



Energy Flow Through the Ecosystem

Directions: Read the passage below, then work through the remainder of the worksheet questions.

In order to fully understand the nature of food chains and food webs, we must now focus on the flow of energy through the ecosystem. Matter can be recycled and used over and over by living organisms, but energy runs a one-way path through the ecosystem. All living organisms require a source of energy, but they may obtain their energy from different sources. What is the ultimate source of energy for life on Earth? The sun! Through the process of photosynthesis, plants capture the energy of the sun and use it to convert carbon dioxide and water into molecules of glucose. The plant uses the energy from the molecules of glucose to carry out its own life processes. It is estimated that a plant uses 90% of the energy from glucose for its own purposes. The remaining 10% is stored in plant tissues and is available to the organisms (herbivores) that eat the plants. All living organisms, through cellular respiration, release the energy contained in molecules of glucose and use this energy to carry out their life processes. At each step of the food chain, the organism uses 90% of the energy and stores 10% in their body tissues. The amount of energy that moves through a food chain is reduced at each level because most of the energy is either used by the organism or given off as heat. Only energy stored in the tissues of an organism can be transferred to the next level. This loss of energy at each step can be represented in an "energy pyramid." Each step in a food chain or in an energy pyramid is referred to as a trophic level. An energy pyramid shows the relative amount of energy contained within each trophic level in a food chain or a food web.

37. What is the ultimate source of energy for all living organisms on Earth? _____

38. What is the relationship between photosynthesis and cellular respiration? _____

39. Plants manufacture molecules of glucose and use the glucose as a source of energy.

a) How much of the energy does a plant use for itself? _____

b) What is this energy used for in plants? _____

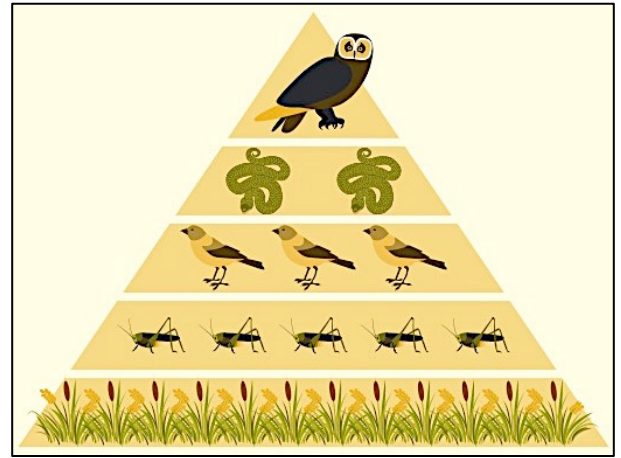
c) What happens to molecules of glucose (energy) that are not used by the plant? _____

40. Consumers feed on plants or other animals that eat plants.

a) How much energy is passed from plants to primary consumers? _____

b) What happens to the energy that is passed to the primary consumer? List three possibilities.

Directions: Use the picture to the right to answer questions 41 - 47.



41. This picture shows an energy pyramid. What is an energy pyramid? _____

42. What are trophic levels? _____

43. How many trophic levels are seen in this energy pyramid? _____

44. Based on what you have learned about food chains, what terms can be used to describe each of the following organisms from the picture?

a) Plants: _____

b) Crickets: _____

c) Birds: _____

d) Snakes: _____

e) Owl: _____

45. How much energy from one trophic level is available to be passed up to the next level? _____

46. Suppose that the plants at the base of this energy pyramid contain 450,000 Calories of food energy. If the crickets eat all the plants, how much energy would be available to the crickets as first-level consumers? _____

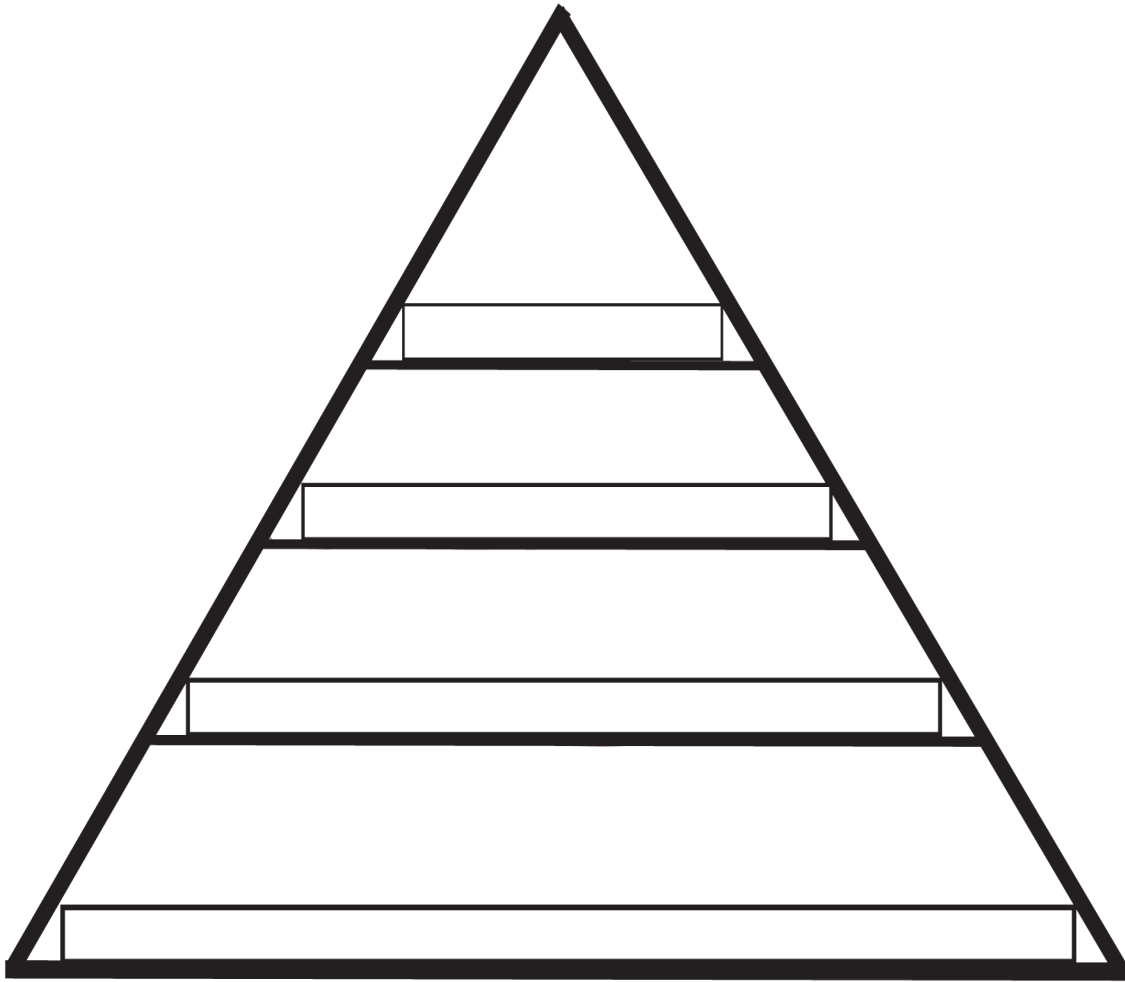
How many Calories are available to the birds? _____

How many Calories are available to the snakes? _____

How many Calories are available to the owl? _____

47. What happens to the number of organisms at each level of the pyramid starting from the base? Explain why this happens. _____

48. Use the diagram below to draw the organisms in a four-step food chain. You can choose between a desert ecosystem or an aquatic ecosystem. Label each of the four trophic levels.



49. If 575, 250 Calories of energy are available at the first trophic level, calculate the number of Calories available to the 2nd, 3rd, and 4th levels.

2nd Level: _____

3rd Level: _____

4th Level: _____

50. Is it possible for an inverted pyramid to exist, like the one show here? Explain your answer. _____

