

Principles of Taxonomy Concept Questions

1. Give some reasons why taxonomy is important. (Organizing organisms, aiding in identifying new organisms, understanding relationships between organisms.)
2. Why is the use of scientific names important? (The use of Latin names provides consistency and avoids the confusion of using common names.)
3. Why is phylogeny sometimes called the foundation of taxonomy? (Phylogeny is the study of relationships between organisms which helps to put them into categories.)
4. Many of the classifications used by Linnaeus are still in use today, even though he did not know about evolution. How is this possible? (He used physical characteristics which are a result of evolution so we would expect related organisms to be similar because of their common ancestry.)
5. What is the relationship between a family and an order? (A family is a smaller group within an order.)
6. If two animals are in the same class, what other categories must they share? (Domain, kingdom, and phylum.)
7. *Panthera leo* (lion), *Canis latrans* (coyote), *Panthera tigris* (tiger), and *Procyon lotor* (raccoon) are all members of the order Carnivora. Which two members are the most closely related? (The lion and tiger are mostly closely related because they are in the same genus.)
8. At which taxonomic level do the lion and tiger in Q7 separate? (At the species level.)
9. Describe how a classification key is organized. (A key starts with general characteristics and gets more specific at each step. Each choice directs you to another step and so on until the organism is identified.)
10. What things seem to be the most important for determining which kingdom an organism will be placed in? (To place an organism into a kingdom we consider broad, general characteristics.)
11. How has technology affected classification? (The microscope, DNA, and sharing research worldwide have improved our ability to accurately classify organisms.)
12. In addition to physical appearance, what else do modern taxonomists consider? (Genetics and embryonic development, cell structure, molecular biology, etc.)
13. Why are bacteria classified in their own kingdoms and not with plants, animals, or fungi? (They are prokaryotic.)
14. What characteristics are shared by all plants? (Plants are multicellular, have a cell wall made of cellulose, are photosynthetic, eukaryotic, and are capable of sexual reproduction.)
15. Suppose you were a microbiologist who had just discovered a new organism. The organism was unicellular, lacked chloroplasts, and had no cell wall. Which kingdom would you place it in? (Protista. Kingdom plantae is ruled out because it is unicellular and lacks a cell wall and chloroplasts. Kingdom animalia is ruled out because it is unicellular. The lack of a cell wall also rules out the bacterial kingdoms. Students might argue that it could be a unicellular fungus.)
16. What similarities and differences exist between plants and protists? (Plants are multicellular, photosynthetic, eukaryotes and some protists are too. Plant-like protists lack true roots, true stems, and true leaves.)
17. What similarities and differences exist between plants and fungi? (Both are eukaryotic. Plants have cell walls made of cellulose and are photosynthetic, while fungi have cell walls made of chitin and they are heterotrophic.)
18. What are the major characteristics that distinguish animals from plants? (Animals are motile, have no cell wall, and are heterotrophic.)
19. Why is it not sufficient to classify animals simply as multicellular heterotrophs? (That description would also include fungi.)
20. Both snakes and worms are tube-shaped with no legs. How could you determine whether the similarity in shape means that they share a recent common ancestor? (You would study internal structures and the similarity of their DNA and proteins.)

21. You are hanging out in the rain forest of Costa Rica and you notice some beetles. Beetles A and B are quite similar but have different markings on their wings. Also, both beetles resemble a third beetle, beetle C that has been previously described. How could you use DNA to determine whether beetles A and B are more closely related to one another or to beetle C? (If DNA from A and B is more similar to each other than the DNA from beetle C is to either of them, they must be more closely related.)
22. Of course, we're animals. Thinking about your own personality, which kingdom do you see yourself identifying with? Why? (Answers will vary. LOL)
23. Your friends are debating whether a virus is living or non-living. What would you say? (Viruses show some but not all the characteristics of living things. For instance, they contain DNA or RNA and evolve but cannot reproduce outside of a host cell.)
24. a) Viruses are obligate intracellular parasites. What does this mean? (Viruses require a living host cell in order to produce more virus particles. They are parasites because they use the host cell resources without providing any benefit.)
b) You hear another student claim that viruses appeared on the planet before cells. Provide reasoning to support/refute the claim. (Viruses require a host cell to replicate, so they could not have existed before cells.)
25. a) What is meant by host range? Distinguish between a virus with a broad host range and one with a more limited host range. (The host range defines the species the virus is able to infect. A broad host range means the virus can infect a number of different species while a narrow range means the virus is more limited in the species it can infect.)
b) Describe the mechanism for the specificity of the host range. (Capsid proteins of the virus recognize specific cell markers on the membrane of the host cell.)
c) Considering your answer to (b), explain how the immune system is able to protect you from a viral infection. (The immune system recognizes the specific proteins on the virus.)
26. Describe how viruses can be spread from person to person. (Viruses can be carried in tiny droplets of water in the air, in drinking water, or body fluids. Some are spread by a vector such as mosquitos.)
27. Explain the difference between the way a virus causes disease and the way a bacterium does. (Viruses usually cause symptoms by damaging or killing cells. Bacteria usually produce toxins which kill or interfere with other cells.)
28. Why are viral infections difficult to treat? (Viral infections are difficult to treat because the virus is usually inside a host cell. It is difficult to destroy the virus without damaging or killing the host cell.)