**Energy Transfer Activity:**  Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This activity will simulate the energy transfer among:

The Sun Producers Primary Consumers Secondary Consumers

**The important role of decomposers will NOT be shown in this simulation.**

1. PRODUCERS (Fruit trees): These will each start with 100 calories of energy. This energy has come from the sun! The trees have already fulfilled the needs of life and will continue to obtain energy from the sun and continue living!!
2. PRIMARY CONSUMERS (Colugo): These will need to collect at least 100 calories of energy. Then you need to use some of that energy to fulfill the needs of life!

Reproduction: 20 calories

Repair damaged tissue: 10 calories

Growth: 30 calories

Fight-off infection: 10 calories

Maintain homeostasis: 20 calories

\*If you do not have enough energy to fulfill the needs of life you DIE!!!

1. SECONDARY CONSUMERS (Philippine Eagle): These will need to kill and take the energy from the primary consumers. Play paper-rock scissors once to determine if you ‘catch’ your prey.

Then use that energy to fulfill the needs of life:

Reproduction: 20 calories

Repair damaged tissue: 10 calories

Growth: 30 calories

Fight-off infection: 10 calories

Maintain homeostasis: 20 calories

\*If you do not have enough energy to fulfill the needs of life you DIE!!!

**Scenario 1: Half Colugos/Half Eagles**

|  |  |  |
| --- | --- | --- |
|  | Colugos | Eagles |
| Number at the start |  |  |
| Number at the end |  |  |

**Scenario 2: About: 90% Colugos/10% Eagles**

|  |  |  |
| --- | --- | --- |
|  | Colugos | Eagles |
| Number at the start |  |  |
| Number at the end |  |  |

**Analysis Questions:**

1. Use an energy pyramid to illustrate the energy relationships in **Scenario 1:**

\*Ms. Hamann will go through at least one with you!

1. Use an energy pyramid to illustrate the energy relationships in **Scenario 2:**
2. Use an energy pyramid to illustrate the energy relationships in the following scenario:

A forest in which there are **100 producers**. (Assume 10% of the energy is passed on from one level to the next.)

How many colugos can this forest support? \_\_\_\_\_\_\_\_\_

How many eagles can this forest support?\_\_\_\_\_\_\_\_\_\_

1. If this same forest from questions 3 was logged, and only **20 producers** remained: draw an energy pyramid to show this relationship.

How many colugos can this logged forest support? \_\_\_\_\_\_\_

How many eagles can this logged forest support? \_\_\_\_\_\_\_\_\_

Number 5-8. We will now use the following food chain as an example. Instead of number of individual organisms we will use **biomass**. And we will again assume only 10% of the biomass can be passed on from one level to the next.

Sun 🡪 Grass 🡪 Grasshopper 🡪 Meadowlark 🡪 Hawk

1. What mass of hawk can be supported with 120,000 kg of grass? Use a biomass pyramid to show your work.

Mass of hawk \_\_\_\_\_\_\_\_\_\_

1. What mass of grasshopper is needed to support one hawk which has a mass of 3 kg? Use an biomass pyramid to show your work.

Mass of grasshoppers \_\_\_\_\_\_\_\_\_\_\_

 6b. How many grasshoppers is this if each grasshopper weighs 0.0003 kg? Show your work!

 Number of grasshoppers \_\_\_\_\_\_\_\_\_

7. What mass of grass is needed to support one meadowlark which has a mass of 0.2 kg? (Use a biomass pyramid to explain your results.)

Mass of grass \_\_\_\_\_\_\_\_\_\_\_\_\_

8. What will happen to the hawk population if more tall-grass prairie is converted to lawns (very short grass)? Use two biomass pyramids to explain your answer: one with tall grass prairie and one with lawn grass.

 The hawk population would \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (increase or decrease?).

9. Worst case scenario: you travel to Kenya on safari and are eaten by a lion. Most of the energy in the food you ate for breakfast that morning will NOT be available to that lion because your body ‘used it up.’ Give at least 3 examples of activities or body functions that used up that energy between the time you ate breakfast and the time the lion ate YOU for lunch.