







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**.

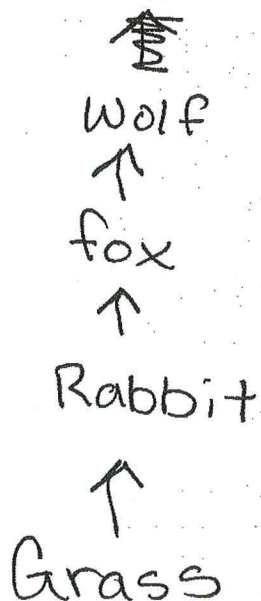
Sample Food Chains

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 

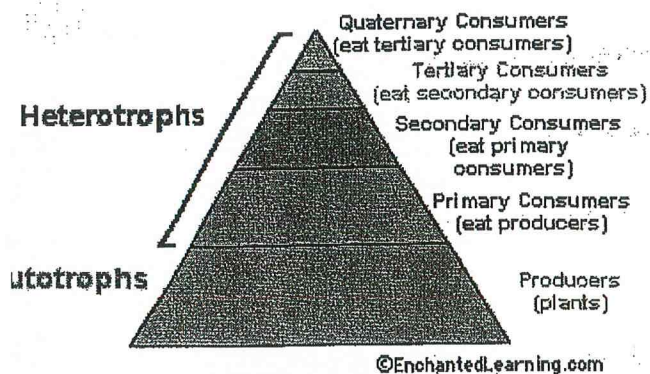
Next come organisms that eat the autotrophs; these organisms are called **herbivores** or **primary consumers** -- an example is a rabbit that eats grass. The next link in the chain is animals that eat herbivore - these are called **secondary consumers** -- an example is a snake that eats rabbits. In 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**
2. What is the ultimate energy for all life on Earth? **Sun**
3. Food chains start with what? **Producers**
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 in hydrothermal Vents**
7. Define herbivore. **An organism that eats only plants**
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.



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? **Arrows**
2. What happens to energy as we move from step to step in a chain or web? **Energy is lost**
3. Define food web. **A series of interconnected food chains**
4. What is meant by trophic levels? **Position it holds in a food chain**
5. Define autotroph. **An organism that produces its own food**
6. The 1st trophic level consists of primary ^{producers} ~~consumers~~ called autotrophs.
7. Name the 2nd trophic level (both names). **Primary consumers or heterotroph**

8. Secondary consumers may be Carnivores eating meat or omnivores that eat both plants and animals.
9. What is the 3rd trophic level called? Secondary consumer
10. What is the 4th trophic level called? Tertiary consumer
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?
Vultures, worms, crabs, Dead organisms
13. What organism feeds on dead plants and animals and helps recycle them? Decomposers
14. Both fungi and bacteria act as decomposers
15. Can an organism fill more than one trophic level --- yes or no? Give an example.
Yes, when the organism eats a variety of food

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?

Primary producers

2. Each trophic level has how much LESS energy? 10% less

3. What may happen if a species goes extinct? An entire food chain can be affected

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.

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.





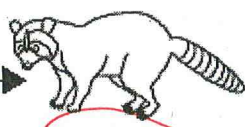

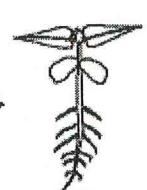
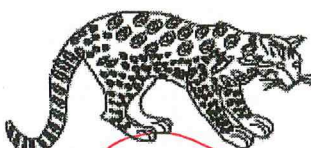






1. In food chains and webs, what trophic level must you have more of than others?
2. Each trophic level has how much LESS energy?
3. What may happen if a species goes extinct?

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.

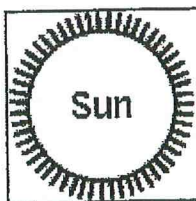
Complete the Food Chains Worksheet

Circle the organisms that complete the food chains below.

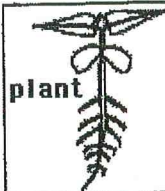
	a. plankton b. alligator c. fish <u>d. grass</u> e. chicken	 <u>zebra</u>	a. spider b. guppy <u>c. lion</u> d. wheat e. human
 <i>Simple, nonflowering plant, includes seaweed.</i>	 algae	a. moth b. snail c. whale d. caterpillar <u>e. snail</u>	a. lion <u>b. starfish</u> c. fish d. grass e. crow  <u>raccoon</u>
	 <u>plants</u>	a. <u>javelina</u> b. anaconda c. falcon d. grass e. spider	 <u>jaguar</u> <i>WILD FIG</i>
	 grass	a. weasel b. spider c. seaweed d. wolverine <u>e. cricket</u>	 <u>snake</u> a. sheep b. goat c. ant <u>d. owl</u> e. moose
 <i>free floating algae, protists, cyanobacteria</i>	 <u>phytoplankton</u>	a. <u>zooplankton</u> b. algae <u>c. seal</u> d. walrus e. moss	a. jellyfish b. spider <u>c. krill</u> d. starfish e. clam  <u>humpback whale</u> <i>look like small shrimp.</i> <i>ex) jellyfish, squid</i>

©EnchantedLearning.com

Directions: Read the following and answer the questions below.



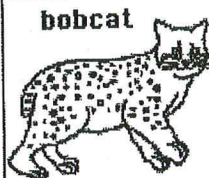
A food chain is a sequence of who eats whom in a biological community. It starts with a primary energy source, like the sun or boiling-hot deep sea vents. The arrows in the chain show the flow of food energy.



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).

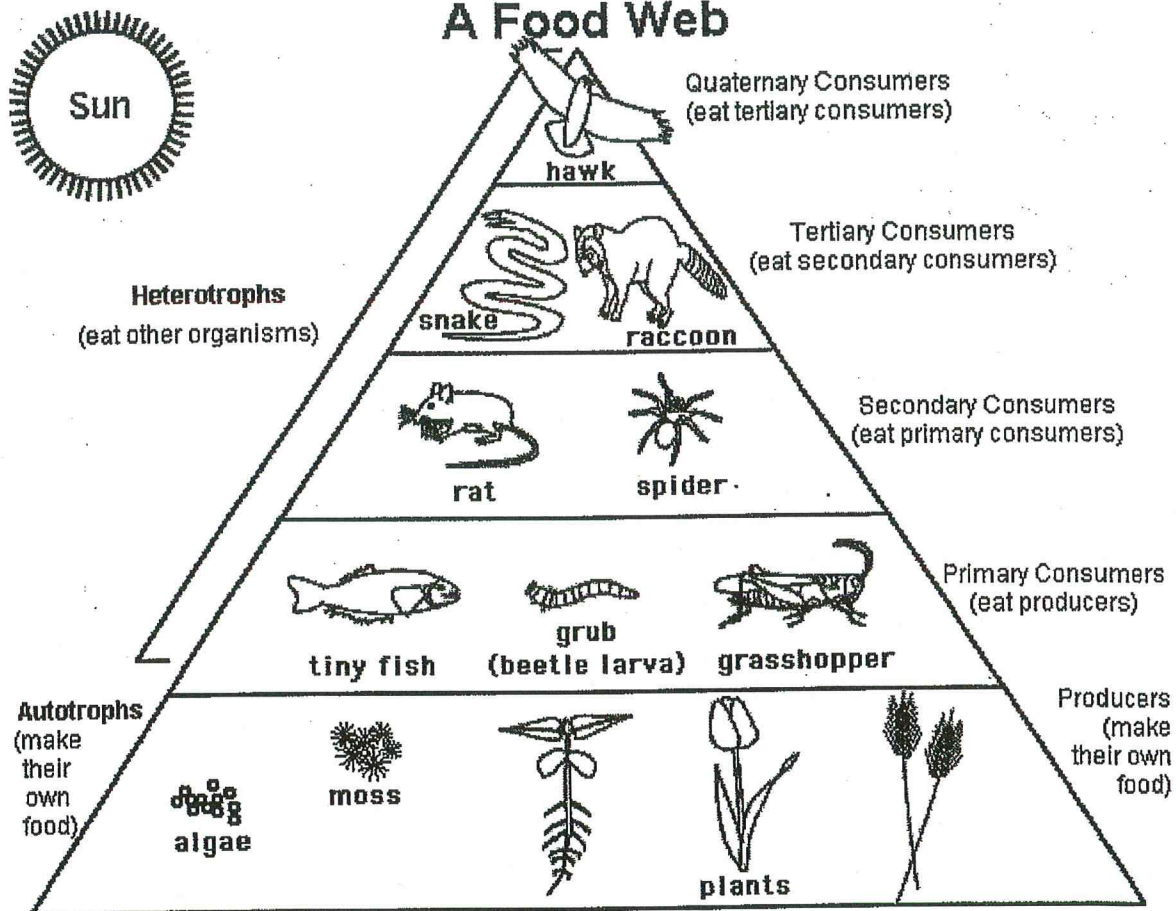
Questions

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

©EnchantedLearning.com

Food Web Worksheet

Read the passage then answer the questions below.



Questions

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

Producers — Primary Consumer — Secondary Consum. — Tertiary Consumer.

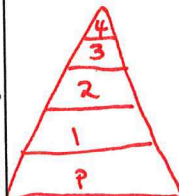
Food Chain Quiz - Multiple choice comprehension questions Color the circle by each correct answer.

<p>1. A plant is ...</p> <ul style="list-style-type: none">• A. an <u>autotroph</u> (self-feeder)○ B. a heterotroph○ C. a primary producer○ D. A and C	<p>6. A person who eats a chicken that ate grain is a ...</p> <ul style="list-style-type: none">○ A. primary producer○ B. primary consumer• C. <u>secondary consumer</u>○ D. quaternary consumer
<p>2. A cow is ...</p> <ul style="list-style-type: none">○ A. a <u>primary consumer</u>○ B. a <u>heterotroph</u> (other feeder)○ C. an <u>herbivore</u> (eats plants)• D. <u>all of the above</u>	<p>7. Primary consumers eat ...</p> <ul style="list-style-type: none">• A. <u>primary producers</u>○ B. primary consumers○ C. secondary consumers○ D. quaternary consumers
<p>3. Autotrophs ...</p> <ul style="list-style-type: none">○ A. <u>make their own food</u>○ B. <u>are the base of the food chain</u>○ C. <u>are primary producers</u>• D. <u>all of the above</u>	<p>8. Secondary consumers eat ...</p> <ul style="list-style-type: none">○ A. primary producers• B. <u>primary consumers</u>○ C. tertiary consumers○ D. quaternary consumers
<p>4. A lion that eats a zebra that ate grass is a ...</p> <ul style="list-style-type: none">○ A. primary producer○ B. primary consumer• C. <u>secondary consumer</u>○ D. quaternary consumer	<p>9. Tertiary consumers eat ...</p> <ul style="list-style-type: none">○ A. primary producers○ B. primary consumers• C. <u>secondary consumers</u>○ D. quaternary consumers
<p>5. A bear that eats a fish that ate bugs that ate algae is a ...</p> <ul style="list-style-type: none">○ A. primary producer○ B. primary consumer○ C. <u>secondary consumer</u>• D. <u>tertiary consumer</u>	<p>10. Quaternary consumers eat ...</p> <ul style="list-style-type: none">○ A. primary producers○ B. primary consumers○ C. <u>secondary consumers</u>• D. <u>tertiary consumers</u>

Food Chain Quiz #2 - Multiple choice comprehension questions

Color the circle by each correct answer.

<p>1. A heterotroph ...</p> <ul style="list-style-type: none"> <input type="radio"/> A. is an autotroph <input checked="" type="radio"/> B. <u>eats other organisms</u> <input type="radio"/> C. is a primary producer <input type="radio"/> D. A and C <input type="radio"/> E. none of the above 	<p>6. A top predator...</p> <ul style="list-style-type: none"> <input type="radio"/> A. has no natural enemies <input type="radio"/> B. is a meat eater <input type="radio"/> C. is a heterotroph <input checked="" type="radio"/> D. <u>all of the above</u> <input type="radio"/> E. none of the above
<p>2. A cow (that eats plants) is ...</p> <ul style="list-style-type: none"> <input checked="" type="radio"/> A. <u>a primary consumer</u> <input type="radio"/> B. a heterotroph <input type="radio"/> C. an herbivore <input type="radio"/> D. all of the above <input type="radio"/> E. none of the above 	<p>7. A detritivore ...</p> <ul style="list-style-type: none"> <input type="radio"/> A. is an autotroph <input checked="" type="radio"/> B. <u>eats decomposing matter</u> <input type="radio"/> C. kills animals <input type="radio"/> D. all of the above <input type="radio"/> E. none of the above
<p>3. If a person eats a vegetable, the person is acting as ...</p> <ul style="list-style-type: none"> <input type="radio"/> A. a primary producer <input checked="" type="radio"/> B. <u>a primary consumer</u> <input type="radio"/> C. a secondary consumer <input type="radio"/> D. a tertiary consumer <input type="radio"/> E. a quaternary consumer 	<p>8. As nutritional energy passes through the food chain, energy ...</p> <ul style="list-style-type: none"> <input checked="" type="radio"/> A. <u>is lost</u> <input type="radio"/> B. is gained <input type="radio"/> C. remains constant <input type="radio"/> D. increases, then decreases <input type="radio"/> E. decreases, then increases
<p>4. If a person eats a steak (from a cow), the person is acting as ...</p> <ul style="list-style-type: none"> <input type="radio"/> A. a primary producer <input type="radio"/> B. a primary consumer <input checked="" type="radio"/> C. <u>a secondary consumer</u> <input type="radio"/> D. a tertiary consumer <input type="radio"/> E. a quaternary consumer 	<p>9. There are more primary producers than there are ...</p> <ul style="list-style-type: none"> <input type="radio"/> A. primary consumers <input type="radio"/> B. secondary consumers <input type="radio"/> C. tertiary consumers <input type="radio"/> D. quaternary consumers <input checked="" type="radio"/> E. <u>all of the above</u>
<p>5. If a person eats a salmon (that ate smaller fish that ate algae), the person is acting as ...</p> <ul style="list-style-type: none"> <input type="radio"/> A. a primary producer <input type="radio"/> B. a primary consumer <input type="radio"/> C. a secondary consumer <input checked="" type="radio"/> D. <u>a tertiary consumer</u> <input type="radio"/> E. a quaternary consumer 	<p>10. There are more tertiary consumers than there are ...</p> <ul style="list-style-type: none"> <input type="radio"/> A. primary consumers <input type="radio"/> B. secondary consumers <input type="radio"/> C. tertiary consumers <input checked="" type="radio"/> D. <u>quaternary consumers</u> <input type="radio"/> E. all of the above

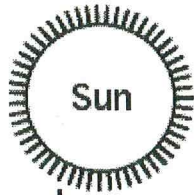


Match each Food Chain Word to its Definition.

Draw a line from each word on the left to its definition.

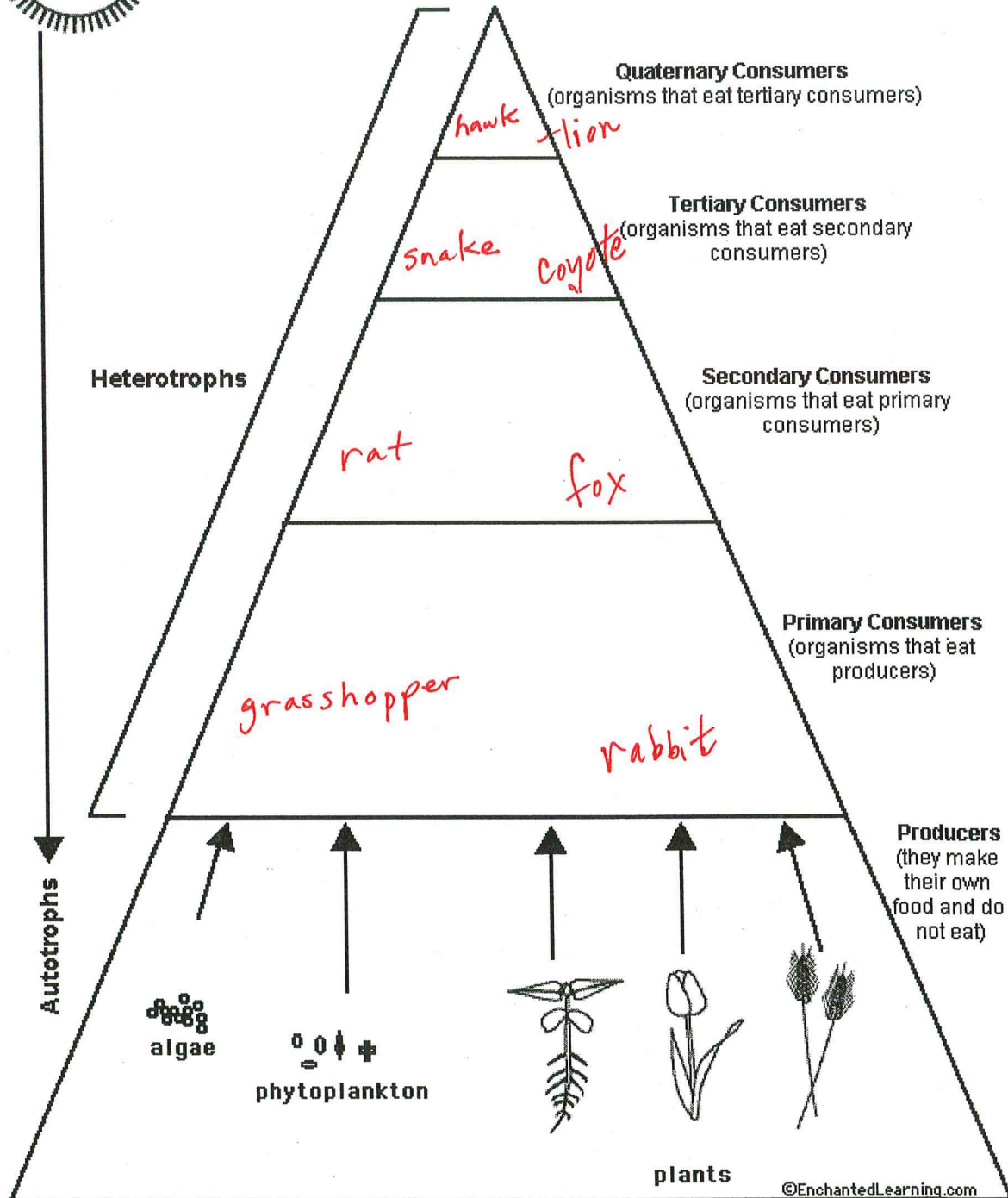
- | | |
|---------------------|---|
| food chain | The network of all the inter-related food chains in a biological community. |
| food web | The sequence of who eats whom in a biological community. |
| autotroph | An organism that gets its energy by eating other organisms. |
| heterotroph | An organism that makes its food from light or chemical energy without eating. |
| carnivore | An organism that eats plants. |
| herbivore | An organism that eats meat. |
| primary consumer | A meat-eater that eats primary consumers. |
| secondary consumer | A meat-eater that eats tertiary consumers. |
| tertiary consumer | A meat-eater that eats autotrophs. |
| quaternary consumer | A meat-eater that eats secondary consumers. |

Food Chain Trophic Levels - Worksheet



The trophic level of an organism is the position it holds in a food chain. For example, plants are producers, zebras are primary consumers (because they eat grass), and lions are secondary consumers (because they eat zebras).

Write organisms for each trophic level.



Cycles worksheet

Please answer the following using the words in the text box.

Carbon Cycle

Coal	Oil	Natural Gas	burning of fossil fuels	volcanoes
Photosynthesis	Respiration	ocean	sugar	Greenhouse
				decayed

1. Plants use CO₂ in the process of photosynthesis to make sugar and oxygen.
2. Animals use oxygen in the process of respiration and make more CO₂.
3. The ocean is the main regulator of CO₂ in the atmosphere because CO₂ dissolves easily in it.
4. In the past, huge deposits of carbon were stored as dead plants and animals decayed.
5. Today these deposits are burned as fossil fuels, which include coal, natural gas, and oil.
6. More CO₂ is released in the atmosphere today than in the past because of burning of fossil fuels.
7. Another natural source for CO₂ is volcanoes.
8. Too much CO₂ in the atmosphere may be responsible for the greenhouse effect.

Nitrogen Cycle

Atmosphere	78%	ammonia	proteins	denitrifying
Nitrate	nitrogen-fixing	plants	animals	waste
				plants

1. Our atmosphere is 78% nitrogen gas.
2. Animals and plants cannot directly use all the nitrogen found in our atmosphere.
3. Only special bacteria can directly use nitrogen in our atmosphere and "fix" it so other organisms can benefit. These bacteria are called nitrogen-fixing bacteria.
4. Higher organisms use nitrogen to make their proteins.
5. Animal waste decay by the action of bacteria which create ammonia and nitrate products rich in nitrogen, and useful for plants to use again.
6. Denitrifying bacteria in the soil can break down the ammonia into the gaseous form of nitrogen, which is not available for use by plants or animals.
7. In another part of the cycle, animals eat plants containing nitrogen, which is again returned to the soil by animal waste or decaying plants and animals.

Phosphorus Cycle

Pollution basins rocks and minerals waste DNA overgrowth plants

1. Phosphorus is NOT found in the free state in Nature, but is contained mostly in rocks and minerals.
2. It is an essential nutrient for life, as it makes up important chemicals such as DNA.
3. In the Phosphorus Cycle, phosphorus moves between the soil and plants, which are eaten by animals. The animals use phosphorus, and then their waste products help return the Sulfur for the next generation of phosphorus in the soil.
4. Some of the phosphorus in soils can be washed away into water basins.
5. Another source of phosphorus in water comes from man-made pollution.
6. Too much phosphorus in water leads to plant overgrowth, strangling all other life forms in the water.

Water Cycle

Ground water hydrologic cycle precipitation condensation evaporation
A body of water transpiration water vapor

- 1) The water cycle is also called the hydrologic cycle.
- 2) Condensation is the process that turns water vapor into liquid, which causes the formation of a cloud.
- 3) After it rains, the water can either end up on land or a body of water.
- 4) When water evaporates from a leaf, this process is called transpiration.
- 5) When water is heated in an ocean, the liquid water changes form into water vapor.
- 6) When water leaves a body of water after it is heated the process is called evaporation.
- 7) When water falls from the sky the process is called precipitation.
- 8) When water hits land and is soaked into the ground, the water becomes ground water.

