

Multiple Choice Questions

1. Thinking about life's organizational hierarchy in a biological system, which of the following is the correct sequence from the smallest unit to the largest unit?
- A. molecule - atom - organelle - tissue - cell
 - B. cell - organelle - atom - tissue - molecule
 - C. organelle - molecule - atom - tissue - cell
 - D. atom - molecule - organelle - cell - tissue**
 - E. atom - organelle - molecule - cell - tissue

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Levels of Biological Organization

2. The hierarchy of life extends past individual organisms. Which of the following is the correct sequence, from least inclusive to most inclusive, following an individual organism?
- A. population - ecosystem - community - biosphere
 - B. community - population - ecosystem - biosphere
 - C. population - community - ecosystem - biosphere**
 - D. community - population - biosphere - ecosystem
 - E. ecosystem - population - biosphere - community

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Levels of Biological Organization

3. In living organisms, emergent properties
- A. functionally arise from smaller successful parts and work together for a more successful organism.**
 - B. are produced in a new generation of offspring that will show the properties.
 - C. develop tissue and organ systems, which show higher levels of complexity.
 - D. functionally arise from larger successful parts working together for stronger organism.
 - E. evolve new properties from other similar organisms.

Accessibility: Keyboard Navigation
Blooms Level: 2. Understand
Learning Outcome: 01.01.01 Describe the characteristics that all living organisms share.
Section: 01.01
Topic: Characteristics of Life
Topic: Levels of Biological Organization

4. To be considered living, an organism must minimally consist of
- A. atoms and molecules.
 - B. DNA and proteins.
 - C. one or more cells.**
 - D. DNA and RNA.
 - E. RNA and proteins.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.01 Describe the characteristics that all living organisms share.
Section: 01.01
Topic: Characteristics of Life

True / False Questions

5. "Life" is defined for any particle, substance, or object as anything which is not dead.

FALSE

"Life" and "living" do not have the same biological meaning as "alive." Read sections 1.1.A through 1.1.E for more information.

Accessibility: Keyboard Navigation
Blooms Level: 2. Understand
Learning Outcome: 01.01.01 Describe the characteristics that all living organisms share.
Section: 01.01

Multiple Choice Questions

6. Which of these is not a required characteristic of life?

- A. evolution
- B. structural organization
- C. energy use
- D. homeostasis
- E. movement

Accessibility: Keyboard Navigation

Blooms Level: 1. Remember

Learning Outcome: 01.01.01 Describe the characteristics that all living organisms share.

Section: 01.01

Topic: Characteristics of Life

7. Organisms that make their own nutrients by capturing energy from nonliving resources (solar energy) are called

- A. detritivores.
- B. parasites.
- C. decomposers.
- D. consumers.
- E. producers.

Accessibility: Keyboard Navigation

Blooms Level: 1. Remember

Learning Outcome: 01.01.01 Describe the characteristics that all living organisms share.

Section: 01.01

Topic: Characteristics of Life

8. Organisms that obtain energy and nutrients by eating either living or dead organisms are called

- A. producers.
- B. All of the answer choices are correct.
- C. autotrophs.
- D. consumers.
- E. plants.

Accessibility: Keyboard Navigation

Blooms Level: 1. Remember

Learning Outcome: 01.01.02 Give examples of each level of biological organization.

Section: 01.01

Topic: Characteristics of Life

9. Which of the following is not an example of a characteristic of life?

- A. Energy is needed to build, regulate, and conduct processes of life.
- B. Organisms are composed of atoms that make up cells.
- C. Organism have the ability to reproduce, grow, and develop.
- D. Organisms maintain internal constancy.
- E. All of the answer choices are correct.

Accessibility: Keyboard Navigation

Blooms Level: 2. Understand

Learning Outcome: 01.01.01 Describe the characteristics that all living organisms share.

Section: 01.01

Topic: Characteristics of Life

10. Thinking about taxonomy, the basic unit of naming, that includes members with the ability to reproduce with each other, is

- A. domain.
- B. family.
- C. species.
- D. genus.
- E. kingdom.

Accessibility: Keyboard Navigation

Blooms Level: 1. Remember

Learning Outcome: 01.02.01 Compare and contrast the three branches of life.

Section: 01.02

Topic: Levels of Biological Organization

11. The four kingdoms included in the domain Eukarya are

- A. Bacteria, Protista, Plantae, and Animalia.
- B. Archaea, Fungi, Plantae, and Animalia.
- C.** Protista, Fungi, Plantae, and Animalia.
- D. Bacteria, Fungi, Archaea, and Animalia.
- E. Archaea, Bacteria, Protista, and Animalia.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.02.01 Compare and contrast the three branches of life.
Section: 01.02
Topic: Levels of Biological Organization

12. A major difference between prokaryotes and eukaryotes is that although prokaryotes

- A.** do not have a nucleus, eukaryotes have a nucleus in their cells.
- B. have chloroplast for photosynthesis, eukaryotes do not.
- C. have mitochondria, eukaryotes do not.
- D. have DNA, eukaryotes only have RNA.
- E. have cell walls, eukaryotes do not.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.02.01 Compare and contrast the three branches of life.
Section: 01.01
Section: 01.02
Topic: Cell Theory
Topic: Characteristics of Life

13. Until the late 1970s, there was no "Domain" as the broadest category in taxonomy. Instead, there were five kingdoms: Protista, Plantae, Fungi, Animalia, and Monera, which included all bacteria-like organisms.

Researchers proposed the domains to distinguish between the bacteria-like organisms. Which information supported the domain level, and subsequent domains of Bacteria, Archaea, and Eukarya?

- A. More complex emergent properties developed after organisms were originally categorized into kingdoms.
- B. Organisms in the Bacteria and Archaea domains have a nucleus, whereas eukaryotes do not.
- C. Cell shapes of bacteria and archaea were found to be more distinct, after microscope technology improved.
- D.** Differences in DNA among the existing kingdoms showed a need for a broader naming category.
- E. Evolution led to new adaptations and diversity of organisms.

Accessibility: Keyboard Navigation
Blooms Level: 4. Analyze
Learning Outcome: 01.02.01 Compare and contrast the three branches of life.
Section: 01.01
Section: 01.03
Topic: Characteristics of Life
Topic: Levels of Biological Organization

14. Which of the following is not a true statement about the scientific method?

- A.** It does not apply to problems encountered in everyday life.
- B. It is a framework to consider evidence in a repeatable way.
- C. It is a framework to consider ideas in a repeatable way.
- D. It is a general way of organizing an investigation.
- E. It begins with observations.

Accessibility: Keyboard Navigation
Blooms Level: 2. Understand
Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.
Section: 01.03
Topic: Scientific Method

15. Which of the following is not true about a hypothesis?

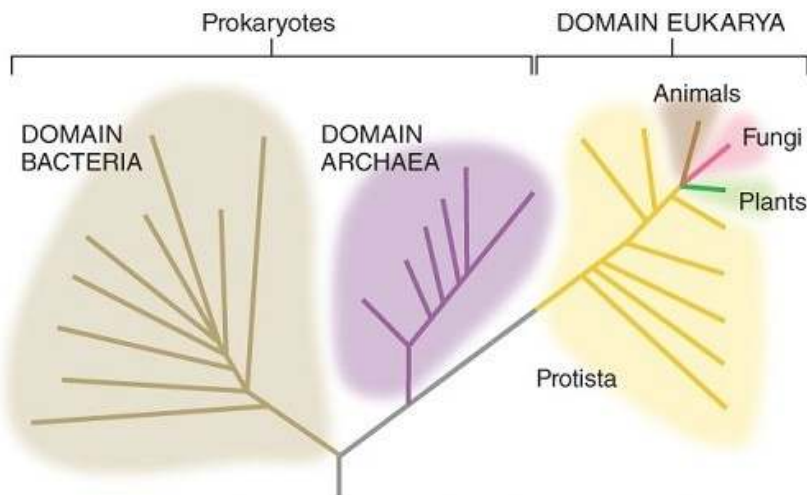
- A. It can be proven to be false.
- B. Previous knowledge can help support it.
- C.** It can be proven to be true.
- D. It is a tentative explanation.
- E. It must be testable to be useful.

Accessibility: Keyboard Navigation

16. In an experimental procedure, the researcher has established multiple levels of a chemical, or amounts of light, or some other factor at the beginning of the experiment, in order to determine if and how much the biological system responds. The manipulated factor at varying levels is the
- A. Both control group and standardized variable are correct.
 - B. control group.
 - C. independent variable.
 - D. standardized variable.
 - E. dependent variable.

Accessibility: Keyboard Navigation
Blooms Level: 3. Apply
Learning Outcome: 01.03.02 Identify the variables in an experiment.
Section: 01.03
Topic: Scientific Method

17. Examine this diagram. Note the structure of branches connecting groups of organisms. Called a phylogenetic tree, the branches propose relationships among organisms to each other, related to common ancestors. Although the proposed relationships can be described in sentences, the diagram summarizes them visually. Which of the following statements is true based on this diagram?



- A. All the organisms in this phylogenetic tree are equally related to one another.
- B. The organisms in domain Archaea are more closely related to the organisms in domain Eukarya than those in domain Bacteria.
- C. The organisms in kingdom Protista are part of domain Bacteria.
- D. All of the answer choices are correct.
- E. The organisms in domain Bacteria are more closely related to the organisms in domain Eukarya than those in domain Archaea.

Accessibility: Keyboard Navigation
Blooms Level: 2. Understand
Figure: 01.09
Learning Outcome: 01.02.01 Compare and contrast the three branches of life. Learning Outcome: 01.03.03 Differentiate between hypotheses, theories, and facts.
Section: 01.02
Section: 01.03
Topic: Scientific Method

18. In an experimental procedure, the researcher measures changes, such as cell growth rates, numbers of patients with a disease, etc. in response to factors manipulated at the beginning of the experiment. This measure of change in response to the initial conditions is the
- A. dependent variable.
 - B. standardized variable.
 - C. independent variable.
 - D. control group.
 - E. Both dependent variable and standardized variable are correct.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.03.02 Identify the variables in an experiment.

19. Which of the following would not be a "control" in an experimental procedure?

- A. a normal group
- B.** an experimental group
- C. a known standard of comparison
- D. a placebo group
- E. a "zero-value" group

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.03.02 Identify the variables in an experiment.
Section: 01.03
Topic: Scientific Method

20. A theory differs from a hypothesis in that a theory

- A. has predictive power for similar phenomena that haven't been observed yet.
- B. has more supportive research evidence than a hypothesis.
- C.** All of the answer choices are correct.
- D. ties together many existing observations.
- E. is broader in scope than a hypothesis.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.03.03 Differentiate between hypotheses, theories, and facts.
Section: 01.03
Topic: Scientific Method

21. A structure, such as a flower in plants, or a liver in animals, consisting of tissues organized to carry out a specific function is a(n)

- A. molecule.
- B. cell.
- C.** organ.
- D. population.
- E. organelle.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Characteristics of Life
Topic: Levels of Biological Organization

22. An ecosystem would include all of the following except

- A. a community that may include producers, consumers, and decomposers.
- B.** the biosphere, with its resources and functioning systems.
- C. populations of organisms in the same species.
- D. nonliving air, water, soils, and other components in an area.
- E. None of the answer choices is correct.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Characteristics of Life
Topic: Levels of Biological Organization

23. A researcher collected a single-celled organism from birdbath water and grew the organism in a laboratory. The researcher observed the organism reproducing by cell division, which resulted in identical offspring generations. This organism exhibits a form of

- A. sexual reproduction, mixing genetic material from the parent cells.
- B.** asexual reproduction.
- C. a form of reproduction occurring only in bacteria.
- D. sexual reproduction of fungi.
- E. evolution of each new generation produced.

Accessibility: Keyboard Navigation
Blooms Level: 2. Understand
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Characteristics of Life

24. Homeostasis means that

- A. cells have enough water.
- B. all organisms require an energy source.
- C. environmental conditions are held constant and do not change.
- D. a population changes over time.
- E. conditions inside a cell or organism remain within a constant range.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Characteristics of Life
Topic: Homeostasis

25. The correct sequence going from smallest to largest is

- A. molecule - atom - organelle - tissue - cell.
- B. tissue - cell - organelle - molecule - atom.
- C. atom - molecule - organelle - cell - tissue.
- D. cell - molecule - tissue - organelle - atom.
- E. cell - tissue - organelle - molecule - atom.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Levels of Biological Organization

26. All ecosystems

- A. are entirely self-sufficient.
- B. None of the answer choices is correct.
- C. need a source of external energy.
- D. stay exactly the same once mature.
- E. consist of only living organisms.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Levels of Biological Organization

27. Which is the correct sequence of steps in the scientific method?

- A. form hypothesis - observation - collect data - analyze results - design an experiment
- B. form hypothesis - observation - design an experiment - collect data - analyze results
- C. observation - analyze results - draw conclusion - design an experiment - form hypothesis
- D. observation - form hypothesis - design an experiment - collect data - analyze results
- E. observation - analyze results - form hypothesis - draw conclusions - design an experiment

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.
Section: 01.03
Topic: Scientific Method

28. A college student has a new job, and must balance classes and commute times to work. The student takes two weeks to drive from campus to the workplace by several routes, including a direct route through town, a highway route, and a route through a city park. Comparing the drive times, affected by the route, speed limits, and intersections is possible. The dependent variable is the

- A. average time in minutes it takes to drive from campus to workplace.
- B. the number of cars in the same route.
- C. the type of vehicle the student is driving.
- D. the time in minutes between walking from class to their vehicle.
- E. distance in miles of each possible driving route from campus to workplace.

Accessibility: Keyboard Navigation
Blooms Level: 2. Understand
Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.
Section: 01.03
Topic: Scientific Method

29. A golfer wants a new set of clubs to improve her game. In an experiment, she tests different drivers made from different materials. She compares the drivers to the distance of her shot. In this simple experiment, the independent variable is the
- A. type of material used to make the golf ball.
 - B. swing speed of the golf club prior to striking the golf ball.
 - C. distance the golf ball traveled.
 - D. type of material used to make the club head.
 - E. wind direction when the experiment took place.

Accessibility: Keyboard Navigation

Blooms Level: 2. Understand

Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.

Section: 01.03

Topic: Experimental Design

Topic: Scientific Method

30. A golfer wants a new set of clubs to improve her game. In an experiment, she goes to the driving range and compares the distance she hits a bucket of golf balls with drivers of different materials in the head before making her purchase decision. In this simple experiment, the standardized variable is the
- A. wind direction when the experiment took place.
 - B. type of material used to make the golf ball.
 - C. all of these except the type of material used to make the club.
 - D. angle the ball was hit by the head surface of the club.
 - E. force generated by her swing, when hitting the ball.

Accessibility: Keyboard Navigation

Blooms Level: 2. Understand

Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.

Section: 01.03

Topic: Experimental Design

Topic: Scientific Method

31. Scientists have developed an ointment to decrease muscle inflammation after intense workouts or trainings. To test the product, 99 weight lifters are divided into three equal groups. Group 1 is given the actual ointment. Group 2 is given an inactive ointment that looks and smells like the active ointment, and Group 3 is not allowed to use any treatment. Group 2 has been given
- A. a placebo.
 - B. a standardized variable.
 - C. a control variable.
 - D. the active ointment.
 - E. an independent variable.

Accessibility: Keyboard Navigation

Blooms Level: 1. Remember

Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.

Section: 01.03

Topic: Experimental Design

32. In an experiment, which of the following is not generally a true statement?
- A. It is important to standardize aspects of an experiment that might affect the outcome, other than the independent variable.
 - B. The larger the sample size the more reliable the results.
 - C. Without the proper control an experiment is not valid.
 - D. None of the answer choices is correct.
 - E. The smaller the sample size the more reliable the results.

Accessibility: Keyboard Navigation

Blooms Level: 1. Remember

Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.

Section: 01.03

Topic: Experimental Design

- You perform an experiment in which you take 16 pots of strawberry plants and give half of them 1 gram of ammonium nitrate per liter of water and the other half just gets water. Each group is then split in half again, and exposed to either 8 or 16 hours of light each day. You monitor the height of the plants for four weeks. You observe that increasing ammonium nitrate and light both increase plant height.
33. Which of the following is/are an independent variable(s) in this experiment?
- A. the amount of ammonium nitrate
 - B. the height of the plants
 - C. the height of the plants and amount of light
 - D. the amount of ammonium nitrate and light
 - E. the amount of light

Accessibility: Keyboard Navigation

34. Which of the following is/are a dependent variable(s) in this experiment?

- A. the amount of ammonium nitrate and light
- B.** the height of the plants
- C. the amount of light
- D. the amount of ammonium nitrate
- E. the height of the plants and amount of light

Accessibility: Keyboard Navigation
Blooms Level: 2. Understand
Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.
Section: 01.03
Topic: Experimental Design

35. In this experiment, you are working with available planter pots from the laboratory. You have choices of clay pots of different sizes, as well as biodegradable peat pots and others within lab equipment provided. To establish a standardized variable, you would

- A. report the pot type used, though recognizing the pot is not as important as fertilizer and light to the strawberries.
- B. select a variety of sizes based on the initial strawberry plant size.
- C. choose clay pots for the fertilized plants, and biodegradable pots for the unfertilized plants.
- D. monitor the strawberry growth rates and determine a mathematical correction to account for the type and size of pot used.
- E.** select all sixteen pots to be of the same material and size for the experiment.

Accessibility: Keyboard Navigation
Blooms Level: 3. Apply
Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.
Section: 01.03
Topic: Experimental Design

36. A plant takes up nutrients like ammonium nitrate to maintain

- A. sexual reproduction.
- B. evolution.
- C. asexual reproduction.
- D. natural selection.
- E.** homeostasis.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.
Section: 01.01
Section: 01.03
Topic: Experimental Design

37. The leaf of a plant is

- A. a molecule.
- B. an organism.
- C.** an organ.
- D. an organelle.
- E. a cell.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Characteristics of Life

38. A plant is a

- A. decomposer.
- B. consumer.
- C.** producer.
- D. consumer and decomposer.
- E. consumer and producer.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01

39. Organisms require energy to function. What is the energy source for the plants in your experiment?

- A. water
- B. light**
- C. carbon dioxide
- D. ammonium nitrate
- E. soil

Accessibility: Keyboard Navigation

Blooms Level: 1. Remember

Learning Outcome: 01.01.02 Give examples of each level of biological organization.

Section: 01.01

Topic: Characteristics of Life

40. As part of observation in your scientific method, you discover that your strawberry plants are producing plantlets that are identical to the parent plant. This demonstrates that they reproduce by

- A. development and maturation.
- B. fragmentation.
- C. development and adaptation.
- D. sexual reproduction.
- E. asexual reproduction.**

Accessibility: Keyboard Navigation

Blooms Level: 2. Understand

Learning Outcome: 01.01.01 Describe the characteristics that all living organisms share.

Learning Outcome: 01.01.02 Give examples of each level of biological organization.

Section: 01.01

Topic: Characteristics of Life

41. What did Charles Darwin propose after observing the 11-inch-long nectaries of the *Angraecum sesquipedale* orchid in Madagascar?

- A. that the orchid was an evolutionary dead end and could no longer reproduce
- B. the existence of a pollinator moth with a proboscis of 10–11 inches**
- C. the presence of very small bees that can fit into a long nectar tube
- D. that the orchid must reproduce asexually
- E. that the orchid was a self-pollinator and required no assistance from an organism

Accessibility: Keyboard Navigation

Blooms Level: 2. Understand

Learning Outcome: 01.03.03 Differentiate between hypotheses, theories, and facts.

Section: 01.04

Topic: Scientific Method

Type: Investigating Life

42. After observing variability among plant and animal species in various locations, Charles Darwin proposed an explanation for what he saw. The broad proposal included reasons that species could be modified through genetic variation, leading to measurable similarity and difference.

Evidence for the proposal came from biological, geographic, and geological observations. His proposal allowed for the prediction of new species that might be found in new settings, based on environmental conditions. Darwin's proposal is an example of

- A. a theory.**
- B. an independent variable.
- C. a standardized variable.
- D. a dependent variable.
- E. a hypothesis.

Accessibility: Keyboard Navigation

Blooms Level: 2. Understand

Learning Outcome: 01.03.03 Differentiate between hypotheses, theories, and facts.

Section: 01.03

Topic: Experimental Design

Topic: Scientific Method

43. Charles Darwin observed an orchid flower with very long, thin tubes that prevent many species from feeding on the flower nectar and pollinating the flower. He offered a prediction that some species of pollinators would eventually be found that can feed and pollinate through the small tube.

You decide to test Charles Darwin's proposal by placing nets over some orchids that allow small pollinators to enter, but prevent the large sphinx moth from entering. You then compare the number of seeds produced by plants with and without the nets. The seed production is

- A. a hypothesis.
- B. a standardized variable.
- C. a theory.
- D. an independent variable.
- E. a dependent variable.

Accessibility: Keyboard Navigation
Blooms Level: 3. Apply
Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.
Learning Outcome: 01.03.02 Identify the variables in an experiment.
Section: 01.03
Section: 01.04
Topic: Experimental Design
Topic: Scientific Method
Type: Investigating Life

44. Darwin observed an orchid flower with petals arranged in very long, thin tubes, rather than broad and flat, as we might see in other common flowers. What is the advantage to the orchid having an 11-inch-long nectar tube arrangement of the petals?
- A. The long tube can trap insects as a source of nutrients.
 - B. The flower can collect more sunlight for photosynthesis.
 - C. The flower can produce nectar more easily spread over a larger area to attract more pollinators.
 - D. The flower nectar tube can collect more rainwater to maintain health of the flower.
 - E. The flower can only be pollinated by a specifically adapted pollinator, reducing cross-fertilization among orchid species.

Accessibility: Keyboard Navigation
Blooms Level: 4. Analyze
Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.
Section: 01.04
Topic: Scientific Method
Type: Investigating Life

45. What is the advantage to the sphinx moth *Xanthopan morgani* by having an 8-inch-long tongue?
- A. It can be used to capture other flying insects for food.
 - B. It is used to attract mates through sexual selection.
 - C. It can reach nectar that no other pollinator can reach.
 - D. It can only pollinate one type of flower.
 - E. It makes flying more efficient.

Accessibility: Keyboard Navigation
Blooms Level: 2. Understand
Learning Outcome: 01.04.01 Explain how observations of orchids and moths confirmed a prediction of evolutionary theory.
Section: 01.04
Topic: Experimental Design
Type: Investigating Life

46. Given basic information from observations of the orchid with a long nectary, and the moth with the long proboscis, what is the advantage to a plant like an orchid producing nectar over a plant like a pine tree that does not produce nectar?
- A. Nectar provides a sticky surface for pollen to attach to, promoting fertilization.
 - B. Nectar helps disperse pollen by water.
 - C. Nectar helps disperse pollen by wind.
 - D. Nectar provides food for the pollen and growing fruit.
 - E. Nectar attracts animals that perform pollination.

Accessibility: Keyboard Navigation
Blooms Level: 3. Apply
Learning Outcome: 01.04.01 Explain how observations of orchids and moths confirmed a prediction of evolutionary theory.
Section: 01.04
Topic: Scientific Method
Type: Investigating Life

True / False Questions

47. The kingdom is the most all-inclusive taxonomic category.

FALSE

Within the hierarchy of taxonomic categories, kingdoms include large groups of similar organisms, but are still subsets of the broad domains. Read section 1.2 for more information.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.02.01 Compare and contrast the three branches of life.

48. The cell is the basic unit of life.

TRUE

Organization at different scales of complexity, energy requirements, homeostasis, reproduction, and evolutionary changes of populations all occur in "life," but require the cell in which to support the vital chemical and energy reactions. Read section 1.1.A for more information.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.01 Describe the characteristics that all living organisms share.
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Cell Theory
Topic: Levels of Biological Organization

49. The smallest scale of biological organization is represented organelles.

FALSE

Life has a chemical makeup at two smaller scales than cells and their components. Read section 1.1.A for more information on the different scales of biological organization.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Cell Theory
Topic: Levels of Biological Organization

50. Decomposers are a special group of producers.

FALSE

The decomposers survive by breaking down the molecules and cells of organisms that have died, and are heterotrophs, because they cannot produce their own nutrient molecules from nonliving environmental resources. Read section 1.1.B for more information.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.01.02 Give examples of each level of biological organization.
Section: 01.01
Topic: Characteristics of Life

51. In an experiment designed to determine if a fertilizer increased crop yield in tomato plants, the number of tomatoes produced by each plant would be the independent variable.

FALSE

Fertilizer effects on the size and numbers of tomatoes produced by the plants would be a specific variable of interest in response to fertilizer application. Read section 1.3.B for more information.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.03.02 Identify the variables in an experiment.
Section: 01.03
Topic: Experimental Design

52. In an experiment designed to determine if a fertilizer increased crop yield in tomato plants, the number of tomatoes produced by each plant would be the dependent variable.

TRUE

The number or size of tomatoes produced by tomato plants is a variable that the researcher can assess as having any response to the application of fertilizer. Read section 1.3.B for more information.

Accessibility: Keyboard Navigation
Blooms Level: 1. Remember
Learning Outcome: 01.03.02 Identify the variables in an experiment.
Section: 01.03

53. In an experiment designed to determine if a fertilizer increased crop yield in tomato plants, the amount of sunlight and water the plants received would be standardized variables.

TRUE

Standardized variables are held constant by researchers, so that no other factors besides the variables being manipulated for comparison will cause variation. Read section 1.3.B for more information.

Accessibility: Keyboard Navigation
 Blooms Level: 2. Understand
 Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.
 Section: 01.03
 Topic: Experimental Design

54. A theory is an advanced hypothesis that has been proven to be true.

FALSE

Scientists don't use "educated guesses" and "opinions" for hypotheses. Hypotheses are potential outcomes or explanations that can be tested one study at a time for support. Theories are broadly supported by evidence from numerous studies, propose explanation for the phenomenon, and offer predictive power for as yet unknown observations. Read sections 1.3.A and 1.3.C for more information.

Accessibility: Keyboard Navigation
 Blooms Level: 1. Remember
 Learning Outcome: 01.03.03 Differentiate between hypotheses, theories, and facts.
 Section: 01.03
 Topic: Experimental Design
 Topic: Scientific Method

Multiple Choice Questions

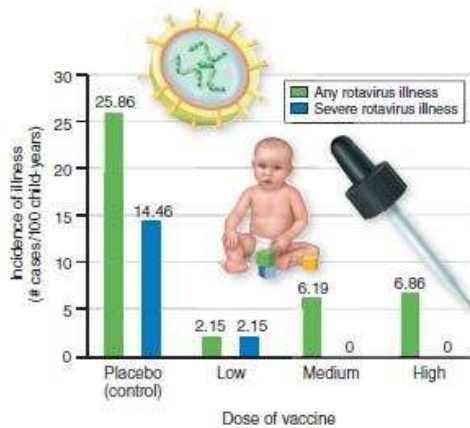
55. You are feeling ill, so you visit a physician. The physician takes your temperature, blood pressure, and pulse and orders blood tests and urine analysis to determine more about your condition. The results of all of these observations and tests will help the physician assess why your body is temporarily out of "normal" conditions, or

- A. adaptation.
- B. growing ability.
- C. natural selection.
- D. organism level of complexity.
- E. homeostasis.**

Accessibility: Keyboard Navigation
 Blooms Level: 2. Understand
 Learning Outcome: 01.01.02 Give examples of each level of biological organization.
 Section: 01.01
 Topic: Characteristics of Life

This figure shows graphed medical research results from a study on a new vaccine. The research was done in an effort to determine if a new vaccine would be effective in preventing potentially dangerous rotavirus infections in infants. Green data bars represent occurrence of infant cases that had normal rotavirus strains that aren't critically dangerous. Blue data bars represent occurrence of infant cases that had more dangerous rotavirus strains that can hospitalize or lead

to fatality of infants.



Topic: Experimental Design
 Topic: Scientific Method

56. In this diagram, the Y-axis of the graph shows values of "Incidence of Illness" in infants. The varying numbers of infants getting sick with rotavirus represents the

- A. normal infant baseline for reference to results from this medical study.
- B. control group of infants in this medical study.
- C.** dependent variable of this medical study.
- D. independent variable of this medical study.
- E. standardized variable of this medical study.

Accessibility: Keyboard Navigation

Blooms Level: 1. Remember

Figure: 01.12

Learning Outcome: 01.03.02 Identify the variables in an experiment.

Section: 01.03

Topic: Experimental Design

57. In the graph, interpret the data that are shown regarding the response of a large number of infants to vaccination from dangerous rotavirus infection. Which of the hypotheses is NOT supported by these data results?

- A. The low dose of the vaccine reduces incidence of illness from any rotavirus in general, and also severe rotavirus.
- B.** The new vaccine is ineffective in protecting infants from any rotavirus infection.
- C. Hypotheses about the vaccine doses can't be evaluated because the placebo group is biased, with high incidence of illness in those infants.
- D. Medium and high doses of the vaccine are more effective at reducing severe rotavirus illnesses than reducing any rotavirus.
- E. The high dose of the new vaccine does not offer any stronger protection from any rotavirus infection than the medium dose.

Accessibility: Keyboard Navigation

Blooms Level: 4. Analyze

Figure: 01.12

Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.

Section: 01.03

Topic: Scientific Method

58. In the graph, the X-axis is showing different doses of vaccine, including "placebo," "low," "medium," and "high." These levels of vaccine were applied to different groups of babies to test if and how much the vaccination helped reduce the incidence of rotavirus, an illness that can quickly dehydrates infants to critical or fatal levels. These dosages in this medical study represent

- A.** the independent variable.
- B. the standardized variable.
- C. the dependent variable.
- D. the control group.
- E. the placebo.

Accessibility: Keyboard Navigation

Blooms Level: 4. Analyze

Figure: 01.12

Learning Outcome: 01.03.02 Identify the variables in an experiment.

Section: 01.03

Topic: Experimental Design

True / False Questions

59. In this experiment, if the scientists giving the placebo (low, medium, or high vaccine doses) did not know which dose they were administering, then this would be an example of a double-blind experiment.

TRUE

An investigator's awareness of medical doses can potentially influence test-subject responses because of verbal and nonverbal communication. Read section 1.3.B for more information.

Accessibility: Keyboard Navigation

Blooms Level: 1. Remember

Figure: 01.12

Learning Outcome: 01.03.02 Identify the variables in an experiment.

Section: 01.03

Topic: Experimental Design

Topic: Scientific Method

Multiple Choice Questions

60. Scientific inquiry in biology is linked in a concept map with two sets of understanding researchers might pursue in experiments. Which of these is a good example of why concepts are linked between what is studied and how it might be studied?

- A. Environmental changes over recent decades have led to studies of whether specific plants and animals can adapt to the changes.

- B. A research physician hypothesizes that a new skin therapy will result in healthier skin tissues for healing.
- C. The influenza virus is spreading rapidly throughout the population and is not being controlled by the current flu medication.
- D.** All of the answer choices are correct.
- E. A newly identified bacterium in African soils is found to promote plant growth that a researcher will study in crop production.

Accessibility: Keyboard Navigation

Blooms Level: 5. Evaluate

Learning Outcome: 01.00.01 Describe how science is used to study life.

Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.

Section: 01.01

Section: 01.03

Topic: Scientific Method

61. Before biologists discovered the role of DNA and chromosomes, Gregor Mendel, a scientific researcher, studied the genetics of pea plants related to flower colors, pea colors, pea pod shapes, and other features of the plant.

He numerically modeled the results he observed and published results, which eventually led to our basic understanding of how biological traits are passed to new generations of organisms.

His work, however, was largely rejected for over 30 years, partly for minor record-keeping errors, and partly for the new approach of defining reproduction of organisms in terms of numerical probabilities. This demonstrates that

- A. only the most recent scientific investigations on a topic are useful in understanding biological conditions or processes.
- B. Gregor Mendel's work wasn't valid until researchers later identified chromosomes and their role in reproduction.
- C. a unique, new way to propose a theory discredits the research until someone else proves findings to be true.
- D. the color and shape of peas was not important to the scientific community.
- E.** scientific evidence is harder to accept because of cultural biases and misunderstandings on the topic.

Accessibility: Keyboard Navigation

Blooms Level: 5. Evaluate

Learning Outcome: 01.00.01 Describe how science is used to study life.

Learning Outcome: 01.03.04 List the limitations of the scientific method.

Section: 01.03

Topic: Scientific Method

62. Viruses are not yet considered an organism because they don't have cell membranes, organelles, and do not carry out vital life functions, although they do have a form of DNA (or similar RNA). A researcher proposing to categorize viruses in the tree of life would need to

- A. establish any virus as a control group for experimentation with established domains of organisms.
- B. apply his/her proposal to any newly discovered virus, since others aren't currently considered organisms.
- C. remember that the scientific method will prevent any changes to the current taxonomy and tree of life.
- D.** propose that relationship to other organisms as a new hypothesis, and test viruses for shared life characteristics.
- E. show the importance of genetic information as a characteristic of life.

Accessibility: Keyboard Navigation

Blooms Level: 4. Analyze

Learning Outcome: 01.01.01 Describe the characteristics that all living organisms share.

Learning Outcome: 01.02.01 Compare and contrast the three branches of life.

Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.

Section: 01.01

Section: 01.02

Section: 01.03

Topic: Characteristics of Life

Topic: Levels of Biological Organization

63. Evolution is the result of changes in the genetic makeup of species within the same population, throughout many generations. This can produce organisms well suited for their environments. Evolution consists of adaptation and natural selection. Adaptation can be distinguished from natural selection, as factors in evolution, in that natural selection

- A. is not successful reproduction.
- B. describes the variability of the environments and conditions in which populations live.
- C. is the ability to reproduce regardless of its genetic traits.
- D.** produces generations with traits within their population that allow them to reproduce and thrive.
- E. results from genetic mutations in asexual reproduction, whereas adaptation happens only in sexual reproduction.

Accessibility: Keyboard Navigation

Blooms Level: 2. Understand

Learning Outcome: 01.01.01 Describe the characteristics that all living organisms share.

Section: 01.01

Topic: Characteristics of Life

Topic: Levels of Biological Organization

True / False Questions

64. Researchers can readily extract DNA from one organism and merge that DNA into another organism, applying genetic engineering as a possible cure to cancer or muscular dystrophy and other diseases. The scientific method can test a hypothesis to determine if this approach is morally right or wrong.

FALSE

Biology graduate students and medical students are commonly required to take bioethics classes, because it is understood that scientific information and technology cannot effectively measure aesthetic value in arts, right or wrong values in morals, or acceptability of ethics. This limitation does not prevent scientists from measuring numbers of people who hold to specific values within a population. Read section 1.2.D for more information.

Accessibility: Keyboard Navigation

Blooms Level: 3. Apply

Learning Outcome: 01.03.04 List the limitations of the scientific method.

Section: 01.02

Topic: Experimental Design

Topic: Scientific Method

Multiple Choice Questions

65. Health care and fitness professionals claim moderate exercise yields heart health.

In an attempt to study the effect of moderate exercise on heart health, you track four groups of fellow students through a semester. One group is a control, who are not to change their exercise patterns. The three other groups are assigned to a 30-minute exercise once, twice, or three times a week.

Results at the end of the semester show that average blood pressure and pulse rates are nearly the same for the control group as the once-a-week exercisers. Average blood pressure and pulse were slightly lower for the two groups that exercised more often, but not every student showed any difference, and some actually had increased blood pressure and pulse rates.

What conclusions can be drawn from the data collected?

- A. A conclusion cannot be drawn based on the information provided.
- B. Measured differences in the average blood pressure and pulse of the once-a-week exercise group and the control group will likely show a statistically significant difference from the groups exercising more often.
- C. The individual student data variability and even increased blood pressure and pulse in the two groups exercising more often will not change the fact that the average data values will prove to be statistically significant in difference from the control group.
- D.** Measured differences in the average blood pressure and pulse of the three experimental groups will not likely show a statistically significant difference from the control group.
- E. The measured blood pressure and pulse data values of the control group and three exercising groups in this study prove that moderate exercise does not have any beneficial impact on heart health.

Accessibility: Keyboard Navigation

Blooms Level: 5. Evaluate

Learning Outcome: 01.00.01 Describe how science is used to study life.

Learning Outcome: 01.03.01 Apply the scientific method to design experiments and analyze data.

Section: 01.03

Topic: Experimental Design

Topic: Scientific Method