PRACTICE EXAM 19: LIFE SCIENCE: BIOLOGY SIMULATION (50 QUESTIONS)

1. Which of the following best describes why scientists consider the cell to be the basic unit of life?

A. The cell is the smallest structure that can be seen with the unaided human eye

B. All living things are made of cells, and cells carry out the processes of life

C. Cells are only found in large, complex organisms such as plants and animals

D. The cell is the largest structure found within the body of any living organism

2. Carbohydrates, lipids, proteins, and nucleic acids are organic compounds. Which compound serves mainly as the structural material and the enzymes of the cell?

A. Proteins, which build cell structures and act as enzymes in the cell

B. Carbohydrates, which serve as the body's main source of quick energy

C. Lipids, which are used mainly for long-term storage of energy in the body

D. Nucleic acids, which store and transmit the genetic information of the cell

3. An enzyme and its substrate fit together like a lock and key. If a change in temperature alters the shape of an enzyme's active site, the enzyme will:

A. Speed up its reaction because the change exposes more of the active site

B. Continue to function exactly as before because shape does not affect enzymes

C. No longer fit its substrate properly, so the reaction it controls will slow or stop

D. Begin to break down carbohydrates instead of acting on its usual substrate

4. A cell is placed in a solution, and there is no net movement of water into or out of the cell. The solution outside the cell must be:

A. Hypotonic, having a lower solute concentration than the inside of the cell

B. Hypertonic, having a higher solute concentration than the inside of the cell

C. Saturated, holding the most solute that the water is able to dissolve at once

D. Isotonic, having a solute concentration equal to that inside of the cell

5. The movement of substances across a cell membrane from a region of lower concentration to a region of higher concentration requires the cell to use energy. This process is known as:

A. Active transport, which moves substances against the concentration gradient

B. Diffusion, the movement of molecules from a higher to a lower concentration

C. Osmosis, the movement of water across a selectively permeable membrane

D. Evaporation, the change of a liquid into a gas at the surface of a substance

6. In a leaf cell, the organelle that uses the energy of sunlight to produce glucose contains a green pigment. The green pigment found in this organelle is called:

A. Hemoglobin, the pigment that carries oxygen in the blood of many animals

B. Chlorophyll, the green pigment that captures light energy for photosynthesis

C. Melanin, the pigment that gives color to the skin and hair of some organisms

D. Keratin, the protein that makes up structures such as hair, nails, and feathers

7. Both photosynthesis and cellular respiration are involved in the flow of energy through living things. The overall purpose of cellular respiration in a cell is to:

A. Capture light energy from the Sun and store it in molecules of glucose

B. Build large molecules such as proteins from smaller building-block units

C. Release the energy stored in glucose so the cell can use it for its activities

D. Remove all of the waste products that build up inside of the cell over time

8. The human body has many organ systems that work together. Which two organ systems work most closely together to provide body cells with oxygen and to remove carbon dioxide?

A. The digestive system and the nervous system working together as a unit

B. The skeletal system and the muscular system working together as a unit

C. The excretory system and the endocrine system working together as a unit

D. The respiratory system and the circulatory system working together as a unit

9. When a person's body temperature drops on a cold day, the body responds by shivering and reducing blood flow to the skin to conserve heat. This response is an example of the body:

A. Reproducing, the process by which an organism produces new offspring

B. Maintaining homeostasis, a stable internal environment despite external change

C. Growing larger, the gradual increase in the size of the body over time

D. Digesting food, the breakdown of food into smaller usable molecules

10. In the human body, the kidneys help to maintain homeostasis. The main function of the kidneys is to:

A. Pump blood through the blood vessels to all parts of the body

B. Exchange oxygen and carbon dioxide between the air and the blood

C. Filter wastes from the blood and regulate the water balance of the body

D. Break down large food molecules into smaller absorbable nutrients

11. During protein synthesis, a molecule of messenger RNA (mRNA) is made from a section of DNA. This molecule then carries the genetic instructions from the nucleus to the:

A. Ribosomes, the structures in the cell where proteins are assembled

B. Mitochondria, the organelles where most of the cell's ATP is produced

C. Cell membrane, the boundary that controls what enters and leaves the cell

D. Vacuole, the structure that stores water and other materials in the cell

12. In a certain species of plant, the allele for red flowers (R) is dominant over the allele for white flowers (r). A cross between two heterozygous red plants (Rr) is made. What fraction of the offspring is expected to have white flowers?

A. None of the offspring, because the dominant red allele is always expressed

B. One-half of the offspring, because both of the parents carry the white allele

C. Three-quarters of the offspring, which inherit at least one recessive allele

D. One-quarter of the offspring, which inherit two recessive white alleles

13. A trait that is controlled by a gene located on the X chromosome is described as sex-linked. Sex-linked recessive traits, such as color blindness, appear more often in males than in females because males:

A. Have two X chromosomes, so they always express both copies of the gene

B. Have only one X chromosome, so a single recessive allele is expressed

C. Inherit the trait only from their fathers and never from their mothers at all

D. Cannot pass a sex-linked trait on to any of their children in the future

14. A mutation in the DNA of a cell can sometimes change the protein that the cell produces. A change in a single base of a gene is most likely to affect the resulting protein by:

A. Increasing the total number of chromosomes that are found in the cell

B. Causing the cell to divide much more rapidly than it normally would

C. Changing one or more of the amino acids in the protein that is produced

D. Preventing the cell from ever dividing again for the rest of its lifetime

15. Bacteria can be used to produce human insulin after the human insulin gene is inserted into the bacterial DNA. This is possible because organisms share:

A. Essentially the same genetic code, so a gene can be read by different organisms

B. The exact same number of chromosomes in every one of their body cells

C. An identical set of all of their genes, regardless of the type of organism

D. The ability to change their own DNA at will whenever they need a new trait

16. Mitosis and meiosis are two types of cell division. Which statement correctly describes a difference between them?

A. Mitosis produces four cells, while meiosis produces only two cells in total

B. Mitosis occurs only in plants, while meiosis occurs only in animal cells

C. Mitosis produces gametes, while meiosis produces cells for growth and repair

D. Mitosis produces identical body cells, while meiosis produces gametes

17. Sexual reproduction tends to produce offspring with more genetic variation than asexual reproduction. This greater variation is beneficial to a population because it:

A. Guarantees that every individual in the population will survive any change

B. Ensures that all of the offspring are identical to one of their two parents

C. Increases the chance that some individuals will survive if the environment changes

D. Prevents the population from ever changing in response to its surroundings

18. Two species of animals living in the same area share a common ancestor. Over time, the two species have come to look quite different from each other. The accumulation of inherited differences between populations over many generations is the basis of:

A. Homeostasis, the maintenance of a stable internal environment in an organism

B. Evolution, the change in the inherited traits of populations over generations

C. Digestion, the breakdown of food into smaller molecules the body can absorb

D. Respiration, the release of energy stored in glucose inside of the cell

19. In a population of mice, some individuals have fur that blends in with the soil while others stand out against it. Predators are more likely to catch the mice that stand out. Over many generations, the mice that blend in will most likely:

A. Become more common, because they survive and reproduce more successfully

B. Become less common, because their camouflage makes them easier to find

C. Disappear from the population entirely within just one or two generations

D. Remain at exactly the same proportion as the mice that stand out clearly

20. Scientists compare the structures of organisms to study how closely they are related. The forelimbs of a cat, a whale, and a bat all have a similar bone structure. These homologous structures provide evidence that the three animals:

A. Live in the same kind of environment and use their limbs in the same way

B. Are currently evolving into a single new species over many generations

C. Share a common ancestor from which they inherited the same bone structure

D. Developed their similar bone structures independently with no shared ancestry

21. A geographic barrier, such as a mountain range, can split a single population into two groups that can no longer interbreed. Over a long period of time, this separation can result in:

A. The immediate death of every member of both of the separated groups

B. The two groups instantly becoming a single, larger interbreeding population

C. The complete loss of all genetic variation within each of the two groups

D. The formation of two separate species through reproductive isolation

22. In an ecosystem, energy originally comes from the Sun. The organisms that capture this energy and convert it into food are the foundation of the ecosystem. These organisms are called:

A. Consumers, which obtain their energy by feeding on other living organisms

B. Producers, which capture energy from the Sun and convert it into food

C. Decomposers, which break down dead organisms and return nutrients to soil

D. Scavengers, which feed on the remains of animals that have already died

23. In a food chain, energy passes from one organism to the next, and only about 10% of the energy stored at one level is passed to the next. This means that, compared to the producers, the top-level consumers in the chain have:

A. Much less energy available to them than is available to the producers

B. Much more energy available to them than is available to the producers

C. Exactly the same amount of energy as is available to the producers

D. No connection at all to the amount of energy available to the producers

24. A food web is a model that shows the feeding relationships in an ecosystem. A food web is considered a better model than a single food chain because it:

A. Shows that energy is created as it moves up through the trophic levels

B. Includes only the producers and decomposers found in the ecosystem

C. Shows that most organisms have several different sources of food

D. Demonstrates that each organism in the ecosystem feeds on only one other

25. As a population of organisms grows, certain factors can slow or stop its growth. Which of the following is an example of a limiting factor that could slow the growth of a deer population?

A. An increase in the amount of food and water available in the environment

B. A decrease in the number of predators that hunt the deer in the area

C. A long stretch of mild weather with no disease present in the population

D. A shortage of food and space caused by too many deer in one area

26. A relationship in which two different species both benefit is called mutualism. Which of the following is an example of mutualism?

A. A tick feeding on the blood of a deer, which is harmed by the tick's presence

B. A bee gathering nectar from a flower while carrying pollen between the plants

C. A lion hunting and killing a zebra in order to obtain food for its survival

D. Two species of birds competing for the same nesting sites in the same trees

27. Decomposers, such as fungi and bacteria, are an essential part of the cycling of matter in an ecosystem. The main role of decomposers is to:

A. Break down dead organisms and wastes, returning nutrients to the environment

B. Capture energy from the Sun and store it in the chemical bonds of food

C. Hunt and capture the largest animals to control their population sizes

D. Produce all of the oxygen that the other organisms in the ecosystem need

28. Nitrogen is an essential nutrient for plants, but plants cannot use nitrogen gas directly from the air. Bacteria in the soil convert nitrogen gas into a form that plants can absorb. This process is an important part of the:

A. Water cycle, in which water moves between the land, the oceans, and the air

B. Carbon cycle, in which carbon moves between the atmosphere and organisms

C. Energy pyramid, which shows the energy available at each level of a food chain

D. Nitrogen cycle, in which nitrogen moves between the air, the soil, and organisms

29. After a wildfire clears a forest, the area is gradually recolonized over many years: first by grasses, then shrubs, then trees, until a mature forest returns. This gradual, predictable change in the community over time is called:

A. Biomagnification, the buildup of toxic substances at higher trophic levels

B. Eutrophication, the nutrient enrichment of a body of water over a long time

C. Ecological succession, the gradual change in the community over time

D. Extinction, the permanent disappearance of a species from the planet Earth

30. A pollutant that does not break down easily enters a food chain and becomes more concentrated in organisms at each higher trophic level. The organisms with the highest concentration of the pollutant would be the:

A. Producers at the very base of the food chain, such as the algae or the grass

B. Top predators at the highest level of the food chain, such as large fish or hawks

C. Decomposers that break down all of the dead organisms in the ecosystem

D. Primary consumers that feed directly on the producers in the food chain

31. Human activities can affect the environment in many ways. Which of the following human activities would most likely help to protect biodiversity?

A. Establishing protected nature reserves where natural habitats are preserved

B. Clearing large areas of forest to plant a single crop on a plantation

C. Releasing untreated chemical waste from factories into rivers and streams

D. Introducing a non-native predator that has no natural enemies in the area

32. The burning of fossil fuels for energy releases carbon dioxide and other gases into the atmosphere. The buildup of these gases is associated with a gradual increase in average global temperatures known as:

A. Eutrophication, the nutrient enrichment of bodies of water over time

B. Biomagnification, the buildup of toxic substances up a food chain

C. Ecological succession, the gradual change in a community over time

D. Global climate change, the long-term rise in average global temperatures

33. A virus consists of genetic material surrounded by a protein coat. One major reason that scientists do not consider viruses to be fully alive is that viruses:

A. Are made up of many cells, each with a nucleus and several organelles

B. Are much larger than the cells of the organisms that they infect and harm

C. Cannot reproduce on their own and must use a living host cell to make copies

D. Make their own food using the energy that they capture from the Sun's light

34. Bacteria are classified as prokaryotes. The cells of bacteria differ from the cells of plants and animals because bacterial cells:

A. Contain many more membrane-bound organelles than plant and animal cells

B. Lack a true nucleus and the membrane-bound organelles of eukaryotic cells

C. Are the only kind of cell that contains genetic material in the form of DNA

D. Are always much larger in size than the cells of plants and of animals

35. A doctor explains that antibiotics can be used to treat an infection caused by bacteria but will not work against a cold, which is caused by a virus. The reason antibiotics do not work against viruses is that:

A. Antibiotics target structures and processes that are found in bacteria but not in viruses

B. Viruses are far too large for any antibiotic molecule to be able to reach them

C. Antibiotics work only after a person has already received a vaccine for the virus

D. Viruses can be destroyed only by being frozen, which the antibiotics cannot do

36. When a person is exposed to a pathogen, the immune system produces proteins that bind to the pathogen and mark it for destruction. These specialized proteins are called:

A. Hormones, the chemical messengers that travel in the blood to target organs

B. Enzymes, the proteins that speed up the chemical reactions inside the cell

C. Antibodies, the proteins that bind to a pathogen and mark it for destruction

D. Platelets, the cell fragments that help the blood to form clots at a wound

37. A person who has had the chickenpox usually does not get the same illness again. This is because, after the first infection, the immune system produces:

A. Red blood cells, which carry oxygen from the lungs to the body's tissues

B. Digestive enzymes, which break down the pathogen in the person's stomach

C. Platelets, which form clots to seal any cut where pathogens might enter

D. Memory cells, which respond quickly if the same pathogen enters again

38. A scientist wants to test whether a certain type of music affects how quickly plants grow. In this experiment, the type of music played for the plants is the:

A. Dependent variable, the factor that the scientist measures at the end of the test

B. Independent variable, the factor that the scientist deliberately changes

C. Control group, the group of plants that hears no music during the experiment

D. Hypothesis, the testable prediction made by the scientist before the experiment

39. In a controlled experiment, a scientist includes a group that does not receive the treatment being tested. The purpose of this control group is to:

A. Provide a baseline for comparison with the group that receives the treatment

B. Guarantee in advance that the scientist's hypothesis will be fully supported

C. Allow the scientist to test several different treatments at the very same time

D. Make the experiment finish more quickly than it otherwise would have done

40. A student records the following heights for five plants, in centimeters: 8, 10, 12, 14, and 16. What is the mean (average) height of these five plants?

A. 8 centimeters, which is the smallest value found in the set of measurements

B. 16 centimeters, which is the largest value found in the set of measurements

C. 12 centimeters, found by adding all the values and dividing the sum by five

D. 60 centimeters, found by adding all five of the height measurements together

41. A scientist observes a pattern in nature, forms a question, and proposes a testable explanation. The next step in the scientific method is for the scientist to:

A. Publish a final conclusion based on the proposed explanation alone

B. Accept the explanation as a fact without performing any further testing

C. Discard the explanation immediately because it has not yet been tested at all

D. Design and carry out an experiment to test the proposed explanation

42. A scientist wants to display data showing how the temperature of a liquid changes during each minute of a 10-minute period. The most appropriate type of graph for showing this change over time is a:

A. Pie chart, which is best for showing how a single whole is divided into parts

B. Line graph, which is best for showing how a value changes over time

C. Bar graph, which is best for comparing values across separate categories

D. Labeled diagram, which is best for showing the parts of a single structure

43. All the members of a single species that live together in the same area at the same time make up a:

A. Community, which includes all the different species living together in an area

B. Ecosystem, which includes all the living and the nonliving factors in an area

C. Population, which is one species living in the same area at the same time

D. Biome, which is a large region defined mainly by its climate and its plant life

44. Producers, consumers, and decomposers all have roles in an ecosystem. Which of the following correctly describes the role of a producer?

A. A producer makes its own food using energy from the Sun through photosynthesis

B. A producer obtains its energy by feeding on the other organisms in the ecosystem

C. A producer breaks down dead organisms and returns their nutrients to the soil

D. A producer hunts and captures other animals in order to obtain its own energy

45. Living things are organized into levels of increasing complexity. Which of the following lists the levels in the correct order, from least complex to most complex?

A. Organism, organ system, organ, tissue, and finally the individual cell

B. Tissue, cell, organ, organ system, and finally the complete organism

C. Organ, organ system, cell, tissue, and finally the complete organism

D. Cell, tissue, organ, organ system, and finally the complete organism

46. A high level of biodiversity is generally considered beneficial to an ecosystem. One reason that high biodiversity is valuable is that it:

A. Guarantees that the population of each species will never change at all

B. Makes the ecosystem more stable and better able to recover from disturbances

C. Ensures that a single species will dominate and control the entire ecosystem

D. Prevents the ecosystem from ever responding to changes in its environment

47. The cell theory is a fundamental idea in biology. Which of the following statements is part of the modern cell theory?

A. Cells form spontaneously from nonliving material under the right conditions

B. Only large organisms such as plants and animals are made up of cells

C. Cells are the largest structures found within the bodies of living organisms

D. All living things are made of cells, and all cells come from preexisting cells

48. When a person exercises, their muscle cells use more energy and need more oxygen. In response, the person's breathing rate and heart rate increase. This increase helps the body by:

A. Delivering more oxygen to the muscle cells and removing more carbon dioxide

B. Lowering the body's temperature so that the muscles do not overheat at all

C. Slowing the rate of cellular respiration to conserve the body's stored energy

D. Stopping the muscle cells from producing any carbon dioxide as a waste product

49. Conservation practices help to protect the environment for the future. Using natural resources in a way that meets the needs of the present without harming the ability of future generations to meet their own needs is called:

A. Deforestation, the clearing of large areas of forest for farmland and cities

B. Extinction, the permanent disappearance of a species from the planet Earth

C. Biomagnification, the buildup of toxic substances at higher trophic levels

D. Sustainability, using resources responsibly to protect them for the future

50. Water moves continuously through the environment in the water cycle. The process by which water vapor in the air cools and changes into liquid water droplets, forming clouds, is called:

A. Evaporation, in which liquid water changes into water vapor in the air

B. Transpiration, in which water is released as vapor from the leaves of plants

C. Condensation, in which water vapor cools and changes into liquid droplets

D. Precipitation, in which water falls from the clouds as rain, snow, or hail

ANSWER KEY WITH EXPLANATIONS – Practice Exam 19

1. B — All living things are made of cells, and cells carry out the processes of life, which is why the cell is considered the basic unit of life. Every larger biological structure is built from cells. This universality is the foundation of cell theory.
2. A — Proteins build cell structures and act as enzymes that control the cell's chemical reactions. Their roles are mainly structural and functional. Carbohydrates and lipids handle energy, and nucleic acids carry genetic information.
3. C — Because an enzyme works by fitting its substrate like a lock and key, a change in the active site's shape means the substrate no longer fits, so the reaction slows or stops. Enzyme function depends on shape. This is why temperature changes can disable an enzyme.
4. D — When there is no net movement of water, the outside solution is isotonic, having a solute concentration equal to that inside the cell. With equal concentrations, water moves equally in both directions. The cell neither gains nor loses water overall.
5. A — Active transport moves substances against the concentration gradient, from lower to higher concentration, and requires the cell to use energy. This contrasts with passive diffusion, which moves down the gradient without energy. The use of energy to move against the gradient defines active transport.
6. B — Chlorophyll is the green pigment in chloroplasts that captures light energy for photosynthesis. This captured energy is used to build glucose. Hemoglobin, melanin, and keratin serve unrelated functions.
7. C — The purpose of cellular respiration is to release the energy stored in glucose so the cell can use it for its activities. This energy is captured in ATP. Photosynthesis, by contrast, stores energy in glucose rather than releasing it.
8. D — The respiratory system brings in oxygen and removes carbon dioxide, and the circulatory system carries these gases to and from the body's cells. The two systems work together at the alveolar capillaries. Their cooperation supplies cells with oxygen.
9. B — Shivering and reducing blood flow to the skin to conserve heat when cold are responses that maintain homeostasis, a stable internal environment. The body counteracts the drop in temperature. Reproduction, growth, and digestion are different processes.
10. C — The kidneys filter wastes from the blood and regulate the body's water balance, helping maintain homeostasis. They adjust what is excreted in urine. Pumping blood, gas exchange, and digestion are functions of other organs.
11. A — Messenger RNA carries the genetic instructions from the nucleus to the ribosomes, where proteins are assembled. The ribosome reads the mRNA to build the protein. Mitochondria, the membrane, and vacuoles serve other roles.
12. D — Crossing two heterozygotes (Rr × Rr) gives a 3:1 ratio, so one-quarter of the offspring are homozygous recessive (rr) with white flowers. Only rr shows the recessive phenotype. The other three-quarters carry at least one dominant R allele and have red flowers.
13. B — Because males have only one X chromosome, a single recessive allele on it is expressed, with no second X to mask it. Females, with two X chromosomes, would need the allele on both. This is why X-linked recessive traits appear more often in males.
14. C — A change in a single base can alter the codon, changing one or more amino acids in the protein, which can affect its shape and function. The base sequence determines the amino acid sequence. This is how a point mutation can alter a protein.

15. A — Because organisms share essentially the same genetic code, a gene from one organism can be read and translated by another, so bacteria can produce human insulin. This universality makes genetic engineering possible. The organisms need not share all their genes or chromosome numbers.
16. D — Mitosis produces genetically identical body cells for growth and repair, while meiosis produces gametes with half the chromosome number. This difference in product and purpose distinguishes them. Mitosis does not make gametes, and meiosis does not make body cells.
17. C — Greater genetic variation increases the chance that some individuals will have traits allowing them to survive if the environment changes. This variety is the raw material for adaptation. It does not guarantee everyone's survival or keep offspring identical.
18. B — Evolution is the change in the inherited traits of populations over many generations, which underlies how two related species can grow to look different. The accumulation of inherited differences drives this change. Homeostasis, digestion, and respiration are unrelated processes.
19. A — Because predators catch the mice that stand out, the camouflaged mice survive and reproduce more, so they become more common over generations. This is natural selection favoring the better-hidden variant. The population shifts toward the camouflaged form.
20. C — The shared bone structure in the forelimbs of a cat, whale, and bat is evidence that the animals inherited it from a common ancestor. These homologous structures reflect common descent despite different uses. The similarity is not due to shared habitat or independent origin.
21. D — When a barrier prevents two groups from interbreeding, they may diverge over time and form two separate species through reproductive isolation. The lack of gene flow allows differences to accumulate. This isolation-driven divergence is how new species can form.
22. B — Producers capture energy from the Sun and convert it into food through photosynthesis, forming the foundation of the ecosystem. Consumers, decomposers, and scavengers depend on the energy producers capture. The energy-capturing organisms are the producers.
23. A — Because only about 10% of energy passes to each higher level, the top consumers have much less energy available than the producers at the base. Most energy is lost as heat at each step. This is why higher trophic levels support less life.
24. C — A food web is a better model because it shows that most organisms have several different food sources, capturing the interconnected feeding relationships of real ecosystems. A single chain oversimplifies these connections. Energy still decreases, and organisms rarely eat just one thing.
25. D — A shortage of food and space caused by too many deer is a limiting factor that slows population growth. As the population grows, these density-dependent factors restrict it. More food, fewer predators, and good conditions would allow growth, not limit it.
26. B — A bee gathering nectar while carrying pollen between flowers is mutualism, since the bee gains food and the plants gain pollination, benefiting both. Each partner helps the other. The tick, lion, and competing birds illustrate parasitism, predation, and competition.
27. A — Decomposers break down dead organisms and wastes, returning nutrients to the environment for reuse by producers. This recycling of matter is essential to nutrient cycles. They are not producers, predators, or oxygen makers.
28. D — Nitrogen-fixing soil bacteria convert nitrogen gas into a form plants can absorb, a key step in the nitrogen cycle. This makes the element available to plants that cannot use nitrogen gas directly. The process is part of the nitrogen cycle, not the water or carbon cycle.
29. C — The gradual, predictable replacement of grasses by shrubs and then trees after a fire is ecological succession. This process rebuilds the community step by step toward a mature stage. It differs from biomagnification, eutrophication, and extinction.

30. B — A persistent pollutant becomes more concentrated at each higher trophic level through biomagnification, so top predators accumulate the most. Each consumer takes in the stored pollutant from all its prey. This makes apex predators most vulnerable.
31. A — Establishing protected nature reserves preserves natural habitats and the species that depend on them, helping protect biodiversity. Clearing forests, releasing waste, and introducing invasive predators all reduce biodiversity. Habitat protection supports a diverse range of species.
32. D — The buildup of carbon dioxide and other gases from burning fossil fuels is associated with global climate change, the long-term rise in average global temperatures. These greenhouse gases trap heat. This differs from eutrophication, biomagnification, and succession.
33. C — Viruses are not considered fully alive because they cannot reproduce on their own and must use a living host cell to make copies. They lack the machinery to function independently. This dependence on a host sets them apart from living cells.
34. B — Bacterial (prokaryotic) cells differ from plant and animal (eukaryotic) cells in lacking a true nucleus and membrane-bound organelles. Their genetic material is not enclosed in a nuclear membrane. Both cell types contain DNA, but only eukaryotes have membrane-bound organelles.
35. A — Antibiotics target structures and processes found in bacteria, such as cell walls and bacterial protein synthesis, which viruses do not have. Because viruses lack these features, antibiotics cannot affect them. This is why antibiotics do not treat viral colds.
36. C — Antibodies are proteins produced by the immune system that bind to a specific pathogen and mark it for destruction. Their specificity lets the body target particular invaders. Hormones, enzymes, and platelets serve other functions.
37. D — Long-lasting immunity after chickenpox comes from memory cells, which respond quickly if the same pathogen enters again. These cells "remember" the pathogen. Red blood cells, digestive enzymes, and platelets do not provide this specific protection.
38. B — The independent variable is the factor the scientist deliberately changes, which here is the type of music played for the plants. It is the variable being tested. The resulting growth would be the dependent variable.
39. A — The control group provides a baseline for comparison with the treated group, so any difference can be attributed to the treatment. Without it, the cause of results would be unclear. The control makes the experiment's conclusion valid.
40. C — The mean is found by adding all the values ($8 + 10 + 12 + 14 + 16 = 60$) and dividing by the number of values (5), giving $60 \div 5 = 12$ centimeters. The mean is the average of the data. It is not simply the smallest, largest, or total value.
41. D — After proposing a testable explanation (hypothesis), the next step in the scientific method is to design and carry out an experiment to test it. Testing provides evidence to support or refute the idea. A hypothesis is not accepted or discarded without testing.
42. B — A line graph is best for showing how a value, such as temperature, changes over time, with connected points revealing the trend across the minutes. Pie charts show parts of a whole, bar graphs compare categories, and diagrams show structures. Change over time calls for a line graph.
43. C — A population consists of all the members of a single species living in the same area at the same time. A community includes multiple species, and an ecosystem adds nonliving factors. The single-species grouping in one place is a population.
44. A — A producer makes its own food using energy from the Sun through photosynthesis, forming the base of the food web. Consumers eat other organisms and decomposers break down dead matter. The self-feeding role defines a producer.

45. D — The correct order from least to most complex is cell → tissue → organ → organ system → organism, with each level built from the one below. Cells form tissues, tissues form organs, organs form systems, and systems make the organism. This reflects increasing complexity.
46. B — High biodiversity makes an ecosystem more stable and better able to recover from disturbances, because many species can fill different roles and respond to change. This resilience helps it withstand events like disease or fire. Greater diversity supports stability rather than guaranteeing unchanging populations.
47. D — A central statement of the modern cell theory is that all living things are made of cells and all cells come from preexisting cells. This unifies the study of living organisms. The idea that cells form spontaneously from nonliving matter is not part of cell theory.
48. A — Increased breathing and heart rates during exercise deliver more oxygen to the muscle cells and remove the extra carbon dioxide they produce. This supports the higher rate of cellular respiration needed for activity. The body raises, rather than lowers, its oxygen delivery and metabolic activity.
49. D — Using resources to meet present needs without harming future generations' ability to meet their own is sustainability. Practices like conservation support this long-term balance. It is the opposite of deforestation, extinction, and biomagnification.
50. C — Condensation is the process by which water vapor cools and changes into liquid droplets, forming clouds. It is part of the water cycle. Evaporation, transpiration, and precipitation are the other water-cycle processes, involving different changes.