**Guided Notes: Principles of Ecology**

1. Ecology is the study of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that occur between organisms and their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. Recall that the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ includes *all living things*. In order to better understand the biosphere, we must first understand how living things are affected by nonliving (*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*) and living (*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*) things present in their environment.

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factors are the nonliving parts of the environment. EX: temperature, \_\_\_\_\_\_\_\_\_\_\_\_\_, light, soil. Why should we include these factors when studying living things?

4. [\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factors](http://videos.howstuffworks.com/discovery/30707-assignment-discovery-abiotic-and-biotic-factors-video.htm) are living things that inhabit an environment. All \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ depend on other living things directly or indirectly for: food, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, reproduction, or protection.

5. To help ecologists study the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the biotic and abiotic parts of the world, they have organized the living world into levels:

**Organism – Population – Community – Ecosystem - Biome**

6. A *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* is a group of organisms of the same species that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and live in the same area at the same time. Members of the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ compete with each other for food, water, mates, or other resources. EX: Zebras \_\_\_\_\_\_\_\_\_\_\_\_\_\_ with each other for the same food source, reproduction, and water source.

7. No \_\_\_\_\_\_\_\_\_\_\_\_ lives independently. While populations are composed of individual organisms, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are made up of different populations. A *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* is made up of interacting populations in a certain area at a certain time. EX: zebras live with lions, giraffes, elephants, and gazelles.

8. An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is made up of interacting populations in a community and the community’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factors. EX: Populations of animals and plants interact with each other and with the abiotic components of the area (waterhole)

9. Types of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factors, like climate, humidity, temperature, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ all work together to create different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ where specific animal and plant species are found.

10. All organisms must “eat” in order to have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to reproduce, grow, find food, and defend themselves. Ultimate source of energy for all life: *\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

11. Autotrophs /Producer- an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that uses light energy to make energy-rich compounds. Radiant energy from the Sun is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into chemical energy that organisms can breakdown for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

12. Consumers/Heterotrophs depend upon \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for nutrients and energy. EX: deer, mice, lions, birds

13. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that feeds only on autotrophs is called an *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*. EX: deer, mice, squirrels, zebras, giraffes, rabbits.

14. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that eats only other heterotrophs is called a *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*. EX: tigers, lions, wolves, hawks, owls

15. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that feeds on other heterotrophs as well as autotrophs is called an *­­­­­­­­­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*. EX: bears, humans, raccoons, possums

16. Some \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ do not kill for food, but still eat other heterotrophs. These are called *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*, and they eat animals that have already died. EX: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, buzzards, ants, beetles

17. Some organisms break down complex \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of dead and decaying animals and plants into simpler molecules that can be absorbed. These organisms are called *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*. EX: bacteria, fungi, worms. These \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, carnivores, decomposers, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ work together to create the food chain/food pyramid in an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

18. Trophic level: A \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in an ecosystem. Food chain: lineup of organisms that shows who eats who. Shows how \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ move through an ecosystem.

19. Every time an organism eats, it obtains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from its food. So energy is transferred from the 1st \_\_\_\_\_\_\_\_\_\_\_ level to the 2nd trophic level to the 3rd trophic level and so on. Some of this energy is lost along the way during an organism’s metabolism and as heat. This energy can be measured in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (kcal). *Energy pyramid* - picture showing how much energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the different trophic levels in a food chain.

20. Notice that there are many more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than there are consumers, and many more primary consumers than there are secondary \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, etc. When the producer is eaten by the consumer, it is an exchange of energy. Ironically, \_\_\_\_\_\_\_\_% of the energy that the producer had is lost, and the consumer only receives 10% of it. Therefore, to get enough energy to survive, the consumer must eat more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, meaning that, to sustain the consumers, there must me many more producers. Also, there is much more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to available to producers, which facilitates faster growth and larger numbers of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

21. In biomes all animals are part of some type of survival relationship.

 [Predator-prey](http://video.nationalgeographic.com/video/player/animals/mammals-animals/cats/leopard_protectskill.html)*:* predators are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that hunt and eat other organisms called \_\_\_\_\_\_\_\_\_\_\_\_

 Symbiosis*:* relationship in which one \_\_\_\_\_\_\_\_\_\_\_\_\_\_ lives on, in, or near another species and affects its survival

Three types:

 (1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (3) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

22. Mutualism: type of ­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in which both species \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Ex. Ants living in the tropical acacia trees- trees are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when ants attack animals that try to feed on the tree and ants receive \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the tree.

23. Commensalism: type of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in which one species \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the other species is neither \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ nor \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ex. Spanish \_\_\_\_\_\_\_\_\_\_\_\_\_\_ grows on the branches of trees. The moss gets a habitat and the tree gets \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Whales have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that live on them. The barnacles have somewhere to live, but do not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the whale.

24. Parasitism: type of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in which one species \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the other species is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Parasite: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that harms but does not kill another organism. Host: organism that is harmed by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Ex. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ feed on dogs, people, etc. The ticks get \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (blood) and the hosts lose blood and can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with disease. Best parasites do not kill their hosts…why?

25. A **limiting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** or **limiting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is a factor that controls a process, such as organism \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or species population size or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Examples of limiting factors include: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of food, predation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or availability of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

26. As a result of limiting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (like food availability, disease, predation, etc) no population will continue to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forever. The **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is the largest number of individuals in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that a given environment can support.

27. The growth rate of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is affected by three things:

(1) the number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(2) the number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(3) the number of individuals that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the population

Immigration – individuals that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the population

Emmigration – individuals that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the population

28. If birth rate is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than death rate, population will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If death rate is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than birth rate, population will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Current human population growth is *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*. Will the population continue to grow unchecked?

29. Human (or any species) growth cannot continue unchecked-why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What resources do we need to survive as a population? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Are we just concerned about longevity of life? Or do we also care about anything besides physical necessities? How does human population growth affect biodiversity?

30. As \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ become less available, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a population slows or stops. An s-shaped curve of this growth pattern is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**



31. Competition for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ resources, predation, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can all affect the size of a population. EX: *Dutch Elm Disease* – Elm trees are attacked by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ spread by a beetle. Result: many elm tree populations have been decimated by this fungus EX: *Pfiesteria*- a toxic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ dinoflagellate associated with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and algal blooms.