

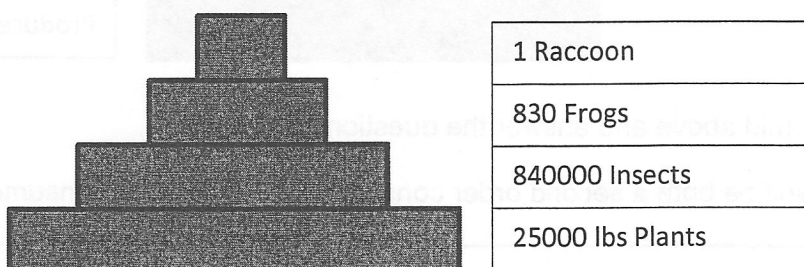
Ecological Pyramids

Q1. If you had all of the food you ate in one year in a room how much would it weigh? (Estimate how much an average days breakfast, lunch, dinner and snacks weighs and multiply by 365...don't include liquids). _____

Objective: You will learn about three types of Ecological pyramids and how they help describe food chain feeding relationships. You will apply this knowledge to some common food chain problems.

#1. Numbers Pyramid

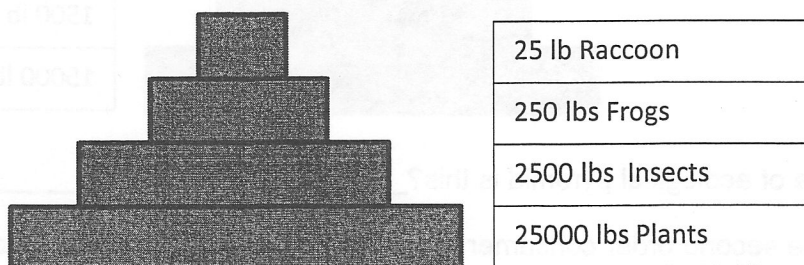
A numbers pyramid shows the total numbers of individual in an ecosystem at each feeding level during the year.



If the raccoon were to eat only frogs during one year, it would require about 830 of them. Those 830 frogs must eat about 840,000 insects. This number of insects require about two and one-half million pounds of plants to sustain them for a year.

#2. Biomass Pyramid

A biomass pyramid shows the mass of consumer tissue supported by each level below it. One 25 pound raccoon requires 250 pounds of frogs per year. The 250 pounds of frogs need 2500 pounds of insects which require 25,000 pounds of plants. Notice that the raccoon indirectly would require 25,000 pounds of plants to sustain it if it eats only frogs, which eats only insects, which eats the plants. If the raccoon ate only plants, it would only require 250 pounds of plant material. Notice that each level of the pyramid varies by a factor of 10. This is a generalization and not always true.

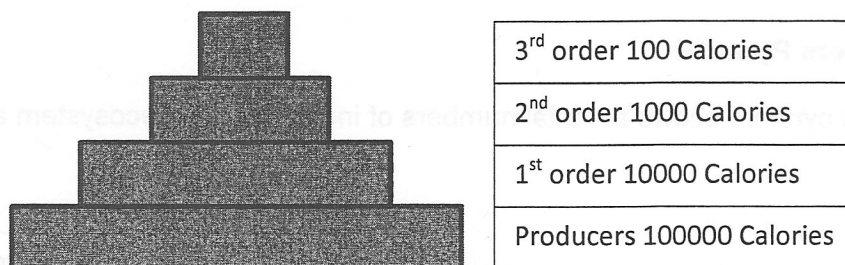


Q2. Raccoons can and will eat large insects. If one raccoon ate only insects, how many pounds of plants would be required to sustain one raccoon? _____

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#3 Energy Pyramid

Energy pyramids are used to show the transfer of energy from one level to another in a food chain. When first order consumers eat producers, only about 10% of the energy taken in by the organism becomes stored in the organism's tissues. Ninety percent of the energy is lost as heat and used during metabolism at each level.



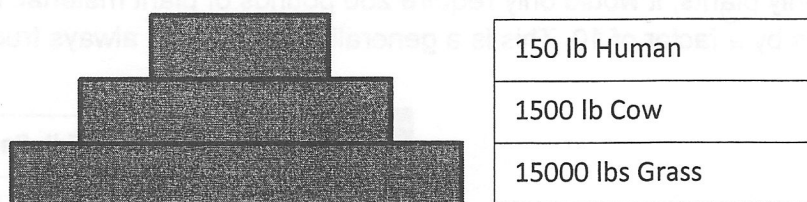
Study the pyramid above and answer the questions that follow:

Q3. Could a wolf be both a second order consumer and third order consumer? Explain

Q4. The flesh of a hundred pound wolf has a caloric value of about 68,000 calories. If the wolf eats only raccoons for one year, how many calories must the wolf eat?

Q5. If the raccoons in question 4 eat only small birds and the small birds eat grain, how many calories of grain are required to sustain one wolf? _____

A common food chain for developed nations is illustrated by the pyramid at the left. Humans eat beef (cows). Cows graze on plant material. Study the pyramid and answer the questions that follow.



Q6. What type of ecological pyramid is this? _____

Q7. Who is the second order consumer in this food chain? The first order consumer? The producer?

Q8. During this time (one year), a 150 pound person would eat one cow of what weight? (Assume the person ate only beef). _____

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Q9. How many pounds of plants were needed to sustain the person who ate only beef?

Q10. If this same person were to shift his diet to eat only plants, how many pounds of vegetables and fruits would be needed to keep him alive for the year? _____

Q11. What percent of the plants are spared when people eat plants directly rather than eating a cow which ate only plants? _____

Q12. In underdeveloped nations, people eat diets composed of a greater portion of plant foods when compared to developed nations. Very little meat is available. Use the above principles to explain why this is the case. _____

Q13. Why must a person eat about ten times his weight in food? _____

Q14. If a snake weighs 7 pounds and eats only mice, how many pounds of mice must the snake eat in a year? How many pounds of grain are required to sustain this many pounds of mice in the same period? _____

Q15. Answer question 1 again applying ecological pyramid principles. How close were you to the correct answer when you initially answered question? _____
