

Science Program — Grade 4

Set 2. Life Sciences: *Food Webs*

The Story



One of the really interesting things about science is that you can learn things at all different levels. That includes things that are really simple to really complicated. For example, you have learned about food chains so you know that animals depend on plants. Animals also depend on one another.

Think about an example of a food chain: a mouse eats little seeds to get the energy it needs. A hawk swoops down and grabs (and eats!) the mouse to get the energy it needs. Now that is a simple “feeding relationship”. The hawk is dependent (it depends on) the mouse that is dependent on the plant for its seeds.

Here is the interesting part, the “different levels” part. If you look more closely, and you have to, you see it gets complicated. In nature, this is more like what happens:

A deer is eating the bushes so the flowers don’t even get to make the seeds for the mouse and even if it did, the birds are right there trying to eat them first. When the mouse wasn’t looking a rabbit moved in and took over the place where the mouse was living so it was stuck out in the open field. A hawk could easily see it, standing out there in the field. So as the hawk was zooming down to try to grab it, an owl came out of the woods and got there first. At least with the mouse out of the way that left more seeds for the bird. That is unless the deer brought another deer to eat seeds with it.

Confused? That’s great because this is really fun to sort out!

Focus Question

Food chains can get complicated. Explain why.



Because lots of different animals are in food chains so they get all mixed up.

Answer

Set 2. Life Sciences: *Food Webs*

Key Words:



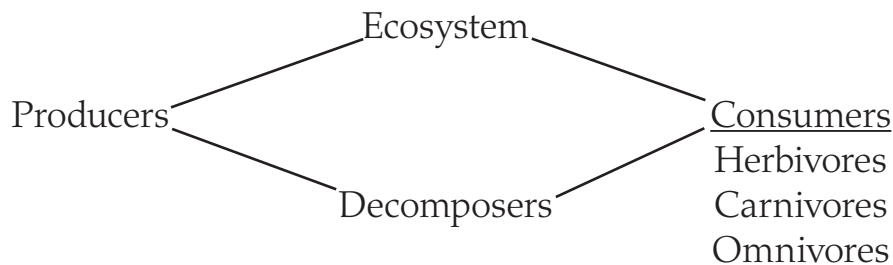
Producer —	green plants
Consumer —	an animal that eats plants or other animals
Herbivores —	animals that eat plants only
Carnivores —	animals that eat other animals only
Omnivores —	animals that eat both plants and animals
Decomposers —	organisms that feed on the remains or waste products of plants and animals
Food chain —	a model to show how energy moves from plants to animals in the environment
Food web —	a model that shows how food chains are connected and overlap in the environment
Interdependence —	when things (meaning here plants and animals) depend on one another for survival
Competition —	when living things in an ecosystem are trying to use the same things (like food or shelter)
Ecosystem —	all the living and nonliving parts of an environment

Getting the Words (and the Concepts) Straight

“Oh man! That’s a LOT of words to learn!”



Here’s a picture of how these words go together (it’s something like the sorting out of the Plant Kingdom we did before).



Set 2. Life Sciences: *Food Webs*

In every ecosystem there are:

Producers — they are the plants (never the animals!). They “produce” the matter (that’s all the plant parts like leaves, stems, roots, fruits) which can be digested into materials that give energy to the consumers that eat the plants.



“You know, the stuff you find in the “produce” section of the food market or grocery store.”

Consumers —they are the animals (never the plants!). They “consume” (or use) the plants or other animals to digest into materials that give them energy to grow and do everyday things to live.

The consumer group can be divided into smaller groups to make it easier for us to talk about them and know what they eat.

Herbivores — Animals that eat “herbs”. When scientists who study plants (called “botanists”) talk about plants they say “herbs”. Herbivores only eat plants or plant parts. There are lots of examples of herbivores. Some are squirrels, cows, sheep, and impalas and gazelles in Africa.

Carnivores — Animals that eat meat only. So these animals eat herbivores or, if they are ferocious (meaning here really savage) they eat other carnivores. Some examples of carnivores are sharks, lions, some snakes, and hawks.

Remember an animal doesn’t have to be big to be ferocious! Spiders look pretty ferocious to small insects!



“These animals don’t bother with their vegetables.”



Set 2. Life Sciences: *Food Webs*

Omnivores — (that’s probably you) Animals that eat both plants and meat. Some examples of omnivores are raccoons, skunks, and bears.

It might be easier to keep these straight if you knew where the words came from:

Herbivore

is from the Latin words “herba”, which means “grass” and “vovare” which means “to swallow”. So “herbivorus” (say “her- biveress”) means an animal that “swallows grass”

Carnivore

is from the Latin words “carn”, which means “flesh” and “vovare”. So “carnivorus” (say “car -niveress”) means an animal that eats meat (or flesh). This is the same place the Spanish word for “meat” comes from.



Omnivore

is from the Latin word “omni”, which means “all” and “vovare”. So “omnivorus” (say “om-niveress”) means an animal that eats everything. Remember this “omni” prefix because you will see this a lot in your studies.

Sometimes all these different consumers are trying to eat the same things. For example, hawks and owls might be fighting over the same mouse. Or raccoons and ducks might want the same fish. Sometimes plants are trying to grow in the same place.

When plants or animals are trying to use the same things to stay alive we call it competition.

Finally, we have a very important group of little organisms called decomposers.

Decomposers feed on all the dead stuff that is left over. They break down dead animals and animal wastes into nutrients (those are the substances needed to live and grow). Those nutrients sink into the soil and are sucked up by plant roots to be used by the plants.

Set 2. Life Sciences: *Food Webs*



“I know you see what is happening here... if the plants are sucking up the nutrients from the soil to help them live and grow, then the herbivores are getting those nutrients when they eat the plants, and the carnivores are getting the nutrients next and on it goes... nature!”

Food Webs

Producers and consumers, that includes herbivores, carnivores, omnivores, and decomposers, are all related to one another in food chains and food webs.

Memory Jiggler



Remember, a food chain is a model to explain how energy moves through an ecosystem. An example of a food chain would be:

Dead leaves → Earthworm → Robin

A food web is a way to show how food chains interconnect and overlap in the environment. Food webs are a good way to show that plants and animals are interdependent.

Here that means that lots of different plants and animals are depending on one another for things (including energy to live!). It is more than, in our example, just the robin depending on the earthworm depending on the leaves.

Focus Question

Explain how producers are related to consumers



Producers are the plants. They are the food for the consumers.

Answer

Set 2. Life Sciences: Food Webs



“Here’s a hint: keep this idea of interdependence in your head. We are going to see this coming up again soon and you are going to see this coming up all over the place in all the rest of science you study.”

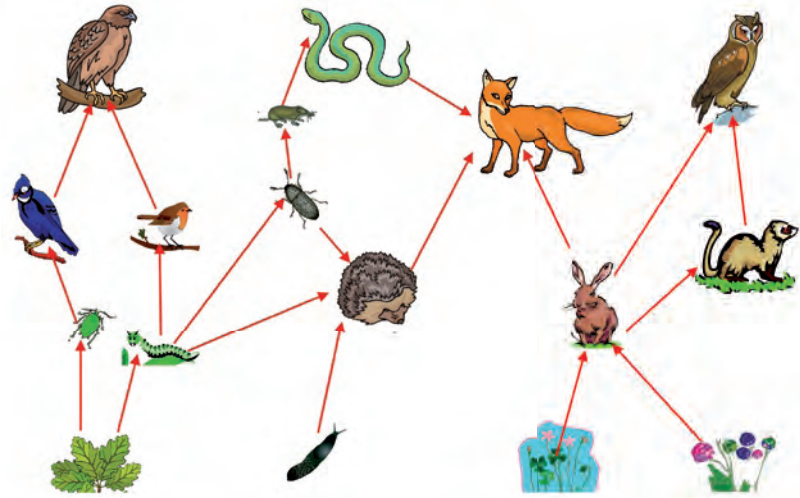
If we look at some examples of food webs you will definitely get the idea.

If you take a close look at this food web you will see the interdependence of the plants and animals. For example,

Caterpillar - the caterpillar is getting its energy from the oak leaves, but the robin, the beetle, and the hedgehog are all using caterpillars for their energy sources.

Hawk - the hawk is looking for blue jays and robins to give it energy.

Fox – the hedgehog gets its energy from slug, caterpillars and beetles. The fox can get its energy from the hedgehog.



Focus Question

Looking at this food web, predict what would happen to the beetle population if the snakes ate all the shrews.



The beetle population would increase because there would be no shrews to eat them. That is, unless the hedgehogs noticed that there were lots more yummy beetles around. They might stop eating so many slugs and eat more beetles. That's what we mean by interdependence.

Answer

Set 2. Life Sciences: *Food Webs*

Investigation — Competition

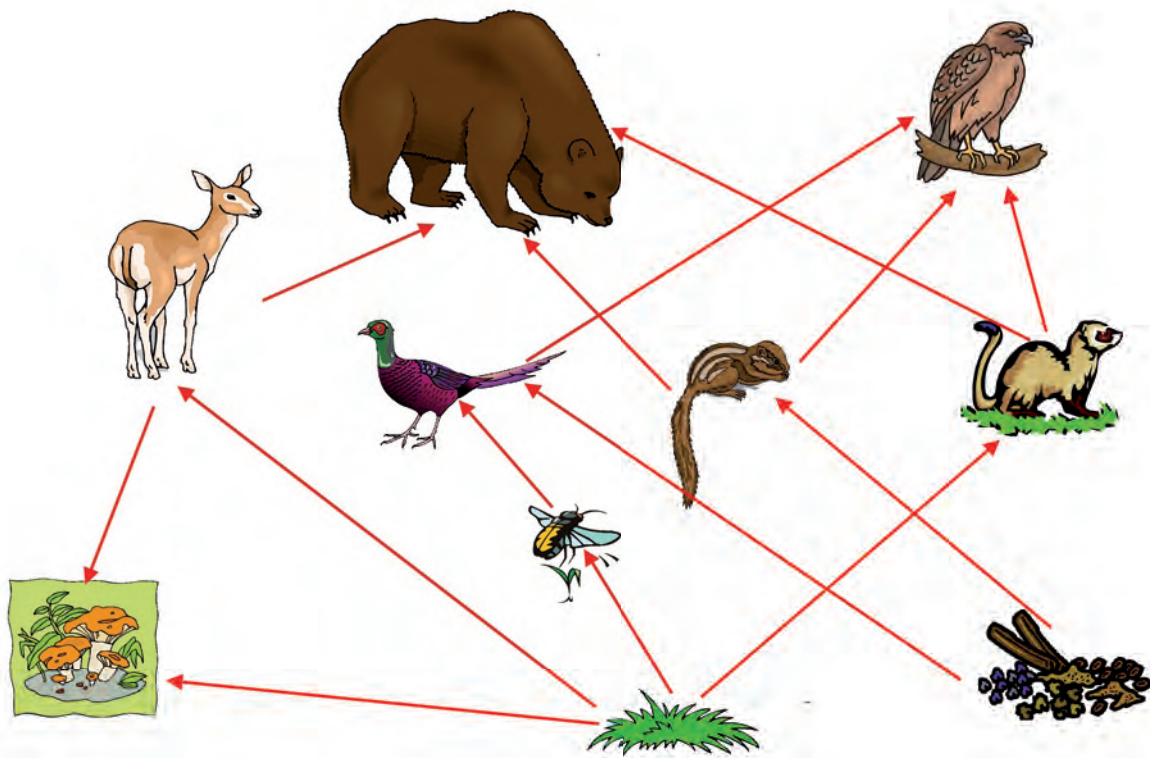
You have already studied many different environments in other years. There are food chains and food webs in all environments. Let's think about an environment that is in the more northern climates where tall trees don't usually grow. It will include the following organisms:



Grasses
Insects
Pheasants
Hawks

Seeds
Deer
Chipmunks

Berries
Bears
Weasels
Decomposers



You know that if something happens in one part of the food web, it will affect other parts (that is, other plants and animals). The table on the next page gives some examples of changes that might happen in the ecosystem. Predict what effects these changes would have on the existing populations.

Set 2. Life Sciences: *Food Webs*

“Remember ‘increase’ means to make bigger and ‘decrease’ means to make smaller.”

Changes in the Ecosystem

Table of Predictions

Change made:	Number of insects	Number of seeds	Number of hawks
Decrease the number of chipmunks			
Increase the number of bears			
Decrease the number of pheasants			

Activity

In this activity you will be playing the role of different plants or animals in the ecosystem.

Your teacher will assign your role and will explain changes in the numbers of various populations.

You should observe what happens based on these changes. Were your predictions correct?

Complete the table on the next page based on your observations. It is the same table as the one you used for your predictions. Compare your observations with your predictions.

Set 2. Life Sciences: *Food Webs*

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Changes in the Ecosystem

Table of Observations

Change made:	Number of insects	Number of seeds	Number of hawks
Decrease the number of chipmunks			
Increase the number of bears			
Decrease the number of pheasants			

Answer the following questions based on the two tables.

- How did your predictions compare to your observations? Explain your answer.

- Based on what you know about food webs and on your observations, choose another change in the ecosystem and predict what would happen. Give a reason for your answer.

Set 2. Life Sciences: *Food Webs*

Test Practice Questions



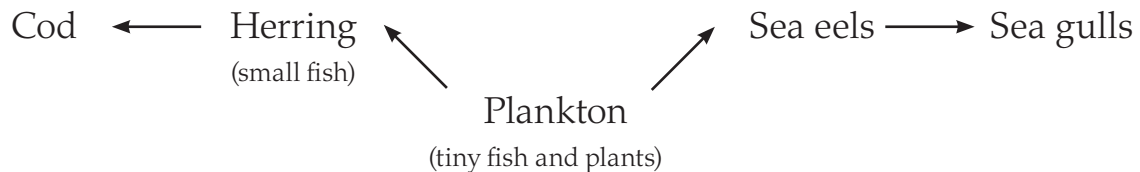
1. Compare a food chain and a food web?
- a food chain only has two organisms interacting
 - a food web only explains how spiders fit into the ecosystem
 - a food web is made up of many food chains
 - a food chain is made up of many food webs

Answer: _____

2. A group of “consumers” would include
- squirrels, chipmunks, and nuts
 - herbivores, carnivores, and flowering plants
 - herbivores, carnivores, and bears
 - anything that makes its own food from the Sun’s energy

Answer: _____

3. Ecologists (scientists who study ecosystems) are worried that too many cod are being fished from the ocean. Using the food web below, predict what would happen to the other organisms if the numbers of cod were decreased.



- the herring population would increase
 - the sea gull population would decrease
 - the plankton would begin to eat the herring
 - the sea eels would eat more sea gulls
4. Animals eat plants or other animals. How much and what they eat affects other parts of the ecosystem. These interrelationships between the living things in an ecosystem is called
- interdependence
 - environment
 - food webbing
 - decomposing

Answer: _____