Almost all energy in the ecosystem comes originally from the sun.

Food chains show

Example: Algae $\rightarrow$ Fish $\rightarrow$ Heron
A terrestrial food chain

Plant → Insect → Carnivore → Carnivore → Carnivore

A marine food chain

Plant → Phytoplankton → Zooplankton → Carnivore → Carnivore
A trophic level is a step in the food chain.

What type of organism is always at the 1\textsuperscript{st} trophic level?

__________________________

What type(s) of organism can be at the 2\textsuperscript{nd} trophic level?

__________________________
Ecological Pyramid

When you compare the biomass (mass of living things) at each level of a food chain, it forms a pyramid.
Energy Pyramid

- Primary producers: 10,000 J
- Primary consumers: 1,000 J
- Secondary consumers: 100 J
- Tertiary consumers: 10 J

1,000,000 J of sunlight
The Law of Conservation of Energy states that matter cannot be created or destroyed. Yet the energy pyramid shows that less energy is available as you move up a food chain. What happens to the rest of the energy?
Why does it take (on average) 16 lbs. of corn or soybeans to produce 1 lb. of beef?
King mackerel is a fish that tends to be high in mercury, tilapia is a fish that is usually low in mercury contamination. Predict what that indicates about their roles in the food chain.
PASSING POLLUTION ALONG THE FOOD CHAIN

Once pollutants enter an organism's system, they stay in its body while other waste is excreted. This means that contaminants accumulate and are passed along the food chain. By the time an orca eats 10 pounds of salmon, it is ingesting pollutants from 10,000 pounds of microscopic plants and algae.

To gain one pound, an orca might eat...

- 10 lbs. Salmon
- 100 lbs. Small fish
- 1,000 lbs. Small invertebrates
- 10,000 lbs. Microscopic plants and algae

Mud and water contaminated with PCBs, mercury and other pollution

Source: R-I reporting
Food Webs

Many heterotrophs feed on more than one type of organism. So most communities have energy flow in a food web, __________ ____________________________.
The Water Cycle

Water storage in ice and snow → Precipitation → Surface runoff → Transpiration → Evaporation → Condensation → Water storage in the atmosphere → Snowmelt runoff to streams → Infiltration → Freshwater storage → Ground-water discharge → Ground-water storage → Streamflow → Freshwater storage → Water storage in oceans.
The Carbon Cycle

Photosynthesis uses carbon dioxide in order to produce a sugar.

When organisms break down sugar to provide usable energy, ______________

______________________________

Thus carbon cycles through living things and the environment.

Also, burning of organic matter (wood, fossil fuels) produces carbon dioxide.
Nitrogen Cycle

Nitrogen is an element that is found in organic molecules (molecules in living things), including ________________.

Nitrogen makes up 78% of the atmosphere.____________________

______________________________.
Certain bacteria can convert atmospheric nitrogen into usable nitrogen. This process is called nitrogen fixing.
nitrogen in the atmosphere

nitrogen in animal proteins

nitrogen in plant proteins

nitrogen in decaying matter and waste

bacteria "fix" nitrogen for use by plants
Many farmers grow cover crops, like fava beans or clover, on their fields to improve the health of the soil.

How do these crops help?