

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Lab Team: \_\_\_\_\_ Date: \_\_\_\_\_

# ACT: Food Webs and Food Chains

**Objective:** The purpose of this activity is to gather a greater understanding of how energy flows through an environment using food chains and food webs. (Indiana State Academic Standards: Biology, 1.37, 1.43, 1.44, & 1.46)

**Instructions:** You will work on parts 1 and 2 individually to master your skill at working with food webs. You will work with your lab team in part 3 to construct a complex food web using the information provided.

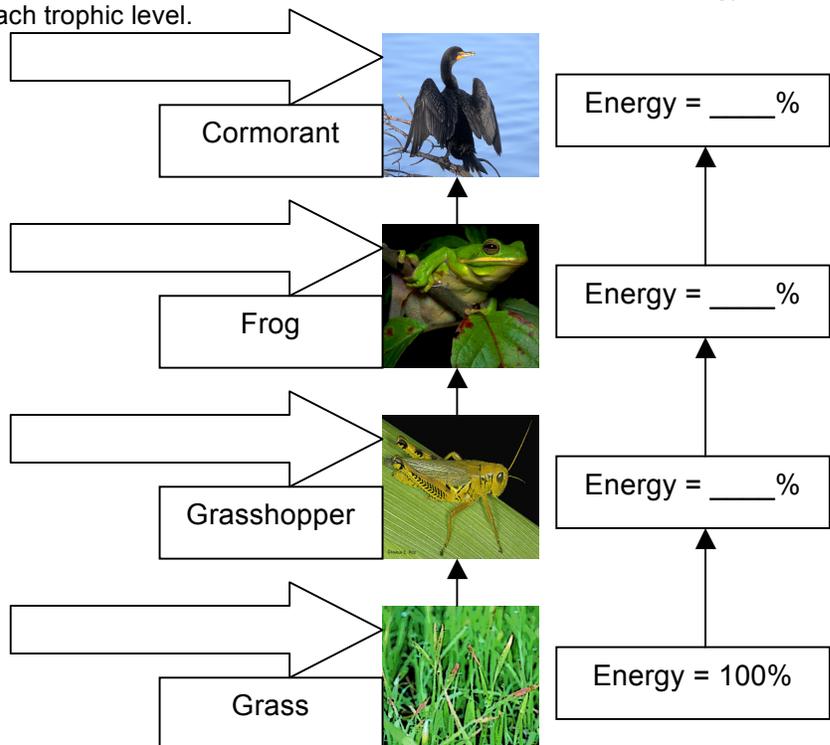
**Background: Ecology** is the study of the relationships between an organism and the living and non-living factors in their environment. The most important relationships an organism has are the ones in which energy is transferred. All living organisms need energy to survive. Some organisms are **autotrophs** or **producers** and are capable of making their own energy by using the sun or other chemical factors. Organisms that can not make their own energy are called **heterotrophs** or **consumers** and they depend on autotrophs or other heterotrophs for energy.

A **food chain** shows the energy exchange from one organism to another in a single way. A **food web** shows multiple food chains connected together to give a more accurate description of how energy flows throughout the environment. Food webs and food chains use arrows to show the direction of energy flow (arrows do not show who eats who.) Each step on a food chain or food web is called a **trophic level**. The first level of all food webs and chains is composed of producers. The next level is made up of those consumers who only consume producers. These **primary consumers** can also be called **herbivores**. The next level on the food web is made up of **secondary consumers** who often consume both producers and some smaller heterotrophs. Organisms who eat both producers and consumers are called **omnivores**. The next trophic level is made up of **tertiary consumers** who primarily eat other consumers. These organisms are often called **carnivores**.

Producers make 100% of the energy in their environments food web. However, when a producer is consumed by a consumer only about 10% of the energy that producer has is transferred to the consumer. The other 90% is given off in the form of heat. This means that for a consumer to get 100% of the energy in one producer they would have to eat 10 of them. This explains why the number of individuals in a population of producers is always much higher than that of any other level. At each energy exchange, 90% of the original energy is lost and 10% is passed on to the next consumer as useful energy.

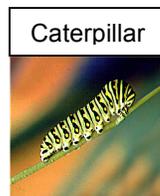
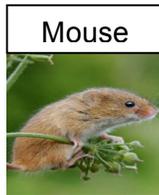
## Part 1:

Label each level of the food chain below in the arrow. Assume that the first level starts out with 100% energy. Calculate how much of the original energy remains at each trophic level.



**Part II:** Read the paragraph below. Use the information to draw the arrows in the food web.

Grass, clover, and nut bearing trees are the main producers of this forest ecosystem. The insects, rabbits and deer depend on grass and clover as their primary source of food while the squirrels eat the nuts produced by the trees. Mice and some small birds like the robins eat grasshoppers and the robins also consume caterpillars. The rabbits and squirrels are consumed by foxes and larger birds like hawks and owls. Owls are also known to consume smaller birds while the hawks enjoy small mice.



**Part III:** Get with your lab team and collect the following supplies:

- Scissors
- Glue
- 1 Piece of Drawing Paper
- 1 Deck of Pond Species Cards
- Colored Pencils

Using the Pond Species Cards, create a food web by pasting the cards onto the drawing paper and drawing the lines of energy flow. Use **GREEN** to show energy flowing from a producer. Use **BLUE** to show energy flowing from a primary consumer. Use **RED** to show energy flowing from a secondary consumer or higher.

Make sure to put your names of all your lab team members, the period number, and the lab team number on your food web.