Ch 3.1: Introduction to Global Systems
1. What is *ecology*? With what parts of the Earth is *ecology* concerned?
2. List and define 6 levels of ecological organization.
3. Compare and contrast *biotic* and *abiotic* factors.

Ch 3.2: Climate, Weather and Life
4. Compare and contrast *climate* and *weather*.
5. What powers and shapes the global climate system?
6. What determines Earth's average temperature?
7. What would result on Earth from an absence of the *greenhouse effect*?
8. Why does latitude affect the amount of solar energy received at that location?
9. What are the 3 climate zones on Earth? Where are they located?
10. What does the differential heating of the Earth cause?
11. What factors shape regional climates?
12. What measurable changes in the Earth system result from climate change?
13. What nonhuman factors can change the Earth's climate?
14. What has been the result of rapid climate change in the Earth's past?

Ch 3.3: Biomes and Aquatic Ecosystems
15. How are *biomes* described?
16. How many major *biomes* are described on Earth?
17. What 2 factors largely determine the plant and animal life found in a particular *biome*?

Ch 4.1: Energy, Producers, and Consumers
1. What is the relationship between *autotrophs* and *primary producers*?
2. Compare and contrast *photosynthesis* and *chemosynthesis*.
3. What is a problem with categorizing consumers into categories?

Ch 4.2: Energy Flow in Ecosystems
4. How does energy move in an ecosystem?
5. How is a *food chain* different from a *food web*?
6. What is the role of *decomposers* and *detritivores* in food webs?
7. Why does the energy available at each *trophic level* in a food chain or food web create a **pyramid** of energy?
8. In Figure 1 below, fill in the blanks with the amount of energy that would be available at each trophic level.

_____ J

_____ J

_____ J

_____ J

100,000 J
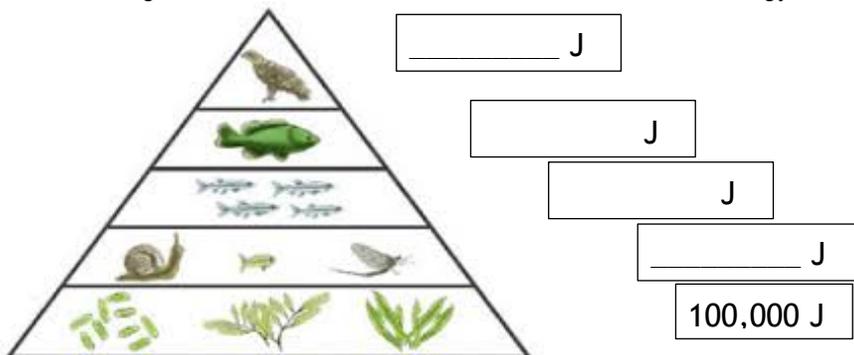
9. What are the names of each trophic level?

10. How is a *pyramid of biomass* different from a *pyramid of energy*?
11. Why is it that sometimes a *pyramid of numbers* does not actually look like a pyramid?

Ch 4.3: Cycles of Matter
12. How does matter move in ecosystems?
13. Name 1 biological process and 1 human activity that drive *biogeochemical cycles*.
14. What is a *nutrient*? Which *nutrient cycles* are especially important for life?
15. What is a biological process that drives the *carbon cycle*?
16. What is a human activity that drives the *carbon cycle*?
17. What is *nitrogen fixation*? Why is it important for life?
18. How do *limiting nutrients* affect ecosystems?

Ch 5.1: How populations grow
19. What are five characteristics of populations?
20. Define and give an example of geographic range
21. Give examples of each of the three types of population distribution
22. What is the population density of a population of 490,000 individuals with a geographic range of 900 km^2? (show your work)
23. How are population density and population distribution different?
24. Explain why the age structure of a population might be significant
25. List and define the four factors that determine how a population size is changing
26. Exponential growth occurs in ideal conditions. What are "ideal conditions."
27. Describe the three phases of logistic growth
28. What is the relationship between Phase II of logistic growth and Carrying Capacity?

Ch 5.2: Limits to Growth
29. How do limiting factors affect a population?
30. List and describe four density dependent limiting factors

Ch 5.3: Human Population Growth
31. Describe human population growth for most of human history. What factors contributed to this situation?
32. How has human population growth changed in the past few centuries? What factors contribute to this situation?
33. What happens to the population of a country during the demographic transition?
34. What does the age structure of China predict about future population growth of that country? Why?


| | Male | 0.0% 0.0% | Female |
| | | 0.0% 0.0% | |

China - 2016
Population: 1,382,323,331

PopulationPyramid.net
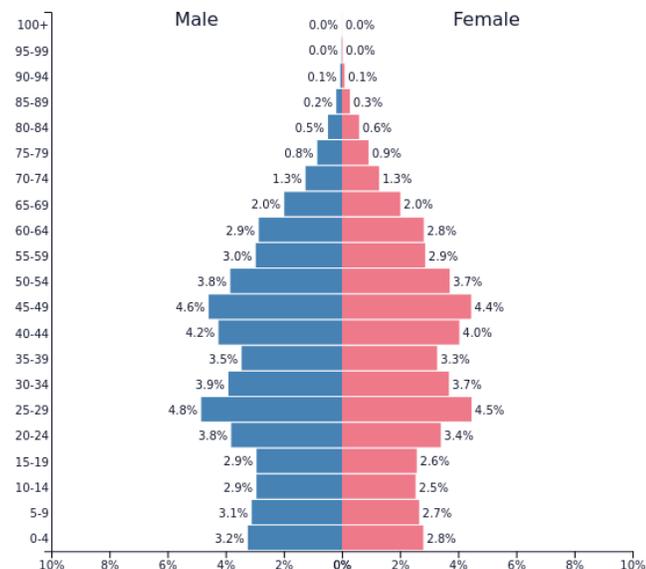
35. What does the age structure of Ethiopia predict about future population growth of that country? Why?

Ethiopia - 2017
Population: 104,344,901
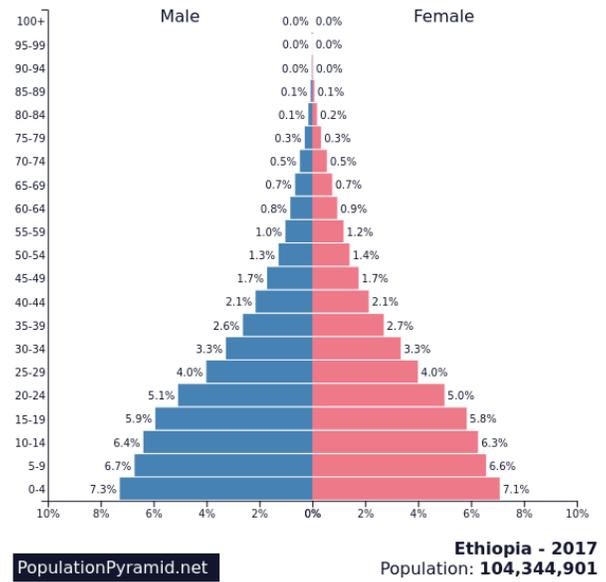
36. What does the age structure of Italy predict about future population growth of that country? Why?

Italy - 2017
Population: 59,797,977
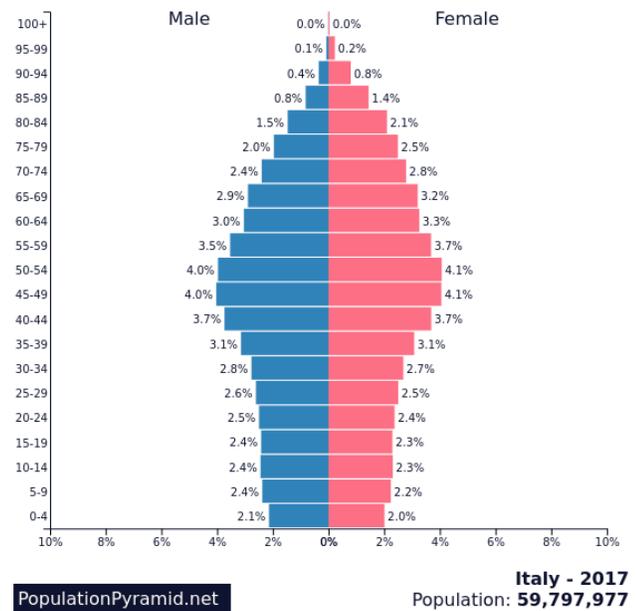
37. What does the age structure of USA predict about future population growth of our country? Why?

United States of America - 2017
Population: 326,474,013
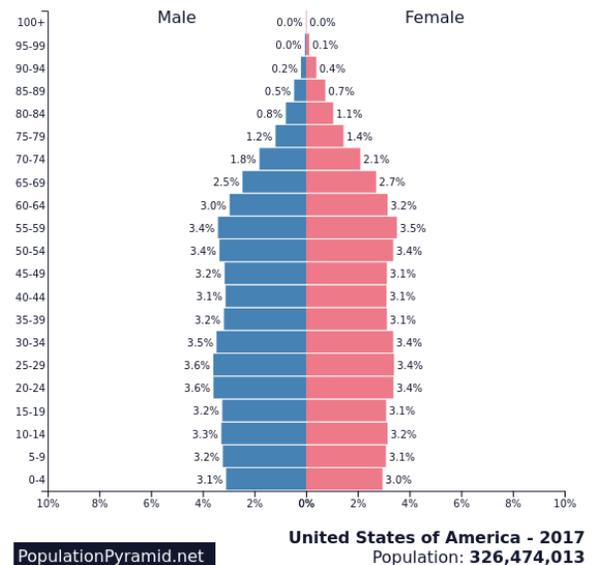
Chapter 6: Communities and Ecosystem Dynamics
Ch 6.1: Habitats, Niches, and Species Interactions
1. How do *habitat* and *niche* relate to an organism?
2. What does the *competition exclusion principle* state?
3. How does competition help to determine the numbers and kinds of species in a community and the niche each species occupies?
4. What is a *keystone species* and what is an example?
5. Compare and contrast *commensalism, mutualism and parasitism.*

Ch 6.2: Succession
6. Compare and contrast *primary succession* and *secondary succession*.
7. How might succession be different after natural disturbances than after human-caused disturbances?

Ch. 6.3: Biodiversity, Ecosystems, and Resilience
8. What is *biodiversity*? What are some benefits of *biodiversity*?

Chapter 7: Humans and Global Change
Ch 7.1: Ecological Footprints
9. Define your *ecological footprint.* How does your footprint likely compare to the global average?

Ch 7.2: Causes and Effects of Global Change
10. In what ways do human activities affect global systems?
11. How does human activity drive climate change?
12. If climate change alters environmental conditions beyond organisms' tolerance ranges, what options are available to them?
13. What happens when habitats become fragmented?
14. Why are *invasive species* considered to be a human-caused change to ecosystems?
15. What problem developed with the *ozone layer* during the 1970s?
16. What is *biological magnification?*

Ch 7.3: Measuring and Responding to Change
17. What does the IPCC data show?
18. What impacts of climate change have been described by the IPCC?
19. Is it possible to use scientific understanding to design solutions to problems of the impact of humans on the biosphere? If so, how? Give an example of a successful application of science to an ecological problem.