

Key

Food Chains and Webs --- "What's for dinner?"

Every organism needs to obtain energy in order to live. For example, plants get energy from the sun, some animals eat plants, and some animals eat other animals.

A food chain is the sequence of who eats whom in a biological community (an ecosystem) to obtain nutrition. A food chain starts with the primary energy source, usually the sun or boiling-hot deep sea vents. The next link in the chain is an organism that makes its own food from the primary energy source -- an example is photosynthetic plants that make their own food from sunlight (using a process called **photosynthesis**) and chemosynthetic bacteria that make their food energy from chemicals in hydrothermal vents. These are called autotrophs or primary producers.

Sample Food Chains

Trophic Level	Grassland Biome	Pond Biome	Ocean Biome
Primary Producer	grass ↓	algae ↓	phytoplankton
Primary Consumer	grasshopper ↓	mosquito larva ↓	zooplankton
Secondary Consumer	rat ↓	dragonfly larva ↓	fish
Tertiary Consumer	snake ↓	fish ↓	seal
Quaternary Consumer	hawk	raccoon	white shark

Next come organisms that eat the autotrophs; these organisms are called **herbivores** or **primary consumers** -- an example is a rabbit that eats grass. The next link in the chain is animals that eat

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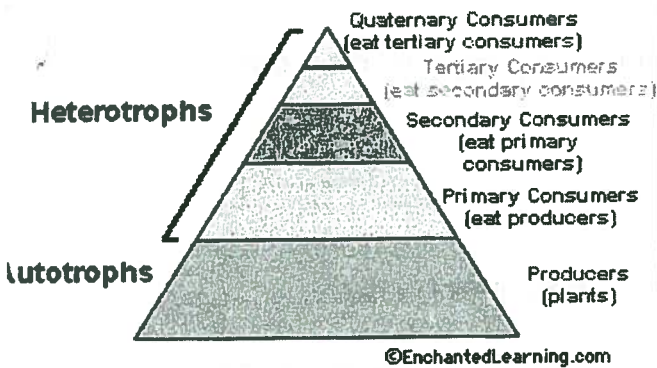
herbivore - these are called **secondary consumers** -- an example is a snake that eats rabbits. In turn, these animals are eaten by larger **predators** -- an example is an owl that eats snakes. The **tertiary consumers** are eaten by quaternary consumers -- an example is a hawk that eats owls. Each food chain ends with a **top predator** and animal with no natural enemies (like an alligator, hawk, or polar bear).

Food Chain Questions

1. What travels through a food chain or web? *energy/nutrients*
2. What is the ultimate energy for all life on Earth? *sunlight*
3. Food chains start with what? *producer (sun)*
4. The 1st organism in a food chain must always be what type of organism? *producer*
5. Name 2 food making processes.
photosynthesis ; chemosynthesis
6. Where do chemosynthetic bacteria get their energy? *chemicals*
7. Define herbivore. *eats autotrophs*
8. Herbivores are also called *primary consumers*
9. What are animals called that feed on herbivores? *Secondary consumers*
10. Secondary consumers are eaten by larger *predators*.
11. *tertiary* consumers eat secondary consumers.
12. Make a food chain with a producer and 3 consumers.

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Grass → *1* rabbit → *2* snake → *3* bird

The Food Web



The ^{#1} **arrows** in a food chain show the flow of **energy**, from the sun or hydrothermal vent to a top predator. As the energy flows from organism to organism, ^{#2} **energy is lost** at each step. ^{#3} A **network of many food chains** is called a food web.

Trophic Levels:

The trophic level of an organism is the **position it holds in a food chain**. ^{#4}

1. ^{#5} **Primary producers** (organisms that make their own food from sunlight and/or chemical energy from deep sea vents) are the base of every food chain - these organisms are called **autotrophs**. ^{#6}
- ^{#7} 2. **Primary consumers** are animals that eat primary producers; they are also called **herbivores** (plant-eaters).
- ^{#9} 3. **Secondary consumers** eat primary consumers. They are **carnivores** (meat-eaters) and **omnivores** (animals that eat both animals and plants). ^{#8}
- ^{#10} 4. **Tertiary consumers** eat secondary consumers.
- ^{#11} 5. **Quaternary consumers** eat tertiary consumers.
6. Food chains "end" with top predators, animals that have little or no natural enemies.

^{#12} When any organism dies, it is eventually eaten by **detrivores** (like **vultures, worms and crabs**) and broken down by **decomposers** (mostly **bacteria and fungi**), and the exchange of energy continues. ^{#13}

^{#14} Some organisms' position in the food chain **can vary as their diet differs**. For example, when a **bear eats berries**, the bear is functioning as a **primary consumer**. When a bear eats a plant-eating rodent, the bear is functioning as a **secondary consumer**. When the bear **eats salmon**, the bear is functioning as a **tertiary consumer** (this is because salmon is a secondary consumer, since salmon eat herring that eat zooplankton that eat phytoplankton, that make their own ^{#15}

energy from sunlight). Think about how people's place in the food chain varies - often within a single meal!

Food Web Questions

1. What is used to indicate the flow of energy in a food chain or web?
arrows
2. What happens to energy as we move from step to step in a chain or web?
→ is 'lost' Reduced
3. Define food web.
many food chains (network)
4. What is meant by trophic levels?
position in food chain
5. Define autotroph.
can make own food
6. The 1st trophic level consists of primary producers called autotrophs.
7. Name the 2nd trophic level (both names). *primary consumers/herbivores*
8. Secondary consumers may be carnivores eating meat or omnivores that eat both plants and animals.
9. What is the 3rd trophic level called? *2nd consumers*
10. What is the 4th trophic level called? *3rd consumers*
11. At the 5th trophic level would be Quaternary consumers that eat tertiary consumers.
12. Give an example of 3 detritivores. On what do they feed?
worms
crab
vultures
dead or decaying matter

13. What organism feeds on dead plants and animals and helps recycle them?

decomposers

14. Both bacteria and fungi act as decomposers

15. Can an organism fill more than one trophic level --- yes or no? Give an example.

Bear eats berries 1st consumer

Bear eats rodent 2nd consumer

Bear eats salmon 3rd consumer

Numbers of Organisms:

In any food web, energy is lost each time one organism eats another. Because of this, there have to be many **more plants than there are plant-eaters**. There are **more autotrophs than** ^{#1} **heterotrophs**, and more plant-eaters than meat-eaters. Each level has about **90% less energy** ^{#2} available to it because some of the energy is lost as heat at each level. Although there is intense competition between animals, there is also interdependence. When one species goes extinct, it can **affect an entire chain** of other species and have **unpredictable consequences**. ^{#3}

1. In food chains and webs, what trophic level must you have more of than others? *1st more autotrophs than heterotrophs*

2. Each trophic level has how much LESS energy?

90%

3. What may happen if a species goes extinct?

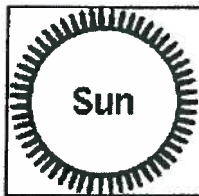
*affect entire chain
with unpredictable consequences*

Equilibrium

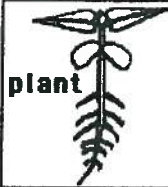
As the number of carnivores in a community increases, they eat more and more of the herbivores, decreasing the herbivore population. It then becomes harder and harder for the carnivores to find herbivores to eat, and the population of carnivores decreases. In this way, the carnivores and herbivores stay in a **relatively stable equilibrium**, each limiting the other's population. A similar equilibrium exists between plants and plant-eaters.

Food Chain Worksheet

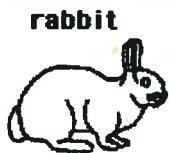
Read the passage then answer the questions below.



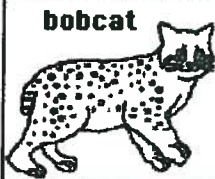
A food chain is a sequence of who eats whom in a biological community. It starts with a **primary energy source**, like the sun or boiling-hot deep sea vents. The arrows in the chain show the flow of food energy. #1



The energy source provides the energy for organisms that are able to convert that raw energy into their own food. These organisms (such as plants, phytoplankton, and algae) are called **autotrophs or primary producers**. #3



The next link in the chain is organisms that eat autotrophs like plants and algae. These organisms are called **primary consumers or herbivores**. Some examples are rabbits, deer, tadpoles, and caterpillars. #4



The next link is organisms that eat primary consumers. These organisms are called secondary consumers. Some examples are bobcats and lions. Chains can be longer than this. The animal at the end of a chain is the **top predator** (it has no natural enemies). #5

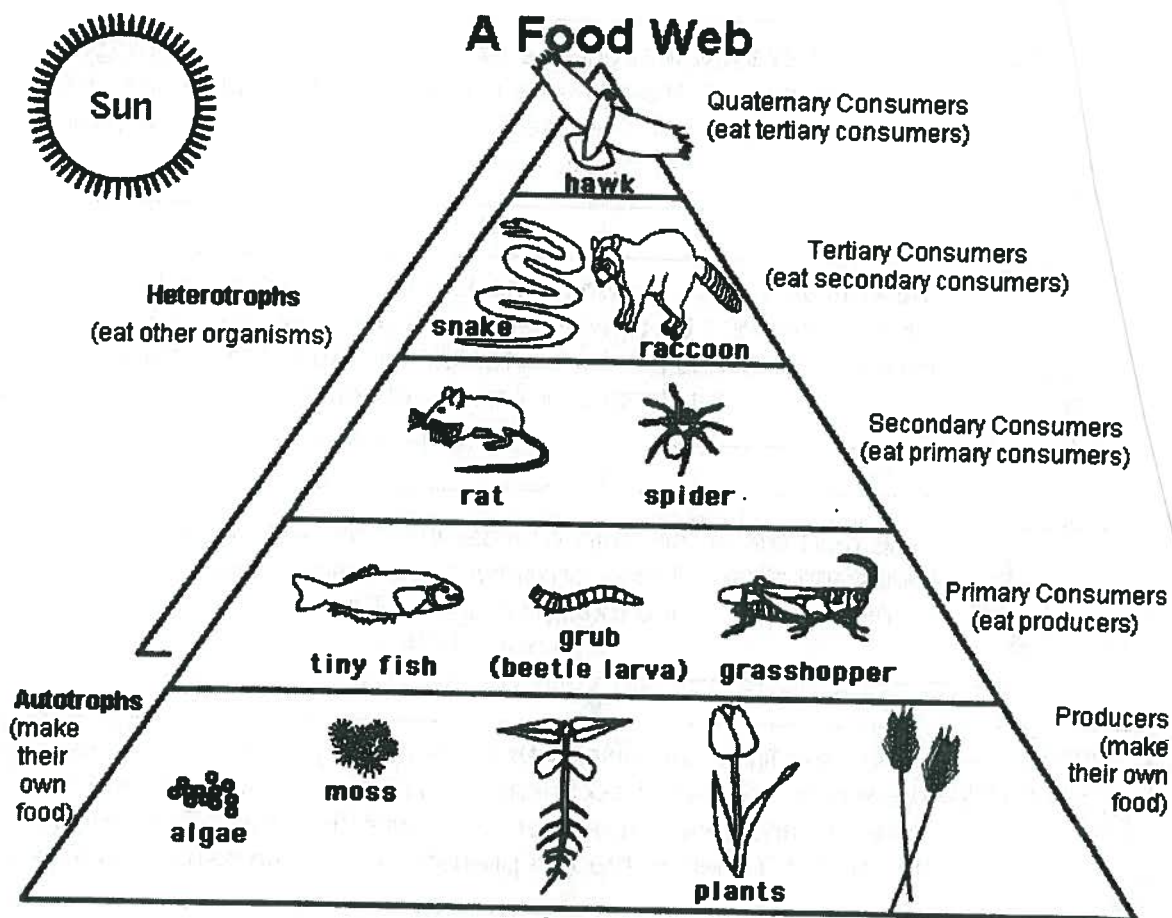
Questions

1. What do the arrows in a food chain represent? Flow of energy (matter)
2. A food chain starts with an primary energy source (Sun) source.
3. Organisms that make their own food are called autotrophs/primary producers
or _____
4. Organisms that eat plants are called herbivores
or primary consumers
5. An animal with no natural enemies is a top predator

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Food Web Worksheet

Read the passage then answer the questions below.



Questions

1. There are many more producers / autotrophs than there are primary consumers.
2. Organisms that eat other organisms are called heterotrophs.
3. Organisms that make their own food are called autotrophs or producers.
4. Grass is a producer / autotroph.
5. Zebras (grass-eaters) are herbivores / 1st consumer.
6. Lions (zebra-eaters) are carnivores / 2nd consumer.

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