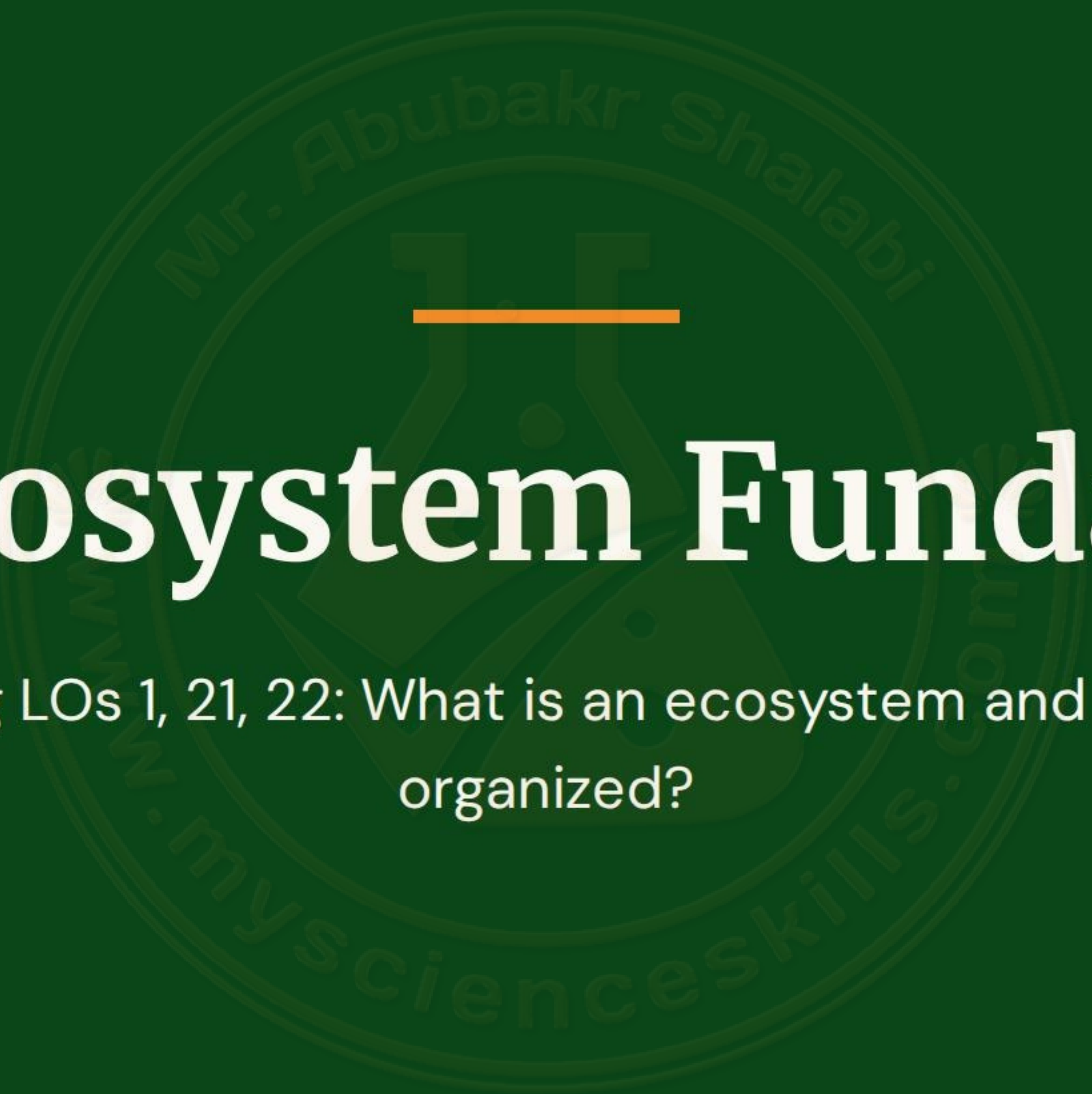


Grade 7 Science

End-of-Term Revision Guide: Ecosystems, Energy, and Biodiversity



Part 1: Ecosystem Fundamentals

Covering LOs 1, 21, 22: What is an ecosystem and how is it organized?

LO 1: Identify parts of an ecosystem.

What is an Ecosystem?

An ecosystem is a community of living organisms interacting with their non-living environment.

- **Biotic Factors:** The **living** parts of the ecosystem.
Examples: Plants, animals, fungi, bacteria.
- **Abiotic Factors:** The **non-living** parts of the ecosystem.
Examples: Sunlight, water, soil, temperature, air.



ECOSYSTEM DIAGRAM CONCEPT

Imagine a forest: The ****Biotic**** parts (trees, animals, insects) interact with the ****Abiotic**** parts (soil, water in the river, sunlight).

An ecosystem is the total sum of these interactions.



LO 21: Levels of organization.



Organism

One single living individual.
(e.g., one deer)



Population

A group of the **same species** living in the same area. (e.g., a herd of deer)



Community

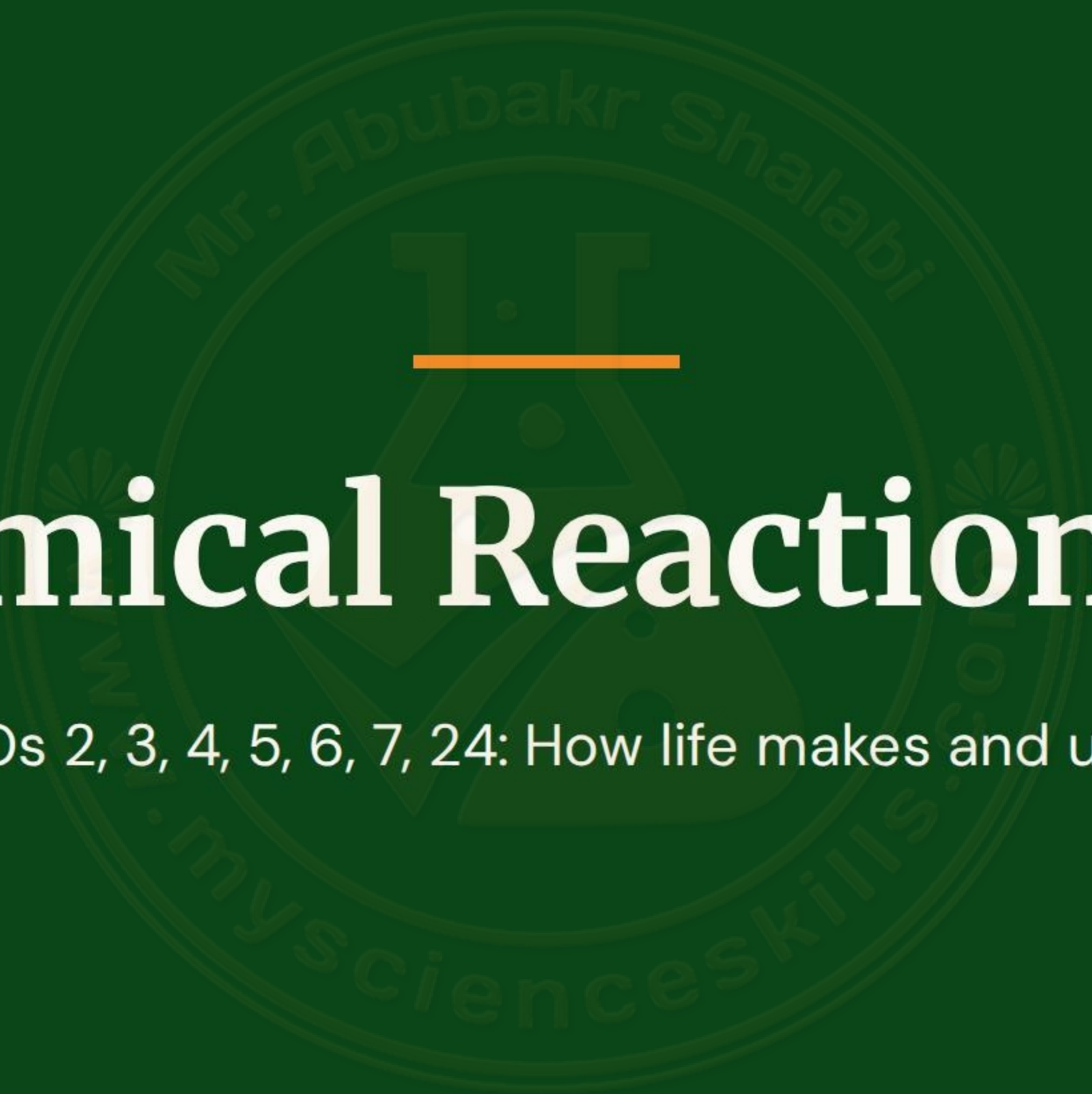
All the **different populations** (species) in one area. (e.g., deer, rabbits, and trees)



Ecosystem

The community **plus** its abiotic factors. (e.g., the forest, river, and all its life)





Part 2: Chemical Reactions & Energy

Covering LOs 2, 3, 4, 5, 6, 7, 24: How life makes and uses energy.

LO 2, 3, 4, 24: Explain Photosynthesis.

Photosynthesis: Making Food

The process plants use to turn sunlight, water, and carbon dioxide into their own food (glucose/sugar) and oxygen.

Simple Formula:



Carbon Dioxide + Water --(Sunlight)--> Sugar + Oxygen



THE PLANT'S KITCHEN

Inputs: Carbon Dioxide (CO₂), Water (H₂O), **Light Energy**

Outputs: Glucose/Sugar (C₆H₁₂O₆), Oxygen (O₂)

Occurs in the chloroplasts (using chlorophyll).



LO 2, 3, 4, 24: Explain Cellular Respiration.

Cellular Respiration: Using Food

The process **all** living things (plants and animals) use to break down food (glucose) to release usable energy (ATP) for the cell. It uses oxygen.

Simple Formula:



Sugar + Oxygen --> Carbon Dioxide + Water + Energy



THE CELL'S POWERHOUSE

Inputs: Glucose/Sugar ($\text{C}_6\text{H}_{12}\text{O}_6$), Oxygen (O_2)

Outputs: Carbon Dioxide (CO_2), Water (H_2O), ****ATP Energy****

Occurs in the mitochondria.

LO 5, 6, 7: Describe the flow of energy.



Producers

Make their own food, usually using sunlight (e.g., plants, algae). They are the base of the food chain.



Consumers

Eat other organisms.
Primary: Herbivores (eat producers).
Secondary: Carnivores/Omnivores (eat primary consumers).



Decomposers

Break down dead organisms and waste (e.g., fungi, bacteria), returning nutrients to the soil.

Energy flows in **one direction**: Sun → Producers → Consumers → Decomposers. Only about **10%** of energy moves to the next level!





Part 3: Matter, Cycles & Changes

Covering LOs 8, 9, 10, 11, 15, 16, 17, 19, 23, 25: How ecosystems are built and how they change.

LO 8, 9, 25: Describe the cycling of matter.



THE WATER CYCLE

Movement through the atmosphere (Condensation), back to Earth (Precipitation), and into the air (Evaporation/Transpiration).

The Water Cycle: Evaporation, Condensation, Precipitation.



THE CARBON CYCLE

Moved primarily by **Photosynthesis** (taking CO₂ out) and **Respiration** (putting CO₂ back in).

The Carbon Cycle: Moved by Photosynthesis and Respiration.



THE NITROGEN CYCLE

Requires specialized **soil bacteria** to convert atmospheric nitrogen into usable compounds for plants.

The Nitrogen Cycle: Soil bacteria are essential to make nitrogen usable for plants.



LO 10, 11, 15–17: Changes to components.

Physical (Abiotic) Changes

Changes to the non-living parts of an ecosystem that affect populations.

- **Natural:** Drought, flood, volcanic eruption.
- **Human-caused:** Pollution (spilling oil), building dams, climate change (rising temperatures).

Biological (Biotic) Changes

Changes to the living parts of an ecosystem that affect populations.

- **Natural:** A disease kills many of one species.
- **Human-caused:** Introducing an **Invasive Species** (like Kudzu) that outcompetes native life.



LO 19, 23: Resource Availability & Data.

Less
Resource Availability

Argument & Evidence

Argument (LO 19): A change to any component (like less water) **will** affect populations (e.g., plant populations will decrease).

Data (LO 23): If there is less food, water, or space (**Limiting Factors**), competition increases and the population size is restricted.

Carrying Capacity: The **maximum** population an ecosystem's resources can support.





Part 4: Interactions & Biodiversity

Covering LOs 12, 13, 14, 18, 20, 22: How species live together and why variety matters.

LO 12, 13, 14: Patterns of interactions.



Competition (- / -)

Organisms fighting for the same limited resource (food, mates, space).



Predation (+ / -)

One organism (predator) hunts and eats another (prey).



Symbiosis (Close Relationship)

Mutualism (+/+): Both benefit (bee & flower). **Commensalism (+/0):** One benefits, one is unaffected. **Parasitism (+/-):** One benefits, one is harmed (tick & dog).



LO 18, 22: Measuring Biodiversity.

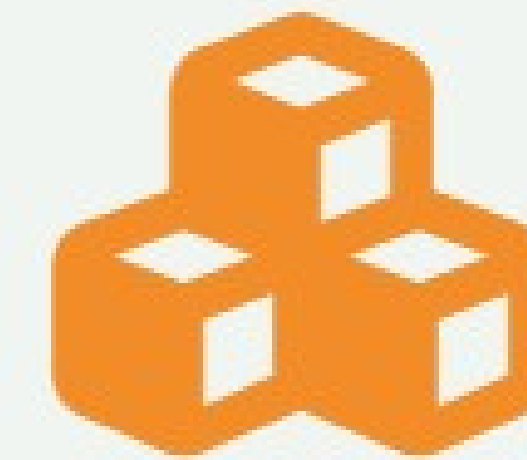
What is Biodiversity? (LO 22)

The **variety** of life in an area. This includes:

- **Genetic Diversity:** Variety of genes (e.g., different colored chicks).
- **Species Diversity:** Number of different species in a community.
- **Ecosystem Diversity:** Variety of habitats (e.g., desert, coral reef, tundra).

How to Measure (LO 18)

Quadrat Sampling: Using a square frame to count species in a small, random area, then using math to estimate the total for the large area.



QUADRAT SAMPLING: ESTIMATION

Scientists place a square frame (quadrat) on the ground to count organisms within that small, defined space.

This count is then scaled up to estimate the total population or diversity in the entire field.



LO 20: Methods to maintain biodiversity.

-  **Habitat Restoration:** Reforestation (planting trees) and Reclamation (restoring land damaged by mining).
-  **Reducing Pollution:** Cleaning up oil spills and plastic waste; limiting harmful chemicals.
-  **Controlling Invasive Species:** Using traps (mechanical), pesticides (chemical), or introducing natural predators (biological) to remove harmful non-native species.
-  **Reducing Climate Change:** Using renewable energy (solar, wind) to reduce greenhouse gases that warm the planet and threaten ecosystems like coral reefs.



Good Luck on Your Exam!

You've got this!