**Food Webs Review Sheet**

**SC.912.L.17.9 Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels**.

Everything that organisms do in ecosystems—running, breathing, burrowing, growing— requires matter and energy. The flow of matter and energy is the most important factor that controls what kinds of organisms live in an ecosystem and how many organisms the ecosystem can support.

Ecologists study how energy moves through an ecosystem by assigning organisms in that ecosystem to a specific level, called a trophic level. Energy moves from one trophic level to another. The lowest trophic level of any ecosystem is occupied by the producers, such as plants, algae, and bacteria. Producers use carbon dioxide and energy from the Sun to build energy-rich carbohydrates

At the second trophic level are herbivores, animals that eat plants or other primary producers. These primary consumers include cows, horses, caterpillars, and some ducks. The third trophic level includes secondary consumers, animals that eat other animals, or carnivores. Tigers, wolves, and snakes are carnivores. Some animals, such as bears and cranes, are omnivores, eating both plants and animals. Many ecosystems contain a fourth trophic level composed of carnivores that consume other carnivores. These are tertiary consumers, or top carnivores.

The path of matter and energy through the living components of an ecosystem is called a food chain. An example of a food chain is shown below. The arrows show the direction of matter and energy flow. That is, each arrow points to the organism that consumes the other organism as food.

plants → grasshoppers → rats → owls

In most ecosystems, matter and energy do not follow simple straight paths because individual animals often feed from different sources. This creates a complicated, interconnected group of food chains called a food web. The diagram below shows a simple food web.



During every transfer of energy within an ecosystem, energy is lost as heat. Thus, the amount of useful energy available decreases as energy passes through an ecosystem, limiting the number of trophic levels an ecosystem can support. When a plant harvests energy from sunlight, photosynthesis captures only about one percent of the energy available to the leaves. When an herbivore uses plant molecules to make its own molecules, only about ten percent of the energy in the plant ends up in the herbivore’s molecules. Finally, when a carnivore eats the herbivore, about ninety percent of the energy is lost in making carnivore molecules. At each trophic level, the energy stored by the organisms is about one-tenth of that stored by the organisms in the level below.

Ecologists often illustrate the flow of energy through ecosystems with an energy pyramid, a diagram in which each trophic level is represented by a level within the pyramid, with the lowest trophic level on the bottom. The width of each level in the pyramid is determined by the amount of energy stored in the organisms at that trophic level. Because energy is lost at each trophic level, the amount of energy available at the top level is much smaller than the amount of energy available at the bottom level.

1. A partial food web for organisms in an ecosystem is shown below.



Which organism, if removed, would impact the food web the most? Explain your answer.

1. How would the removal of decomposers, not show in the food web above, impact the ecosystem?
2. In a certain, ecosystem, there are 200,000 Joules of energy available at the Producers trophic level. Calculate the amount of energy available at each of the following trophic levels. (Show your work)

|  |  |
| --- | --- |
| 1. Primary consumers
2. Secondary consumers
 | 1. Tertiary consumers
2. Quaternary consumer
 |

1. A food chain is illustrated below:



The arrows represented as most likely indicate

1. Energy released from metabolism into the environment as heat.
2. Oxygen released from metabolism produced by cellular respiration.
3. The absorption of energy from the environment that has been created.
4. The transport of glucose away from the organism through photosynthesis
5. The diagram below shows the cycling of nutrients in an ecosystem.



The removal of which of the following groups would cause an immediate decrease in the amount of energy flowing through the system?

1. Producers
2. Consumers
3. Decomposers
4. Inorganic nutrients
5. A diagram of a food web is shown below.



Which organism receives the least amount of energy from the producers?

**A. Hawk**

**B. Rabbit**

**C. Grasshopper**

**D. Mouse**

1. Part of a desert food web is diagrammed below.



Which of the following will **most likely** result if all of the primary consumers are removed from this ecosystem?

1. Prairie rattlesnakes will become herbivores.
2. Golden eagle and kit fox populations will decrease.
3. Sagebrush grasshoppers will consume soil bacteria.
4. Silk grass and sand sagebrush populations will decrease.
5. The food web shows the flow of energy through a sagebrush-steppe ecosystem.



Which of these organisms are in a trophic level that receives a larger percentage of the energy captured by the producers than the percentage received at the bats’ trophic level?

1. Mountain lions
2. Snakes
3. Hawks
4. Ground squirrels