

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

# Biological Energy Study Guide

## Parent Signature (3 % extra credit on test)

I have gone over this study guide with my student for about 30 minutes.

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### Parts of an Ecosystem

1. What is ecology the study of?

*Ecosystems and how they work*

2. What is biodiversity?

*A variety of life*

3. What is interdependence?

*Living things depending on each other*

4. Give an example of interdependence from nature.

*Bees and flowers. The bees gather nectar from the flowers, the flowers need to be pollinated*

5. How are interdependence and biodiversity connected to each other?

*You can't have one without the other. Things can depend on each other if they are the same. There can't be variety in an ecosystem if things don't help each other out*

6. What is the difference between biotic and abiotic factors in an ecosystem? Give two examples of each.

*Biotic factors are living—plants, animals, fungi, bacteria, etc*

*Abiotic are non-living—soil, air, light, water*

7. Explain what a producer is and give two examples.

*An organism that produces its own food using photosynthesis. Ex: trees, grass, algae*

8. Explain what a consumer is and give two examples.

*An organism that gets energy from eating other organisms. Fly, tiger, sloth, deer.*

9. Explain what a decomposer is and give two examples.

*An organism that gets energy from helping organisms decay. Ex: bacteria, mold, mushrooms*

10. What are the three types of consumers? Give an example of each.

*Herbivores (cows), carnivores (lion), omnivores (people, bears)*

### Obtaining Energy in an Ecosystem

1. What is the purpose of cellular respiration (it turns what into what)?

*It turns the chemical energy in our food into mechanical energy*

2. What is the equation for cellular respiration? (**Have it memorized!**)

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$

3. How does your body obtain each of the ingredients it needs to perform this reaction?

*You eat sugar and you breathe in oxygen*

4. Cellular respiration converts energy from which form to which 2 forms?

*Chemical to mechanical and heat*

5. Where does cellular respiration happen in the cells? *Mitochondria (mighty-chondria)*

6. Which type of organisms use cellular respiration—consumers, producers, or both? *both*

7. What is the real purpose of photosynthesis? Is photosynthesis **directly** responsible for making energy?

*To make food for the plant. It does not directly make energy the plant can use.*

8. What three things are needed in order to complete photosynthesis? How do plants get each of them?

*Carbon dioxide, water, sunlight*

9. What is the chemical equation for photosynthesis? (**Have it memorized!**)

*$6CO_2 + 6H_2O + \text{sunlight} \rightarrow C_6H_{12}O_6 + 6O_2$*

10. Photosynthesis converts energy from which form to which?

*Electromagnetic to chemical*

11. Do plants use the process of cellular respiration? If so, when/why do they use it?

*Yes. They do it after cellular respiration in order to change the sugar they make into usable energy.*

12. Where in the cell does photosynthesis take place? *In the chloroplast*

13. Where is chlorophyll found and what does it actually do? *In the chloroplast, it absorbs sunlight*

14. How are plants and animals interdependent? (Hint: What do each **produce**?)

*We make carbon dioxide that plants use, they make oxygen that we use.*

### **Connections in an Ecosystem**

1. What is the difference between a food web and a food chain? Which is more accurate?

*A food chain is one way energy can go in an ecosystem. A food web is a combination of food chains*

2. Which way do the arrows point in a food chain/ web?

*Always towards the eater*

3. Explain the relationship between predator and prey—who is who?

*Predators eat the prey*

4. What is carrying capacity?

*The maximum # of organisms an ecosystem can support*

5. Name four things that might limit the carrying capacity of an environment.

*Water, food, living space, sunlight, predators*

6. In class we read about a situation with a deer herd on the Kaibab Plateau. Explain how carrying capacity was an important factor in what occurred with the Kaibab Deer population in the early 20<sup>th</sup> century.

*Once the deer got above the carrying capacity, they started to starve. They ruined the ecosystem and actually made the carrying capacity lower.*

7. What happens to the number of organisms as you move up an energy pyramid? The amount of energy?

*They both decrease*

8. How much energy is transferred when you move up one level in an energy pyramid? *10%*

9. How is most of the energy lost as you move up an energy pyramid? *As heat, the rest is used as mechanical*

10. Where does all of the energy in an ecosystem originate from? *The sun (light)*

11. Where do you find producers in an energy pyramid? **Give at least two reasons why they are there.**

*At the bottom. There must be more of them than anything else, they have the most energy, they don't eat anything*

12. Which are more energy efficient—herbivores or carnivores? Why?

*Herbivores. They are lower on the food chain and get more energy from the sun because it has to pass through fewer organisms to get to them*

13. What is a keystone species? *A species that most of the ecosystem depends on. Without it, many things would be affected and possibly not be able to survive*

14. Give two examples of keystone species and explain what makes them keystones in their ecosystems.

*Wolves—they keep the herbivore population down Otters—they keep the sea urchins under control*

15. Many keystone species are predators but not all keystone species are. Give two examples of keystone species that are not predators and explain how they affect their ecosystems.

*Beavers—they create dams that shape the ecosystem into a wetland so other species can live there*

*Bees—they pollinate flowers so they can reproduce and keep the food chain going*

*Lemmings—they are the main prey for many of the tundra animals*

17. What is a symbiotic relationship?

*A close, long term relationship between two species*

18. What is mutualism? Give an example.

*A relationship in which both species benefit. Ex: bees and flowers, cleaner fish and sharks*

19. What is commensalism? Give an example.

*A relationship in which one species benefits and the other is not affected. Ex: a bird living in a tree*

20. What is parasitism? Give an example.

*A relationship in which one species benefits and the other is harmed. Ex: A leech, caterpillar/wasp*

21. How is being a parasite different from being a predator?

*Predators kill and eat their victims. Parasites USE their victims for something but usually don't kill them*

22. Identify what each of the following scientists study in ecosystems.

Botanist: *plants*

Mammalogist: *mammals*

Meteorologist: *climate*

Entomologist: *insects*

Herpetologist: *reptiles/amphibians*

Geologist: *rocks/soil*

Ichthyologist: *fish*

Ornithologist: *birds*

23. Why is it important to have many different types of scientists study the same ecosystem?

*It would be too much work for one person, they wouldn't be able to understand anything deep enough. It is important to have scientists that are experts at something and then share their knowledge*

24. Fill in the chart below concerning human impacts on the environment.

Human Impact	What it is	Ways it Happens
H	<i>Habitat loss</i>	<i>Deforestation, draining wetlands, climate change</i>
I	<i>Invasive species</i>	<i>Stowaways, releasing pets, good intentions</i>
P	<i>Pollution</i>	<i>Cars and industry, acid rain, trash/pesticides</i>
P	<i>Population Growth</i>	<i>Urban sprawl, spread of diseases, accidental casualties</i>
O	<i>Overharvesting</i>	<i>Overfishing, poaching, clear-cutting</i>

25. Which impact listed in the chart above affects the most species? Why is that?

*Habitat loss, when a species loses its habitat it has no place to live and loses its food sources too. Many of the things humans do impact habitat in some way.*

26. Explain how population growth is connected to all other aspects of HIPPO.

*More people = more space we take up, more species we introduce, more pollution we create, more things we harvest from the ecosystem*

27. How is extinction today different than in the past?

*Most extinction today is due to humans. Human caused extinction causes imbalance in the ecosystem. Species that are going extinct today are still needed in their ecosystems.*

28. Name two ways humans *directly* cause extinction and two ways humans *indirectly* cause extinction.

*Direct: Hunting, trapping, fishing and deforestation (directly kills trees)*

*Indirect: pollution, urban sprawl, deforestation, offsetting the food web, etc.*

29. Name 4 potential effects extinction of species can have on humans.

*Economic impacts (loss of products for industry), offsets the food web, loss of medicines, loss of crops/food sources, etc*