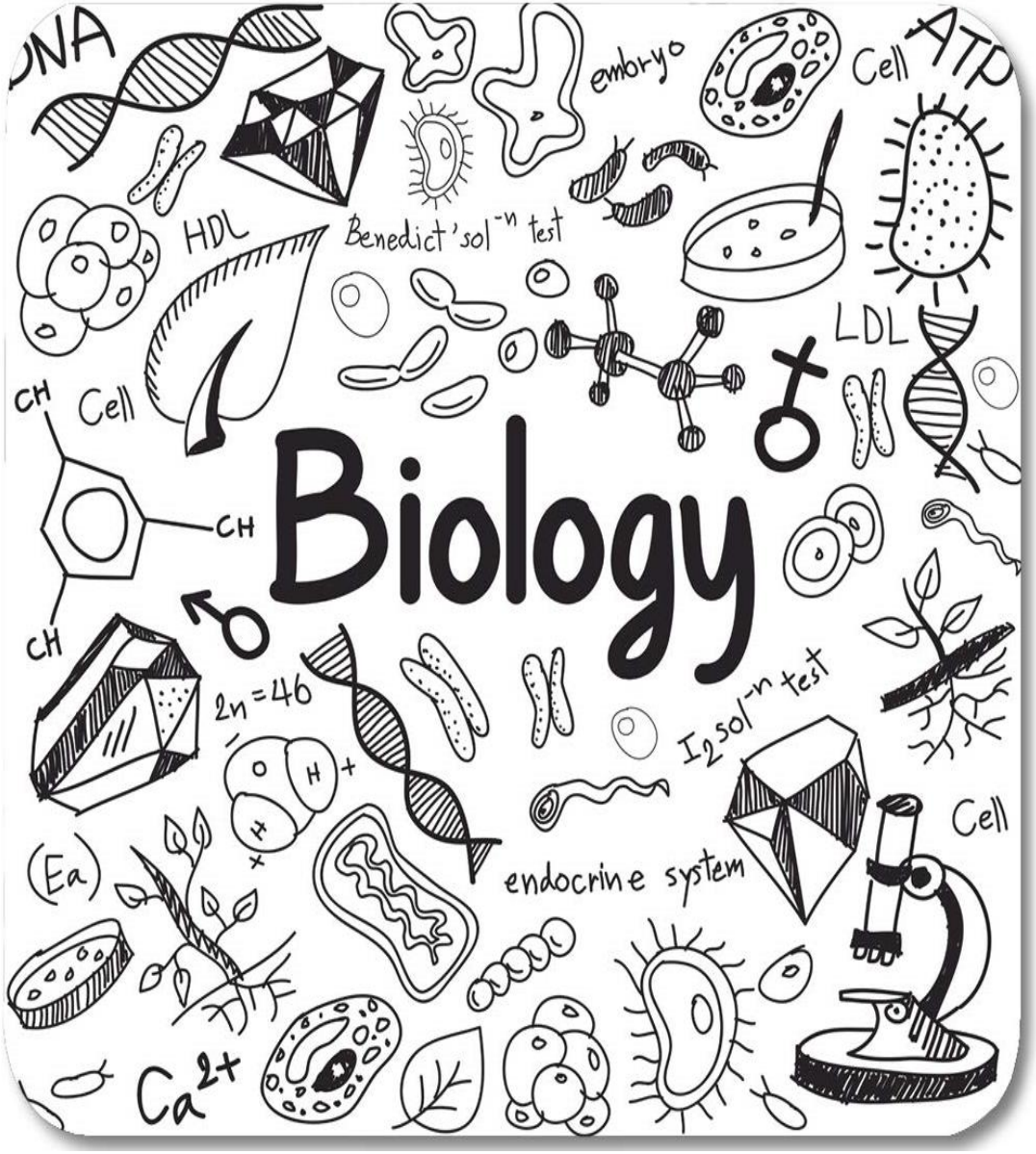
The National Orthodox School Shmaisani

Lesson: Ecological Pyramids

Scholastic Year: 2022-2023

Grade: 8 CS



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Objective : compare between pyramids of energy and pyramids of Biomass.

Resources : Book pages 186,187

https://www.youtube.com/watch?v=wGfOoRrICto pyramids

Page 186

15.2 Energy flow

Objective

- Model energy flow through food chains

Carnivores

Cheetahs are the world's fastest land animals, but there aren't many of them. As you go up a food chain, the animals become larger and fewer.

Cheetahs are carnivores. They feed mainly on impalas. To get enough food they need a large area of land and access to plenty of their prey. As their land is taken for towns and farms, their numbers keep dropping. Many wild carnivores are endangered.

Many wild carnivores are endangered.

A pyramid of numbers is usually narrower at the top.

Pyramids of number

Food chains show what each animal eats, but they don't show how many plants or animals there are at each level.

A pyramid of numbers shows how many of each organism there are in a food chain. Leopards prey on impala, and impala feed on grass. A lot of grass in the first trophic level feeds a smaller number of impala in the second trophic level. These provide food for an even smaller number of leopards in the third trophic level.

Pyramids of number don't all have the same shape. When insects feed on trees, the pyramid shape is spoiled. Trees are much larger than insects, so the second trophic level contains more organisms than the first level.

The shape of a pyramid of numbers is distorted when the organisms in each trophic level are very different sizes.

Passing on energy

Pyramids of number show the numbers of organisms at each level. They don't show the amount of energy that is passed up from plants to predators.

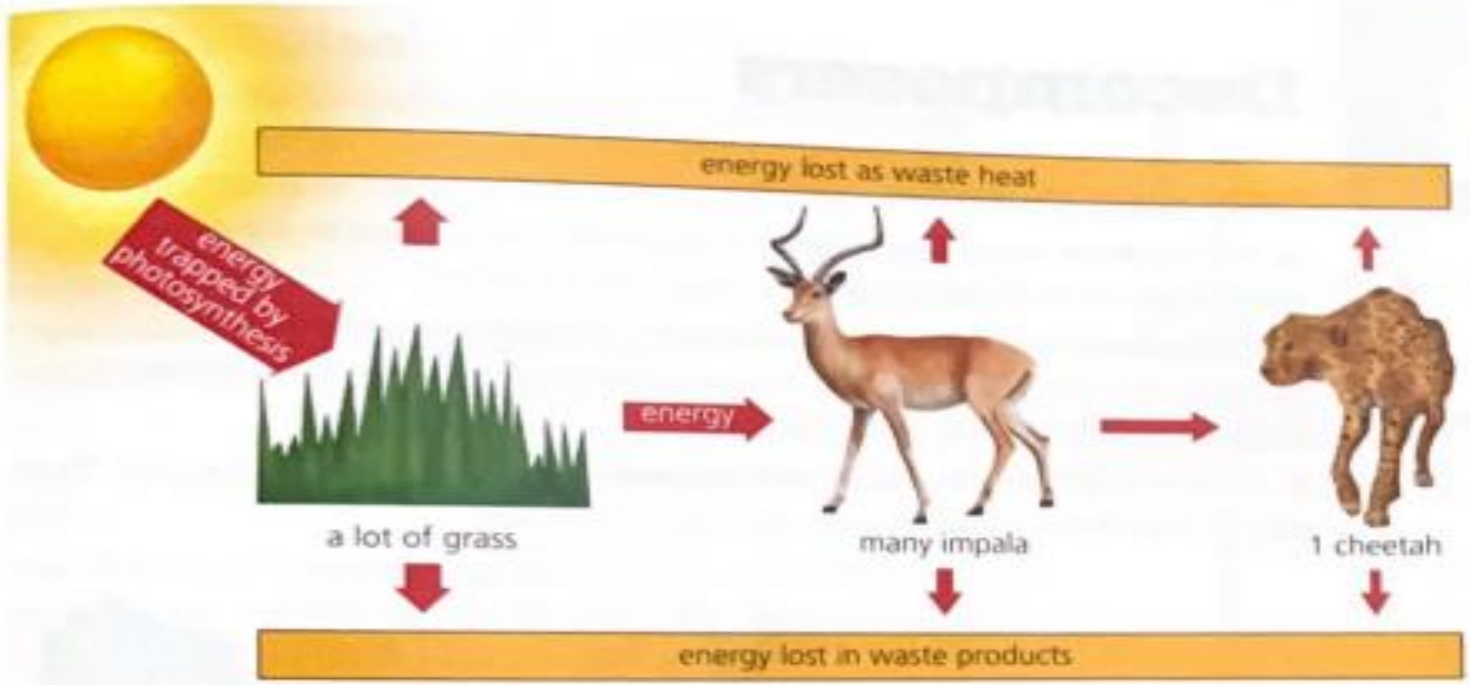
When impalas eat grass, they do not get all the food the grass plants made. Plants use most of the food they make for respiration. Respiration happens all the time in every plant cell, just as it does in animals. The energy it releases keeps plants alive and lets them grow.

Impalas can only get food that is stored in a plant's leaves. Impalas can't digest some parts of leaves, and these pass out in their faeces – so they only get some of the energy that was stored in the leaves.

Just like the plants, impala use most of their food for respiration.

When a cheetah eats impala, it only gets the food the impalas stored in their muscles and fat while they were growing. This is only a tiny percentage of the energy the plants absorbed from the Sun. So cheetahs need to eat a lot of impala, and impala need to eat a lot of grass.

Energy flow

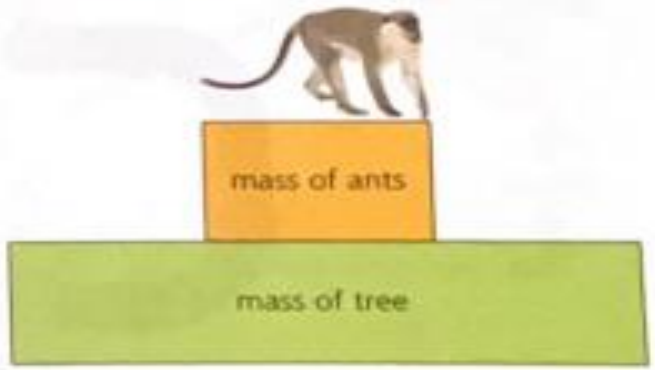


Energy is lost at each step in a food chain.

Pyramids of biomass

Pyramids of biomass are always shaped like pyramids because they show the mass of living things in each trophic level – not their number.

Only a fraction of the biomass in each trophic level is passed to the animals that consume it. Most is used for respiration. So the total biomass in a higher trophic level is always less than in a lower one.



A pyramid of biomass shows the mass of living things in each trophic level.

Energy flow

Pyramids of biomass are steeper in aquatic environments. Most of the producers there are microscopic organisms. They have fewer indigestible parts so the herbivores get a bigger percentage of the biomass from these producers, and more of the energy they absorb from the Sun is passed on. Aquatic pyramids of biomass have up to six trophic levels.

Workbook page 80 question 1

1 Draw lines to link each word to the correct description.

Word
Food chain
Pyramid of numbers
Pyramid of biomass
Energy losses
Energy flow

Description
Shows the mass of living things in each trophic level.
The transfer of energy from one organism to another.
Shows where each organism gets its energy from.
Shows the number of organisms in each trophic level.
The energy organisms release during respiration or lose in the waste products they excrete.

Workbook page 80 question 2

2 Complete these sentences using the words in the box below.

Pyramids of number show the number of ..... in each ..... level but pyramids of ..... show their total mass. This gets less at each trophic level because every living thing loses most of the ..... they take in. Some is lost as heat during ..... and some is lost in the waste ..... living things excrete. Their consumers can only get the energy left in their ..... .

trophic respiration products biomass tissues energy organisms

The missing words are:
organisms, trophic, biomass, energy, respiration, products, tissues.

Page 187 questions 3,5,7

3 What happens to most of the energy in the food that impalas eat?

4 Draw a pyramid of biomass for this food chain. Use 1 mm for every 100 kg.

Acacia tree leaves → giraffes → lion

20 000 kg 1500 kg 150 kg

5 Convert this food chain into a pyramid of biomass.

Grass plants → impala → cheetah

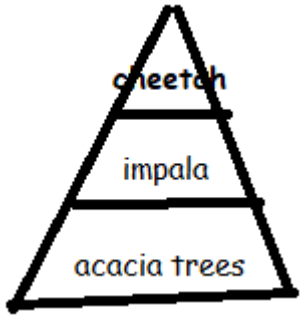
10 000 kg 500 kg 50 kg

6 There are predators and prey in most parts of the world. Which are present in the higher numbers?

7 What is the same about every pyramid of biomass?

Q3. Most of the energy in the food that impalas eat is used for respiration.

Q5.



7. Pyramids of biomass are always shaped like pyramids