

## WEEK 5 TOPIC: ORGANISM'S INTERACTION AND TRANSFER OF ENERGY

Energy flows from the sun to autotrophs such as corn plants, and heterotrophs such as chicken and lizards. Autotrophs get energy from the sun to produce food molecules; hence, they are the producers. Dependent species cannot make their own food and are called heterotrophs or consumers, which obtain energy by eating or consuming plants and animals. The kinds of organisms in an ecosystem determine the flow of energy.



### Terms:

**Food Chain** - shows the feeding relationships between organisms

**Food Web** - consists of several food chains in a single ecosystem

### Components of the Food Chain/Web

1. **Producers** - can manufacture and produce their own food (plants). They are called *Autotrophs*.

2. **Consumers** - any organism that feeds on other organisms.

Organism that feeds directly on the producers is called the **first-order consumer**. Organism that eats the first-order consumer is referred to as the **second-order consumer**, while those that eat the **second-order consumers** are the third-order consumers and so on.

Organisms can also be classified according to the type of food they eat.

- Herbivores** - feed solely on plants, vegetables and fruits.
  - Carnivores** - feed on other animals.
  - Omnivores** - feed on both plants and animals.
3. **Scavengers** - organisms that feed on dead, decaying flesh of an animal, dead plant materials, or refuse, to break down their organic materials into smaller pieces.
4. **Decomposers** - organisms feed on dead plants and animals, and the smaller pieces of organic matter provided by scavengers.

### ACTIVITY 1: What Am I?

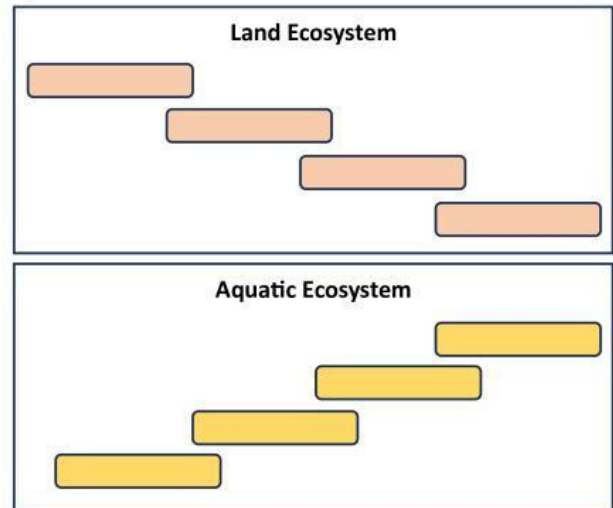
Directions: Match column A with column B. Write the letter of your answer on the space before the number.

- |                             |               |
|-----------------------------|---------------|
| _____ 1. Decomposer         | a. sunlight   |
| _____ 2. Energy source      | b. hawk       |
| _____ 3. Primary consumer   | c. rice plant |
| _____ 4. Producer           | d. rat        |
| _____ 5. Secondary consumer | e. snake      |
| _____ 6. Tertiary consumer  | f. bacteria   |

### ACTIVITY 2: Forming Food Chain

Directions: Form a simple food chain in the given ecosystems using the organisms in the box

Carabao grass snake phytoplankton small fish  
frog zooplankton seal grasshopper



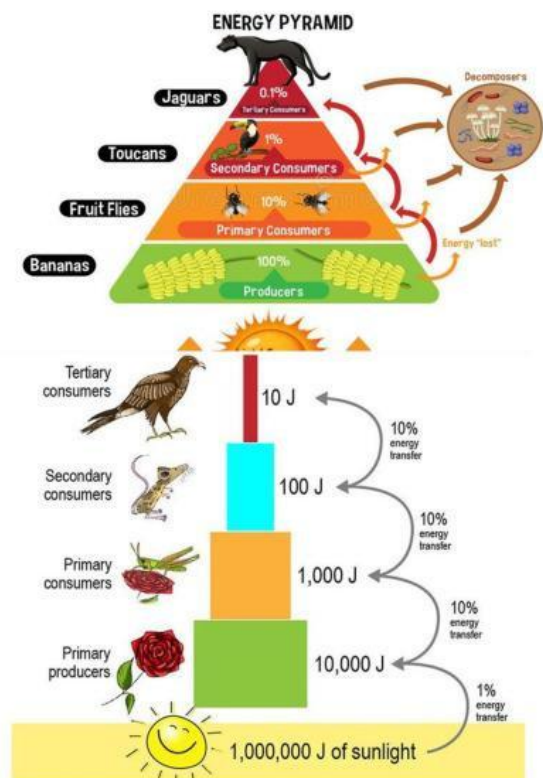
## THE ENERGY PYRAMID AND TRANSFER OF ENERGY

The graphical model of how energy flow in a community shows the trophic level.

The transfer of energy in the food chain is limited; and hence, the number of trophic levels in the food chain is limited. In feeding, only 10% of the energy is available to the next level. For example, a plant will use 90% of the energy it gets from the sun for its own growth and reproduction.

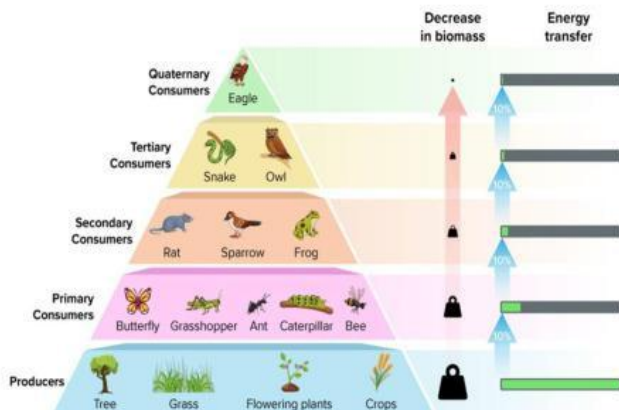
**Calculating the 10% rule** in the transfer of energy flow in the pyramid.

$$\frac{10,000 \text{ J}}{1,000,000 \text{ J}} \times 100 = \text{energy transferred}$$



$$\frac{1,000 J}{10,000 J} \times 100 = 10\%$$

Or the 10% of 10,000 is 1,000 J in the next trophic level.



**Biomass** is organic, meaning it is made of material that comes from living organisms, such as plants and animals.

A **biomass pyramid** is the representation of total living biomass or organic matter present at different trophic levels in an ecosystem.

#### Biomass Transfer Calculations

Divide the biomass of the higher trophic level by the biomass of the lower trophic level, then multiply this by 100. This gives you a percentage.

So, if we had a trophic level 1 with a biomass of 20kg and a trophic level 2 with a biomass of 15kg, the efficiency of biomass would be 15/20 multiplied by 100. This would give us 75%.

$$\frac{\text{higher level}}{\text{lower level}} \times 100 = \% \text{ biomass transferred}$$

$$\frac{15\text{kg}}{20\text{kg}} \times 100 = 75\%$$

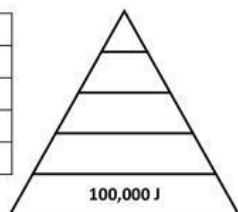
#### ACTIVITY 3: Solve Me!

A. In the following food chain, only 10 % of energy is transferred to the next trophic level. The flow of energy is shown below.

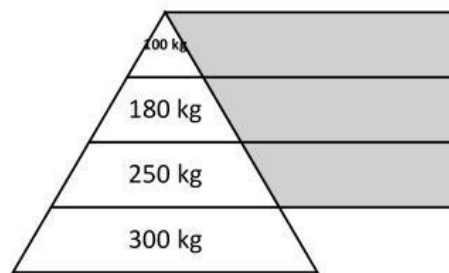
Plants → Grasshopper → Frog → Snake → Hawk

Calculate the available energy in the higher trophic level, and put inside the energy pyramid.

Plants	100,000 J
Grasshopper	
Frog	
Snake	
Hawk	



B. Compute for the biomass transferred in the following:



**ASSESSMENT.** Read and analyze each question. Select the correct answer from the options.

1. How much biomass from 100 kg of chicken can be transferred to the consuming human?

- a. 1 kg      b. 10 kg      c. 100 kg      d. 1000 kg

2. The following practices should be observed in order to sustain feeding process in the ecosystem EXCEPT:

- a. Raise animals and insects to fight other pests.  
b. Dump organic wastes into rivers and streams.  
c. Grow a variety of crops instead of only one crop.  
d. Use organic fertilizers instead of chemical fertilizers.

3. Which of the following explains why fruits and vegetables eaters are energy efficient?

- a. They do not used energy at all.  
b. They burn much of their energy in a day.  
c. They directly derive energy from the producer level.  
d. They get their energy from first degree consumer level.

4. Which of the following shows the correct sequence of feeding relationships in a food chain?

- a. Grasses – Grasshoppers – Frogs – Snakes - Eagle  
b. Grasshoppers – Grasses - Frogs - Snakes - Eagle  
c. Frogs – Snakes - Eagle - Grasses - Grasshoppers  
d. Snakes – Eagle – Frogs – Grasses - Grasshoppers

5. Which consumer in a trophic level can eat both plants and animals?

- a. Carnivores      c. Herbivores  
b. Decomposers      d. Omnivores

6. If there are 600 kg of biomass at the third trophic level, how much biomass was available at the first trophic level?

- a. 6kg      b. 600kg      c. 6000kg      d. 60000kg

7. If there are 100,000 kilocalories of energy in the first trophic level, how many kilocalories are available to organisms in the second trophic level?

- a. 100 kcal      b. 1000 kcal  
c. 10,000kcal      d. 100,000 kcal

8. Which of the following organisms are placed at the base of the energy pyramid?

- a. consumers      c. decomposers  
b. producers      d. scavengers

9. Which consumer helps the recycling of nutrients?

- a. decomposer      c. consumer  
b. producer      d. scavenger

10. What will happen if producers are removed from the feeding process?

- a. The feeding process will continue.  
b. The feeding process remains constant.  
c. The food chain and food web will not be possible.  
d. The food chain and food web will utilize animals as producers.