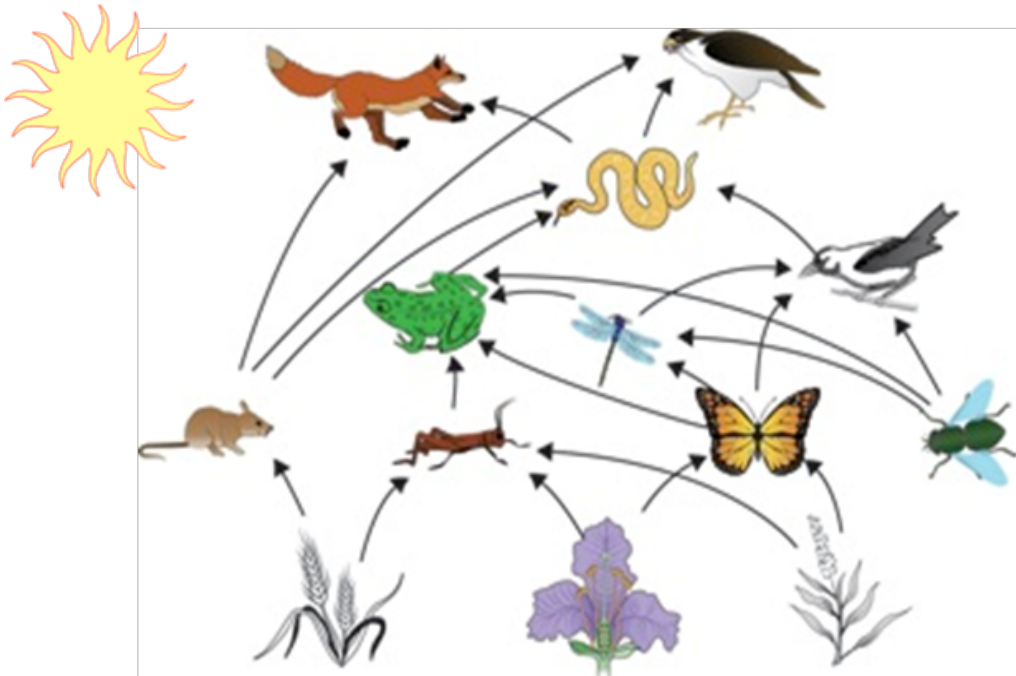




Name: \_\_\_\_\_ Date: \_\_\_\_\_ Group: \_\_\_\_\_

## Part I: Food Chains and Food Webs

A food chain is a sequence of food energy transfer from one organism to another within an ecological community. A food web is a depiction of all of the interrelating food chains that exist within an ecological community, such as that illustrated in the diagram below. For this activity, you will participate in making a food web for a prairie ecosystem.



### Procedure:

1. Read each organism card. Decide if the organism is a producer or consumer.
2. Sort the consumers into four groups: primary consumer, secondary consumer, tertiary consumer, and quaternary consumer.
3. On the next page, sketch out one food chain using the organisms from the cards.
4. Sketch another food chain using at least one of the same organisms from step three. Continue until you have at least three connected food chains.
5. Answer the questions on the next page.

## Part I: Food Chains and Food Webs, continued

1.

List the Producers

List the Consumers

2.

Primary Consumers

Secondary Consumers

Tertiary Consumers

Quaternary Consumers

3. Sketch a food chain. Use the arrows to indicate the transfer of energy from one organism to another.



energy  
→

energy  
→

energy  
→

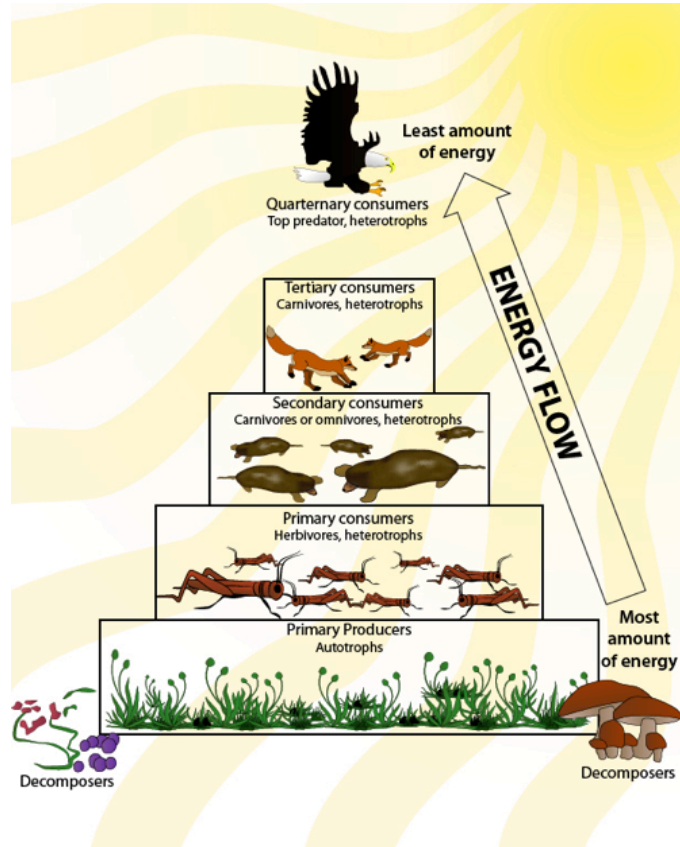
4. Sketch a food web:

## Part II: The Ecological Pyramid

An ecological pyramid places organisms into trophic levels. A trophic level is an organism's position on a food chain—what it eats and what eats it. As you travel from the bottom of the pyramid and move up, energy decreases. Generally, scientists estimate the amount of energy available to the next trophic level by using the "10 percent rule," meaning that only 10 percent of the energy from the previous level is transferred to the next level.

The bottom of the ecological pyramid is where the primary producers (autotrophic organisms that undergo photosynthesis) are identified. Energy is the greatest at this level, as the sun supplies energy to plants for photosynthesis to occur.

The remaining levels up the ecological pyramid are for the consumers, or heterotrophs. Heterotrophic organisms must consume other organisms for survival. To break it down further, the first level of consumers are the primary consumers. Primary consumers are herbivores. The second level of consumers are the secondary consumers. Secondary consumers are either carnivores or omnivores.





## Part II: The Ecological Pyramid, continued

- Your turn! Calculate the energy lost and energy available at each trophic level.

**Example:** Let's say a producer (oak tree) has 5,000 kcal available. The primary consumers feeding on the tree have 490 kcal available. How much energy (%) was **lost** between the producer and the primary consumer? How much energy is **available** for the primary consumers?

Producer Energy		5000 KCal
	-	
Primary Consumer Energy		490 KCal
		4510 KCal
	=	
$4510 \text{ KCal} \div 5000 \text{ KCal (total energy)} = .902$		
.902 X 100 = 90.2%		<b>Energy Lost</b>
<b>Energy Available:</b>		
100% - 90.2% = 9.8%		<b>Available Energy</b>



## Part II: The Ecological Pyramid, continued

2. Your turn! Calculate energy lost and the energy available for each trophic level. Use the example, if needed.

Producer \_\_\_\_\_ Kcal

Primary Consumer - \_\_\_\_\_ KCal

= \_\_\_\_\_ KCal

\_\_\_\_\_ KCal ÷ \_\_\_\_\_ KCal = \_\_\_\_\_  
(total energy)

\_\_\_\_\_ x 100 = \_\_\_\_\_% **Energy lost**

**Energy Available:**

100% - \_\_\_\_\_ = \_\_\_\_\_% **Available energy**

Primary Consumer \_\_\_\_\_ KCal

Secondary Consumer - \_\_\_\_\_ KCal

= \_\_\_\_\_ KCal

\_\_\_\_\_ KCal ÷ \_\_\_\_\_ KCal = \_\_\_\_\_  
(total energy)

\_\_\_\_\_ x 100 = \_\_\_\_\_% **Energy lost**

**Energy Available:**

100% - \_\_\_\_\_ = \_\_\_\_\_% **Available energy**

Secondary Consumer \_\_\_\_\_ KCal

Tertiary Consumer - \_\_\_\_\_ KCal

= \_\_\_\_\_ KCal

\_\_\_\_\_ KCal ÷ \_\_\_\_\_ KCal = \_\_\_\_\_  
(total energy)

\_\_\_\_\_ x 100 = \_\_\_\_\_% **Energy lost**

**Energy Available:**

100% - \_\_\_\_\_ = \_\_\_\_\_% **Available energy**

Tertiary Consumer \_\_\_\_\_ KCal

Quaternary Consumer - \_\_\_\_\_ KCal

= \_\_\_\_\_ KCal

\_\_\_\_\_ KCal ÷ \_\_\_\_\_ KCal = \_\_\_\_\_  
(total energy)

\_\_\_\_\_ x 100 = \_\_\_\_\_% **Energy lost**

**Energy Available:**

100% - \_\_\_\_\_ = \_\_\_\_\_% **Available energy**



## Part II: The Ecological Pyramid, continued

An ecological pyramid is a beneficial model, as it shows a visual representation of energy transfer.

### Procedure:

1. Sort the organism cards back into the original groups: producers, primary consumers, secondary consumers, tertiary consumers, and quaternary consumers. List all organisms from the cards that belong in each trophic level on the ecological pyramid on the next page. A trophic level is an organism's position on a food chain.
2. Label each section of the pyramid with the correct trophic level.
3. Add up the total amount of energy for all of the producers. Record this in the appropriate area of the energy pyramid provided. The amount of energy available for each organism is labeled on each of the organism cards.
4. Add up the total energy available for the primary consumers. Record this in your Student Journal in the appropriate area of the energy pyramid provided. Repeat this step for the remaining trophic levels.
5. Calculate the energy loss at each trophic level.

## Part II: The Ecological Pyramid, continued

