

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

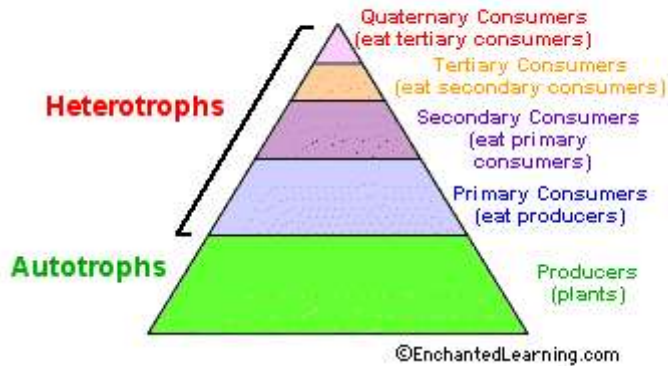
Next come organisms that eat the autotrophs; these organisms are called **herbivores** or **primary consumers** -- an example is a rabbit that eats grass. The next link in the chain is animals that eat

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?
2. What is the ultimate energy for all life on Earth?
3. Food chains start with what?
4. The 1st organism in a food chain must always be what type of organism?
5. Name 2 food making processes.
6. Where do chemosynthetic bacteria get their energy?
7. Define herbivore.
8. Herbivores are also called _____.
9. What are animals called that feed on herbivores?
10. Secondary consumers are eaten by larger _____.
11. _____ consumers eat secondary consumers.
12. Make a food chain with a producer and 3 consumers.

The Food Web



The 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, energy is lost at each step. 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.

1. **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**.
2. **Primary consumers** are animals that eat primary producers; they are also called **herbivores** (plant-eaters).
3. **Secondary consumers** eat primary consumers. They are **carnivores** (meat-eaters) and **omnivores** (animals that eat both animals and plants).
4. **Tertiary consumers** eat secondary consumers.
5. **Quaternary consumers** eat tertiary consumers.
6. Food chains "end" with top predators, animals that have little or no natural enemies.

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.

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

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?
2. What happens to energy as we move from step to step in a chain or web?
3. Define food web.
4. What is meant by trophic levels?
5. Define autotroph.
6. The 1st trophic level consists of _____ consumers called _____.
7. Name the 2nd trophic level (both names).
8. Secondary consumers may be _____ eating meat or _____ that eat both plants and animals.
9. What is the 3rd trophic level called?
10. What is the 4th trophic level called?
11. At the 5th trophic level would be _____ consumers that eat _____ consumers.
12. Give an example of 3 detritivores. On what do they feed?

13. What organism feeds on dead plants and animals and helps recycle them?
14. Both _____ and _____ act as decomposers
15. Can an organism fill more than one trophic level --- yes or no? Give an example.

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 heterotrophs, and more plant-eaters than meat-eaters. Each level has about 10% less energy 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.















1. In food chains and webs, what trophic level must you have more of than others?
2. Each trophic level has how much LESS energy?
3. What may happen if a species goes extinct?

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.

Complete the Food Chains Worksheet

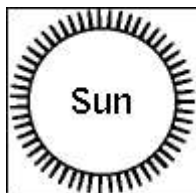
Circle the organisms that complete the food chains below.

	a. plankton b. alligator c. fish d. grass e. chicken	 zebra	a. spider b. guppy c. lion d. wheat e. human	
	 algae	a. moth b. snail c. whale d. caterpillar e. snail	a. lion b. starfish c. fish d. grass e. crow	 raccoon
	 plants	a. javelina b. anaconda c. falcon d. grass e. spider	 jaguar	
	 grass	a. weasel b. spider c. seaweed d. wolverine e. cricket	 snake	a. sheep b. goat c. ant d. owl e. moose
	 phytoplankton	a. zooplankton b. algae c. seal d. walrus e. moss	a. jellyfish b. spider c. krill d. starfish e. clam	 humpback whale

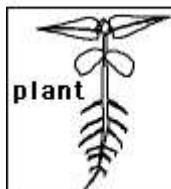
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Food Chain Worksheet

Read the passage then answer the questions below.



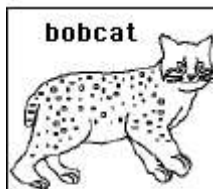
A food chain is a sequence of who eats whom in a biological community. It starts with a primary energy source, like the sun or boiling-hot deep sea vents. The arrows in the chain show the flow of food energy.



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.



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.



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).

Questions

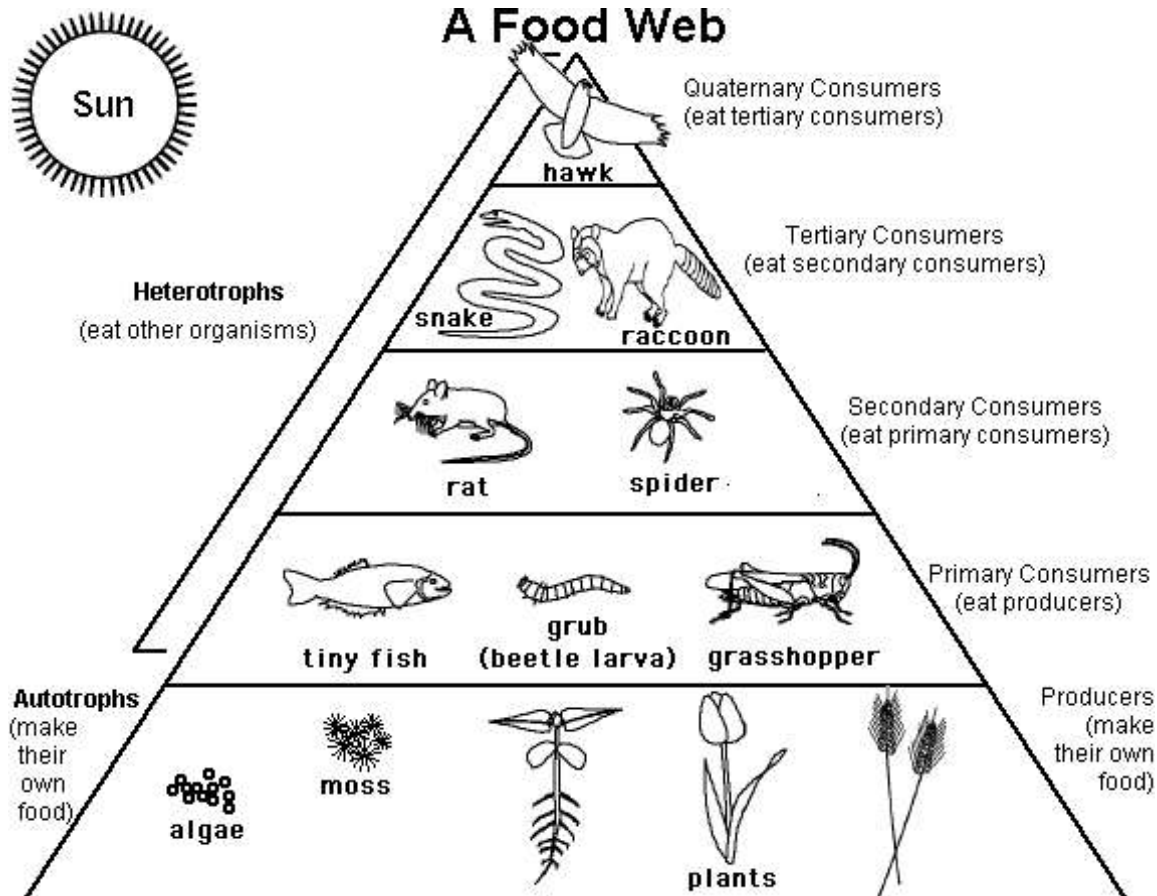
1. What do the arrows in a food chain represent? _____

2. A food chain starts with an _____ source.
3. Organisms that make their own food are called _____
or _____.
4. Organisms that eat plants are called _____
or _____.
5. An animal with no natural enemies is a _____.

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Food Web Worksheet

Read the passage then answer the questions below.



Questions

1. There are many more _____
than there are primary consumers.
2. Organisms that eat other organisms are called _____.
3. Organisms that make their own food are called _____
or _____.
4. Grass is _____.
5. Zebras (grass-eaters) are _____.
6. Lions (zebra-eaters) are _____.