

Chapter 01 An Introduction to Biology

Multiple Choice Questions

1. Plant photosynthesis and the consumption of plants by animals are both examples of what unifying principle of life?

- A. All living organisms use energy.
- B. All living organisms maintain organization.
- C. All living organisms have evolved over the course of many generations.
- D. All living organisms maintain some level of homeostasis.
- E. All living organisms are composed of similar structures.

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.01.01 Describe the principles of biology.

Section: 01.01

2. A plant will begin flowering in response to changes in length of daylight, temperature, and light quality. This is an example of which unifying principle of life?

- A. Plants conduct photosynthesis.
- B. Living organisms maintain homeostasis.
- C. Living organisms interact with their environment.**
- D. Living organisms grow and develop.
- E. Populations of organisms evolve from one generation to the next.

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about a principle of life.
- *What type of thinking is required?*
 - o You are being asked to apply your knowledge of principles of life to pick which aligns best with plants responding to light.

Gather Content

- *What do you know about principles of life? What other information is related to the question?*
 - o Not all organisms can perform photosynthesis, so this is not a general principle of life.
 - o Responding to light is not a form of homeostasis nor does it involve growing or developing.
 - o Responding to light does not affect the transfer of information from one generation to the next.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o The best answer is that responding to light is an example of an organism interacting with its environment.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to apply your understanding of the principles of life to explain the response of plants to light. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you think that being able to do photosynthesis was a principle of all life? Did you think that one of the other principles of life corresponded with a plant responding to light?

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Blooms Level: 3. Apply

Gradable: automatic

LO: 01.01.01 Describe the principles of biology.

Section: 01.01

3. Whether the external temperature is hot or cold, birds maintain an internal body temperature of approximately 40°C. This is an example of.

- A. metabolism.
- B. cellular respiration.
- C. growth and development.
- D.** homeostasis.
- E. proteomics.

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.01.01 Describe the principles of biology.

Section: 01.01

4. Proteins are largely responsible for the traits of living organisms, while _____ provides the blueprint for the organization, development, and function of living things.

- A.** DNA
- B. protein
- C. carbohydrate
- D. lipid
- E. metabolite

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.01.01 Describe the principles of biology.

Section: 01.01

5. Which level of organization includes all of the others in the list?

- A. cell.
- B. tissue.
- C. organ.
- D. organism.
- E.** population.

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.01.02 Explain how life can be viewed at different levels of biological complexity.

Section: 01.01

6. Which level of organization is common to all life forms?

- A. cell.
- B. tissue.
- C. organ.
- D. organelle.
- E. colony.

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.01.02 Explain how life can be viewed at different levels of biological complexity.

Section: 01.01

7. When cells in an organism associate with each other, they form _____.

- A. atoms
- B. molecules
- C. macromolecules
- D. tissues
- E. populations

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.01.02 Explain how life can be viewed at different levels of biological complexity.

Section: 01.01

8. A community of organisms interacting with their physical environment is a(n) _____.

- A. population
- B. organism
- C. biosphere
- D. ecosystem
- E. macromolecular community

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.01.02 Explain how life can be viewed at different levels of biological complexity.

Section: 01.01

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9. Which is the smallest of all levels of organization?

- A. atom.
- B. cell.
- C. organ.
- D. organism.
- E. population.

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.01.02 Explain how life can be viewed at different levels of biological complexity.

Section: 01.01

10. Molecules are made up of _____.

- A. atoms
- B. cells
- C. organs
- D. organisms
- E. populations

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.01.02 Explain how life can be viewed at different levels of biological complexity.

Section: 01.01

11. Boa constrictors on an island are an example of a(n) _____.

- A. cell
- B. organ
- C. organism
- D. population**
- E. ecosystem

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about levels of organization.
- *What type of thinking is required?*
 - o You are being asked to apply your knowledge of organization to identify where a group of boa constrictors would fit.

Gather Content

- *What do you know about the organization of living things? What other information is related to the question?*
 - o A boa constrictor is an organism, so it is made up of smaller levels like a cell and an organ. An ecosystem includes living and non-living substances.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o A population is a group of organisms. Because the question looks at multiple boa constrictors, this is a population made up of multiple organisms.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to apply your understanding organization to classify a population. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you think that an organ or cell were made up of multiple organisms? Did you think that an ecosystem was just made up of a single species of organisms?

Blooms Level: 3. Apply

Gradable: automatic

LO: 01.01.02 Explain how life can be viewed at different levels of biological complexity.

Section: 01.01

12. A flower on a plant represents which level of organization?

- A. atom.
- B. cell.
- C. organ.**
- D. organism.
- E. population.

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about levels of organization.
- *What type of thinking is required?*
 - o You are being asked to apply your knowledge of levels of organization to classify a flower.

Gather Content

- *What do you know about levels of organization? What other information is related to the question?*
 - o A flower is made up of atoms and cells. The flower cannot grow on its own.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o A flower is an organ that is part of a larger organism that would be part of a population.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to apply your understanding of organization to explain where a flower would be classified. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you recall that a flower is made up of cells and atoms? Did you think that the flower was not an organ but was an organism? Did you think that a population was made up of a single organ?

Blooms Level: 3. Apply

Gradable: automatic

LO: 01.01.02 Explain how life can be viewed at different levels of biological complexity.

Section: 01.01

13. The phenomenon through which populations of organisms change over several generations is termed _____.

- A. homeostasis
- B. growth and development
- C. reproduction
- D. biological evolution**
- E. organization

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.01.01 Describe the principles of biology.

Section: 01.01

14. Changes in _____ represent the predominant cause for biological evolution.

- A. homeostasis
- B. growth and development
- C. reproduction
- D. genetic makeup**
- E. energy

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.02.01 Explain the two basic mechanisms by which evolutionary change occurs: vertical descent with mutation and horizontal gene transfer.

Section: 01.02

15. A variety of finch species within the Hawaiian Islands have acquired different types of beaks needed for utilizing specific food resources. What is the likely process by which these different species of finches came about?

- A. vertical descent with mutation.**
- B. horizontal gene transfer.
- C. an accumulation of harmful genetic mutations.

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.02.01 Explain the two basic mechanisms by which evolutionary change occurs: vertical descent with mutation and horizontal gene transfer.

Section: 01.02

16. What feature of genetic mutations can eventually lead to the evolution of new species?

- A. Mutations always produce harmful effects.
- B. Mutations never affect protein structure or function.
- C. Mutations are not a mechanism through which biological evolution occurs.
- D. Mutations always produce beneficial effects.
- E. Mutations produce changes in the DNA sequence of a gene.**

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.02.01 Explain the two basic mechanisms by which evolutionary change occurs: vertical descent with mutation and horizontal gene transfer.

Section: 01.02

17. New species evolve from preexisting species by the accumulation of _____.

- A. metabolic events
- B. genetic mutations**
- C. proteomes
- D. reproductive events
- E. developmental events

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.01 Explain the two basic mechanisms by which evolutionary change occurs: vertical descent with mutation and horizontal gene transfer.

Section: 01.02

18. How does evolutionary change occur?

- A. Through the modification of characteristics in a preexisting population.
- B. It may involve vertical descent with mutation.
- C. It may involve horizontal gene transfer.
- D. All of these choices are correct.**
- E. None of these choices are correct.

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.01 Explain the two basic mechanisms by which evolutionary change occurs: vertical descent with mutation and horizontal gene transfer.

Section: 01.02

19. In the process of biological evolution, new species may evolve through exchange of genes from one species to another. This process is called.

- A. proteome transfer.
- B. horizontal gene transfer.**
- C. vertical evolution.
- D. vertical descent with mutation.
- E. genomic sciences.

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.01 Explain the two basic mechanisms by which evolutionary change occurs: vertical descent with mutation and horizontal gene transfer.

Section: 01.02

20. The grouping or classification of species is termed _____.

- A. genus
- B. kingdom
- C. taxonomy**

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.02 Outline how organisms are classified (taxonomy).

Section: 01.02

21. When grouping organisms, which classification is most general for a particular type of organism?

A.

Kingdom.

B.

Phylum.

C.

Order.

D.

Family.

E.

Species.

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.02 Outline how organisms are classified (taxonomy).

Section: 01.02

22. All organisms in the Kingdom ____ can perform photosynthesis.

A.

Animalia.

B.

Protista.

C.

Fungi.

D.

Plantae.

E.

Bacteria.

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.02 Outline how organisms are classified (taxonomy).

Section: 01.02

23. Our species is called *Homo sapiens*. The first word refers to which taxonomical grouping?

A.

Kingdom.

B.

Phylum.

C.

Order.

D.

Genus.

E.

Species.

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.02 Outline how organisms are classified (taxonomy).

Section: 01.02

24. When considering nomenclature for scientific names, what is the difference between the two primates, *Homo sapiens* and *Homo erectus*?

A. One is a primate but the other is not.

B. They are animals of a different kingdom.

C. They are animals of a different order.

D. They are animals of a different species.

E. They are animals of a different genus.

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.02.02 Outline how organisms are classified (taxonomy).

Section: 01.02

25. Which domain of life contains the most multicellular organisms?

A.

Archaea.

B.

Bacteria.

C.

Prokarya.

D.

Eukarya.

E.

microorganisms.

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.02 Outline how organisms are classified (taxonomy).

Section: 01.02

26. The complete genetic composition of an organism is called its.

A. proteome.

B. genome.

C. transcriptosome.

D. phenotype.

E. None of these choices are correct.

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.03 Describe how changes in genomes and proteomes underlie evolutionary changes.

Section: 01.02

27. Which is responsible for encoding the proteins found in a cell?

A.

genome.

B.

proteome.

C.

cytoskeleton.

D.

evolution.

E.

extracellular proteins.

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.03 Describe how changes in genomes and proteomes underlie evolutionary changes.

Section: 01.02

28. If a scientist were studying the role of different proteins in the regulation of insulin secretion from a pancreatic cell, they would be studying.

A. genomics.

B. proteomics.

C. cell biology.

D. both genomics and proteomics.

E. both proteomics and cell biology.

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.03.01 Explain how researchers study biology at different levels, ranging from molecules to ecosystems.

Section: 01.03

29. An explanation for a biological process that is substantiated by a large body of evidence is called a _____.

- A. hypothesis
- B. theory**
- C. systems biology
- D. reductionism
- E. prediction

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

30. Collecting data without a specific hypothesis in mind is called _____.

- A. reductionism
- B. hypothesis testing
- C. discovery-based science**
- D. theoretical
- E. All of these choices are correct

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

True / False Questions

31. All tissues are composed of cells.

TRUE

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.01.02 Explain how life can be viewed at different levels of biological complexity.

Section: 01.01

32. The capacity to maintain a fairly constant body temperature is a homeostatic process.

TRUE

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.01.01 Describe the principles of biology.

Section: 01.01

33. A community is composed of different populations of animals and plants.

TRUE

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.01.02 Explain how life can be viewed at different levels of biological complexity.

Section: 01.01

34. A defining characteristic that distinguishes prokaryotic and eukaryotic organisms is the lack of a cell membrane in prokaryotes.

FALSE

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.02 Outline how organisms are classified (taxonomy).

Section: 01.02

35. The modification of a limb that was used for walking in a preexisting ancestor to one that is used as a wing for a species today is called proteomics.

FALSE

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.01 Explain the two basic mechanisms by which evolutionary change occurs: vertical descent with mutation and horizontal gene transfer.

Section: 01.02

36. A bacterial infection such as pneumonia is most likely caused by organisms derived from the kingdom fungi.

FALSE

Clarify Question

- *What is the key concept addressed by the question?*
 - The question asks about classifying bacteria and fungi.
- *What type of thinking is required?*
 - You are being asked to apply your knowledge of bacteria and fungi to explain the cause of an infection.

Gather Content

- *What do you know about the kingdoms of life? What other information is related to the question?*
 - There are two domains of prokaryotes, the eubacteria and archeabacteria. Within eukaryotes there are four kingdoms; protists, fungi, plants and animals.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - Bacteria are not in the kingdom fungi, so the statement is false. Bacteria are also prokaryotes, while fungi are eukaryotes.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - This question asked you to apply your understanding of classifying organisms. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you think that bacteria and fungi were both prokaryotes? Did you think that bacteria were a type of fungi?

Blooms Level: 3. Apply

Gradable: automatic

LO: 01.02.02 Outline how organisms are classified (taxonomy).

Section: 01.02

37. All genetic mutations are harmful to an organism.

FALSE

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.02.01 Explain the two basic mechanisms by which evolutionary change occurs: vertical descent with mutation and horizontal gene transfer.

Section: 01.02

38. Vertical evolution, whereby living organisms evolve from a common ancestor ("tree of life"), is the only mechanism of evolution on Earth.

FALSE

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.02.01 Explain the two basic mechanisms by which evolutionary change occurs: vertical descent with mutation and horizontal gene transfer.

Section: 01.02

39. The proteome, rather than genome, is most directly responsible for the structure, function, and appearance of organisms.

TRUE

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.02.03 Describe how changes in genomes and proteomes underlie evolutionary changes.

Section: 01.02

40. Little scientific evidence is necessary when formulating a theory.

FALSE

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

41. The maintenance of cell structure requires energy.

TRUE

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.01.01 Describe the principles of biology.

Section: 01.01

42. Discovery-based science and hypothesis testing are the two major scientific approaches that help us understand biology.

TRUE

Blooms Level: 1. Remember

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

Multiple Choice Questions

43. What is the appropriate order of the stages of investigating whether maple trees drop their leaves in the autumn because of colder days?

(1) Maple trees are grown in two greenhouses where the only variable is temperature (15°C vs. 10°C).

(2) The hypothesis is rejected.

(3) There is no statistical difference in the number of leaves dropped at 10°C as compared to 15°C.

(4) The observation is that maple trees drop their leaves in autumn.

(5) The hypothesis is that maple trees drop their leaves because of colder temperatures.

A. 1, 2, 3, 4, 5.

B. 3, 4, 5, 1, 2.

C. 5, 4, 3, 1, 2.

D. 4, 5, 1, 3, 2.

E. 3, 4, 2, 1, 5.

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about the steps in the scientific method.
- *What type of thinking is required?*
 - o You are being asked to apply your knowledge of the scientific method to order the steps in the process.

Gather Content

- *What do you know about the scientific method? What other information is related to the question?*
 - o There are 5 steps to the scientific method
 - o 1. Observations are made regarding natural phenomena.
 - o 2. These observations lead to a hypothesis that tries to explain the phenomena. A useful hypothesis is one that is testable because it makes specific predictions.
 - o 3. Experimentation is conducted to determine if the predictions are correct.
 - o 4. The data from the experiment are analyzed.
 - o 5. The hypothesis is considered to be consistent with the data, or it is rejected.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o Using this ordering, you would first need to observe that trees drop their leaves in the fall, then propose a hypothesis that this is because it is colder in the fall. Next you would set up the experiment with trees at different temperatures, collect and analyze the data, and then reject or accept the hypothesis based on the results.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to apply your knowledge of the scientific method to order events. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you recall that an observation needs to be made before a hypothesis can be formed? Did you think that the statistics can be run on an experiment before it is performed?

Blooms Level: 3. Apply

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

44. “All living organisms are composed of cells” is an example of what type of scientific statement?

- A. A hypothesis.
- B. A theory.**
- C. A discovery.
- D. A prediction.
- E. A fact.

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

45. A wristwatch suddenly stops working. After replacing the battery, the watch starts working again. Which of the following statements correctly describes the situation from the perspective of the scientific method?

- A. This proves that a dead battery was the reason the wristwatch stopped working.
- B. This substantiates the theory that all wristwatches require functional batteries.
- C.** This is consistent with the hypothesis that a dead battery caused the wristwatch to stop working.
- D. This leads to the prediction that a battery is required for wristwatch operation.

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about interpreting the results of an experiment.
- *What type of thinking is required?*
 - o You are being asked to apply your knowledge of experiments to choose the correct way of state the results.

Gather Content

- *What do you know about a hypothesis? What other information is related to the question?*
 - o You cannot prove a hypothesis, you can reject it or say that the results are consistent with an experiment. You cannot take the results from fixing one watch and expand them to all other watches, some of which may not use a battery.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o You can say that the watch you put the battery into probably had a dead battery, but you cannot make the other conclusions in the list.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to apply your understanding of a hypothesis to draw a conclusion. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you think that you could prove a hypothesis? Did you think that the results from one watch could be applied to all watches?

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Blooms Level: 3. Apply

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

46. A researcher decides to test the scientific validity of the common phrase “An apple a day keeps the doctor away.” What would be a valid hypothesis to investigate this specific question?

- A. Eating apples decreases the frequency of contracting a cold.
- B. The daily consumption of a single apple does not change the number of visits to the doctor.**
- C. Eating one apple every day is good for you.
- D. Apples are high in vitamin C.
- E. Those who consume apples have longer lifespans than those who do not consume apples.

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about writing a hypothesis.
- *What type of thinking is required?*
 - o You are being asked to apply your knowledge of hypotheses to identify one to test a statement.

Gather Content

- *What do you know about hypotheses? What other information is related to the question?*
 - o The statement links apples and seeing a doctor. Apples being good for you or containing vitamin C do not address visiting a doctor. Similarly not contracting a cold or living longer do not necessarily correlate with not seeing a doctor.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o The best answer is that consuming an apple does not change the number of visits to a doctor. If this statement is not shown to be true in an experiment, then the null hypothesis that an apple a day reduces visits to the doctors would be supported.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to apply your understanding of hypotheses to pick the best one to test a statement. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you think that showing that apples were healthy would correlate with decreased doctors visits? Did you think that reduced colds or increased life span necessarily means fewer doctors visits?

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Blooms Level: 3. Apply

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

47. A researcher tests the hypothesis that large, daily doses of vitamin C help protect against catching the common cold. What would be the best experimental and control group to test this hypothesis?

- A. *Experimental group*: takes a large dose of vitamin C daily;
Control group: takes nothing.
- B. *Experimental group*: people with a cold are administered vitamin C daily;
Control group: people without a cold are not administered vitamin C.
- C. *Experimental group*: takes a large dose of vitamin C daily;
Control group: takes a large weekly dose of vitamin C.
- D.** *Experimental group*: takes a large, daily dose of vitamin C;
Control group: takes a daily dose of a sugar pill disguised as vitamin C.

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about experimental design.
- *What type of thinking is required?*
 - o You are being asked to apply your knowledge of experimental design to pick the best experimental and control groups.

Gather Content

- *What do you know about experimental and control groups? What other information is related to the question?*
 - o The experimental group in this case should see if large daily doses of vitamin C prevents a cold in someone who does not have a cold already.
 - o The control group should not receive any vitamin C, should not already have a cold, and should be given some kind of pill to take so they don't know that they are in the control group. This is called a placebo.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o The best answer would be to have the experimental group receive a large daily dose while the control group receives a sugar pill. Neither group should already have a cold at the start of the experiment.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to apply your knowledge of experimental design to choose the correct experimental and control groups. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you think that the control group could receive small doses of vitamin C or already have a cold? Did you think that the experimental group could already have a cold?

Blooms Level: 3. Apply

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

A researcher hypothesizes that crocodile gender is determined by the incubation temperature of the egg. The hypothesis states that an average nest temperature of 32 – 33°C results in the birth of male crocodiles while cooler and higher incubation temperatures result in female crocodiles.

48. What is a valid, testable prediction based on this hypothesis?

- A. Male crocodiles will prefer temperatures of 32 – 33°C.
- B. Incubation of any crocodile egg at 32°C, will result in a male crocodile.**
- C. Male eggs will hatch at 32°C, while female eggs will not hatch at 32°C.
- D. Male eggs will be more fragile than female eggs.
- E. Crocodiles arrange the gender of offspring by manipulating incubation temperatures.

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about the best hypothesis for an observation.
- *What type of thinking is required?*
 - o You are being asked to apply your knowledge of hypotheses to choose the best one for an observation.

Gather Content

- *What do you know about observations and hypotheses? What other information is related to the question?*
 - o Any egg can become male or female depending on the temperature of incubation, so there are no female or male eggs. You also cannot infer anything about the preferences or behaviors of crocodiles from this observation.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o The best answer is that if you incubate a crocodile egg at 32 degrees C, it will hatch as a male crocodile.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to apply your understanding of observations and hypotheses to make a good match. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you think that the eggs were either male or female to start with? Did you think that after hatching the males preferred 32 degrees C?

Blooms Level: 3. Apply

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

49. The researcher determines that an average nest incubation temperature of 32 – 33°C results in the birth of male crocodiles, while higher and lower incubation temperatures result in female crocodiles. What is the most likely explanation for this phenomenon?

- A. Since this phenomenon is influenced by an external stimuli (temperature), it cannot be attributed to changes in either the genome or the proteome.
- B. Incubation temperature changes both the crocodilian genome and proteome.
- C.** Incubation temperature results in a change in the crocodilian proteome.
- D. Incubation temperature results in a change in the crocodilian genome.

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about genomes and proteomes.
- *What type of thinking is required?*
 - o You are being asked to evaluate different statements about how temperature could affect the gender of a crocodile.

Gather Content

- *What do you know about genomes and proteomes? What other information is related to the question?*
 - o The genome consists of the DNA of a cell and does not change readily. The proteome of a cell represents all of the proteins made in a cell. This can change as different genes are expressed.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o The best answer is that the genome will not change between males and females, while the proteome will. The difference in temperature could cause different genes to be expressed, producing different proteins that make a crocodile male or female.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to evaluate different statements about how the genome and proteome could be affected by temperature to change the gender of a crocodile. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you recall that the genome of a cell is not easy to change? Did you forget that the proteome of a cell can change with external stimuli such as temperature?

Chapter 01 - An Introduction to Biology

Blooms Level: 5. Evaluate

Gradable: automatic

LO: 01.02.03 Describe how changes in genomes and proteomes underlie evolutionary changes.

Section: 01.02

50. Researchers find a group of crocodiles in which an expanded incubation temperature gives rise to male crocodiles. This particular group of crocodiles hatch male crocodiles even with incubation temperatures as low as 29 °C. What type of scientific approach has led to this observation?

A. Discovery-based science.

B. Hypothesis testing.

Blooms Level: 2. Understand

Gradable: automatic

LO: 01.03.02 Distinguish between discovery-based science and hypothesis testing, and describe the steps of the scientific method

Section: 01.03

51. What is the most likely explanation for how a group of crocodiles acquired the trait in which lower incubation temperatures give rise to male crocodiles?

- A. Horizontal gene transfer from a related species has introduced changes in this group's genome.
- B. Horizontal gene transfer from a related species has introduced changes in this group's proteome.
- C.** One or more mutations in the genome have been passed through the group by vertical descent.
- D. One or more mutations in the proteome have been passed through the group by vertical descent.

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about acquiring mutations in a crocodile.
- *What type of thinking is required?*
 - o You are being asked to evaluate statements about how mutations could occur in a crocodile.

Gather Content

- *What do you know about mutations? What other information is related to the question?*
 - o Horizontal gene transfer is the transfer of genes from one individual to another, often across species and occurs mostly in bacteria. In eukaryotes and especially animals, this is very rare. Heritable mutations also occur in the genome, and not in the proteome as proteins are made from the instructions carried in the DNA.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o The best answer is that mutations occur in the genome. These are then passed on through the generations by vertical transfer.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to evaluate different statements about how mutations could occur in crocodiles. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you think that horizontal gene transfer could occur from an animal closely related to a crocodile? Did you think that mutations in the proteome could be inherited?

Chapter 01 - An Introduction to Biology

Blooms Level: 5. Evaluate

Gradable: automatic

LO: 01.02.01 Explain the two basic mechanisms by which evolutionary change occurs: vertical descent with mutation and horizontal gene transfer.

Section: 01.02

52. A scientist isolates a single-celled organism from the bottom of a sulfur hot spring. When examined under the microscope, it is clear that the cell is very small and contains no nucleus. Based on this evidence alone, in what domain of life is this organism?

- A. Eukarya.
- B. Bacteria.
- C. Archaea.
- D. Either bacteria or archaea.**
- E. It is impossible to determine anything based on this evidence alone.

Clarify Question

- *What is the key concept addressed by the question?*
 - o The question asks about different domains.
- *What type of thinking is required?*
 - o You are being asked to apply your knowledge of domains to classify a single celled organism with no nucleus.

Gather Content

- *What do you know about the different domains? What other information is related to the question?*
 - o Eukarya do contain some single celled organisms, but all have a nucleus. Both bacteria and archaea are single celled and have no nucleus.

Choose Answer

- *Given what you now know, what information is most likely to produce the correct answer?*
 - o Both bacteria and archaea have no nucleus and are single celled, so the organism could be from either domain.

Reflect on Process

- *Did your problem-solving process lead you to the correct answer? If not, where did the process break down or lead you astray? How can you revise your approach to produce a more desirable result?*
 - o This question asked you to apply your understanding of domains to classify an organism. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you think that eukaryotes did not have a nucleus? Did you think that only archaea or bacteria were single celled or had no nucleus?

Chapter 01 - An Introduction to Biology

Blooms Level: 3. Apply

Gradable: automatic

LO: 01.02.02 Outline how organisms are classified (taxonomy).

Section: 01.02