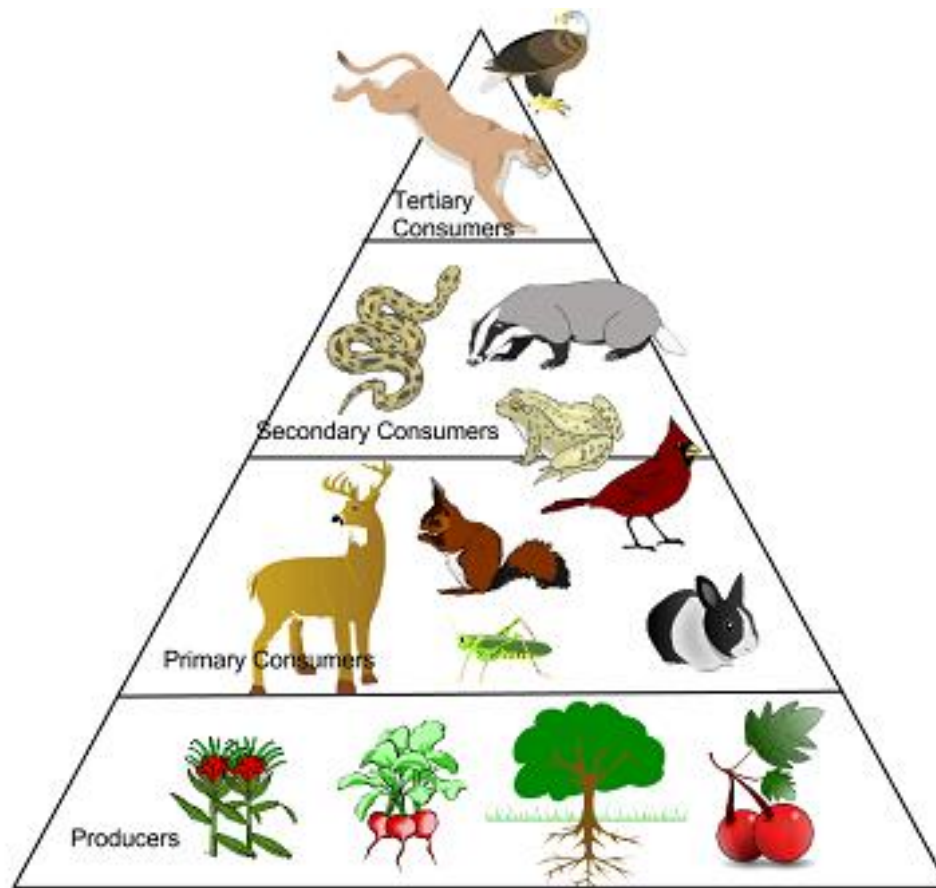
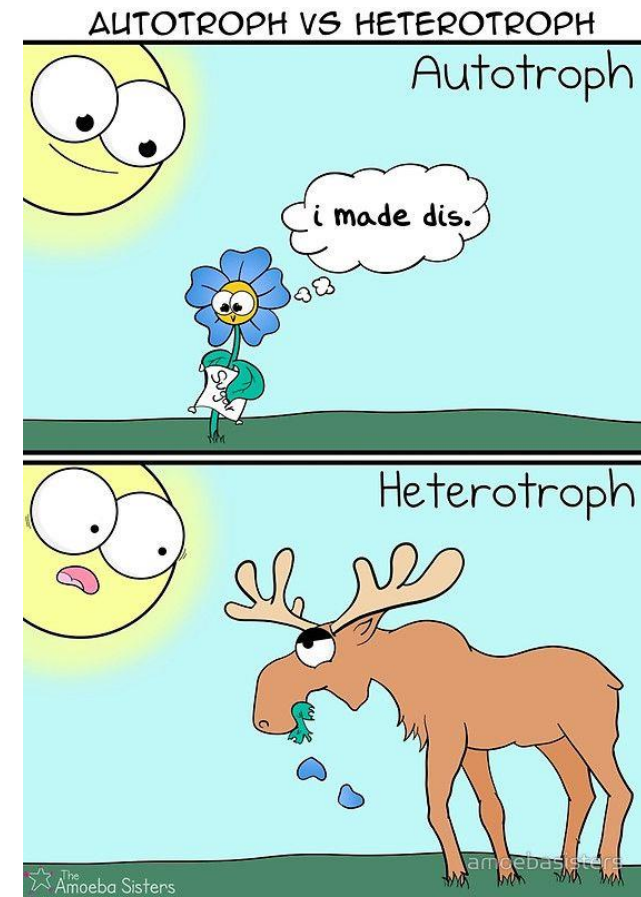


Ecological Pyramids



TROPHIC LEVELS

- ❑ An organism's trophic (feeding) level is determined by the organism's source of energy.
- ❑ We can classify organisms into two main types based on their trophic level.
 1. Autotrophs
 2. Heterotrophs

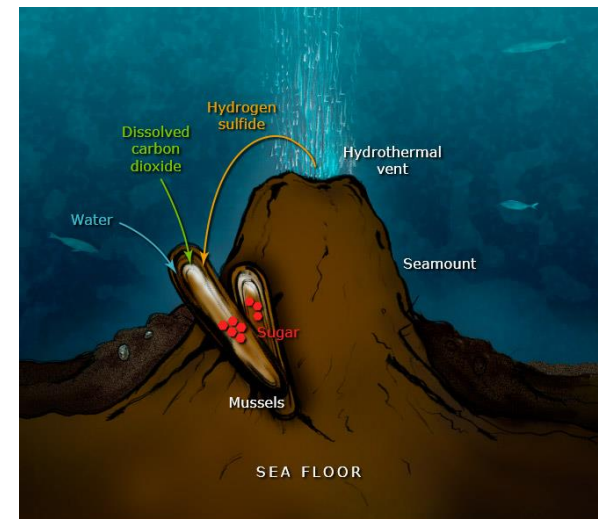


AUTOTROPHS (AKA: Producers):

- Capture energy from the sun (photosynthetic) or from inorganic molecules (chemosynthetic) and converts it into usable energy (sugar).



Examples: All plants & algae and some types of bacteria.



HETEROTROPHS (AKA: Consumers

- Obtain energy to build their molecules by consuming plants or other organisms



Examples:

- 1^o, 2^o, etc... consumers
- Scavengers
- Decomposers





SCAVENGERS

- Start the decomposition process by finding consuming carcasses of other animals that have been killed.
 - For Example: Hyenas, Crabs, Vultures.



Decomposers/Detritivores

- **Decomposers** feed by chemically breaking down organic matter (they don't have mouths to consume with) into detritus.



Decomposer examples include bacteria and fungi.

- **Detritus** are small pieces of decomposing plant and animal remains. These in turn are feed on by **Detritivores**.



Detritivore examples include earthworms, snails, shrimp, mites and crabs.

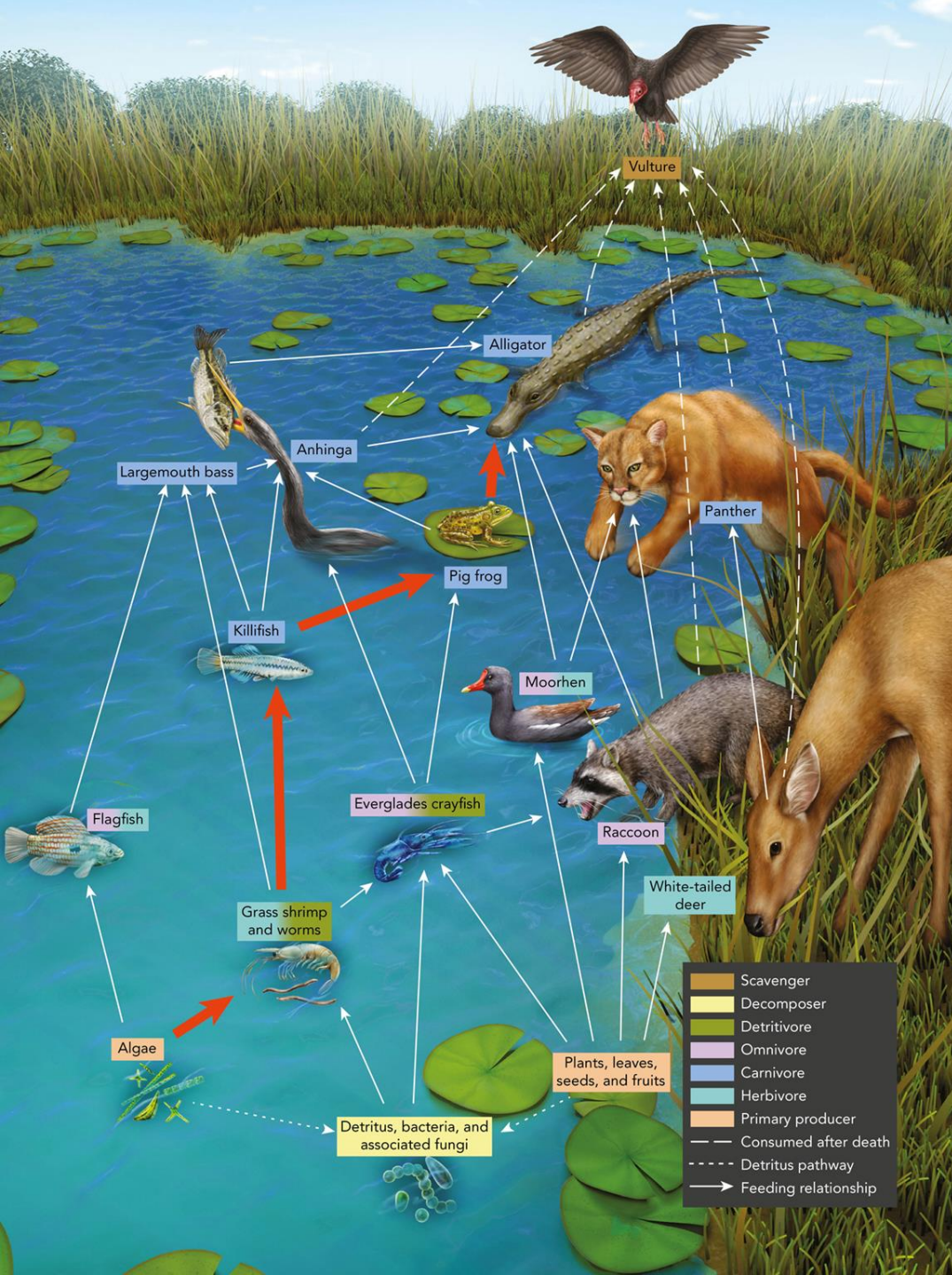
Decomposers/Detritivores

- **Decomposition releases nutrients that primary producers use to grow.**
- **Without Scavengers, Decomposers & Detritivores, nutrients would remain locked within dead organisms.**

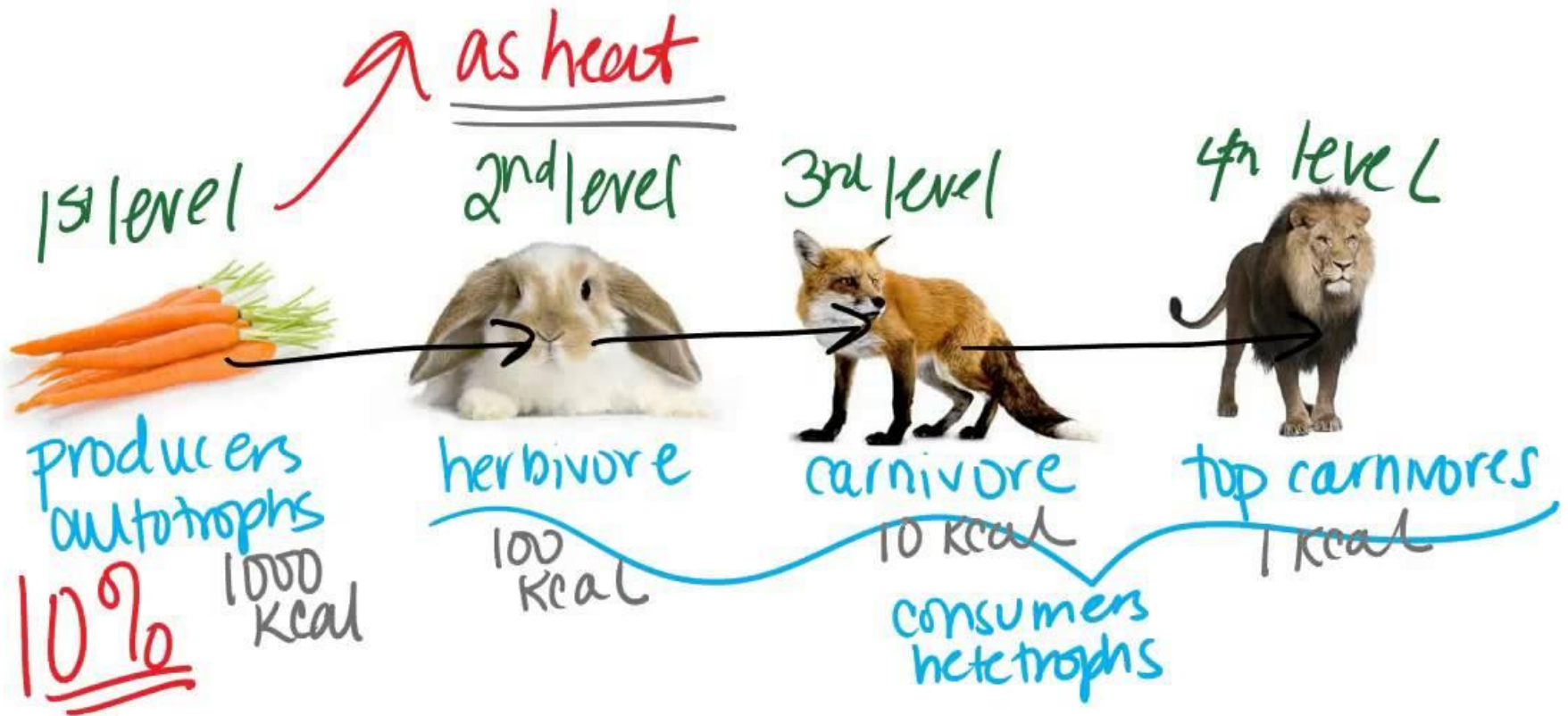


Energy Flow in Ecosystems

- Organisms convert food (glucose) into energy.
- As organisms are consumed they transfer that some of that energy onto the consumer.
- Energy is a one way path. It is not a cycle.

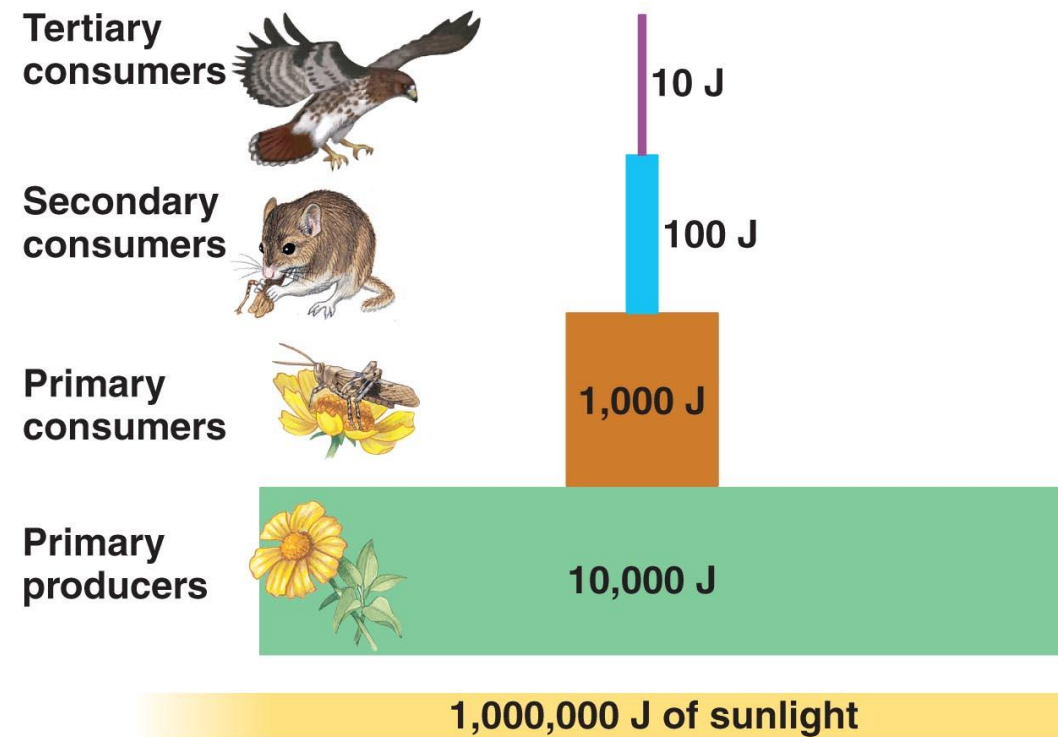


Energy Flow Models:



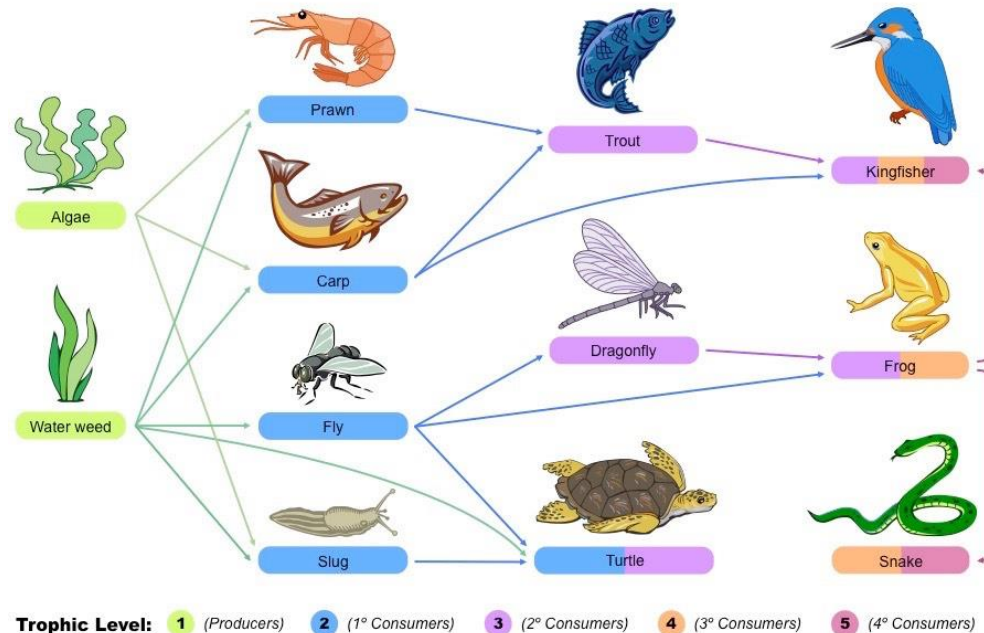
Energy Pyramid Model

- An energy pyramid is a diagram that compares energy used by producers and consumers at each trophic (feeding) level.
- Each level of the pyramid is called a trophic level.



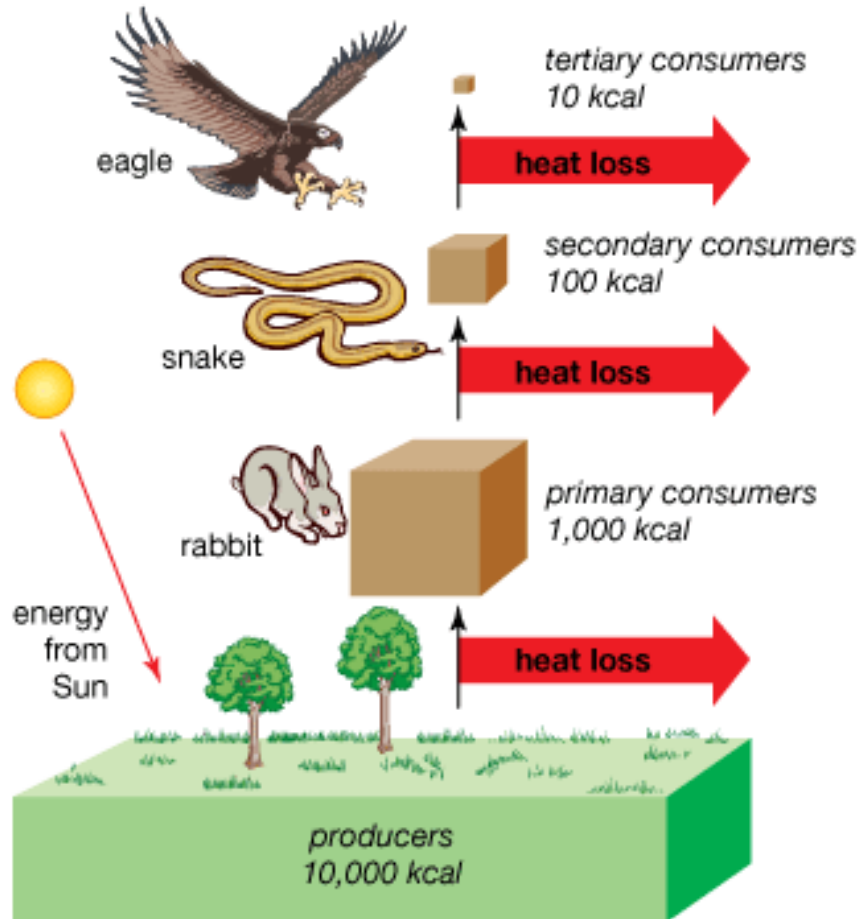
Energy Pyramid Model

Energy pyramids show 1 food chain in a food web. Producers are at the bottom of the food chain, so they appear at the bottom of the pyramid. Primary consumers are next and so on till the chain ends.



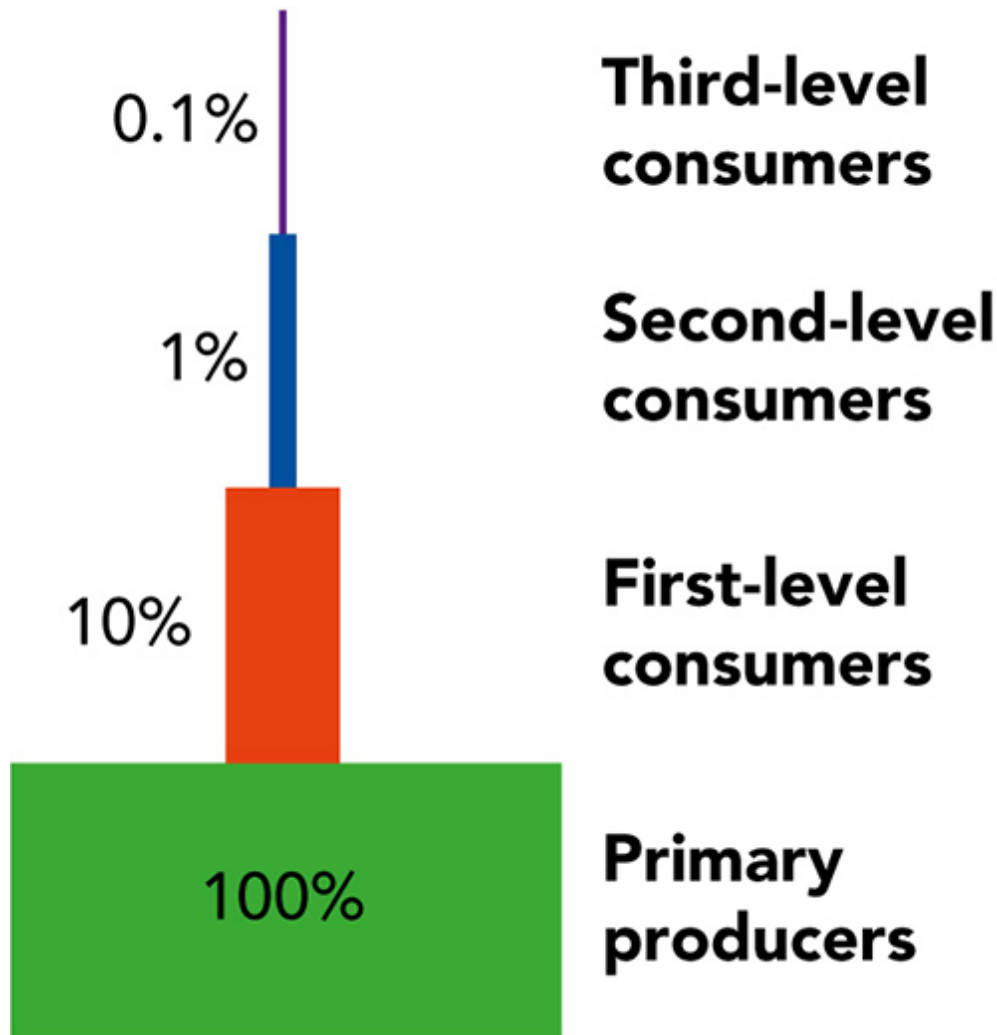
Energy Pyramid Model

Energy flow and trophic levels



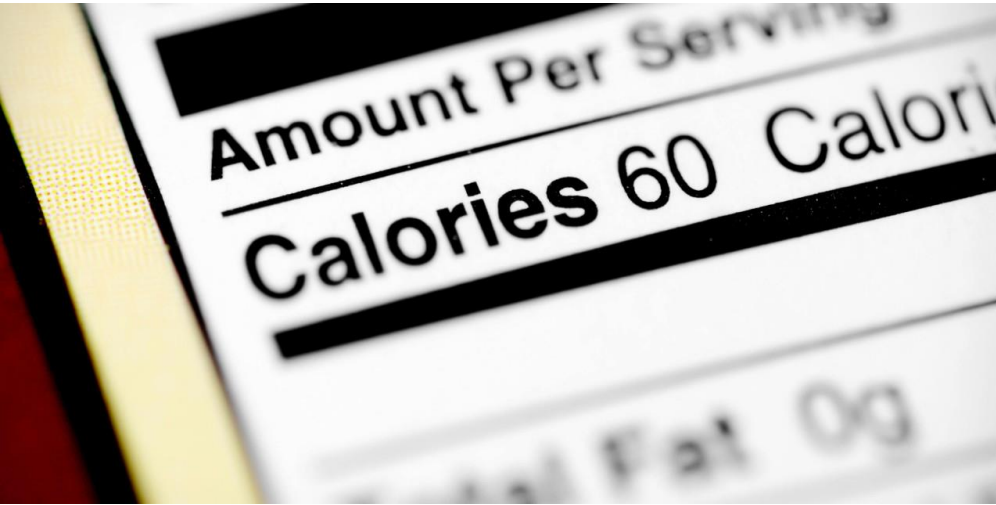
- 10% of the energy available within one trophic level is transferred to the next.
- On average 90% of the energy is either not consumed, or lost through waste and heat.

Energy Pyramid Model



Because of this exponential loss of energy, there reaches a limit in every food chain where there is no longer enough energy to support a higher trophic level.

Energy Pyramid Model



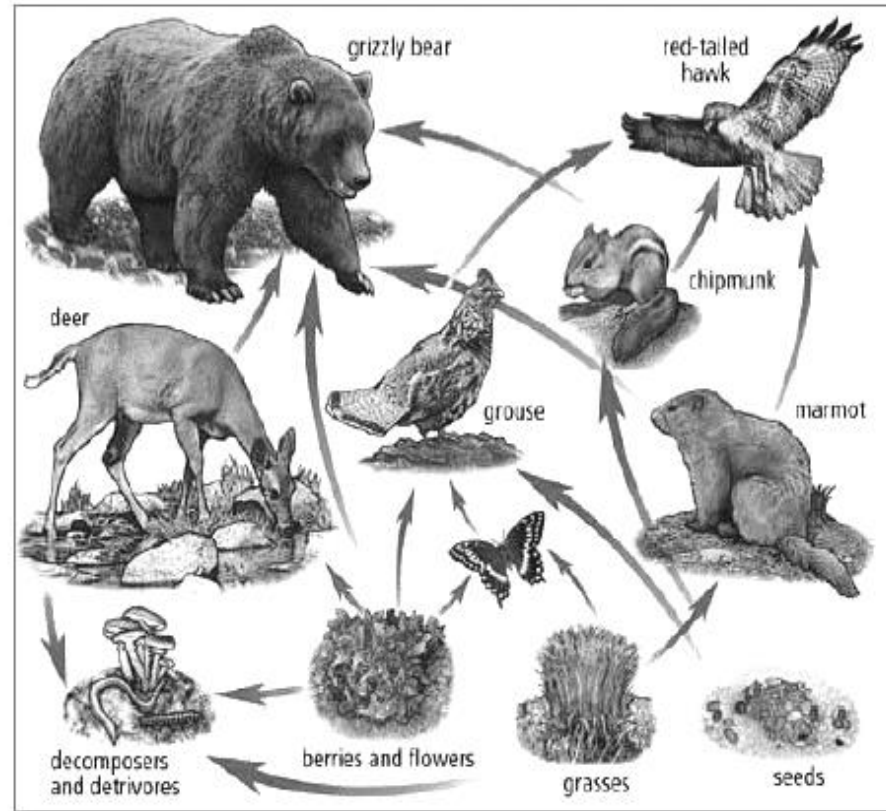
Metric units of energy include:

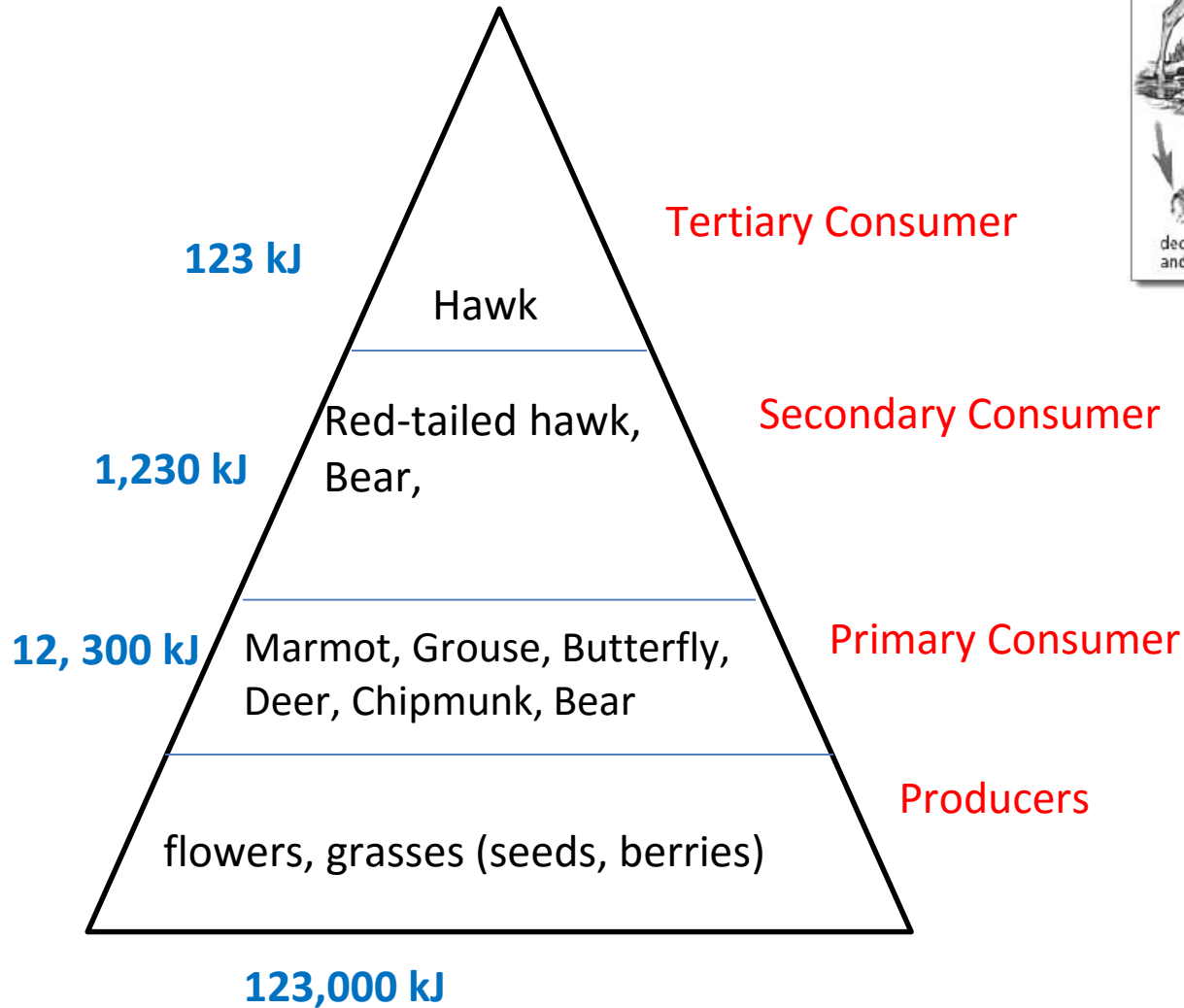
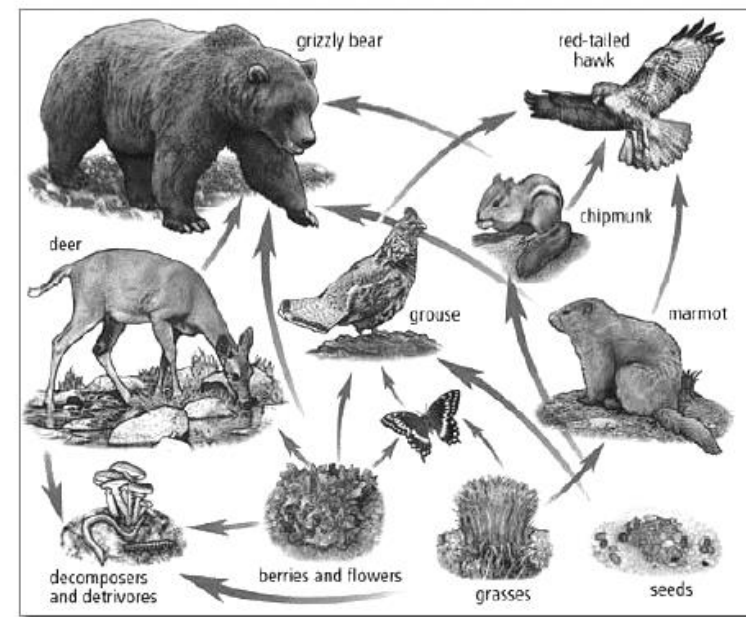
- calories (c)
- joules (j)

**HOW MANY
CALORIES ARE IN A
KILOCALORIE?**

Student Task

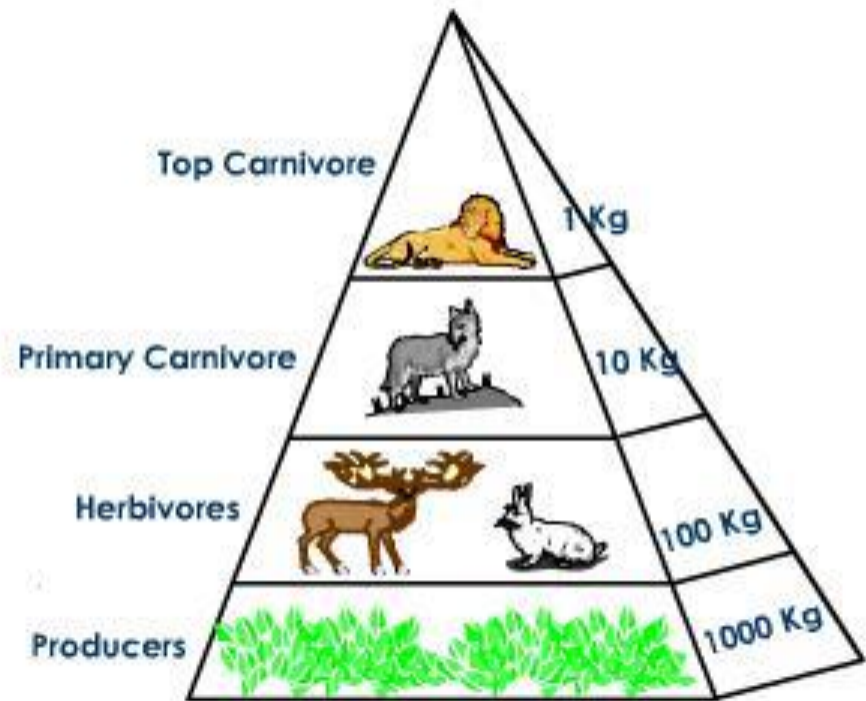
- Study the food web and convert a food chain from it into an energy pyramid model.
- The autotrophs in this food web start off with 123,000 kilojoules of energy and the decomposers are included on the outside of the pyramid.
- Also label the levels with the terms on paper





Biomass Pyramid Model

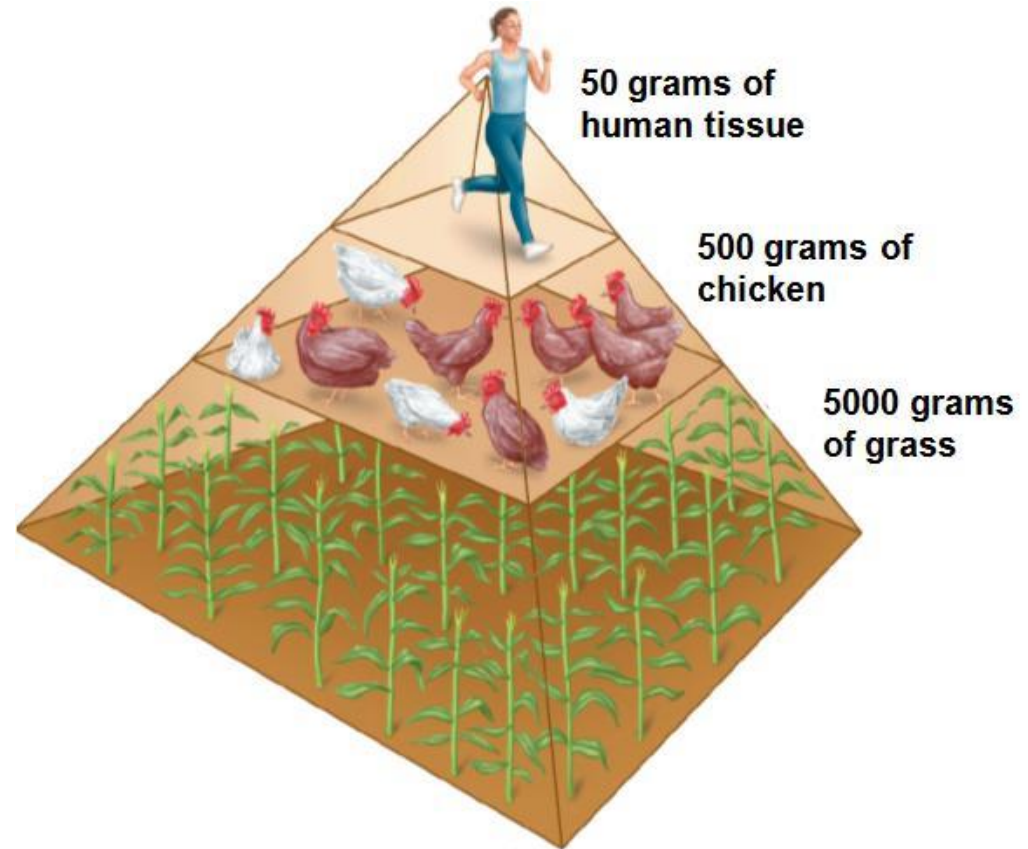
- **Biomass** is the mass of organisms at a specific trophic level minus water.
- Biomass refers to the amount of carbon and other trace elements an organism's body contains.



Upright Pyramid of biomass in a Terrestrial Ecosystem

Biomass Pyramid Model

- Energy is stored as biomass (in sugars, fats and to a lesser extent proteins) and so pyramids of biomass also decrease as energy decreases from trophic level to level.



Biomass Pyramid Model:

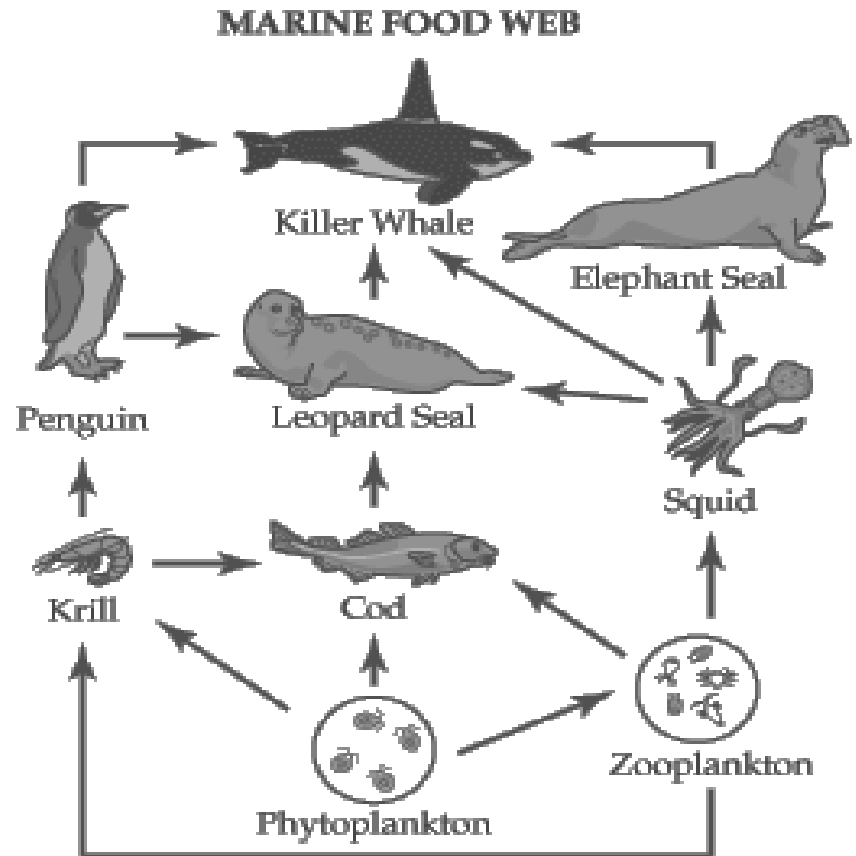
Measuring Mass in Grams



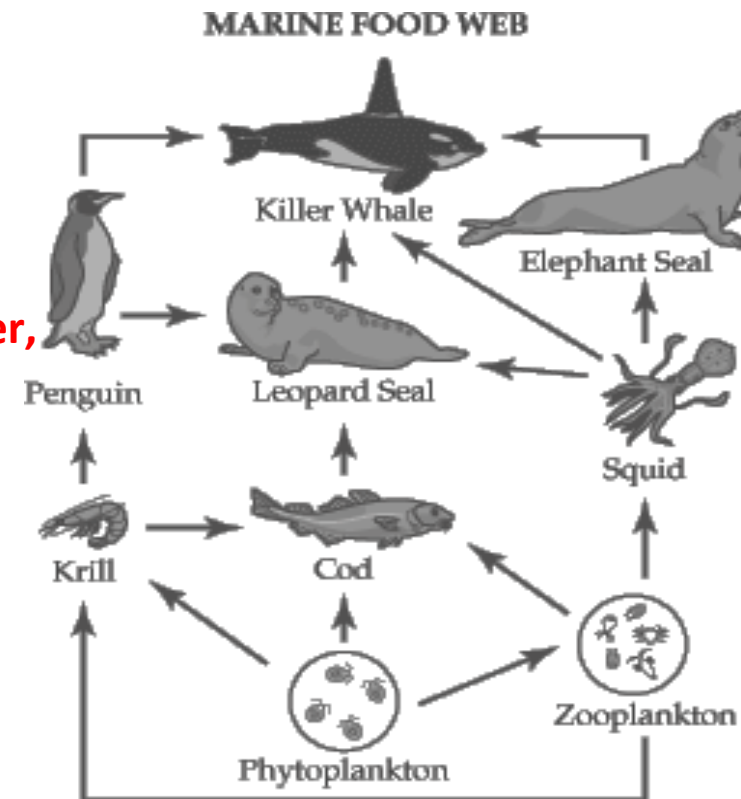
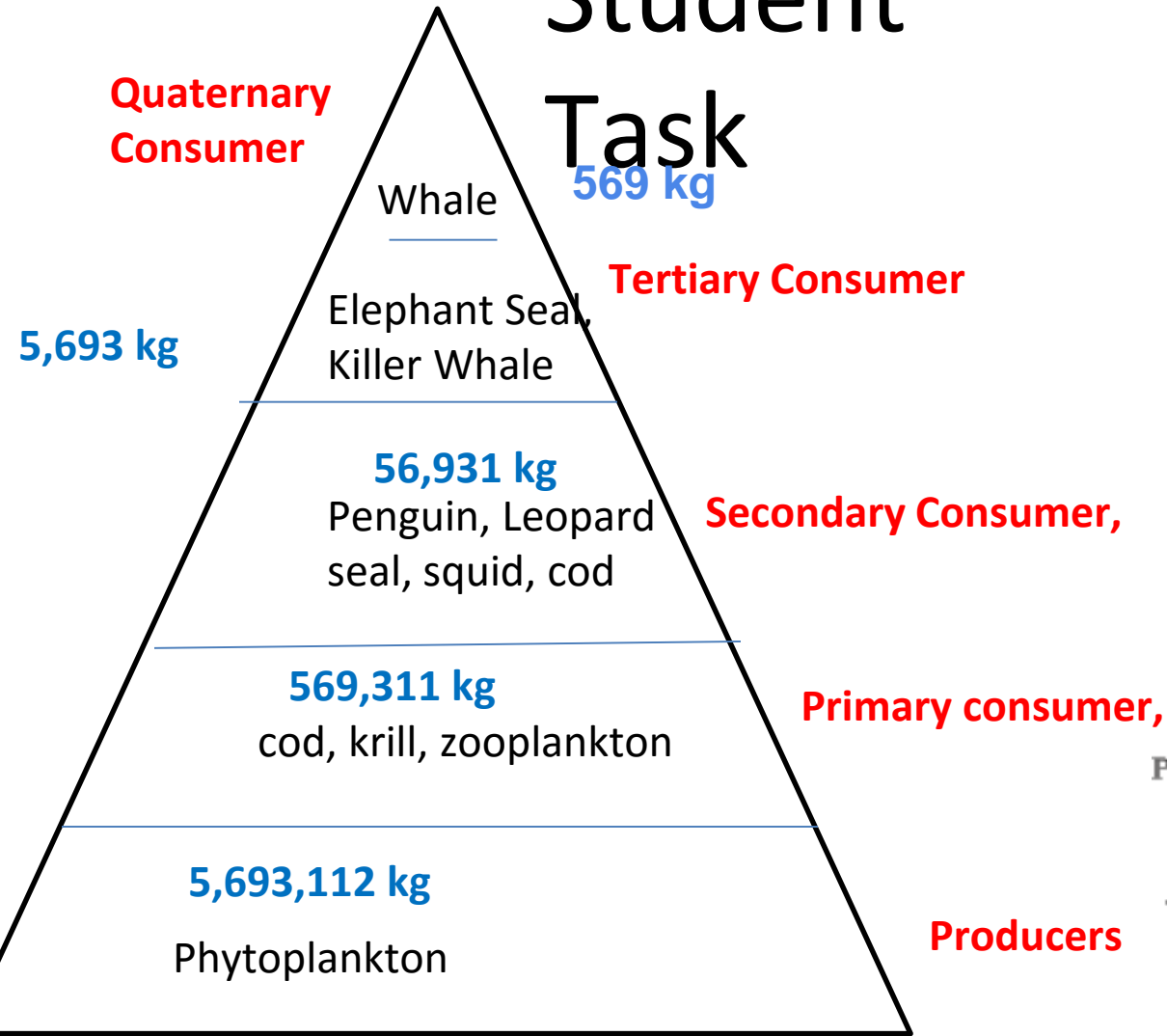
Metric units of mass are:
–grams (g)

Student Task

- Study the food web below and convert it into a biomass pyramid model.
- The autotrophs (phytoplankton) in this food web start off with 5,693,112 Kg of biomass.
- Also label the levels with the terms found on your paper



Student Task

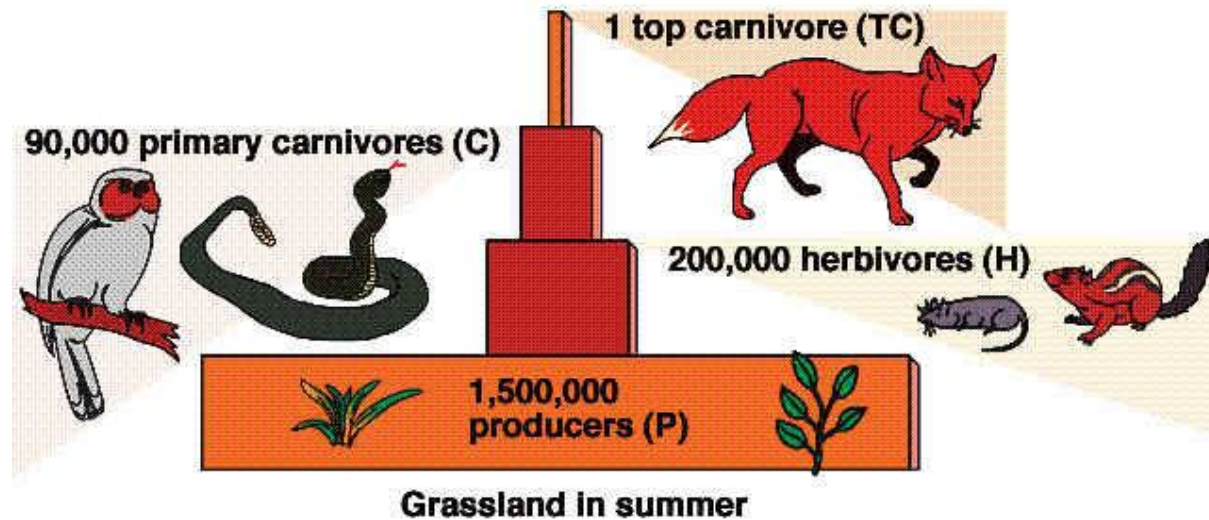


Pyramid of Numbers

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- Biomass can be converted into the actual number of organisms at each trophic level in a pyramid of numbers.

Pyramid Showing Numbers

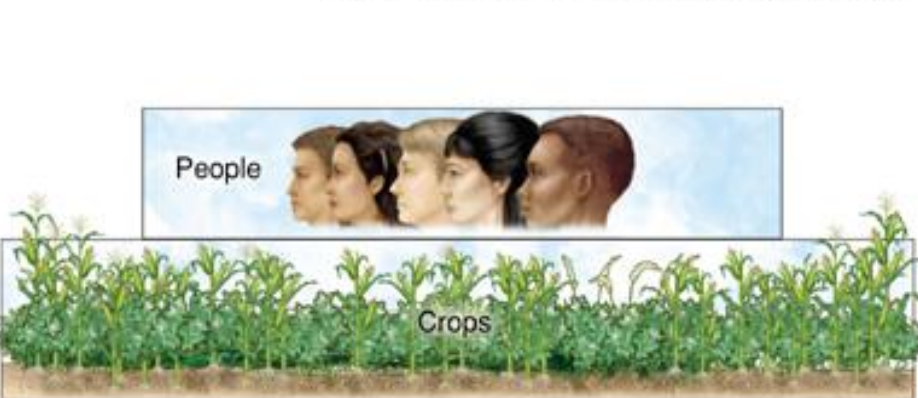


HOW DOES THIS APPLY TO YOU?

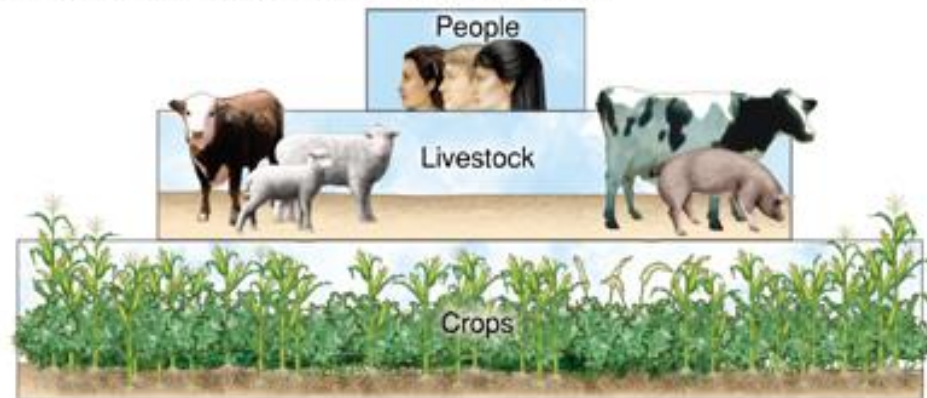
Being able to feed everyone on Earth is already a challenge. It will become even more so as our population on Earth grows. How can we feed more people in the future?

By growing more crops or by growing more meat?

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Vegetarians



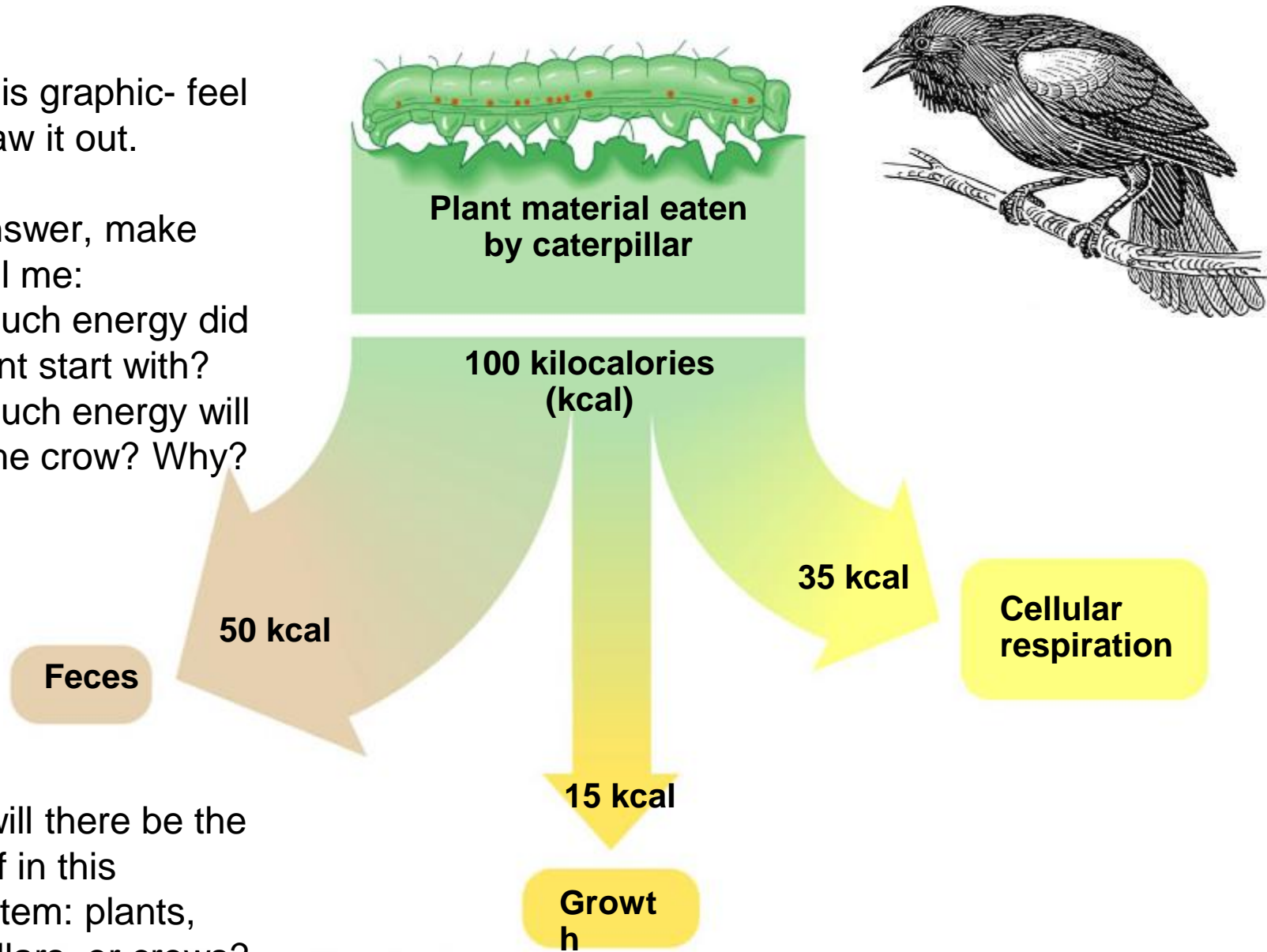
Meat-based diet

EXIT SLIP

Explain this graphic- feel free to draw it out.

In your answer, make sure to tell me:

- How much energy did the plant start with?
- How much energy will go to the crow? Why?



- What will there be the most of in this ecosystem: plants, caterpillars, or crows? How do you know?