Biology
Ecology

Name:_____
Period:_____

Building an Energy Pyramid

Objectives: Students will construct an energy pyramid to show the flow of energy through the Cedar Glade ecosystem; Students will calculate how much energy is transferred from one trophic level to the next trophic level.

Materials:

- Energy Pyramid template
- Cedar Glade Species List
- Energy Pyramid Student Data Sheet
- Calculator
- 1- 1000mL beaker
- 3-small beakers
- 1-1mL pipette

Background:

What is a trophic level?

Explain the differences between a producer, primary consumer, secondary and tertiary consumer.

What is an energy pyramid? Explain how much energy is transferred from one level to the next.

Procedure:

1. Label each level of the energy pyramid on the left side(see attached sheet) with the appropriate term: *producer, primary consumer, secondary consumer, tertiary consumer*
2. Label each level of the energy pyramid on the right side (see attached sheet) with the appropriate term: *trophic level 1, trophic level 2, trophic level 3, tropic level 4*
3. From the Cedar Glade Species List, select organisms to represent each level of the pyramid. Write the name of at least 3 organisms in each level of the pyramid.
4. Fill in the appropriate tropic levels in table 1 based on the energy values. Fill in the appropriate producers and consumers based on the energy values.
5. Calculate the percent of energy that is transferred from the first trophic level to the second level by dividing energy from trophic level two by energy from trophic level one and multiplying by 100. Continue down the chart and calculate the rest of the percent energy transferred for the rest of the trophic levels.
6. Pour 1000mL of tap water into the 1000mL beaker. Add 1 or 2 drops of food coloring to the tap water and swirl. The water in this beaker represents the energy found in the first tropic level.
7. Line up the 3 small beakers. Look at your calculations in Table 1. How much energy was transferred from tropic level 1 to level 2?_____% Pour that percentage from the 1000mL into the first beaker.
8. How much energy was transferred from the second tropic level to the third level?_____%. Pour that percentage from beaker one into beaker two.
9. Repeat for the fourth tropic level/beaker three.

Table 1: Available Energy in Tropic Levels of the Cedar Glade

Trophic Level	Organism	Energy Kcal/m^2/year	Percent Energy Transferred
		200	----------
		19.6	
		2.0	
		0.19	

Questions and Analysis:

1. The beaker + 1000mL represent which part of a food chain?

2. A. The 1st small beaker represented the_____trophic level, or , the_____consumer.

   B. The 2nd small beaker represented the_____trophic level, or, the _____consumer.

   C. The 3rd small beaker represented the _____trophic level, or, the _____consumer.

3. Could the ecosystem represented in Table 1 support another level above level four? Explain.

4. Since every trophic level only transfers 10% of the energy it obtains to the next level, explain where the rest of the energy goes.

5. Where on the food chain should humans eat in order to gain the most energy? (In other words, where is the "best deal" in terms of energy?) Explain.

Energy Pyramid Template