

## Chapter 1 - A View of Life

1. Identify three of the five basic themes in biology:

- I. The cellular composition of life
- II. The evolution of life
- III. The interactions of living systems
- IV. The mechanisms of disease
- V. The transmission of information

- a. I, II, and III
- b. II, III, and IV
- c. III, IV, and V
- d. I, IV, and V
- e. II, III, and V

*ANSWER:* e

2. Which statement best describes the cell theory?

- a. All living organisms grow and develop.
- b. All living organisms respond to stimuli.
- c. All living organisms are composed of basic units called cells.
- d. All living organisms can move from one place to another in order to find food or to escape predators.
- e. All living organisms can form a population of organisms that is able to adapt to the environment.

*ANSWER:* c

3. What statement best describes “biology”?

- a. The science of life
- b. The naming of organisms
- c. The study of natural selection
- d. The measurement of populations
- e. The study of how organisms are related to one another

*ANSWER:* a

4. An organism that is eukaryotic is by definition:

- a. is a protist
- b. is unicellular
- c. possesses a nucleus
- d. possesses organ systems
- e. belongs to domain Bacteria

*ANSWER:* c

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5. What type of molecule carries the hereditary information of an organism?

- a. DNA
- b. RNA
- c. protein
- d. nucleus
- e. hormone

*ANSWER:* a

6. How does a prokaryotic cell differ from a eukaryotic cell?

- a. A prokaryotic cell has no membrane-enclosed organelles.
- b. A prokaryotic cell has a plasma membrane.
- c. A prokaryotic cell contains organelles.
- d. A prokaryotic cell has a nucleus.
- e. A prokaryotic cell has DNA.

*ANSWER:* a

7. In living organisms, chemical reactions responsible for growth, repair, and nutrition are collectively referred to as:

- a. development
- b. metabolism
- c. adaptation
- d. genetics
- e. homeostasis

*ANSWER:* b

8. The primary purpose of homeostasis is to:

- a. accept responses to stimuli
- b. provide unlimited growth within an organism
- c. allow unrestricted movement of an organism
- d. convert an organism to live in a harmful environment
- e. maintain a constant internal environment

*ANSWER:* e

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9. Suppose a particular protein is produced in excess of the cell's needs. What kind of mechanism will intervene to stop production?
- a. growth
  - b. anabolic
  - c. metabolic
  - d. respiratory
  - e. homeostatic

*ANSWER:* e

10. What is the purpose of the cilia and flagella of cells?
- a. They generate the cell's metabolism.
  - b. They provide movement for the cell.
  - c. They help maintain homeostasis.
  - d. They generate cell signaling.
  - e. They contract muscles.

*ANSWER:* b

11. What is an example of a sessile organism?
- a. dog
  - b. coral
  - c. snake
  - d. bird
  - e. earthworm

*ANSWER:* b

12. Which stimuli most directly causes the Venus flytrap to catch an insect?
- a. gravity
  - b. light
  - c. touch
  - d. scent
  - e. sound

*ANSWER:* c

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13. What is a distinct characteristic of asexual reproduction?

- a. fusion of egg and sperm
- b. a cell splitting into identical halves
- c. genes contributed by two parents
- d. high degree of genetic variation
- e. formation of a fertilized egg

*ANSWER:* b

14. Which is a benefit of sexual reproduction over asexual reproduction?

- a. More offspring can be produced.
- b. The offspring are all identical to the parents.
- c. There is less variation from generation to generation.
- d. Evolution will occur at a slower rate when there are two parents.
- e. The interaction of the genes from both parents brings about genetic variation.

*ANSWER:* e

15. What represents the most basic level of chemical organization?

- a. cell
- b. atom
- c. tissue
- d. molecule
- e. organism

*ANSWER:* b

16. When tissues organize, what do they form?

- a. a cell
- b. a nucleus
- c. an atom
- d. an organ
- e. an enzyme

*ANSWER:* d

17. All of the members of the same species occupying the same area at the same time constitute a(n):

- a. individual
- b. population
- c. community
- d. ecosystem
- e. biosphere

*ANSWER:* b

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18. What large molecules are essential in determining the structure and function of cells and tissues?
- RNA
  - genes
  - proteins
  - hormones
  - nucleotides

*ANSWER:* c

19. What are units of hereditary information?
- RNA
  - genes
  - proteins
  - hormones
  - nucleotides

*ANSWER:* a

20. Information in living organisms is transmitted by which mechanism(s)?
- genes only
  - hormones only
  - genes and hormones
  - neurotransmitters only
  - genes, hormones, and neurotransmitters

*ANSWER:* e

21. Which statement best describes autotrophic organisms?
- Autotrophs are exemplified by fungi.
  - Autotrophs are exemplified by animals.
  - Autotrophs cannot carry out cellular respiration.
  - Autotrophs depend on heterotrophs for food.
  - Autotrophs synthesize complex molecules from CO<sub>2</sub>, water, and energy.

*ANSWER:* e

22. Which sequence represents the pattern of energy flow within an ecosystem?
- producers → consumers → decomposers
  - decomposers → producers → consumers
  - consumers → producers → decomposers
  - decomposers → consumers → producers
  - producers → decomposers → consumers

*ANSWER:* a

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23. Which process is most directly associated with the theory of evolution?
- Populations changing over time
  - Mutations changing the gene pool
  - Production of large numbers of offspring
  - Sexual reproduction producing variation in a population
  - Competition between members of a population for limited resources

ANSWER: a

24. What is an end product of cellular respiration?
- sugar
  - light
  - oxygen
  - glucose
  - carbon dioxide

ANSWER: e

25. What would be the ultimate effect on an ecosystem if decomposers were eliminated?
- The rate of photosynthesis would increase.
  - The consumers would have to eat twice as much.
  - Energy flow between producers and consumers would increase.
  - All life would eventually cease as nutrients would no longer be available.
  - Producers would outgrow consumers due to the excess of carbon dioxide.

ANSWER: d

26. Using the Linnaean system of nomenclature, corn is named *Zea mays*. What is the specific epithet in this name?
- Zea mays*
  - Zea*
  - mays*
  - Quercus*
  - corn

ANSWER: c

27. Which organizational unit includes the fewest species of organisms?
- class
  - biosphere
  - community
  - population
  - ecosystem

ANSWER: d

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28. Similar families of organisms are next grouped together in the same:

- a. class
- b. order
- c. genus
- d. phylum
- e. kingdom

*ANSWER:* b

29. You discover an organism that is eukaryotic, unicellular, and photosynthetic. Based on this evidence, to which group would you assign this organism?

- a. domain Bacteria
- b. protist group
- c. kingdom Fungi
- d. kingdom Plantae
- e. domain Archaea

*ANSWER:* b

30. An organism that is neither prokaryotic nor photosynthetic, and must obtain its nutrients by secreting digestive enzymes into the environment, belongs to which group of organisms?

- a. Bacteria
- b. protists
- c. Fungi
- d. Plantae
- e. Animalia

*ANSWER:* c

31. One of the conclusions drawn from Darwin's theory of evolution is that:

- a. existing organisms can adapt to environmental changes
- b. living organisms are composed of basic units called cells
- c. living organisms contain substances produced by cells
- d. genetic information can pass from organism to organism by means of DNA
- e. organisms living today descended with modifications from previously existing forms

*ANSWER:* e

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32. What is the ultimate source of genetic variation within a population?
- Mutations in DNA
  - Adaptation of a species to environmental changes
  - A sensory system that can detect an environmental change
  - Homeostatic mechanisms that compensate for environmental changes
  - A system of locomotion that allows an organism to escape environmental changes

*ANSWER:* a

33. In the deductive approach to scientific thought processes, we begin with \_\_\_\_ and make \_\_\_\_ based on that information.
- premises; observations
  - observations; premises
  - observations; conclusions
  - observations; inductions
  - premises; conclusions

*ANSWER:* e

34. A hypothesis can best be described as a(n):
- data point
  - conclusion
  - observation
  - tentative explanation
  - stepwise problem-solving approach

*ANSWER:* d

35. Which is a characteristic of a good hypothesis?
- It is falsifiable.
  - It is a statement of fact.
  - It can only be tested once.
  - It can be proven to be true.
  - It represents important conclusions.

*ANSWER:* a



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36. Which statement represents a good hypothesis?
- a. Shoofly pie tastes good.
  - b. There is life after death.
  - c. Hemophilia is also known as "bleeder's disease."
  - d. The swimming speed of *Artemia* increases at higher temperatures.
  - e. Sparrows, robins, hawks, and pigeons are all birds and have wings; therefore, all birds have wings.

ANSWER: d

37. During an experiment, what is the purpose of a control group?
- a. To verify data
  - b. To disprove the theory
  - c. To prove the hypothesis
  - d. To produce replicated results of other groups
  - e. To compare results to the experimental group with the variable being tested

ANSWER: e

38. Suppose we want to examine the effect of a fertilizer on the size of zucchini produced, and therefore, we need to establish the experimental and control groups. The control group for this experiment would be defined under which conditions?
- a. soil, fertilizer, water, sun, but no zucchini seeds
  - b. soil, fertilizer, water, sun, and zucchini seeds
  - c. soil, water, sun, and no zucchini seeds
  - d. soil, water, sun, and zucchini seeds
  - e. soil, water, and sun

ANSWER: d

39. In the experimental evaluation of a new drug, what is the purpose of a placebo?
- a. A placebo increases the sample size.
  - b. A placebo prevents errors in recording of the data.
  - c. A placebo removes the bias of the physician in charge of the experiment.
  - d. A placebo removes the potential psychological bias of the patient in the study.
  - e. A placebo prevents sampling errors from compromising the results of the experiment.

ANSWER: d

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40. What is the most likely cause of a sampling error?
- a. a malfunctioning calculator
  - b. a poorly designed hypothesis
  - c. very few individuals in the control group
  - d. having both an experimental and a control group
  - e. the researcher's knowledge of which individuals were in the experimental group

ANSWER: c

41. Which statement concerning a scientific theory is FALSE?
- a. It is unchangeable.
  - b. It predicts new facts.
  - c. It is based on a number of hypotheses.
  - d. It may suggest practical applications.
  - e. It is supported by many observations.

ANSWER: a

42. Consider the statement "biological systems interact." What does this mean?
- a. Systems combine to reproduce.
  - b. Biological organisms are interdependent.
  - c. Structure and function are not interrelated.
  - d. Biological organisms are not interdependent.
  - e. Every organism is in conflict with other organisms.

ANSWER: b

43. Which best describes a result of sexual reproduction?
- a. The only source of variation is mutation.
  - b. Clones of the original cell are produced.
  - c. One cell divides to produce two identical cells.
  - d. Two sex cells combine to form a fertilized cell.
  - e. The offspring obtain genes only from one parent.

ANSWER: d

44. A DNA molecule is made up of:
- a. lipids
  - b. proteins
  - c. nucleotides
  - d. fatty acids
  - e. carbohydrates

ANSWER: c

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45. Which is a byproduct of photosynthesis?

- a. water
- b. light
- c. glucose
- d. oxygen
- e. carbon dioxide

ANSWER: d

46. To which Phylum do humans belong?

- a. Animalia
- b. Chordata
- c. Vertebrata
- d. Mammalia
- e. *Homo sapiens*

ANSWER: b

47. Which is a required structure of a photosynthetic organism?

- a. neurons
- b. cellulose
- c. skeleton
- d. chloroplasts
- e. immune system

ANSWER: d

48. Which scenario best describes a double-blind study?

- a. The investigator and the subjects wear blindfolds.
- b. No one knows what is in the experimental or control group
- c. The subjects do not know if they are in the experimental or control group.
- d. Neither the investigator or the subjects know if they are in the experimental or control group.
- e. The investigator does not know if subjects are in the experimental or control group.

ANSWER: d

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49. Using the characteristics that define life, compare and contrast a plant, a bacterium, and a salt crystal.

**ANSWER:** **Cellular in structure:** A plant (eukaryote) and a bacterium (prokaryote) are cellular, but a salt crystal is not.

**Grow and develop:** A plant grows by increasing the size and number of cells in its multicellular body; a bacterium grows by increasing in size and then dividing to produce additional bacteria. Both plants and bacteria develop as they age. A salt crystal can increase in size only by adding additional crystals and does not “develop” in the biological sense of the word.

**Regulate their metabolic processes:** Plants and bacteria can regulate their metabolism; a salt crystal lacks metabolic processes.

**Respond to stimuli:** In bacteria (unicellular) the whole organism responds; in plants (multicellular) various parts can usually respond in different ways. A salt crystal cannot respond.

**Reproduce:** Plants and bacteria usually can reproduce both sexually and asexually. A salt crystal cannot reproduce unless one accepts the breaking apart of a crystal as a type of reproduction.

**Evolve and adapt:** Plants and bacteria can do both; salt crystals cannot.

50. Explain the importance of information transfer in living systems. Include three specific examples.

**ANSWER:** Information transfer occurs when 1) traits are passed to the next generation, 2) when one individual communicates with another, 3) when one portion of a cell communicates with another portion, and 4) when one part of a multicellular organism communicates with another part.

For example, in sexual reproduction the genetic information from the parents is transmitted to the offspring. The information in those genes is then used to determine what proteins are made and consequently how that cell develops. Lastly, a cell may produce a hormone or a neurotransmitter that provides information of various kinds to other cells.

51. Identify two adaptations in different living organisms and use natural selection to explain how each may have logically evolved.

**ANSWER:** Example 1: The long, flexible tongue of a frog is an adaptation for catching insects. In a population of frogs much genetic variation would exist with respect to tongue length. However, those frogs having longer tongues would be able to catch more insects than the short-tongued frogs which might be weak and even starve. Over many generations frogs having long tongues would most likely thrive and produce more offspring than frogs having short tongues, and consequently the long-tongue trait would become more and more prevalent in the population.

Example 2: The thick coat of the polar bear is an adaptation for surviving low temperatures. In a population of polar bears much genetic variation would exist among coat thickness. However, those bears having a thinner coat would be more adversely affected by the low temperatures, for example they might be sickly, be less fertile, and even die. Over many generations, bears having thicker coats would most likely thrive and produce more offspring than thin-coated bears, and consequently the thick-coated trait would become more and more prevalent in the population.

52. If you observe a cell that contains organelles, then that cell is most likely a(n) prokaryote.

\_\_\_\_\_

**ANSWER:** False - eukaryote

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53. The term development refers to all the changes that occur during the life cycle of an organism.

\_\_\_\_\_

ANSWER: True

54. An organism that reproduces asexually produces genetically variable offspring.

\_\_\_\_\_

ANSWER: False - sexually

55. The scientific name for coffee is *Coffea arabica*. More specifically, the species name is arabica.

\_\_\_\_\_

ANSWER: False - *Coffea arabica*

56. Similar orders are placed in the same class.

\_\_\_\_\_

ANSWER: True

57. The two domains of prokaryotes are Bacteria and Fungi.

\_\_\_\_\_

ANSWER: False - Archaea

58. With deductive reasoning, you draw conclusions from specific observations.

\_\_\_\_\_

ANSWER: False - inductive

59. A falsifiable hypothesis cannot be tested.

\_\_\_\_\_

ANSWER: False - can

60. Changing your view of reality involves a paradigm shift.

\_\_\_\_\_

ANSWER: True

61. Systems biology is also called integrative biology.

\_\_\_\_\_

ANSWER: True

62. On a scientific expedition into new territory, you discover a previously undescribed organism living within the very hot environment of a geyser. This organism has a cell wall, is single celled, heterotrophic, and has no true nucleus. In what kingdom would you most likely place this organism and why?

ANSWER: **Concepts to Consider:** Characteristics of this organism indicate it is a prokaryote; its habitat may indicate that it belongs to the kingdom Archaeobacteria.

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63. Design a complete ecosystem that would sustain a number of living organisms for several years in a sealed container. The only thing that can be added is sunlight. Explain why you have selected each organism.

**ANSWER: Concepts to Consider:** Include producers (plant), consumers (animal), and decomposers (heterotrophic bacteria and fungi); plants convert sunlight to organic energy, animals consume the plants, and decomposers recycle nutrients within the dead plants and animals; animal and bacterial wastes are taken up by plants.

64. You place equal numbers of dark and light varieties of feeder crickets into a terrarium containing a species of lizard. After two days, you notice that the dark variety of the crickets was less common than the light variety. What process is taking place on a small scale within the terrarium? Design an experiment in which you would try to determine if color or taste is the primary factor responsible for the selective feeding of the lizards.

**ANSWER: Concepts to Consider:** Natural selection, correct experimental design, and hypothesis testing.

*Match the organism to the role it plays in the energy cycle:*

- a. primary producer
- b. primary consumer
- c. secondary consumer
- d. decomposer

65. Fungi

**ANSWER:** d

66. Plant

**ANSWER:** a

67. Bird

**ANSWER:** c

68. Caterpillar

**ANSWER:** b

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*Match the group of organisms with the correct phrase or example.*

- a. protists
  - b. plants
  - c. fungi
  - d. bacteria
  - e. animals
69. bread mold

*ANSWER:* c

70. chimpanzee

*ANSWER:* e

71. oak tree

*ANSWER:* b

72. prokaryotes

*ANSWER:* d

73. unicellular eukaryotes

*ANSWER:* a