Student name:\_\_\_\_\_\_\_\_\_\_

**TRUE/FALSE - Write 'T' if the statement is true and 'F' if the statement is false.
1)** All tissues are composed of cells.

 ⊚ true
 ⊚ false

**2)** The capacity to maintain a fairly constant body temperature is a homeostatic process.

 ⊚ true
 ⊚ false

**3)** A community is composed of different populations of animals and plants.

 ⊚ true
 ⊚ false

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

 ⊚ true
 ⊚ false

**5)** 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 biological organization.

 ⊚ true
 ⊚ false

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

 ⊚ true
 ⊚ false

**7)** All genetic mutations are harmful to an organism.

 ⊚ true
 ⊚ false

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

 ⊚ true
 ⊚ false

**9)** Proteins, rather than genes, are most directly responsible for the structure, function, and appearance of organisms.

 ⊚ true
 ⊚ false

**10)** Little scientific evidence is necessary when formulating a theory.

 ⊚ true
 ⊚ false

**11)** The maintenance of cell structure requires energy.

 ⊚ true
 ⊚ false

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

 ⊚ true
 ⊚ false

**CHECK ALL THE APPLY. Choose all options that best completes the statement or answers the question.
13)** A journal article that you are reading explains the difference between DNA sequences of a species of plant that is found in diverse environments. These sequences lead to structural change in the size of the flowers due to environmental differences. The areas of science incorporated in this article include \_\_\_\_\_\_\_\_\_\_. (Check all that apply.)

 A) ecology
 B) anatomy
 C) cell biology
 D) molecular biology
 E) systems biology

**14)** When performing hypothesis testing, the steps that most accurately describe the process you must go through include \_\_\_\_\_\_\_\_\_\_. (Check all that apply.)

 A) create a natural phenomenon.
 B) analyze data to support or reject hypothesis.
 C) observe a natural phenomena.
 D) develop a theory based on observations.
 E) develop hypotheses to explain phenomena.
 F) design experiments to determine if predictions are correct or not.

**MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.
15)** Plant photosynthesis and the consumption of plants by animals is best explained by 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.

**16)** 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.

**17)** 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.

**18)** Proteins are largely responsible for the traits of living organismswhile \_\_\_\_\_\_\_\_ provides the blueprint for the organization, development, and function of living things.

 A) DNA
 B) protein
 C) carbohydrate
 D) lipid
 E) metabolite

**19)** Which level of organization includes all of theothers in the list?

 A) cell
 B) tissue
 C) organ
 D) organism
 E) population

**20)** Which level of organization is common to all life forms?

 A) cell
 B) tissue
 C) organ
 D) organism
 E) population

**21)** When cells in an organism associate with each other they form

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

**22)** A community of organisms interacting with their physical environment is a/an

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

**23)** In life, which is the simplest of all levels of organization?

 A) atom
 B) cell
 C) organ
 D) organism
 E) population

**24)** Molecules are made up of \_\_\_\_\_\_\_\_\_\_.

 A) atoms
 B) cells
 C) organs
 D) organisms
 E) populations

**25)** Boa constrictors on an island are an example of a/an \_\_\_\_\_\_\_\_\_\_.

 A) cell
 B) organ
 C) organism
 D) population
 E) ecosystem

**26)** A flower on a plant represents the \_\_\_\_\_ level of organization.

 A) atom
 B) cell
 C) organ
 D) organism
 E) population

**27)** 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.

**28)** Changes in \_\_\_\_\_\_\_\_ represent the predominant cause for biological evolution.

 A) homeostasis
 B) growth and development
 C) reproduction
 D) genetic makeup
 E) energy

**29)** A variety of finch species within the Hawaiian Islands have acquired different types of beaks needed for utilizing specific food resources. What is the likelyprocess 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

**30)** What featureofgenetic mutations can eventuallylead to the evolution of new species?

 A) Mutations alwaysproduce harmful effects.
 B) Mutations neveraffect protein structure or function.
 C) Mutationsarenot a mechanism through which biological evolution occurs.
 D) Mutations alwaysproduce beneficial effects.
 E) Mutations producechanges in the DNA sequence of a gene.

**31)** New species evolve from pre-existing species by the accumulation of

 A) metabolic events.
 B) genetic mutations.
 C) proteins.
 D) reproductive events.
 E) developmental events.

**32)** How does evolutionary change occur?

 A) Through themodification of characteristics in a preexisting population.
 B) It may involvevertical descent with mutation.
 C) It may involvehorizontal gene transfer.
 D) All of these choices are correct.
 E) None of these choices are correct.

**33)** 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.

**34)** The grouping or classification of species is termed

 A) genus.
 B) kingdom.
 C) taxonomy.

**35)** When grouping organisms, which classification is most general for a particular type of organism?

 A) Kingdom
 B) Phylum
 C) Order
 D) Family
 E) Species

**36)** All organisms in the Kingdom \_\_\_\_ can perform photosynthesis.

 A) Animalia
 B) Protista
 C) Fungi
 D) Plantae
 E) Bacteria

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

 A) Kingdom
 B) Phylum
 C) Order
 D) Genus
 E) Species

**38)** 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.

**39)** Which domain of life contains the mostmulticellular organisms?

 A) Archaea
 B) Bacteria
 C) Prokarya
 D) Eukarya
 E) Microorganisms

**40)** 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.

**41)** 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.

**42)** 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.

**43)** “All living organisms are composed of cells” is best related to what kind of scientific statement?

 A) Hypothesis
 B) Theory
 C) Discovery
 D) Prediction
 E) Fact

**44)** 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 adead battery was the reason the wristwatch stopped working.
 B) This substantiatesthe theory that all wristwatches require functional batteries.
 C) This is consistent with the hypothesis that a dead battery caused thewristwatch to stop working.
 D) This leads to theprediction that a battery is required for wristwatch operation.

**45)** 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 dailyconsumption of a single apple does not change the number ofvisits to thedoctor.
 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.

**46)** A researcher teststhe 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.

**47)** 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 nest temperatures above or below that incubation temperature range result in female crocodiles.
 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 bemore fragile than female eggs.
 E) Crocodiles arrange the gender of offspring by manipulating incubation temperatures.

**48)** 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 nest temperatures above or below that incubation temperature range result in female crocodiles.
 The researcher observes that an average nest temperature of 32–33°C results in the birth of male crocodiles, while nest temperatures above or below that incubation temperature range result in female crocodiles. What is the most likely explanation for this phenomenon?

 A) Incubation temperature results in a change incrocodilian genes.
 B) Incubation temperature results in a change incrocodilian proteins.
 C) Incubation temperature changesboth the crocodilian genesand proteins.
 D) Since this phenomenon is influenced by an external stimulus (temperature), it cannot be attributed to changes in either the genesor the proteins.

**49)** 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 nest temperatures above or below that incubation temperature range result in female crocodiles.
 Researchers find a group of crocodiles where 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-basedscience
 B) Hypothesistesting
 C) Theoretical testing
 D) Scientific method

**50)** 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 nest temperatures above or below that incubation temperature range result in female crocodiles.
 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 genes.
 B) Horizontal gene transfer from a related species has introduced changes in this group’s proteins.
 C) One or more mutations in the geneshave been passed through the groupby vertical descent.
 D) One or more mutations in the proteinshave been passed through the group by vertical descent.

**51)** 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.

**52)** Which statement is true about all eight bear species shown in the evolutionary tree?


 A) All bears have similarities because theyevolved from a common ancestor.
 B) All bears are genetically identical because they have a common ancestor.
 C) All bears have adapted to live in cold temperatures.
 D) All bears are similar because they mate with each other.

**53)** Which of the following is NOT an example of a biological model?

 A) Computer-generated structure of amino acids found in proteins
 B) Growth equations for population growth
 C) One of two pathways describing how plants transport minerals into their roots
 D) Pictures of different ecosystems
 E) Taxonomic classification of species in the kingdom Animalia

**Answer Key**Test name: chapter 1

1) TRUE

2) TRUE

3) TRUE

4) FALSE

5) FALSE

6) 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 archaea. Within domain eukaryathere 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?

7) FALSE

8) FALSE

9) TRUE

10) FALSE

11) TRUE

12) TRUE

13) [A, B, D]

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● This question is about studying life at different levels of biological organization.

 ● ***What type of thinking is required?*** ● You are being asked to apply your knowledge of levels of biological organization to an unfamiliar example.

 **Gather Content**
 ● ***What do you already know about levels of biological organization? What other information is related to the question?*** ● Biology can be studied at many different levels. For example, the study of organisms in their natural environments is called ecology. Cell biologists study the structure and function of cells. Anatomy and physiology are the study of the structure and function of organisms.Molecular biologists focus on molecules, such as proteins and nucleic acids. Systems biologists study emergent properties that arise from complex interactions in living systems.

 **Choose Answer**
 ● ***Given what you now know, what information is most likely to produce the correct answer?*** ● In this particular example, a plant wasstudied in itsnatural environment which requires the expertise of ecologists. The knowledge and skills of a molecular biologist would be needed forcollection and analysis of DNA samples. Also, flower structurevaries in the plant species, requiring knowledge of anatomy.

 **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*** ● Answering this question correctly depended on your ability to use your knowledge of levels of biological organizationin a new situation.If you got an incorrect answer, were you able to identify the levels of biological organization in the question? Did you remember that ecology is thestudy of organisms in their natural environment,molecular biology is thestudy of molecules, and anatomy is the study of structure?

14) [B, C, E, F]

A theory is usually created from vast amounts of data. A natural phenomenon is natural, so it cannot be created as part of an experiment. Therefore these are not steps in hypothesis testing.

15) A

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about a principle of life.

 ● ***What type of thinking is required?*** ● 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 the principles of life? What other information is related to the question?*** ● Not all organisms are composed of similar structures, so this is not a general principle of life.
 ● Using energy, maintaining organization, evolving, and maintaining homeostasis are all unifying principles of life. Which one is described in the question?

 **Choose Answer**
 ● ***Given what you now know, what information is most likely to produce the correct answer?*** ● The best answer is that photosynthesis and consuming plants are both ways to obtain energy. Therefore, the principle that all organisms use energy is the best answer.

 **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 the principles of life to a new situation. If you got the correct answer, great job! If you got an incorrect answer, where did the process break down? Did you realize that photosynthesis and eating plants are both ways a getting energy?Did you think that one of the other principles of life corresponded to photosynthesis and eating plants?

16) C

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about a principle of life.

 ● ***What type of thinking is required?*** ● 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 the principles of life? What other information is related to the question?*** ● Not all organisms can perform photosynthesis, so this is not a general principle of life.
 ● Responding to light is not a form of homeostasis nor does it involve growing or developing.
 ● 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?*** ● 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?*** ● 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?

17) D

18) A

19) E

20) A

21) D

22) D

23) A

24) A

25) D

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about levels of organization.

 ● ***What type of thinking is required?*** ● 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?*** ● 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?*** ● 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?*** ● 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?

26) C

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about levels of organization.

 ● ***What type of thinking is required?*** ● You are being asked to apply your knowledge of levels of organization to classify a flower.

 ● ***What key words does the question contain and what do they mean?*** ● Level of organization – level of biological complexity

 **Gather Content**
 ● ***What do you know about levels of organization? What other information is related to the question?*** ● 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?*** ● 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?*** ● 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?

27) D

28) D

29) A

30) E

31) B

32) D

33) B

34) C

35) A

36) D

37) D

38) D

39) D

40) B

41) C

42) D

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about the steps in the scientific method.

 ● ***What type of thinking is required?*** ● 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?*** ● There are 5 steps to the scientific method: 1.Observations are made regarding natural phenomena.
 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.
 3.Experimentation is conducted to determine if the predictions are correct.
 4.The data from the experiment are analyzed.
 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?*** ● 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?*** ● This question asked you to apply you 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?

43) B

44) C

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about interpreting the results of an experiment.

 ● ***What type of thinking is required?*** ● You are being asked to apply your knowledge of experiments to choose the correct way of state the results.

 ● ***What key words does the question contain and what do they mean?*** ● Scientific method—series of steps to formulate and test validity of hypotheses

 **Gather Content**
 ● ***What do you know about a hypothesis? What other information is related to the question?*** ● 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?*** ● 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?*** ● 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?

45) B

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about writing a hypothesis.

 ● ***What type of thinking is required?*** ● You are being asked to apply your knowledge of hypotheses to identify one to test a statement.

 ● ***What key words does the question contain and what do they mean?*** ● Hypothesis—proposed explaination for natural phenomena

 **Gather Content**
 ● ***What do you know about hypotheses? What other information is related to the question?*** ● 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?*** ● 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 besupported.

 **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 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?

46) D

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about experimental design.

 ● ***What type of thinking is required?*** ● You are being asked to apply your knowledge of experimental design to pick the best experimental and control groups.

 ● ***What key words does the question contain and what do they mean?*** ● Experimental group—experimental target that experiences a change in some factor
 ● Control group—experimental group that experiences and interaction, but no change, in some factor

 **Gather Content**
 ● ***What do you know about experimental and control groups? What other information is related to the question?*** ● 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.
 ● 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?*** ● 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?*** ● 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?

47) B

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about the best hypothesis for an observation.

 ● ***What type of thinking is required?*** ● You are being asked to apply your knowledge of hypotheses to choose the best one for an observation.

 ● ***What key words does the question contain and what do they mean?*** ● Testable—can be shown to be consistantor inconsistant with empirically obtained data obtained

 **Gather Content**
 ● ***What do you know about observations and hypotheses? What other information is related to the question?*** ● 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?*** ● The best answer is that if you incubate a crocodile egg at 32°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?*** ● 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°C?

48) B

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about genomes and proteomes.

 ● ***What type of thinking is required?*** ● 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?*** ● 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?*** ● 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?*** ● 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?

49) A

50) C

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about acquiring mutations in a crocodile.

 ● ***What type of thinking is required?*** ● 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?*** ● 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 genes, and not in proteinsas 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?*** ● The best answer is that mutations occur in genes. 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?*** ● 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 proteins could be inherited?

51) D

**Clarify Question**
 ● ***What is the key concept addressed by the question?*** ● The question asks about different domains.

 ● ***What type of thinking is required?*** ● 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?*** ● Eukarya does 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?*** ● 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?*** ● 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?

52) A

Groups of organisms, such as bears, have a set of unifying features because they share a common ancestor.

53) D