**Modeling Energy Transfer Between Trophic Levels**

Part 1 - Develop *a model that demonstrates how much energy is passed from one trophic level to the next.*

* Draw a sketch of your model.
* Include labels of each component of your model.
* Write an explanation of **WHY** you created your model in this way *and* explain **HOW** it represents the flow of energy between trophic levels.

Things to Know

* An average of 10% of the energy from one trophic level is passed on to the subsequent trophic level.
* Approximately 1-2% of the energy from the sun is absorbed by autotrophs.
* Include 4 trophic levels in your model.
* In **this** model, 1,000,000 kcal/m2 of solar energy hits the Earth’s surface.

Part 2 – *Draw a Pyramid of Energy*

* Draw an energy pyramid that depicts the information in the model created in part 1.
* Label the amount of energy (kcal) found at each trophic level.
* Include the following terms: *primary producer, primary consumer, secondary consumer, tertiary consumer, autotroph, & heterotrophs.*

Part 3 – *Develop a model that demonstrates the implications of eating at different trophic levels.*

* Draw a sketch of the energy pyramid that includes the three organisms listed below. Your model should specify the numbers, mass (g), and energy (kcal/g) for each trophic level.
* Create a model to depict **two** scenarios: 1) The farmer eats only soybeans for a year and 2) the farmer eats only hens for a year.

Things to Know

* 1 hen eats 25 grasshoppers/day
* 1,000 grasshoppers have mass of 1 kg
* 1 grasshopper requires about 30 g of soy/year
* 1 human requires about 400 grasshoppers/day
* Dry soybeans have about 5 kcal/g
* Grasshoppers have about 150 kcal/g
* A whole hen has about 1000 kcal/g
* The farmer requires 2000 kcal/day
* Grasshoppers require \_\_\_\_\_\_kcal/day
* Hens require \_\_\_\_\_\_kcal/day

Part 4 - *Analyze information learned about energy transfer in an ecosystem.*

* On average, how much energy was not passed on to the subsequent trophic level?
* Describe the pattern of energy transfer among consumers within a pyramid of energy.
* Explain why such a low amount of energy is passed from one trophic level to the next.
* Calculate the percentage of energy from the 2nd trophic level that is passed on to an organism in the 4th trophic level. SHOW YOUR WORK
* Calculate the percentage of energy from the 1st trophic level that is passed on to an organism in the 4th trophic level. SHOW YOUR WORK
* Explain why an energy pyramid in an ecosystem typically is limited to four or five levels only.
* Propose an explanation for why the population size of top carnivores, such as hawks, is always smaller than the population size of herbivores.
* If the farmer consumed food from the first trophic level only, how many more individuals could this trophic level support? Explain how you arrived at this answer.
* Explain why a vegetarian diet is considered a more energy-efficient diet for humans than one based on beef, chicken, or pork. Refer directly to your models for specific examples.
* In addition to being able to support more individuals when eating at a lower trophic level, what are some other environmental benefits of eating at a lower trophic level?