**Energy Pyramid Dilution Lab**

Class Copy

**Introduction-** The ultimate source of energy for living organisms on our planet is from the **sun** (Or, in some ecosystems chemical eating bacteria). Organisms that obtain and use sun or chemical energy to grow are called **autotrophs**  and can make their own food to feed themselves (“self-feeders”). They are also known as **producers**. Organisms without the ability to harvest energy from the sun (or chemicals) and must consume other organisms to obtain energy are known as **heterotroph** or **consumers**. In this lab, **energy** is represented by food coloring. As learned, energy decreases through each trophic level, representing the energy lost as heat in an organism’s **metabolism**. As one moves up the energy pyramid, 10 % of the energy is available to be used by the consumer at the next trophic (feeding) level.

**Methods (write answers to the questions in your notebook and other data collected)**  
1. Obtain a graduated cylinder, four beakers, a graduated cylinder, sharpie, food coloring, and a ruler.   
2. Label the beakers 1-4   
3. Create a colored solution representing 100% of the original energy harvested from the sun. To do this measure 50 mL of water and place 5 drops of food coloring into beaker 1 to make a solution. This represents the first trophic level or **primary producers** in an ecosystem and 100% of the energy is available for the next trophic (feeding) level.   
4. To model the second trophic level, transfer 5 mL of solution from beaker 1 to beaker 2. Observe- this is 10% of the energy available for the secondary consumer. Add water to make a 50 mL solution. What percent of the energy is represented in beaker 2? Hint: What percent dye solution from the original trophic level is available? OR, how is percent calculated?   
4. Transfer 5 ml of beaker 2 into beaker 3. This represents the transfer of energy. Add water to make a 50 mL solution. What percentage of the original energy is now available in beaker 3?   
5. Repeat the transfer of energy to beaker 4. What is the amount of the original energy available in beaker 4?  
6. Rinse out all the beakers, graduated cylinder and fill the Erlenmeyer flask with water for the next group.

**Analysis** Use a ruler to draw a pyramid with four levels. Use color and shading to represent the trophic levels observed in the dyes, label each trophic level, primary producer, primary consumer, secondary consumer, tertiary consumer and quaternary consumer.

|  |
| --- |
| **Pyramid Drawing With Shading** Draw in notebook!  \*In the pyramid shade the decrease in the trophic levels  \*Label each level with the correct trophic level: primary producer, primary consumer, secondary consumer, and tertiary consumer \*Show a decrease in biomass at each level assuming the original primary producer has 5000 kg of mass consumed by the primary consumer, and so on and so forth. |

**Conclusion- write detailed sentences in your notebook.**

1. What does the heat loss represent at each level (hint describe activities necessary for you to live)?
2. Where is most of the biomass located in the pyramid? Why?
3. Based on your 3-D pyramids, what terms are represented at the bottom level? What is an example of organisms living in this area?
4. Read page 161. What does the term biological magnification mean? Explain what would happen to a biomagnified compound through the energy/biomass pyramids. (6-7 sentences).
5. Explain how biomagnification of lead shot from waterfowl hunters effects a bald eagle that mainly feeds on fish.