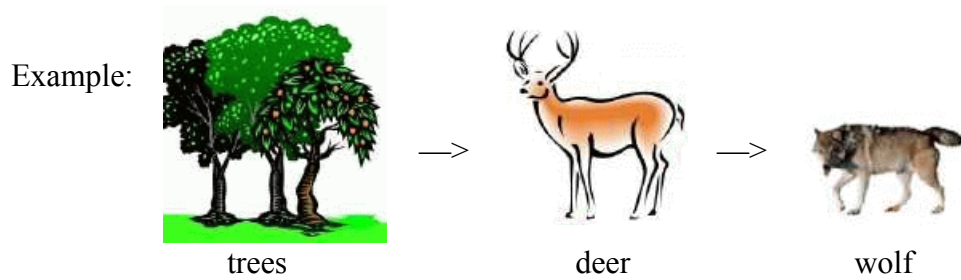


## Food Chains

A food chain is a diagram that shows the organisms in an ecosystem.

- 1) Each organism has \_\_\_\_\_ food source and has \_\_\_\_\_ other species eat it.  
 Is this a realistic situation in most ecosystems? \_\_\_\_\_



- 2) Which species is a:
- |           |       |
|-----------|-------|
| Consumer  | _____ |
| Producer  | _____ |
| Herbivore | _____ |
| Carnivore | _____ |

- 3) a) If you could measure the mass of all of the trees in a forest, all of the deer, and all of the wolves, which **should** have:
- the most total mass? \_\_\_\_\_
- the least total mass? \_\_\_\_\_

b) Why?

- 4) a) How much food (in kilograms) do you eat every day (estimate)? \_\_\_\_\_
- b) How much would this total up to in one year? \_\_\_\_\_
- c) Estimate how much food have you eaten in your entire life? \_\_\_\_\_
- d) What is your body mass? \_\_\_\_\_
- e) How much weight have you gained since you were born? \_\_\_\_\_
- f) What is c) minus e) \_\_\_\_\_
- g) What happened to all of this extra mass of food? \_\_\_\_\_

- h) What did all of this extra food energy eventually turn into? \_\_\_\_\_
- i) At your age, what happens to most of the food energy that you eat each year? \_\_\_\_\_

- 5) a) What is your body mass? \_\_\_\_\_
- b) What is the total mass of food that you eat each year? \_\_\_\_\_
- c) Calculate  $a) \div b) \times 100\% =$  \_\_\_\_\_ %
- d) Do you think that the body mass of other species will be a similar percentage of the total food mass that they need in a year?

Read the top section of page 34

5) What does the word “trophic” mean?

- 6) a) What is an autotroph (give an example)?  
b) What is a heterotroph (give an example)?

7) Ecosystems can be divided up into different trophic levels depending on what they eat.

What type of organism (see question 2) is in the: third trophic level \_\_\_\_\_  
second trophic level \_\_\_\_\_  
first trophic level \_\_\_\_\_

Read the bottom section of page 34

- 8) a) What is the ultimate source of all food energy in an ecosystem? \_\_\_\_\_  
b) What part of the ecosystem captures this energy and turns it into food? \_\_\_\_\_

Read the section called “Limits on Energy Transfer” starting on page 35 (including figure 4)

9) a) What does grass do with most of the food energy that it creates?

These functions are called *metabolism*.

The rest of the food energy is used to make new plant mass (leaves, roots, etc.)

- b) What happens to this plant mass?  
i) much of it is lost as \_\_\_\_\_ and is decomposed by \_\_\_\_\_.  
ii) the rest is \_\_\_\_\_ by animals like mice.  
c) Approximately what percentage goes to your answer in b) ii)? \_\_\_\_\_%
- 10) a) What do the mice do with most of the food energy that it eats?  
b) What fraction of the food mass that mice eat eventually gets turned into new mouse mass that can be eaten by carnivores like foxes?

Read the bottom section on page 36

This section involves our tree → deer → wolf food chain.

- 11) a) Do deer eat all parts of a spruce tree?  
b) What happens to the parts that the deer do not eat?
- 12) a) What happens to most of the spruce tree material that the deer do eat?  
b) Of the food that deer eat...  
i) some is not digested, but becomes \_\_\_\_\_ that gets eaten by \_\_\_\_\_.  
ii) most of what is digested is used for metabolism, which includes: \_\_\_\_\_.  
iii) only about \_\_\_\_% gets turned into new deer mass that can be eaten by wolves.  
iv) do wolves eat all parts of a deer? \_\_\_\_\_  
what happens to those parts that they do not eat? \_\_\_\_\_.
- 13) a) Because so much food energy is lost as heat at each step in a food chain, most food chains have no more than \_\_\_\_\_ trophic levels.  
b) Look at figure 6.  
What percentage of the food energy produced by grass gets into owls as food? \_\_\_\_\_  
c) Look at figure 7. How many owls can a prairie with 100,000 grass plants support? \_\_\_\_\_  
d) Which trophic level will have the most biomass? (grass, grasshoppers, mice, or owls)

- 14) Assume that each species in a food chain need an amount of food that is equal 10 times its own body mass.
- a) Can an animal eat all of the prey organisms living in its environment?  
Why (what would happen next year)?

Imagine that there are 100 wolves living in a forest.

The deer that the wolves eat are 3 times as heavy as the wolves.

The trees that the deer eat are 2 times as heavy as the deer.

- b) How many deer must be living in the forest to support this population of wolves?

- c) How many trees must be living in the forest to support this many deer?

- 15) a) If loggers cut down half of the trees in the forest, what would happen to the wolf population? \_\_\_\_\_

- b) If a disease were to kill off all or most of the wolves, what would happen to:

i) the deer population \_\_\_\_\_

ii) the tree population \_\_\_\_\_

- c) If a disease were to kill off all or most of the deer, what would happen to:

i) the wolf population \_\_\_\_\_

ii) the tree population \_\_\_\_\_

- 16) a) What happens to all of the waste materials of the trees, deer, and wolves as well as all of the wolves, deer, and trees that are not killed and eaten?

- b) What kind of organisms are involved?

- c) What would happen if these organisms were not present in the ecosystem?

17) A small village of people have a limited amount of land to grow crops. Their land can be used to grow corn. They can eat the corn themselves or feed it to cows and then eat the cows. Which choice will allow the population of the village to become larger? Explain why.

18) Draw two food chains that show where your food energy comes from. Pick two foods that you like to eat.