



MSC: Conceptual

6. Evolutionary tree diagrams representing the relationships between various organisms can be drawn only when those organisms share a
- common cellular metabolism.
  - distinct lineage.
  - common cellular organization.
  - common ancestor.

ANS: D                      DIF: Easy                      REF: 2.1                      OBJ: A2  
MSC: Applied

7. Evolutionary trees are based on
- the principle of convergent evolution.
  - a set of shared characteristics believed to have arisen in a common ancestor.
  - similarities in the function of a characteristic or trait.
  - consensus among biologists regarding the usefulness of particular traits.

ANS: B                      DIF: Easy                      REF: 2.1                      OBJ: A2  
MSC: Factual

8. What single feature, shared by all organisms, allows scientists to reliably compare distantly related living or recently extinct organisms?
- most recent common ancestor
  - universal ancestor
  - most recent common lineage
  - DNA

ANS: D                      DIF: Easy                      REF: 2.1                      OBJ: A2  
MSC: Factual

9. The current classification system used by biologists is
- complex and unchanging.
  - universally accepted by all biologists.
  - based on four generalized types of living organisms: the Bacteria, the Archaea, the Eukarya, and the Protista.
  - updated and revised whenever new information becomes available.

ANS: D                      DIF: Medium                      REF: 2.1                      OBJ: A2  
MSC: Factual

10. In order to determine relationships among different organisms scientists would examine
- DNA.
  - behavior.
  - body structures.
  - all of the above

ANS: D                      DIF: Medium                      REF: 2.1                      OBJ: A2  
MSC: Factual

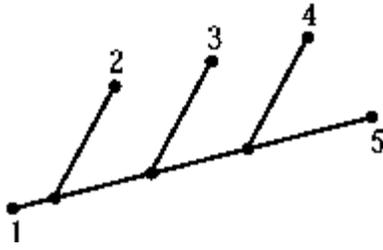
11. The diagram below is an evolutionary tree showing the relationship between the three domains. Which letter represents the most recent common ancestor of the Archaea and Eukarya?





MSC: Conceptual

21. Examine the evolutionary tree pictured below.



In this evolutionary tree, which groups of organisms are likely to share the most behaviors?

- a. 5 and 4
- b. 5 and 3
- c. 5 and 2
- d. 5 and 1

ANS: A                      DIF: Difficult                      REF: 2.1                      OBJ: A2  
MSC: Conceptual

22. With the exception of the \_\_\_\_\_ the following kingdoms are placed within the domain Eukarya.

- a. Protista
- b. Plantae
- c. Bacteria
- d. Fungi

ANS: C                      DIF: Easy                      REF: 2.1                      OBJ: A3  
MSC: Factual

23. Which of the following is a kingdom?

- a. Bacteria
- b. Eukarya
- c. Plantae
- d. Archaea

ANS: C                      DIF: Easy                      REF: 2.1                      OBJ: A3  
MSC: Factual

24. Evolutionary trees have been successfully used to

- a. identify which multicellular species are most closely related to humans.
- b. explain how evolution works.
- c. explain why most carnivorous mammals have four or five toes.
- d. explain the potential impact of global climate change.

ANS: A                      DIF: Medium                      REF: 2.1                      OBJ: A4  
MSC: Applied

25. Which of the following is *not* one of the three primary methods used to classify organisms?

- a. the Linnaean hierarchy
- b. the Darwinian hierarchy
- c. domains
- d. an evolutionary tree

ANS: B                      DIF: Easy                      REF: 2.2                      OBJ: A3  
MSC: Factual

26. Which of the following pairs of kingdoms would be included exclusively in the domain Eukarya?

- a. Plantae and Bacteria
- b. Animalia and Archaea
- c. Animalia and Fungi
- d. Protista and Bacteria

ANS: C                      DIF: Easy                      REF: 2.2                      OBJ: A3  
MSC: Factual

27. Taxonomy is the subdiscipline in biology that classifies living organisms; at the present time
- all living organisms have been discovered, named, and their relationships to other organisms described.
  - humans have just finished a complete count of the number of species on Earth.
  - the diversity of organisms on Earth is not completely known and estimates of the number of unknown species vary 10-fold.
  - there is no consensus regarding the appropriate classification strategy for the currently known organisms.

ANS: C

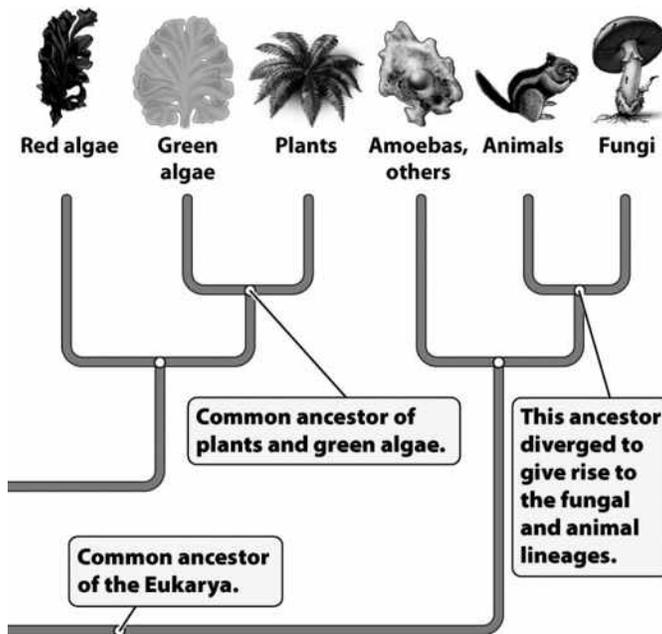
DIF: Medium

REF: 2.2

OBJ: A3

MSC: Applied

28. Based on the evolutionary tree shown below, which of the following are thought to be most closely related?



- an oak tree and a squirrel
- a mushroom and a cactus
- a honeybee and a clover plant
- a clam and a mushroom

ANS: D

DIF: Medium

REF: 2.2

OBJ: A3

MSC: Applied

29. Classification systems are continually revised as new information becomes available from various sources such as
- better understanding of the details of physiological processes.
  - using DNA analysis to compare nonstructural features of different organisms.
  - the continued evolution of current Earth species.
  - the identification of alien species that have reached Earth via meteorites and comets.

ANS: B

DIF: Difficult

REF: 2.2

OBJ: A3

MSC: Applied

30. The level in the Linnaean hierarchy immediately above the class is the
- phylum.
  - genus.
  - kingdom.
  - order.

ANS: A                    DIF: Easy                    REF: 2.2                    OBJ: A4  
MSC: Factual

31. Which of the following would contain the most closely related group of phyla?
- a. class
  - b. order
  - c. genus
  - d. kingdom

ANS: D                    DIF: Easy                    REF: 2.2                    OBJ: A4  
MSC: Factual

32. Which of the following taxa in the Linnaean hierarchy has the greatest total number of species?
- a. phylum
  - b. order
  - c. family
  - d. class

ANS: A                    DIF: Easy                    REF: 2.2                    OBJ: A4  
MSC: Factual

33. The most inclusive category in the Linnaean classification system is
- a. order.
  - b. phylum.
  - c. kingdom.
  - d. species.

ANS: C                    DIF: Easy                    REF: 2.2                    OBJ: A4  
MSC: Factual

34. The members of which of the following taxa would be most similar to one another?
- a. class
  - b. genus
  - c. order
  - d. kingdom

ANS: B                    DIF: Medium                    REF: 2.2                    OBJ: A4  
MSC: Applied

35. The most restrictive category in the Linnaean classification system is
- a. species.
  - b. order.
  - c. kingdom.
  - d. phylum.

ANS: A                    DIF: Medium                    REF: 2.2                    OBJ: A4  
MSC: Applied

36. In taxonomy, individuals belonging of the same class would also belong to the same
- a. species.
  - b. genus.
  - c. order.
  - d. none of the above

ANS: D                    DIF: Medium                    REF: 2.2                    OBJ: A4  
MSC: Applied

37. Which of the following statements about modern classification is *not* correct?
- a. Systematic studies have revealed so many errors within the Linnaean hierarchy that it is no longer considered useful.
  - b. The number of taxa in the Linnaean hierarchy has been determined subjectively; it represents a human understanding of natural processes.
  - c. A complete evolutionary lineage includes all the descendants of a single common ancestor.
  - d. Many scientists are reluctant to accept classification information from newer technologies like DNA analysis.

ANS: A                    DIF: Difficult                    REF: 2.2                    OBJ: A4

MSC: Conceptual

38. *Canis latrans* is the scientific name for the coyote. The term *Canis* represents the coyotes'
- genus.
  - kingdom.
  - order.
  - species.

ANS: A                      DIF: Easy                      REF: 2.2                      OBJ: A5  
MSC: Applied

39. Which of the following avian species are most closely related?
- Picoides villosus* and *Picoides borealis*
  - Picoides borealis* and *Phylloscopus borealis*
  - Numenius borealis* and *Picoides borealis*
  - Numenius americanus* and *Grus americana*

ANS: A                      DIF: Medium                      REF: 2.2                      OBJ: A5  
MSC: Applied

40. There are currently three recognized domains; which of the following is *not* included within this taxon?
- Archaea
  - Bacteria
  - Procarya
  - Eukarya

ANS: C                      DIF: Easy                      REF: 2.2                      OBJ: B1  
MSC: Factual

41. The chemical composition of ancient sediments suggests that oxygen was essentially absent from the atmosphere of the early Earth; how can its abundance in today's atmosphere be explained?
- Sunlight split water molecules apart, a process that produced oxygen gas.
  - Volcanic activity released oxygen that had been trapped beneath the Earth's surface.
  - Cyanobacteria and some eukaryotes produced oxygen as a byproduct of photosynthesis.
  - Chemical erosion of the Earth's surface released oxygen initially bound in surface rocks.

ANS: C                      DIF: Medium                      REF: 2.2                      OBJ: C1  
MSC: Factual

42. Prokaryotes differ in several ways from eukaryotes; one of the most distinctive is
- the absence of a plasma membrane.
  - having hereditary material composed of DNA.
  - the presence of chromosomes.
  - a nucleus that encloses the cell's DNA.

ANS: D                      DIF: Easy                      REF: 2.3                      OBJ: A1  
MSC: Factual

43. Bacteria can be distinguished from most other organisms because
- bacterial cells have membrane-bound organelles.
  - bacterial DNA is not located within an organelle.
  - bacteria reproduce by splitting in two.
  - bacteria are generally single-celled.

ANS: B                      DIF: Medium                      REF: 2.3                      OBJ: A1  
MSC: Factual

44. In addition to the Bacteria, which other kingdom is comprised exclusively of prokaryotic organisms?
- Archaea
  - Protista

b. Fungi

d. Plantae

ANS: A                      DIF: Medium                      REF: 2.3                      OBJ: A1  
MSC: Factual

45. When success is defined as the greatest number of living individuals, Earth's most successful inhabitants are the

- a. vertebrates and birds.
- b. fungi and animals.
- c. bacteria and archaea.
- d. plants and animals.

ANS: C                      DIF: Easy                      REF: 2.3                      OBJ: A2  
MSC: Factual

46. Microscopic examination can often resolve questions in taxonomy, for example, cells that possess a nucleus are never classified as

- a. eukaryote.
- b. fungi.
- c. archaean.
- d. protist.

ANS: C                      DIF: Medium                      REF: 2.3                      OBJ: A2  
MSC: Applied

47. Which of the following terms describes organisms that can survive in extremely salty environments?

- a. thermophiles
- b. halophiles
- c. methanogens
- d. none of the above

ANS: B                      DIF: Easy                      REF: 2.3                      OBJ: A3  
MSC: Factual

48. Which of the following would you most likely find surviving in a boiling-hot spring?

- a. an archaean
- b. bacteria
- c. a eukaryote
- d. none of the above

ANS: A                      DIF: Easy                      REF: 2.3                      OBJ: A3  
MSC: Factual

49. The photograph below shows *Sulfolobus*, an archaean that lives in environments with very high temperatures.



What hypothesis can explain the extreme habitats of the archaeans?

- a. They came to Earth from other planets, where harsher conditions prevail.
- b. They would be more widespread, but are unable to successfully compete with bacteria and now occupy habitats where bacteria cannot live.
- c. Archaeans evolved when Earth was much less hospitable, and are now relegated to those habitats most similar to early Earth.
- d. Numerous food resources are available and unexploited in Earth's extreme habitats.

ANS: B                      DIF: Difficult                      REF: 2.3                      OBJ: A3  
MSC: Conceptual

50. Bacterial cells can typically be described by one of the following three shapes:
- a. the sphere, rod, or cube.
  - b. the rod, sphere, or corkscrew.
  - c. the corkscrew, cube, or rod.
  - d. the cube, sphere, or comma.

ANS: B                      DIF: Easy                      REF: 2.3                      OBJ: A4  
MSC: Factual

51. A distinguishing difference between bacteria and archaeans is
- a. that bacteria are prokaryotic and archaeans are eukaryotic.
  - b. the molecules used to construct their cell walls.
  - c. the presence of membrane-bound organelles, which are observed only in bacteria.
  - d. the greater size of the bacterial nucleus.

ANS: B                      DIF: Medium                      REF: 2.3                      OBJ: B1  
MSC: Factual



MSC: Applied

58. Which of the following statements about bacteria is *false*?
- They help a variety of organisms digest their food.
  - They can provide the nitrate necessary for plant nutrition.
  - They can be used to clean up oil spills.
  - The membranes from their organelles can be used to produce medicines.

ANS: D                    DIF: Medium                    REF: 2.3                    OBJ: C3  
MSC: Applied

59. What do these products have in common—soy sauce, yogurt, swiss cheese, and buttermilk?
- All four are modified dairy products.
  - Antibiotic therapy often depresses the intestinal bacterial flora; any of the four can be used to reestablish those bacterial colonies.
  - Each is one of the better sources of protein for individuals choosing a meatless diet.
  - The production of each involves bacterial fermentation.

ANS: D                    DIF: Easy                    REF: 2.3                    OBJ: C4  
MSC: Factual

60. The workers shown in the photograph below are involved in bioremediation; what explanation could account for their specific actions?



- They could be adding fertilizers to stimulate the growth of naturally occurring microbes that will consume a pollutant like oil.
- They could be dispersing nonnative microbes that will consume a pollutant like oil.
- They could be dispersing seeds to reestablish vegetative growth that will remove pollutants from the environment.
- All of the above are examples of bioremediation.

ANS: D                    DIF: Medium                    REF: 2.3                    OBJ: C5  
MSC: Applied

61. Viral classification and biology has been challenging; presently most biologists agree that viruses
- should be classified as members of the kingdom Protista.
  - are constructed from a protein wrapped around DNA or RNA.
  - use a photosynthetic process more similar to bacteria than plants.
  - should be classified as autochemotrophic.

ANS: B

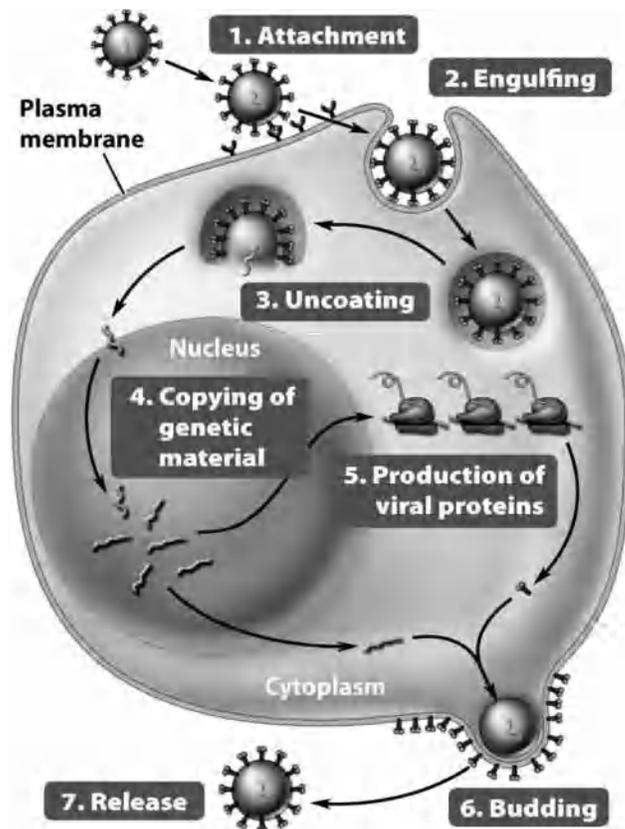
DIF: Difficult

REF: 2.4

OBJ: D2

MSC: Applied

62. What aspect of the viral life cycle depicted in the illustration below explains the pathology associated with a viral infection?



- Infected cells produce new virus particles rather than the proteins associated with normal cell activity and homeostasis.
- Newly replicated virus particles are released by budding, a process that depletes the cell membrane.
- The immune response to the presence of viral protein may be extremely intense.
- Retroviral insertion of DNA causes immediate cell death.

ANS: A

DIF: Difficult

REF: 2.4

OBJ: D3

MSC: Applied

63. The infective strategy seen in the retroviruses involves \_\_\_\_\_ the host cell.
- the insertion of RNA and its conversion to DNA within
  - the integration of the viral genetic material into the DNA of
  - an initial symptom-free period with no pathology evident in
  - all of the above

ANS: D                    DIF: Difficult            REF: 2.4                    OBJ: D3  
MSC: Applied

64. A disproportionate number of viral infections occur in the respiratory and digestive systems; how might this be explained?
- New viral particles can be easily released in feces or exhaled air.
  - The lung, stomach, and intestinal tract can be easily reached when the virus contacts a new host.
  - The immune response may be less vigorous or effective in these locations.
  - All of the above are reasonable hypotheses.

ANS: B                    DIF: Difficult            REF: 2.4                    OBJ: D4  
MSC: Applied

65. Like any disease or parasite, viruses need to reach new hosts to extend the infective cycle, which explains why such a large number of viral infections are associated with the
- urinary and cardiovascular systems.
  - digestive and respiratory systems.
  - nervous and integumentary systems.
  - reproductive and integumentary systems.

ANS: B                    DIF: Difficult            REF: 2.4                    OBJ: D4  
MSC: Applied

66. Viruses may rapidly evolve resistance to vaccines and medications by modifying their DNA; what mechanism(s) do they use?
- Dying viruses burst open, and another virus can take up the released DNA.
  - Adjacent viruses form a conjugation tube and exchange DNA laterally.
  - Viral DNA replication is sloppy; random DNA variations often result in viral proteins that reduce the effectiveness of current treatments.
  - All of the above commonly occur in viruses.

ANS: C                    DIF: Difficult            REF: 2.4                    OBJ: D5  
MSC: Applied

67. Cipro, an antibiotic that is taken orally, has been recently reevaluated for its impact on intestinal microbial flora; what best summarizes the findings?
- Not surprisingly, there was virtually no effect; otherwise, human trials would have indicated that Cipro was unsuitable for human use.
  - A small but insignificant reduction in species diversity followed each course of antibiotics, but test participants quickly reestablished a normal intestinal community.
  - A single course of antibiotics was tolerated well by the majority of test participants, but a second course of antibiotics administered shortly after the first caused an extensive and prolonged change.
  - Intestinal microbial are particularly sensitive to Cipro; their populations crashed almost immediately after the first dose was taken.

ANS: C                    DIF: Medium              REF: Biology in the News  
OBJ: C6                    MSC: Factual

## COMPLETION

- New features that allow a group to survive and reproduce successfully can be called \_\_\_\_\_ innovations.

ANS: evolutionary

DIF: Easy            REF: 2.1            OBJ: A1            MSC: Factual

2. \_\_\_\_\_ is the science of naming and classifying organisms within the Linnaean hierarchy.

ANS: Taxonomy

DIF: Easy            REF: 2.1            OBJ: A1            MSC: Factual

3. Within an evolutionary tree descendants share common features because they share a common \_\_\_\_\_.

ANS: ancestor

DIF: Easy            REF: 2.1            OBJ: A1            MSC: Factual

4. Bacteria, Archaea, and Eukarya are the three \_\_\_\_\_; they form the highest hierarchical level in the organization of life.

ANS: domains

DIF: Easy            REF: 2.1            OBJ: A2            MSC: Factual

5. Fossil evidence suggests that the \_\_\_\_\_ were the first eukaryotic group to evolve.

ANS: protists

DIF: Easy            REF: 2.1            OBJ: A2            MSC: Applied

6. \_\_\_\_\_ are diagrams that show the relationships between various organisms as indicated by DNA analysis or comparative studies on body form, physiology, or behavior.

ANS: Evolutionary trees

DIF: Medium        REF: 2.2            OBJ: A1            MSC: Applied

7. The Linnaean hierarchy goes from species to genus to family to order to \_\_\_\_\_ to phylum to kingdom.

ANS: class

DIF: Easy            REF: 2.2            OBJ: A4            MSC: Factual

8. The father of modern scientific naming is \_\_\_\_\_.

ANS: Carolus Linnaeus

DIF: Easy            REF: 2.2            OBJ: A4            MSC: Factual

9. The figure below shows a bacterium dividing by binary fission; because the process is asexual you would expect the DNA in each daughter cell to be \_\_\_\_\_.



ANS: identical

DIF: Medium      REF: 2.2      OBJ: B2      MSC: Applied

10. Infective bacteria are usually too large to enter cells but can cause pathology by releasing an \_\_\_\_\_ that kills adjacent tissues.

ANS: exotoxin

DIF: Medium      REF: 2.2      OBJ: C6      MSC: Applied

11. Wetland soils are saturated with water and devoid of oxygen creating a habitat ideally suited for \_\_\_\_\_ prokaryotes.

ANS: anaerobic

DIF: Easy      REF: 2.3      OBJ: B3      MSC: Applied

12. \_\_\_\_\_ describes those prokaryotes able to live in unusually cold conditions.

ANS: Psychrophile

DIF: Medium      REF: 2.3      OBJ: B3      MSC: Factual

13. Dental hygienists carefully remove plaque, an aggregate of prokaryotic cells organized as a \_\_\_\_\_, from the surface of the teeth of their patients.

ANS: biofilm

DIF: Medium      REF: 2.3      OBJ: B4      MSC: Applied

14. During \_\_\_\_\_ bacteria trade small sections of plasmid DNA with one another.

ANS: conjugation

DIF: Easy      REF: 2.3      OBJ: B5      MSC: Factual

15. The status of viruses has been controversial but most biologists now agree that the most appropriate description for a virus is a microscopic, \_\_\_\_\_ infective particle.

ANS: noncellular

DIF: Medium      REF: 2.4      OBJ: D1      MSC: Factual

16. A viral particle is very simple, consisting of a core of DNA or RNA surrounded by a \_\_\_\_\_.

ANS: protein coat

DIF: Medium      REF: 2.4      OBJ: D1      MSC: Factual

17. Using the simplest methods to study the composition of intestinal microbial flora, it is necessary to collect a \_\_\_\_\_ sample from the subject.

ANS: fecal

DIF: Easy      REF: Biology in the News      OBJ: C2  
MSC: Applied

### TRUE/FALSE

1. A lineage is a group of relatives that have a common ancestor.

ANS: T      DIF: Easy      REF: 2.1      OBJ: A1  
MSC: Applied

2. Switching the order of the last two organisms on an evolutionary tree has no effect on how the tree is read.

ANS: T      DIF: Medium      REF: 2.1      OBJ: A1  
MSC: Conceptual

3. Evolutionary trees can be used to predict the behavior of organisms.

ANS: T      DIF: Medium      REF: 2.1      OBJ: A1  
MSC: Applied

4. Protists are part of the domain Bacteria.

ANS: F      DIF: Easy      REF: 2.1      OBJ: A2  
MSC: Factual

5. Bacteria, protists, and fungi belong to the domain Archaea.

ANS: F      DIF: Easy      REF: 2.1      OBJ: A2  
MSC: Factual

6. DNA analysis has confirmed the relationships among most species well beyond any reasonable doubt.

ANS: F      DIF: Easy      REF: 2.1      OBJ: A2  
MSC: Applied

7. The broadest classification category currently used by most biologists is the domain.

ANS: T      DIF: Easy      REF: 2.2      OBJ: A3  
MSC: Applied

8. The most commonly used classification system includes 12 kingdoms.



MSC: Applied

17. Recent studies on the effects of antibiotics on the normal intestinal microbial flora confirm previous views that these medications are entirely harmless to humans.

ANS: F

DIF: Medium

REF: Biology in the News

OBJ: C6

MSC: Applied