SOLUTIONS TO THE STUDY GUIDE FOR MODULE #10

1. a. Ecology – The study of the interactions between living and nonliving things

b. Population – A group of interbreeding organisms coexisting together

c. Community – A group of populations living and interacting in the same area

d. Ecosystem – An association of living organisms and their physical environment

e. Biome – A group of ecosystems classified by climate and plant life

f. Primary consumer – An organism that eats producers

g. Secondary consumer – An organism that eats primary consumers

h. Tertiary consumer – An organism that eats secondary consumers

i. Ecological pyramid – A diagram that shows the biomass of organisms at each trophic level

j. Biomass – A measure of the total dry mass of organisms within a particular region

k. Transpiration – Evaporation of water from the leaves of a plant

l. Watershed – An ecosystem where all water runoff drains into a single body of water

m. Greenhouse effect – The process by which certain gases (principally water vapor, carbon dioxide, and methane) trap heat that would otherwise escape the earth and radiate into space

2. If an insect not native to the U.S. were carried into the country through foreign fruits and vegetables, it could ruin the balance of the U.S. ecosystem.

3.

Organism	Possible Trophic Levels
Whale	primary consumer, secondary consumer
Sea turtle	primary consumer, secondary consumer
Phytoplankton	producer
Meran	primary consumer, secondary consumer
Ocean perch	secondary consumer
Zooplankton	primary consumer
Sea bass	secondary consumer (the meran can be a primary consumer, so if the sea bass eats a meran that eats only phytoplankton, it is a secondary consumer), tertiary consumer
Shark	secondary consumer, tertiary consumer

4. a. The size of the rectangle indicates biomass. Also, the rectangles, in order, represent producers (bottom), then primary consumers, then secondary consumers, then tertiary consumers (top). Finally, we must look at percentage change, not absolute changes in the length. Thus, the primary and secondary consumers have the greatest disparity in biomass.

b. The smallest amount of energy is wasted where the biomass is as close to equal as possible. Thus, from producer to primary consumer wastes the least energy.

5. The clownfish and the sea anemone form a mutualistic symbiotic relationship. The clownfish is protected by the sea anemone and it attracts food to the sea anemone. The goby and the blind shrimp have a mutualistic symbiotic relationship in which the goby protects the blind shrimp, and the blind shrimp provides a home for the goby. Finally, the Oriental sweetlips and blue-streak wrasse form a mutualistic symbiotic relationship in which the sweetlips gets it teeth cleaned by the wrasse and the wrasse gets food from the sweetlips' teeth.

6. Mutualism seems to contradict the idea that organisms always battle for survival.

7. The ocean does not lose water because the land gets the excess water, and that excess water flows back into the ocean via surface runoff (or as runoff from a river or stream).

8. It transports nutrients within an ecosystem and even from one ecosystem to another.

9. If too many trees and plants are removed from a watershed, too many nutrients will flow into the river or stream, throwing off the ecosystem.

10. Oxygen is taken from the air principally by respiration and is restored principally by photosynthesis.

11. Oxygen is also removed from the air by fire, ozone formation, and the rusting of metals and minerals.

12. Oxygen is also restored by ozone destruction and water vapor destruction.

13. Carbon dioxide leaves the air by photosynthesis and by dissolving in the ocean.

14. Carbon dioxide enters the air via decomposition, fossil fuel burning, fire, and respiration.

15. Fuel burning worries those who think that global warming is a problem, because it is a human-made way of adding more carbon dioxide to the air.

16. No, all measurable data indicate that any warming which did take place occurred before humans really started burning fuels in earnest.

17. Nitrogen fixation is the process by which nitrogen gas from the atmosphere is converted into nitrogen-containing molecules that are useful to most of organisms in creation. Nitrogen-fixing bacteria perform it.

18. Organisms emit some nitrogen in their wastes, and the rest is turned back into useful forms of nitrogen by the decomposers that feed on their decaying remains.