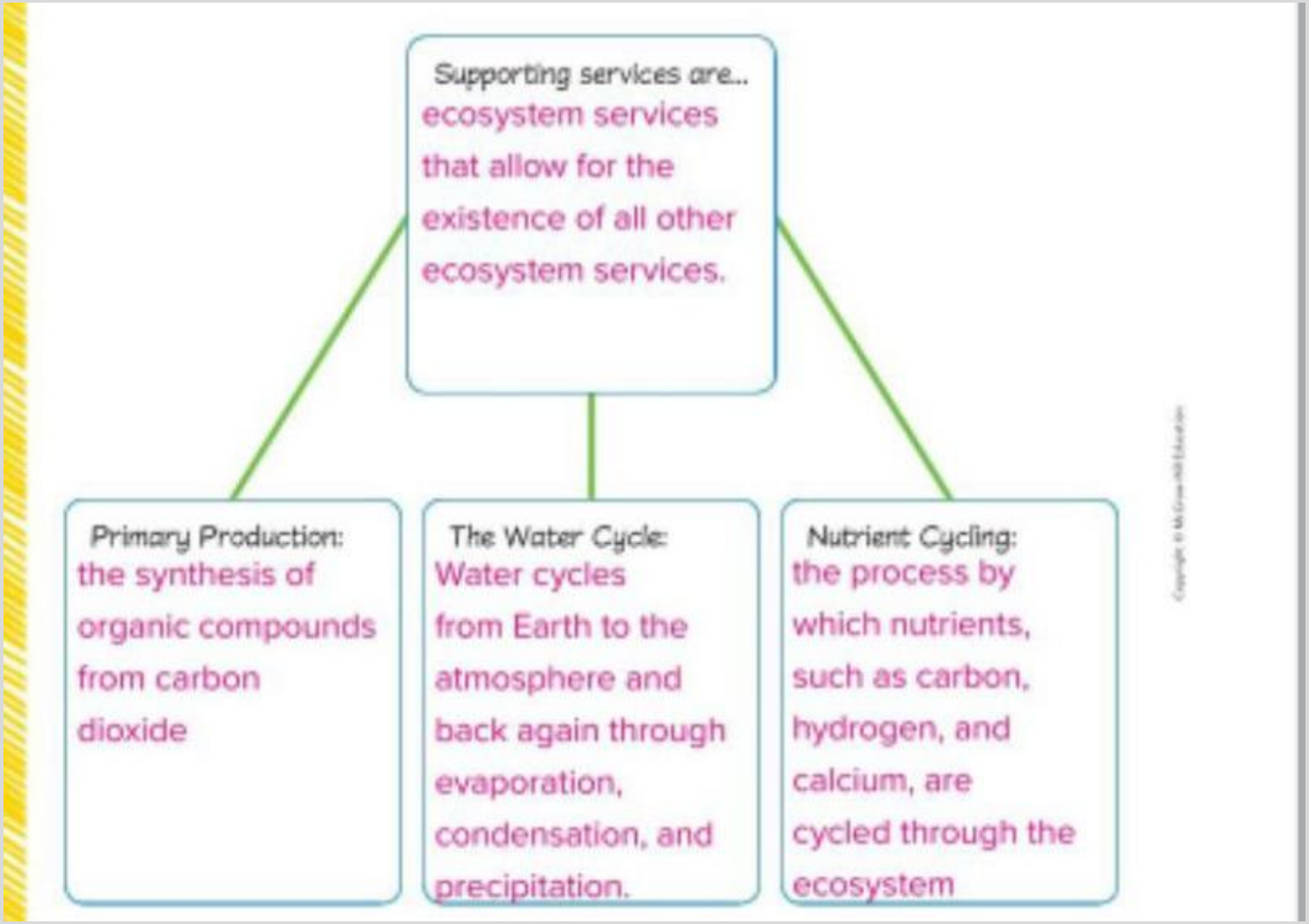
Purification of the air

Cultural services

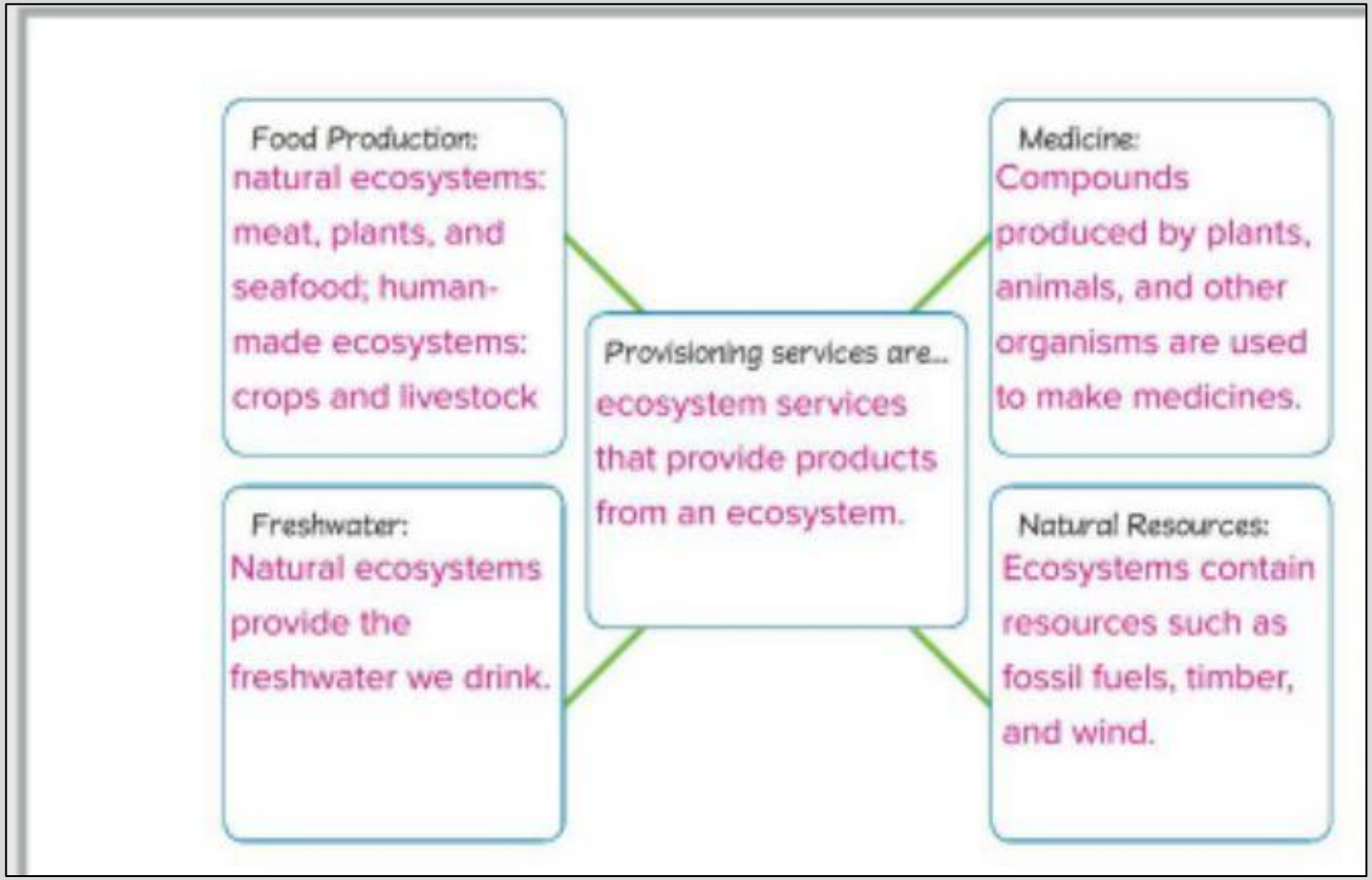
tourism

relaxation

How do human benefit from biodiversity?



How do human benefit from biodiversity?



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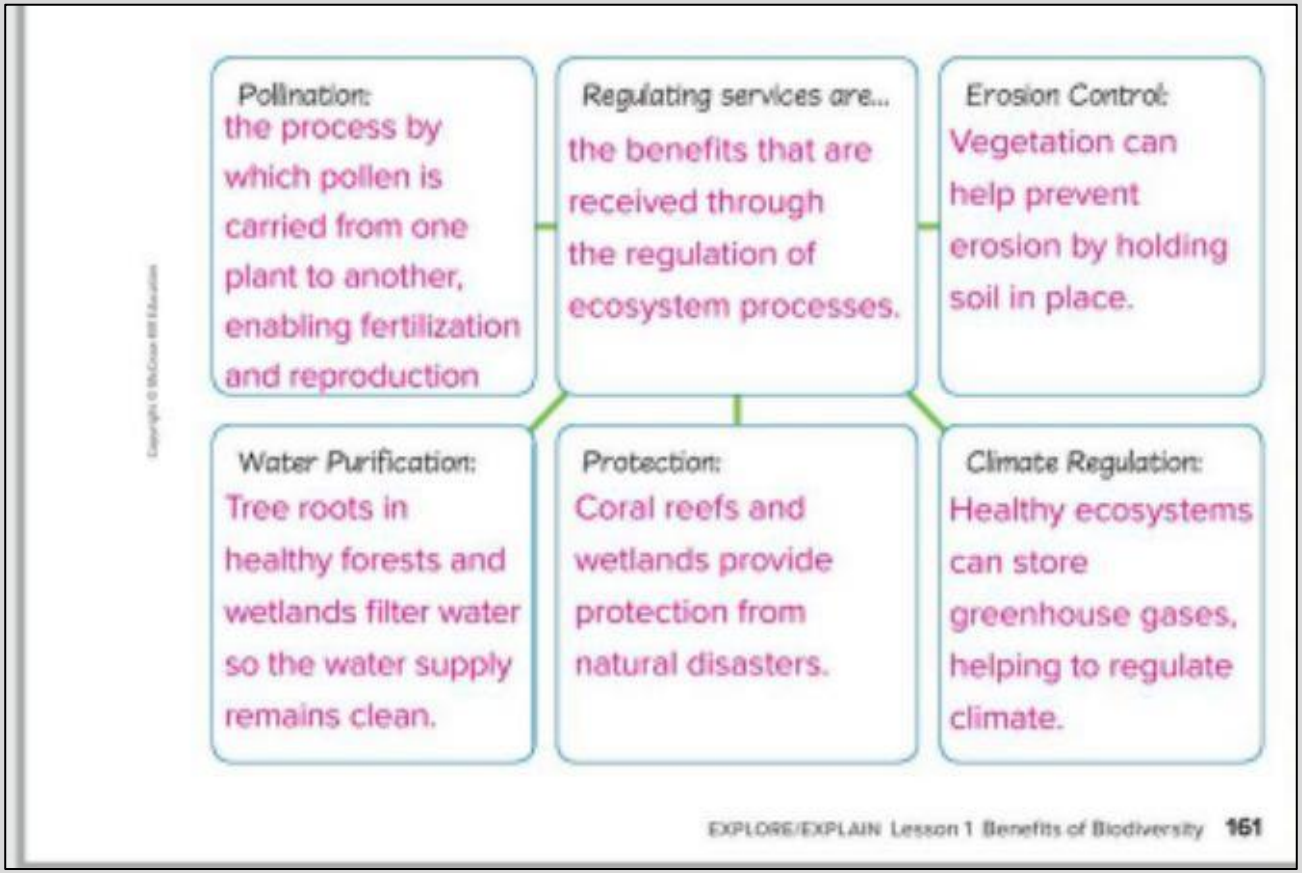

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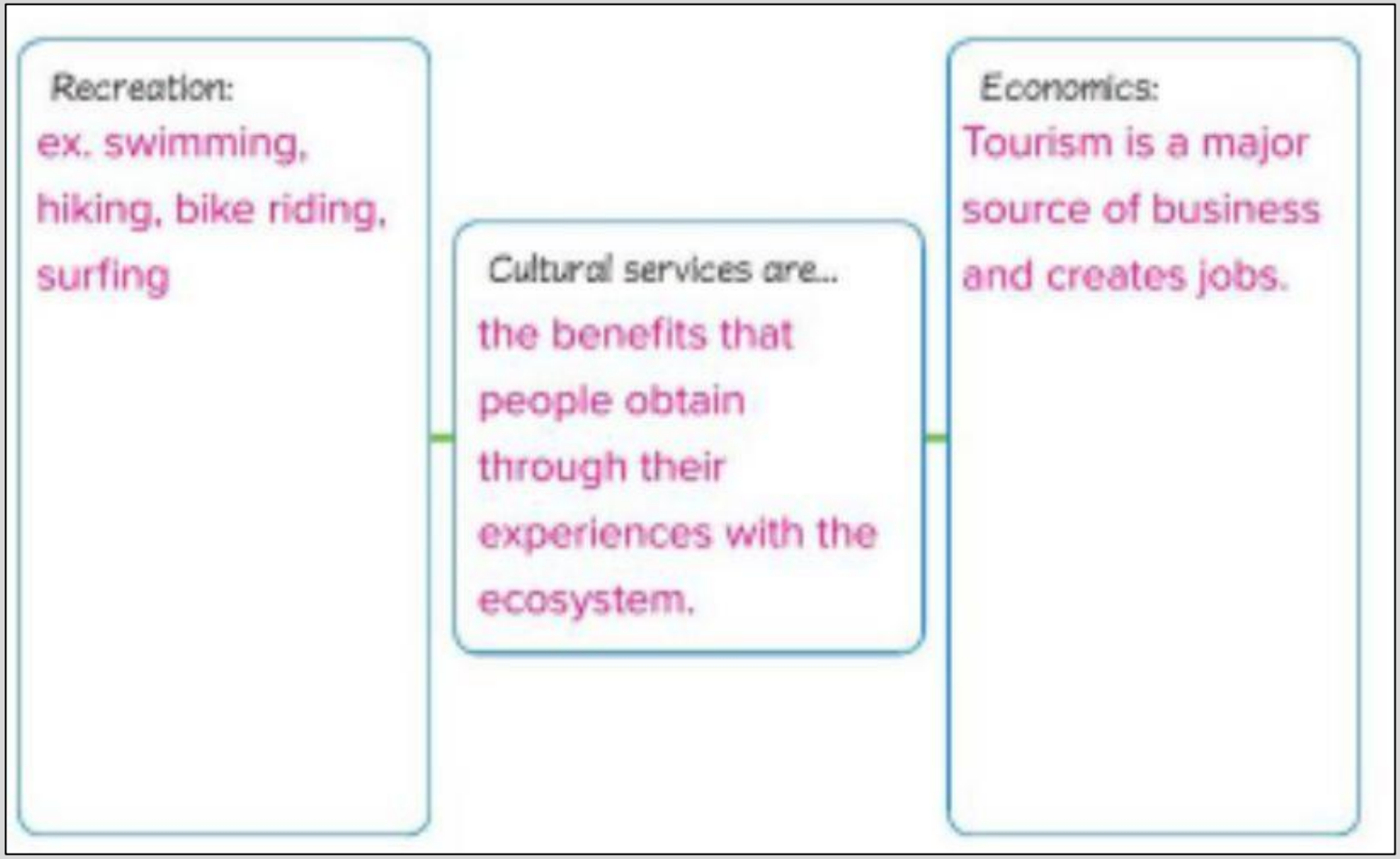


19	Give examples of strategies to maintain biodiversity, including controlling methods: Mechanical, Chemical, and Biological	textbook and figures	179
20	Identify significant threats to biodiversity, Explain the effects of habitat loss, the introduction of exotic species, hunting, and climate change on biodiversity	textbook, figures and questions	173, 183

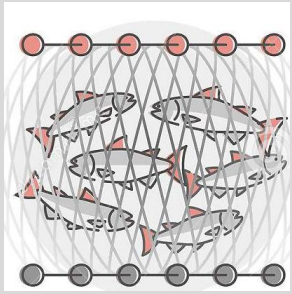
In what ways is biodiversity is threatened?

There are 5 major threats to biodiversity:

Habitat destruction

Invasive species

Pollution



Overexploitation

Climate Change

In what ways is biodiversity is threatened?

Pollution

Pollution: is the contamination of the environment with substances that are harmful to life.

Examples:

Water pollution

↓

(from houses and automobiles)

Air pollution

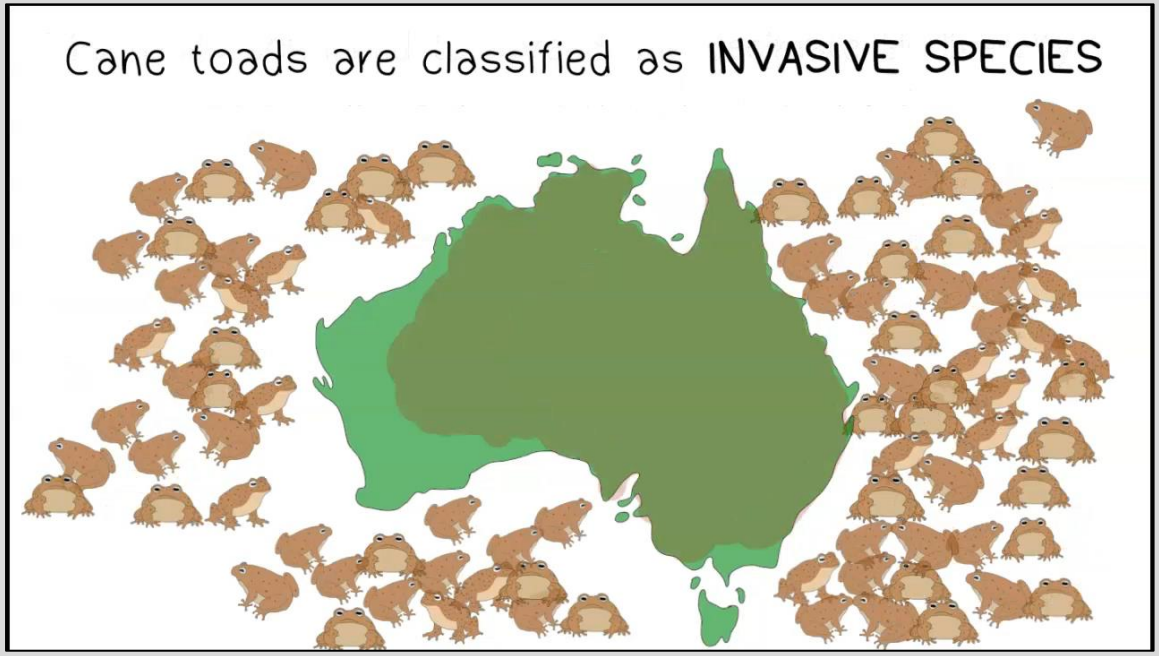
↓

(from cars and factories)

In what ways is biodiversity is threatened?

Invasive Species

Invasive Species: **is an organism that is introduces into an ecosystem (by accident or on purpose) and competes native species for resources (such as space, food, light and nutrients)**



In what ways is biodiversity is threatened?

Habitat Destruction

Habitat Destruction: to change habitat so much that is no longer useable by the organisms living there.

Examples:

Draining wetlands

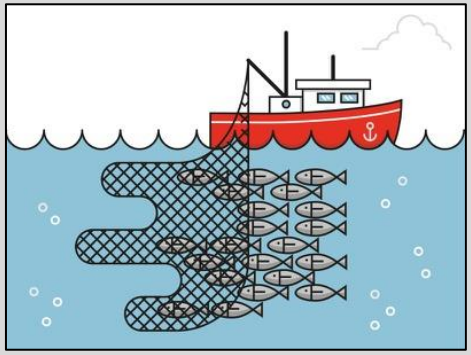
Cutting down forests

In what ways is biodiversity is threatened?

Overexploitation

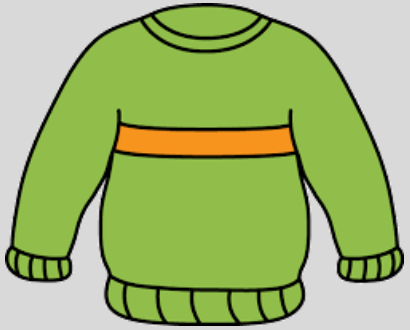
Overexploitation: is the overuse of animals and plants by human for different purposes.

Examples:



For food

For medicines



For clothing

How can we protect biodiversity and ecosystem services?

- There are many solutions to protect biodiversity. These solution depends on which ecosystem is affected and how it has been affected.

Habitat Restoration and Conservation:

Reforestation: Planting trees that have been cut or burned

Reclamation: Restoring land disturbed by mining

How can we protect biodiversity and ecosystem services?

Controlling Invasive species

Mechanical controls:
use physical means such as:
Barriers
Weeding
Trapping

Chemical controls:
use chemicals such as herbicides and pesticides

Biological controls:
use of other species to combat an invasive species

How can we protect biodiversity and ecosystem services?

Cleaning Up and Reducing pollution:

Regulations
(US Clean Water Act)

Reduce the use of chemicals

Proper dispose of waste

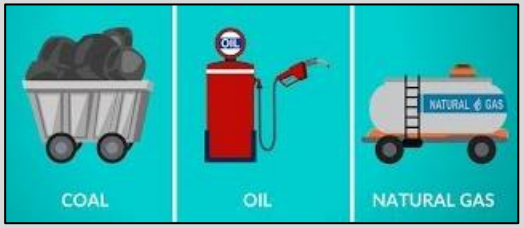
Sustaining population:

Hunting and fishing regulation

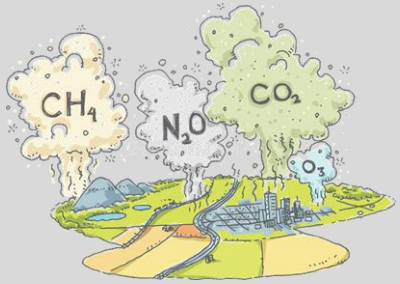
How can we protect biodiversity and ecosystem services?

Reducing Impacts of Climate Change:

What is the main cause of climate change?



Burning fossil fuels (for electricity and vehicles)



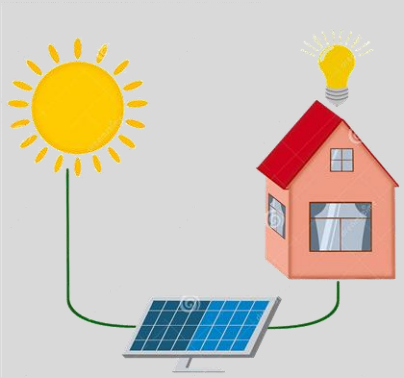
Increase the greenhouse gases

Climate change

How can we protect biodiversity and ecosystem services?

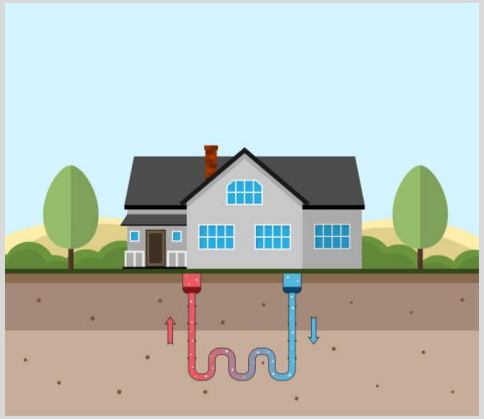
Reducing Impacts of Climate Change:

Use renewable energy sources:



Solar energy

Wind energy



Geothermal energy

You can:

Walk or ride a bike

Use public transportation

Recycling

How can we protect biodiversity and ecosystem services?

3. Evaluate the following possible solutions to combat the threats to biodiversity shown in the image above. Which of the following would be the least effective solution?

A regulating fishing

B bioremediation

C proper disposal of wastes

D reducing the use of harmful chemicals

In what ways is biodiversity is threatened?

The orange-spotted filefish, a fish that lives on coral reefs, is highly sensitive to changes in water temperature. After an extended period of warm water temperatures in 1988, the fish disappeared from the coral reefs off the coasts of Japan.

2. Which threat to biodiversity caused the change in the population of orange spotted filefish?

A invasive species

B overexploitation

C habitat destruction

D climate change