PRACTICE EXAM 10: LIFE SCIENCE: BIOLOGY SIMULATION (50 QUESTIONS)

1. While studying a forest, a biologist sees claw marks high on a tree trunk and concludes that a bear has been in the area. This conclusion, drawn from the evidence rather than directly observed, is an example of:

A. A controlled experiment, in which one variable is changed at a time

B. A direct observation, made using only the biologist's senses

C. An inference, a logical interpretation based on available evidence

D. A hypothesis, a testable prediction stated before any data are collected

2. Over the course of several months, a tadpole gradually changes into an adult frog, growing legs and absorbing its tail. This series of changes during the organism's life best illustrates the life process of:

A. Excretion, the removal of metabolic wastes from the organism's body

B. Reproduction, the production of new organisms similar to the parent

C. Respiration, the release of energy stored in the organism's food

D. Growth and development, the increase in size and change in form over time

3. Proteins are among the most important molecules in living things, serving many different roles. Which of the following is one role that proteins play in organisms?

A. Storing the long-term genetic information passed on to offspring

B. Acting as enzymes that control the chemical reactions in cells

C. Serving as the main long-term energy storage molecule in the body

D. Forming the green pigment that captures sunlight in plant leaves

4. An enzyme found in the human body works fastest at about 37°C, the normal body temperature, and works much more slowly at 10°C. This pattern shows that the activity of an enzyme:

A. Depends on temperature, reaching its fastest rate at an optimum temperature

B. Is completely unaffected by changes in the temperature of its surroundings

C. Is always fastest at the lowest possible temperature it can be exposed to

D. Increases steadily and without limit as the temperature continues to rise

5. A scientist removes a particular structure from a cell, and the cell loses the ability to control its activities and can no longer make proteins correctly. The structure that was most likely removed is the:

A. Vacuole, which stores water and dissolved substances within the cell

B. Cell wall, which surrounds and supports the outside of a plant cell

C. Ribosome, which assembles amino acids into the proteins a cell needs

D. Nucleus, which contains the DNA that directs the cell's activities

6. A student examines two cells under a microscope. One cell has a cell wall and chloroplasts, while the other has neither. The student can conclude that the cell with a cell wall and chloroplasts is most likely:

A. An animal cell, because only animal cells contain chloroplasts and cell walls

B. A plant cell, because cell walls and chloroplasts are features of plant cells

C. A bacterial cell, because bacteria carry out photosynthesis in chloroplasts

D. A virus, because viruses are surrounded by a cell wall containing chloroplasts

7. Oxygen passes from the tiny air sacs in the lungs into the surrounding blood, where the oxygen concentration is lower, without the body using any energy. This movement of oxygen is best described as:

A. Active transport, which uses cellular energy to move oxygen into the blood

B. Osmosis, which is the movement of water across a selectively permeable membrane

C. Diffusion, the movement of a substance from higher to lower concentration

D. Respiration, in which the cells release the energy stored in glucose molecules

8. Inside the leaf of a green plant, the food-making process of photosynthesis takes place. Which of the following correctly lists the raw materials a plant uses during photosynthesis?

A. Glucose and oxygen, which the plant takes in through its leaves and roots

B. Oxygen and nitrogen, which the plant pulls directly from the surrounding air

C. Carbon dioxide and water, which the plant takes in from the air and the soil

D. Glucose and water, which the plant absorbs from the soil through its roots

9. During cellular respiration, the energy stored in glucose is released and captured in a form that the cell can use to power its activities. The molecule that stores this usable energy for the cell is:

A. DNA, which stores the genetic instructions passed on to offspring

B. Chlorophyll, which captures the light energy used to make sugar

C. Water, which the cell uses to transport materials throughout the body

D. ATP, which stores energy the cell can use to power its activities

10. In an ecosystem, the gas released by plants during photosynthesis is the same gas that animals take in and use during respiration. This gas is:

A. Carbon dioxide, which animals release and plants take in during the day

B. Oxygen, which plants release during photosynthesis and animals use to live

C. Nitrogen, which both plants and animals take in to build new proteins

D. Hydrogen, which plants and animals exchange as they carry out life processes

11. A young oak tree grows taller each year as it produces many new cells. The type of cell division that produces these new cells for the tree's growth is:

A. Meiosis, which produces sex cells with half the usual number of chromosomes

B. Fertilization, which combines two sex cells to begin a brand-new organism

C. Mitosis, which produces new body cells for the growth of the organism

D. Pollination, which transfers pollen from one flower to another flower

12. During meiosis, homologous chromosomes can exchange pieces of their DNA before the sex cells are formed. This exchange of DNA is important because it:

A. Increases the genetic variation found among the offspring that are produced

B. Guarantees that all of the offspring will be genetically identical to each other

C. Doubles the number of chromosomes that each sex cell will end up carrying

D. Removes all of the mutations from the DNA before the sex cells are formed

13. In a molecule of DNA, the two strands are held together by pairs of bases that follow specific pairing rules. According to these rules, the base cytosine (C) always pairs with:

A. Thymine (T), forming one of the rungs that hold the DNA strands together

B. Guanine (G), forming one of the rungs that hold the DNA strands together

C. Adenine (A), forming one of the rungs that hold the DNA strands together

D. Another cytosine (C), forming one of the rungs that hold the strands together

14. Genes affect the traits of an organism through a series of steps inside the cell. The most direct way that a gene influences an organism's trait is by directing the cell to:

A. Store extra water that the cell can use to express the inherited trait

B. Release the energy needed for the organism to develop its inherited trait

C. Remove all of the wastes so the organism can show its inherited trait

D. Build a specific protein that helps to produce the organism's trait

15. In a population, a new form of a gene can suddenly appear that none of the previous generations had. This brand-new form of a gene arises through the process of:

A. Digestion, in which large food molecules are broken into smaller ones

B. Respiration, in which the cell releases the energy stored in glucose

C. Mutation, in which a change occurs in the DNA sequence of a gene

D. Diffusion, in which substances move from higher to lower concentration

16. Over many generations, farmers have produced cows that give far more milk than their wild ancestors by always breeding the cows that produce the most milk. This practice is best described as:

A. Selective breeding, in which humans choose which organisms will reproduce

B. Genetic engineering, in which a gene is inserted directly into an organism's DNA

C. Natural selection, in which the environment alone decides which cows survive

D. Cloning, in which an exact genetic copy of a single cow is produced in a lab

17. Some crop plants have been genetically modified to produce a substance that kills insect pests. The most direct advantage of growing these modified crops is that they:

A. Grow into many genetically different plants from a single planted seed

B. Suffer less damage from insect pests because of the substance they produce

C. No longer need any sunlight, water, or soil in order to grow successfully

D. Can be grown only by cloning and are unable to produce any seeds at all

18. In a certain plant, purple flowers (P) are dominant over white flowers (p). Two heterozygous purple plants (Pp) are crossed. What is the expected ratio of purple-flowered to white-flowered offspring?

A. 1 purple to 1 white, because half of the offspring inherit two recessive alleles

B. 1 purple to 3 white, because white is the more common result of this cross

C. 4 purple to 0 white, because the dominant purple allele blocks all white plants

D. 3 purple to 1 white, because three of four genotype combinations include a P allele

19. Two pea plants both have purple flowers, but one is homozygous (PP) and the other is heterozygous (Pp). Even though their genotypes are different, the two plants look the same because:

A. The recessive white allele is expressed whenever it is present in the plant

B. The two plants must actually have exactly the same genotype after all

C. A single dominant allele is enough to produce the purple flower color

D. Flower color in pea plants is controlled only by the surrounding environment

20. A child shows a mix of traits, some resembling the mother and some resembling the father. This blend of traits in the child is a result of sexual reproduction, in which the child:

A. Receives genetic information from both the mother and the father

B. Receives all of its genetic information from only one of its two parents

C. Develops completely new genes that neither parent ever carried at all

D. Inherits traits that were gained by the parents during their own lifetimes

21. In nature, populations tend to produce more offspring than the environment can support, so the individuals must compete for limited food, space, and other resources. According to Darwin, the most likely outcome of this competition is that:

A. Every individual born into the population will survive and reproduce equally

B. The individuals will share all resources equally so that none has an advantage

C. The largest individuals will always survive regardless of any other trait

D. Individuals with traits better suited to the environment are more likely to survive

22. For a population of organisms to change over time through natural selection, the population must contain individuals that differ from one another. These inherited differences among individuals are referred to as:

A. Adaptations, traits that have already spread through the entire population

B. Variation, the inherited differences found among individuals in a population

C. Mutations, which always reduce the survival of every affected individual

D. Extinctions, the complete disappearance of a species from the Earth

23. Scientists comparing two species of birds find that the two species have very similar DNA and produce many of the same proteins. From this evidence, scientists would most likely conclude that the two species:

A. Live in completely different habitats and never interact with each other

B. Are closely related and share a relatively recent common ancestor

C. Developed their similarities entirely by chance with no connection

D. Are unable to be compared because only fossils can show relationships

24. Fossils are the preserved remains or traces of organisms that lived long ago. Fossils provide important evidence for evolution because they:

A. Show that the kinds of organisms living on Earth have changed over time

B. Prove that all species on Earth have remained exactly the same since they appeared

C. Demonstrate that complex organisms always appeared before simpler ones

D. Reveal that living things never share any features with organisms of the past

25. Many birds build nests in hidden locations where their eggs are less likely to be found by predators. This nest-building behavior, which improves the survival of the birds' offspring, is best described as a:

A. Structural adaptation, an inherited physical feature of the bird's body

B. Behavioral adaptation that helps improve the survival of the offspring

C. Random mutation that the bird develops during a single nesting season

D. Vestigial behavior that no longer serves any useful purpose for the bird

26. In a meadow ecosystem, the grasses and wildflowers use sunlight to make their own food and supply energy to the rest of the food chain. These food-making organisms are classified as:

A. Decomposers, which break down dead organisms to recycle their nutrients

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

C. Predators, which obtain energy by hunting and capturing other animals

D. Producers, which capture energy from the Sun to make their own food

27. In a food web, owls eat mice, and the mice eat seeds from grasses. If a disease caused the owl population to decline sharply, the most likely immediate effect on the food web would be that the:

A. Grass population would increase because the mice would stop eating seeds

B. Mouse population would disappear entirely from the food web very quickly

C. Mouse population would increase because fewer owls would be eating them

D. Owl population would become the main producer at the base of the food web

28. Certain birds ride on the backs of large grazing animals and eat the ticks and insects living on the animals' skin. The birds get a meal, and the grazing animals are relieved of harmful pests. This relationship is best described as:

A. Mutualism, in which both the birds and the grazing animals benefit

B. Parasitism, in which the birds benefit while seriously harming the animals

C. Commensalism, in which the birds benefit while the animals are unaffected

D. Competition, in which the birds and the animals struggle for the same food

29. A sudden, severe frost kills a large number of insects in a field, and the frost affects the insects regardless of how many of them are present. A factor like this frost, whose effect does not depend on the size of the population, is called a:

A. Density-dependent factor, whose effect increases as the population grows

B. Biotic factor, because frost is a living part of the environment

C. Carrying capacity, the largest population the environment can support

D. Density-independent factor, whose effect is the same at any population size

30. After a lava flow cools and hardens into bare rock, lichens are often the first organisms to appear, slowly breaking the rock down into soil. Because they are the first to colonize the bare rock, lichens are known as:

A. Climax species, the stable community found at the end of succession

B. Pioneer species, the first organisms to colonize a lifeless area

C. Keystone species, whose loss would cause the whole community to collapse

D. Invasive species, non-native organisms that crowd out the local community

31. A long-lasting chemical pollutant enters a lake and is absorbed by tiny organisms. As larger animals eat many smaller ones, the pollutant becomes most concentrated in the largest predators at the top of the food chain. This increasing concentration up the food chain is called:

A. Biomagnification, in which a pollutant becomes more concentrated at higher levels

B. Eutrophication, in which excess nutrients cause oxygen levels in water to drop

C. Succession, in which one community gradually replaces another over time

D. Carrying capacity, the largest population the lake is able to support over time

32. Many scientists have linked the burning of large amounts of fossil fuels to a gradual rise in Earth's average temperature. The connection is that burning fossil fuels releases large amounts of:

A. Oxygen, which traps heat in the atmosphere and warms the planet over time

B. Nitrogen, which reacts with sunlight to raise the temperature of the air

C. Carbon dioxide, a greenhouse gas that traps heat in the atmosphere

D. Water vapor, which blocks sunlight and cools the surface of the Earth

33. The human digestive system carries out a process that is necessary before the body can use the food a person eats. The main role of the digestive system is to:

A. Pump blood through the body to deliver oxygen to all of the cells

B. Send rapid signals that allow the body to respond to its surroundings

C. Filter wastes out of the blood and remove them from the body as urine

D. Break food down into small molecules that the body's cells can absorb

34. In the human body, the circulatory system and respiratory system work together to supply the cells with oxygen. The most direct way these systems cooperate is that the:

A. Circulatory system breaks down food so the respiratory system can store it

B. Respiratory system takes in oxygen that the circulatory system carries to the cells

C. Respiratory system filters the wastes that the circulatory system produces

D. Circulatory system produces the oxygen that the respiratory system breathes in

35. When a person accidentally touches a sharp object, they pull their hand away instantly, before they consciously feel the pain. This rapid, automatic protective response is called a:

A. Reflex, a rapid automatic response that helps protect the body from harm

B. Hormone, a chemical messenger released slowly into the bloodstream

C. Mutation, a change in the DNA that occurs within the body's cells

D. Habit, a behavior that the person has practiced and learned over time

36. When a particular kind of bacteria invades the body, the immune system produces proteins that are specific to that kind of bacteria and help destroy it. These specific proteins are called:

A. Enzymes, which speed up the chemical reactions involved in digesting food

B. Hormones, which travel through the blood to regulate the body's organs

C. Antibodies, which are specific to a pathogen and help to destroy it

D. Platelets, cell fragments that gather at a wound to help the blood clot

37. When a person spends time in cold weather, the body responds by shivering, which produces heat. This response helps the body to:

A. Lower its internal temperature to match the cold air around the person

B. Stop all of its chemical reactions until the person warms back up

C. Permanently change its DNA so the person survives better in the cold

D. Maintain a stable internal temperature despite the cold surroundings

38. In sexual reproduction in animals, a sperm cell joins with an egg cell to form a single new cell that can develop into a new organism. This single cell formed at fertilization is called a:

A. Gamete, a sex cell that contains half the usual number of chromosomes

B. Zygote, the single cell formed when a sperm and an egg join together

C. Clone, an organism that is genetically identical to one of its parents

D. Mutation, a change that occurs in the DNA sequence of a single gene

39. Although the muscle cells and skin cells in a person's body have different shapes and jobs, they all contain the same set of genes. These cells are able to become different from one another because:

A. Different genes are turned on or off in different types of cells

B. Each type of cell receives a completely different set of genes

C. The environment changes the actual DNA sequence in each cell type

D. The cells gradually lose most of their genes as the person grows older

40. In a food chain, the amount of energy available decreases at each step from the producers to the top consumers. The main reason for this decrease is that, at each step, much of the energy is:

A. Created and stored permanently in the bodies of the organisms at that step

B. Passed downward to the producers at the very base of the food chain

C. Used for life processes and lost to the surroundings, largely as heat

D. Converted directly into new matter that the organisms add to their bodies

41. A scientist studies how the amount of fertilizer affects how tall tomato plants grow. He gives different amounts of fertilizer to identical plants and measures their heights. In this experiment, the amount of fertilizer is the:

A. Dependent variable, the factor that is measured as the result of the test

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

C. Control group, the group of plants that receives no fertilizer at all

D. Constant, a factor that is kept the same for every plant in the study

42. A student wants to test whether a certain music genre affects how well people remember a list of words. To make the results of the study more reliable, the student should:

A. Test only one person a single time to keep the experiment simple

B. Change the music genre and the word list at the same time during the test

C. Measure the results only once at the very end without repeating any trials

D. Test many people and repeat the experiment to confirm the results

43. A scientist records that the number of algae in a pond increases steadily as the amount of dissolved nutrients in the water increases. Based only on these data, the most reasonable conclusion is that, within the range studied:

A. Increasing the dissolved nutrients is associated with an increase in algae

B. The amount of dissolved nutrients has no effect on the number of algae

C. The number of algae decreases as the dissolved nutrients increase

D. Algae can grow only when there are no dissolved nutrients in the water

44. A biology student wants to examine the detailed structure of the cells in a thin slice of leaf tissue. The most appropriate instrument for this task is a:

A. Balance, which is used to measure the mass of an object precisely

B. Thermometer, which is used to measure the temperature of a sample

C. Microscope, which magnifies small objects so that cells can be seen

D. Graduated cylinder, which is used to measure the volume of a liquid

45. In a healthy ecosystem, bacteria and fungi break down the bodies of dead plants and animals. This activity is essential because these organisms:

A. Capture energy from the Sun and pass it on to the ecosystem's producers

B. Break down dead matter and return its nutrients to the soil for reuse

C. Hunt and capture living animals to control the ecosystem's populations

D. Prevent any new organisms from ever growing in the ecosystem again

46. Scientists classify living things into groups based on the characteristics that the organisms share. Organisms placed into the same small group, such as the same genus, are expected to:

A. Share many characteristics and be closely related to one another

B. Share no characteristics at all despite being grouped together

C. Live only in completely different habitats from one another

D. Be unable to be compared because they are placed in the same group

47. While some bacteria cause disease, many bacteria are helpful. Which of the following is an example of a beneficial role that bacteria can play?

A. Producing the sunlight that green plants need to carry out photosynthesis

B. Replacing the need for any decomposers in a healthy forest ecosystem

C. Preventing all of the chemical reactions from taking place inside cells

D. Helping break down dead matter and recycle nutrients in the soil

48. A virus is not made of cells and cannot carry out life processes on its own. In order to reproduce and make more viruses, a virus must:

A. Enter a living host cell and use that cell's machinery to make copies of itself

B. Find sunlight and water to use as the raw materials for making more viruses

C. Divide on its own into two identical halves the way that bacteria do

D. Absorb nutrients directly from the soil the way that a fungus does

49. In a population of bacteria, repeated use of an antibiotic over time leads to a population that the antibiotic can no longer kill. This change happened because the bacteria that survived the antibiotic were the ones that:

A. Were taught by the antibiotic how to defend themselves against the drug

B. Each gradually built up their own resistance during their individual lifetimes

C. Already carried a resistance trait and passed it on to their offspring

D. Caused the antibiotic to create brand-new resistance genes in every cell

50. An ecologist observes that a forest with many different species of trees and animals recovers from a fire faster than a nearby forest with only a few species. This observation best supports the conclusion that greater biodiversity tends to:

A. Increase an ecosystem's stability and its ability to recover from disturbance

B. Make an ecosystem weaker and less able to recover from a disturbance

C. Have no effect at all on how well an ecosystem recovers from a fire

D. Cause more damage to an ecosystem during a fire than fewer species would

ANSWER KEY – Practice Exam 10: Life Science: Biology Simulation

1. C — An inference is a logical interpretation drawn from evidence rather than something directly observed. Concluding a bear was present from claw marks goes beyond what was seen, making it an inference. Distinguishing inference from direct observation is a basic skill in scientific reasoning.
2. D — A tadpole changing into a frog, increasing in size and changing form, illustrates growth and development. These changes occur over the organism's life. Growth and development are among the basic life processes shared by living things.
3. B — One role of proteins is acting as enzymes that control the chemical reactions in cells. Enzymes are proteins that catalyze cellular reactions. This catalytic function is one of many jobs proteins perform.
4. A — An enzyme working fastest at body temperature and slowly at cold temperatures shows that enzyme activity depends on temperature and peaks at an optimum. Moving away from that optimum reduces activity. This temperature dependence is a key property of enzymes.
5. D — The nucleus contains the DNA that directs the cell's activities, including protein production, so removing it causes the cell to lose control of its functions. Without the nucleus, the genetic instructions are gone. This is why the nucleus is the control center of the cell.
6. B — Cell walls and chloroplasts are features of plant cells, so a cell with both is most likely a plant cell. Animal cells lack these structures. The combination of the two confirms the cell is a plant cell.
7. C — Oxygen moving from higher to lower concentration without using energy is diffusion. It moves down its concentration gradient from the lungs into the blood. This passive process drives gas exchange in the body.
8. C — Photosynthesis uses carbon dioxide from the air and water from the soil as its raw materials. These reactants are converted into glucose and oxygen. Identifying carbon dioxide and water as the inputs is key to understanding the process.
9. D — ATP is the molecule that stores the usable energy released from glucose during cellular respiration. The cell draws on ATP to power its activities. This makes ATP the cell's immediate energy currency.
10. B — Plants release oxygen during photosynthesis, and animals take in that same oxygen for respiration. This shared gas links the two processes. The exchange of oxygen supports the interdependence of plants and animals.
11. C — Mitosis produces new body cells for the growth of an organism, accounting for a young tree's yearly increase in cells. Each division adds genetically identical cells. Mitosis is the cell division responsible for growth.
12. A — Crossing over, the exchange of DNA between homologous chromosomes during meiosis, increases the genetic variation among offspring. This shuffling creates new allele combinations. Such variation is a major benefit of sexual reproduction.
13. B — In DNA, cytosine always pairs with guanine, forming one type of rung on the DNA ladder. This follows the base-pairing rules. Correct pairing allows DNA to be copied accurately.
14. D — A gene most directly influences a trait by directing the cell to build a specific protein, and that protein helps produce the trait. The link from gene to protein to trait is central to inheritance. This is how genetic information shapes an organism.

15. C — A brand-new form of a gene arises through mutation, a change in the DNA sequence. Mutations are the original source of new genetic variation. This new variation can then be acted on by natural selection.
16. A — Producing higher-milk cows by always breeding the best producers is selective breeding, a human-directed process. It relies on choosing which organisms reproduce. Over generations, this shifts the traits of the herd.
17. B — A pest-killing gene makes the crop suffer less damage from insect pests, which is the direct advantage. The plant expresses the protective substance from the inserted gene. This targeted improvement is the goal of the modification.
18. D — Crossing Pp × Pp produces a 3:1 ratio of dominant to recessive phenotypes, so purple to white is expected at 3 to 1. Three of the four genotype combinations include a dominant P allele and appear purple. Only the homozygous recessive offspring are white.
19. C — Both PP and Pp plants look purple because a single dominant allele is enough to produce the purple flower color. The dominant allele masks the recessive one in the heterozygote. This is why different genotypes can share the same phenotype.
20. A — A child showing a mix of parental traits results from receiving genetic information from both the mother and the father. Sexual reproduction combines genes from two parents. This mixing produces the blend of traits seen in offspring.
21. D — According to Darwin, competition for limited resources means individuals with traits better suited to the environment are more likely to survive and reproduce. This differential survival drives natural selection. The best-suited individuals pass on their advantageous traits.
22. B — Inherited differences among individuals in a population are called variation. Natural selection requires this variation so that some individuals are better suited than others. Variation is the raw material for evolutionary change.
23. B — Very similar DNA and shared proteins between two species indicate they are closely related and share a recent common ancestor. Molecular similarity reflects evolutionary relatedness. The more shared sequences, the closer the relationship.
24. A — Fossils provide evidence for evolution because they show that the kinds of organisms living on Earth have changed over time. Older fossils often differ from modern organisms. This record of change supports the theory of evolution.
25. B — Building hidden nests to protect eggs is a behavioral adaptation that improves the survival of offspring. It is an inherited behavior rather than a physical structure. Such behaviors arise through natural selection like physical adaptations.
26. D — Grasses and wildflowers that use sunlight to make their own food are producers. They form the base of the food chain by producing food through photosynthesis. Producers supply energy to the consumers that eat them.
27. C — A sharp decline in owls would allow the mouse population to increase, because fewer owls would be eating the mice. Removing a predator releases the prey from that pressure. This indirect effect is common in food webs.
28. A — Birds eating pests off grazing animals benefit by getting food while the animals benefit by being relieved of pests, making this mutualism. Both partners gain an advantage. This reciprocal benefit defines mutualism.
29. D — A frost that affects insects regardless of population size is a density-independent factor. Its impact does not depend on how crowded the population is. This contrasts with density-dependent factors like disease.

30. B — Lichens that are the first organisms to colonize bare rock are pioneer species. They begin building soil so other organisms can follow. Pioneer species start the process of primary succession.
31. A — A persistent pollutant becoming most concentrated in top predators illustrates biomagnification, the increasing concentration of a toxin up the food chain. Because it does not break down, it accumulates at higher levels. This is why top predators are most affected.
32. C — Burning fossil fuels releases large amounts of carbon dioxide, a greenhouse gas that traps heat in the atmosphere. Rising carbon dioxide levels are linked to rising global temperatures. Reducing these emissions is a focus of climate efforts.
33. D — The main role of the digestive system is to break food down into small molecules that the body's cells can absorb. This breakdown makes nutrients available for energy and growth. Without it, the body could not use the food a person eats.
34. B — The respiratory system takes in oxygen that the circulatory system then carries to the cells, which is how the two systems cooperate. Their teamwork delivers oxygen that neither could accomplish alone. This interdependence keeps the body's cells supplied.
35. A — A rapid, automatic protective response that occurs before conscious awareness, like pulling a hand from a sharp object, is a reflex. It bypasses slower conscious decision-making. Reflexes help protect the body from injury.
36. C — Antibodies are proteins specific to a particular pathogen that help destroy it. Their specificity lets the immune system target a particular kind of bacteria. This targeted defense is central to fighting infection.
37. D — Shivering to produce heat helps the body maintain a stable internal temperature despite cold surroundings. This response counteracts heat loss. Keeping temperature steady is an example of homeostasis.
38. B — The single cell formed when a sperm and an egg join at fertilization is called a zygote. From this cell a new organism develops. The zygote is the starting point of development.
39. A — Specialized cells differ because different genes are turned on or off in different cell types, even though all share the same genes. This differential gene expression produces cell diversity. It explains how one set of genes gives rise to many cell types.
40. C — Energy decreases at each step of a food chain because much of it is used for life processes and lost to the surroundings as heat. Only a fraction passes to the next level. This loss limits the length of food chains.
41. B — The amount of fertilizer is the independent variable because it is the factor the scientist deliberately changes. The plant height measured in response is the dependent variable. Identifying the manipulated factor is key to the experiment.
42. D — Testing many people and repeating the experiment makes the results more reliable by providing a larger sample and confirming the findings. A bigger sample and replication reduce the effect of chance. These are core principles of sound experimental design.
43. A — Since algae increase steadily as nutrients increase, the data support that increasing dissolved nutrients is associated with an increase in algae. This describes a direct relationship within the range studied. Conclusions should stay within the conditions actually measured.
44. C — A microscope is the appropriate instrument because it magnifies small objects so that cells can be seen. Cells are too small for the unaided eye. The microscope makes cellular structures visible for study.

45. B — Bacteria and fungi that break down dead matter and return its nutrients to the soil are essential because they recycle nutrients for reuse. This decomposition keeps the ecosystem supplied with the materials life needs. Without decomposers, nutrients would stay locked in dead matter.
46. A — Organisms placed in the same small group, such as a genus, are expected to share many characteristics and be closely related. The closer the grouping, the more traits and ancestry shared. Classification is based on such shared characteristics.
47. D — A beneficial role of bacteria is helping break down dead matter and recycle nutrients in the soil. These decomposing bacteria return nutrients for producers to use. Their activity supports the cycling of matter in ecosystems.
48. A — Because a virus is not made of cells and cannot carry out life processes alone, it must enter a living host cell and use that cell's machinery to make copies. This dependence on a host defines how viruses reproduce. It is why viruses multiply only inside cells.
49. C — The surviving bacteria already carried a resistance trait and passed it on to their offspring, so resistance became common. The antibiotic selected for existing resistance rather than creating it. This is natural selection acting on a bacterial population.
50. A — The more diverse forest recovering faster supports the conclusion that greater biodiversity increases an ecosystem's stability and ability to recover from disturbance. Higher diversity tends to make ecosystems more resilient. This finding highlights the value of biodiversity.