

PRACTICE EXAM 6: LIFE SCIENCE: BIOLOGY SIMULATION (50 QUESTIONS)

1. A plant placed near a window grows so that its stems bend toward the light coming through the glass. This response of the plant to a change in its environment best illustrates the life process of:

- A. Reproduction, the ability of an organism to produce new individuals
- B. Response to stimuli, the ability to react to changes in the environment
- C. Excretion, the removal of the waste products of an organism's metabolism
- D. Digestion, the breakdown of large molecules into smaller usable ones

2. An amoeba is a single-celled organism that carries out all of its life processes within one cell, while a human carries out life processes using many specialized cells. Compared with the amoeba, the human is best described as:

- A. A multicellular organism whose specialized cells perform different functions
- B. A single-celled organism that performs every function within one cell
- C. A nonliving structure because it is made of more than one type of cell
- D. An organism that does not need to carry out any of the basic life processes

3. Most of the molecules that make up living organisms, such as carbohydrates, proteins, and lipids, contain a particular element that allows them to form long, complex chains. This element is:

- A. Oxygen, which makes up the largest portion of every cell by weight
- B. Iron, which is found in the center of every protein in living organisms

C. Sodium, which forms the backbone of all carbohydrate molecules

D. Carbon, which can form long chains and rings to build complex molecules

4. An enzyme-controlled reaction speeds up as temperature rises from 10°C to 37°C, but slows sharply and then stops as the temperature continues to rise toward 60°C. The slowing of the reaction above 37°C is best explained by the fact that the enzyme has:

A. Run out of substrate molecules to bind at the higher temperatures

B. Begun to multiply rapidly, using up the available energy in the reaction

C. Started to lose its shape, so its active site no longer fits the substrate

D. Changed into a different enzyme that works only at very high temperatures

5. The nucleus of a eukaryotic cell is often described as the control center of the cell. The nucleus deserves this description because it:

A. Produces all of the energy that the cell needs to carry out its activities

B. Contains the DNA that directs the cell's activities and protein production

C. Captures sunlight and uses it to manufacture sugar for the entire cell

D. Stores large amounts of water and dissolved wastes within the cell

6. The cell membrane is described as selectively permeable. This term means that the membrane:

A. Allows absolutely all substances to pass through it freely at all times

B. Blocks every substance from entering or leaving the cell under any condition

C. Permits substances to cross only when the cell is actively dividing in two

D. Allows some substances to pass through while blocking or controlling others

7. A plant cell is placed in pure distilled water. Because the inside of the cell contains dissolved substances, water will tend to move:

- A. Into the cell by osmosis, since water moves toward the higher solute concentration
- B. Out of the cell by osmosis, since water always leaves cells placed in pure water
- C. Out of the cell by active transport, which uses energy to pump water outward
- D. Neither into nor out of the cell, since pure water cannot cross the membrane

8. In a green plant, a pigment found in the chloroplasts absorbs light energy and makes photosynthesis possible. This pigment is:

- A. Chlorophyll, which absorbs light energy used to produce sugar in the plant
- B. Hemoglobin, which absorbs light energy and carries it through the plant's stem
- C. Keratin, which absorbs light energy and stores it within the plant's roots
- D. Insulin, which absorbs light energy and converts it directly into plant tissue

9. When you eat and digest a sandwich, the energy your body cells obtain from the food is released through a process that takes place inside the cells. This energy-releasing process is:

- A. Photosynthesis, which builds sugars from carbon dioxide using light energy
- B. Digestion, which mechanically and chemically breaks the food into pieces
- C. Excretion, which removes the waste products that the cells no longer need
- D. Cellular respiration, which releases the energy stored in food molecules

10. In an ecosystem, plants and animals continually exchange two gases that link photosynthesis and respiration. Which pair of gases is exchanged between these processes?

- A. Nitrogen and hydrogen, which cycle between the plants and the animals
- B. Oxygen and carbon dioxide, which cycle between photosynthesis and respiration
- C. Helium and methane, which are produced and used by both kinds of organisms
- D. Ozone and ammonia, which move back and forth between plants and animals

11. When you cut your finger, the skin eventually heals as new cells replace the ones that were damaged. The process that produces these new, genetically identical skin cells is:

- A. Mitosis, which produces new body cells for growth and the repair of tissue
- B. Meiosis, which produces sex cells with half the usual number of chromosomes
- C. Fertilization, which joins a sperm and an egg to begin a new organism
- D. Pollination, which transfers pollen from one flower to another flower

12. In organisms that reproduce sexually, a special type of cell division produces sex cells with half the number of chromosomes found in body cells. This type of division is important because it:

- A. Produces body cells that are used for the growth and repair of tissues
- B. Creates cells that are exact genetic copies of the single parent organism
- C. Keeps the chromosome number constant from one generation to the next
- D. Doubles the chromosome number so that offspring have extra genetic material

13. DNA is found in the cells of all living organisms and is often called the molecule of heredity. DNA earns this name because it:

- A. Provides the immediate energy that powers the activities of the cell
- B. Forms the membranes that surround and protect each living cell
- C. Speeds up the chemical reactions that take place inside living cells
- D. Stores the genetic instructions that are passed from parents to offspring

14. During the production of a protein, a cell structure reads the genetic message carried by messenger RNA and links amino acids together in the correct order. This structure is the:

- A. Ribosome, which assembles amino acids into a protein according to the message
- B. Nucleus, which stores the genetic message but does not build any proteins
- C. Mitochondrion, which supplies energy but does not assemble the protein

D. Cell membrane, which controls what enters the cell but builds no protein

15. A mutation occurs in the DNA of one of an organism's sex cells. Compared with a mutation in a skin cell, this mutation is significant because it:

A. Will have no effect at all, since mutations in sex cells are always repaired

B. Affects only the organism in which it occurs and not its future offspring

C. Can be passed on to the organism's offspring through reproduction

D. Immediately changes the DNA in every other cell of the organism's body

16. Investigators can compare DNA samples found at a scene with DNA from different individuals because each person's DNA produces a unique pattern. This use of DNA patterns to identify individuals is known as:

A. Selective breeding, in which organisms with desired traits are chosen to reproduce

B. DNA fingerprinting, in which unique DNA patterns are used to identify individuals

C. Cloning, in which an exact genetic copy of an organism is produced in a lab

D. Cross-pollination, in which pollen is transferred between two different plants

17. Before recombinant DNA technology, insulin for treating diabetes was obtained from animals. Today, human insulin can be produced in large amounts by inserting the human insulin gene into:

A. Plants, which then grow insulin crystals inside their leaves for harvesting

B. Viruses, which manufacture insulin while floating freely in the bloodstream

C. Red blood cells, which release insulin as they travel through the body

D. Bacteria, which then produce human insulin as they reproduce in large numbers

18. In pea plants, tall (T) is dominant over short (t). A plant with the genotype Tt is best described as:

A. Heterozygous for height, carrying one dominant and one recessive allele

- B. Homozygous dominant, carrying two identical dominant alleles for height
- C. Homozygous recessive, carrying two identical recessive alleles for height
- D. Unable to reproduce, because mixed alleles prevent the plant from making seeds

19. In a certain plant, red flowers (R) are dominant over white flowers (r). A heterozygous red plant (Rr) is crossed with a white plant (rr). What percentage of the offspring is expected to have white flowers?

- A. 0%, because the dominant red allele prevents any white offspring from appearing
- B. 25%, because only one of every four offspring inherits two recessive alleles
- C. 50%, because half of the offspring inherit two recessive alleles and appear white
- D. 100%, because white is recessive and therefore appears in all of the offspring

20. Two genetically identical plants are grown from cuttings of the same parent. One is grown in bright sunlight and the other in dim light, and the one in bright light grows much larger. This difference in size shows that:

- A. The two plants must have had completely different genes from the start
- B. The environment can affect how an organism's inherited traits are expressed
- C. Sunlight changes the DNA sequence of the plant grown in bright light
- D. Plant size is controlled entirely by genes and not at all by the environment

21. A population of moths includes light-colored and dark-colored individuals. After tree bark in the area becomes darkened by pollution, the dark moths survive better because they are harder for birds to see. Over time, the dark moths become more common. This change in the population is the result of:

- A. The moths choosing to change their color to match the darkened tree bark
- B. The pollution directly changing the genes of every moth in the population
- C. Each individual moth gradually darkening its wings during its own lifetime
- D. Natural selection favoring the better-camouflaged moths in the new conditions

22. Scientists comparing the DNA of different organisms have found that humans and mice share a large number of similar genes. This similarity is best explained by the idea that humans and mice:

- A. Share a common ancestor from which they inherited many of the same genes
- B. Evolved their matching genes completely independently of one another
- C. Belong to the exact same species despite their many physical differences
- D. Exchange genes directly with each other when they live in the same area

23. A group of birds from a mainland population is blown by a storm to a distant island, where they remain separated from the original population for many generations. The most likely long-term result of this separation is that the island birds will:

- A. Remain genetically identical to the mainland birds because they cannot change
- B. Gradually become different and may eventually form a new, separate species
- C. Immediately become a new species the moment they land on the island
- D. Return to the mainland and merge back into the original population unchanged

24. Some birds migrate thousands of miles each year to reach areas with more food and milder weather during the cold season. This migration is best described as a:

- A. Structural adaptation, an inherited physical feature of the bird's body
- B. Random mutation that gives the birds a new ability during their lifetime
- C. Behavioral adaptation that improves the birds' chances of survival
- D. Vestigial behavior that no longer serves any purpose for the birds

25. The fossil record shows that some species survived for millions of years and then disappeared when their environment changed rapidly. These extinctions most likely occurred because the species:

- A. Reproduced too quickly and used up all of their available resources at once
- B. Chose to stop reproducing when the conditions around them began to change

- C. Were replaced instantly by identical species that appeared from elsewhere
- D. Could not adapt quickly enough to survive the rapid changes in their environment

26. In a pond ecosystem, algae and water plants are able to make their own food using sunlight. Because of this ability, these organisms are classified as:

- A. Producers, which capture energy from the Sun and make their own food
- B. Consumers, which obtain energy by feeding on other living organisms
- C. Decomposers, which break down dead organisms to recycle their nutrients
- D. Predators, which hunt and capture other animals for their source of food

27. In a meadow, a snake eats frogs, and the frogs eat insects that feed on plants. In this food chain, the snake is best classified as a:

- A. Producer, because it forms the base of the food chain in the meadow
- B. Primary consumer, because it feeds directly on the meadow plants
- C. Secondary or higher consumer, because it eats animals that eat other organisms
- D. Decomposer, because it breaks down the dead remains of the frogs it eats

28. Two species of plants growing in the same small area both require the same nutrients, water, and sunlight. As they grow larger, they increasingly interfere with each other's access to these resources. This interaction is an example of:

- A. Mutualism, in which both plant species clearly benefit from growing together
- B. Competition, in which organisms struggle over the same limited resources
- C. Predation, in which one plant captures and consumes the other for food
- D. Commensalism, in which one plant benefits and the other is left unaffected

29. In an ecosystem, the population of foxes and the population of rabbits they eat tend to rise and fall in a repeating pattern over many years. This pattern occurs because:

- A. The rabbits and foxes reproduce at exactly the same rate every single year
- B. The foxes and rabbits never affect each other's population sizes at all
- C. The rabbits hunt the foxes whenever the fox population becomes too large
- D. Changes in the prey population affect the predators, which in turn affect the prey

30. Over a long period, an abandoned field changes from grasses to shrubs and finally to a mature, stable forest that no longer changes very much. This final, stable stage of succession is called the:

- A. Climax community, the stable community reached at the end of succession
- B. Pioneer community, the first organisms to colonize a bare or disturbed area
- C. Limiting factor, a condition that restricts the growth of a population
- D. Carrying capacity, the maximum population an environment can support

31. A factory releases chemicals into a river, and downstream the number of fish species sharply decreases. The most reasonable conclusion is that the chemicals released by the factory:

- A. Improved the river habitat, allowing more kinds of fish to thrive downstream
- B. Had no measurable effect on the organisms living in the river downstream
- C. Reduced the water quality, harming the fish that lived downstream of the factory
- D. Caused the fish downstream to evolve into entirely new species very quickly

32. To reduce the depletion of natural resources, some communities promote the use of energy sources that are naturally replenished, such as sunlight and wind. These naturally replenished sources are called:

- A. Fossil fuels, which formed from ancient organisms over millions of years
- B. Renewable resources, which are naturally replenished and not easily used up
- C. Nonrenewable resources, which exist in limited amounts that cannot be replaced
- D. Pollutants, which are harmful substances released into the environment

33. The human digestive system carries out an important function that allows the body to use the food a person eats. The main function of the digestive system is to:

- A. Break down food into small molecules that the body's cells can absorb and use
- B. Pump blood throughout the body to deliver oxygen to all of the body's cells
- C. Filter wastes out of the blood and remove them from the body as urine
- D. Carry electrical messages that allow the body to respond to its surroundings

34. In the human body, muscles are attached to bones and work together to allow movement. When a muscle contracts, it pulls on a bone to move part of the body. This cooperation is an example of:

- A. A single organ carrying out movement entirely on its own without any help
- B. The digestive and nervous systems working together to move the body
- C. Two organisms competing for the same resources within the human body
- D. Two organ systems, the muscular and skeletal, working together for movement

35. The human heart is a muscular organ that contracts rhythmically throughout a person's life. The primary function of the heart is to:

- A. Exchange oxygen and carbon dioxide between the air and the bloodstream
- B. Filter harmful wastes out of the blood before returning it to the body
- C. Pump blood through the blood vessels to all parts of the body
- D. Produce the digestive juices needed to break down food in the stomach

36. When a person breathes in, air travels to the lungs, where a gas needed by body cells passes into the blood. Which gas passes from the lungs into the blood during this process?

- A. Oxygen, which the blood then carries to cells throughout the body
- B. Carbon dioxide, which the blood then carries to cells throughout the body
- C. Nitrogen, which the cells use directly to build new proteins for growth

D. Helium, which the cells use as their main source of usable energy

37. A person hears a loud sound and immediately turns toward it. In this response, the ears detect the sound and send a message to the brain, which then directs the muscles to turn the head. The structures that carry these rapid messages are the:

- A. Hormones, which are chemicals released slowly into the bloodstream
- B. Nerves, which carry rapid electrical signals between the body's parts
- C. Red blood cells, which travel through the blood vessels carrying oxygen
- D. Enzymes, which speed up the chemical reactions that occur within cells

38. A vaccine for a disease contains weakened or inactivated parts of a pathogen. After receiving the vaccine, a person is protected because their immune system has:

- A. Removed all of the white blood cells that might react to the pathogen
- B. Changed the person's DNA so the pathogen can never enter the body
- C. Produced antibiotics that will destroy the pathogen if it ever appears
- D. Built a memory of the pathogen, allowing a fast response to future infection

39. On a hot day, a person begins to sweat, and the evaporation of the sweat helps cool the body back toward its normal temperature. This response helps the body maintain a stable internal temperature and is an example of:

- A. A disease that disrupts the body's normal control of its temperature
- B. Positive feedback that drives the body's temperature even higher
- C. Homeostasis maintained through a feedback response that reverses the change
- D. Natural selection acting on the person's sweat glands during their lifetime

40. In sexual reproduction in animals, a new organism begins to develop when a sperm cell and an egg cell join together. This joining of a sperm and an egg is called:

- A. Fertilization, which combines genetic material from two parents into one cell
- B. Mitosis, which produces two genetically identical body cells from one cell
- C. Digestion, which breaks down large food molecules into smaller usable ones
- D. Excretion, which removes the waste products produced by an organism's cells

41. A student notices that bread seems to mold faster in a warm kitchen than in a cold refrigerator. Which of the following would be the best hypothesis for the student to test?

- A. Bread is a type of food that many people enjoy eating with their meals
- B. Refrigerators are useful appliances found in most modern kitchens today
- C. Mold is a type of fungus that grows on many different kinds of food
- D. Bread stored at warmer temperatures will grow mold faster than bread kept cold

42. In an experiment testing how the amount of water affects plant growth, a scientist gives different amounts of water to identical plants while keeping the light, soil, and temperature the same. The amount of water in this experiment is the:

- A. Dependent variable, which is the plant growth measured at the end of the test
- B. Independent variable, which is the factor the scientist deliberately changes
- C. Control group, which receives no treatment and serves as a comparison
- D. Constant, which is a factor kept the same for every plant in the experiment

43. In an experiment, a scientist measures the rate of a reaction at five different temperatures and finds that the rate increases steadily as the temperature rises. Based only on these data, the most appropriate conclusion is that, within the range tested:

- A. Temperature has no effect on the rate of the reaction being studied
- B. The reaction rate decreases as the temperature is raised step by step
- C. Increasing the temperature increases the rate of the reaction
- D. The reaction rate is completely unrelated to any change in temperature

44. A student wants to observe the individual cells that make up a thin slice of onion tissue. Which tool would be most appropriate for this investigation?

- A. A microscope, which magnifies small objects so that cells can be seen
- B. A balance, which measures the mass of an object placed upon its pan
- C. A thermometer, which measures the temperature of a substance or surroundings
- D. A graduated cylinder, which measures the volume of a liquid sample

45. Nearly all of the energy that flows through the living things in an ecosystem can ultimately be traced back to a single original source. That original source of energy is:

- A. The decomposers, which release energy as they break down dead organisms
- B. The soil, which stores chemical energy that plants absorb through their roots
- C. The consumers, which generate energy as they move and search for food
- D. The Sun, whose light energy is captured by producers during photosynthesis

46. A scientist discovers a new organism that has a backbone, gives birth to live young, has hair, and feeds its young with milk. Based on these characteristics, the organism would most likely be classified as a:

- A. Reptile, a group of animals that have scales and lay eggs on dry land
- B. Mammal, a group of animals that have hair and feed their young with milk
- C. Fish, a group of animals that have gills and live their entire lives in water
- D. Insect, a group of animals that have six legs and three main body segments

47. Although some bacteria cause disease, many bacteria are helpful to ecosystems and to humans. Which of the following is a beneficial role played by some bacteria?

- 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. Breaking down dead organisms and returning nutrients to the soil

D. Preventing all chemical reactions from occurring inside living cells

48. A virus causes disease by entering a host cell and using the cell's own machinery to make many copies of the virus, often damaging or destroying the cell in the process. This explains why viruses:

- A. Can reproduce on their own anywhere, without ever needing a host cell
- B. Are classified as the producers at the base of every ecosystem's food chain
- C. Must invade living cells in order to reproduce and spread the infection
- D. Are easily destroyed by antibiotics in the same way that bacteria are

49. An ecologist compares two grasslands and finds that the one with a greater variety of plant and animal species is better able to survive a drought than the one with fewer species. This finding supports the idea that:

- A. Grasslands with fewer species are always the healthiest and most stable
- B. The variety of species in an ecosystem has no effect on its survival
- C. Droughts cause more harm to ecosystems that contain many different species
- D. Greater biodiversity tends to increase an ecosystem's stability and resilience

50. A town must decide whether to clear a large forest to build new housing. To make a responsible decision, town planners should:

- A. Clear the entire forest immediately to provide as much housing as possible
- B. Weigh the need for housing against the environmental value of the forest
- C. Avoid gathering any information, since the decision cannot affect the environment
- D. Choose the option that costs the least money regardless of any other effects

ANSWER KEY – Practice Exam 6: Life Science: Biology Simulation

1. B — Bending toward light is a response to stimuli, the ability of an organism to react to changes in its environment. The plant detects the light source and grows toward it. This reaction to an external change is one of the basic life processes shared by living things.
2. A — A human is a multicellular organism whose many specialized cells perform different functions, in contrast to the single-celled amoeba. Different cell types handle different jobs in the body. This division of labor among cells is characteristic of complex multicellular life.
3. D — Carbon is the key element in organic molecules because it can form long chains and rings, allowing the construction of complex carbohydrates, proteins, and lipids. Its bonding ability is the basis of the diversity of life's molecules. Carbon's versatility makes it central to all organic chemistry.
4. C — Above its optimum temperature, an enzyme begins to denature, losing the shape of its active site so it can no longer fit the substrate. This loss of shape slows and finally stops the reaction. The shape change explains why excessive heat disables enzyme activity.
5. B — The nucleus contains the cell's DNA, which directs the cell's activities and the production of proteins. Because it holds and controls the genetic instructions, it functions as the control center. This regulatory role is why the nucleus governs cell function.
6. D — Selectively permeable means the membrane allows some substances to cross while blocking or controlling others. This selectivity lets the cell regulate its internal environment. Controlling what enters and leaves is a defining property of the cell membrane.
7. A — Because the cell contains dissolved substances, water moves into the cell by osmosis toward the higher solute concentration inside. Water always moves toward the side where solutes are more concentrated. This inward flow is why cells swell in pure water.
8. A — Chlorophyll is the pigment in chloroplasts that absorbs light energy and makes photosynthesis possible, allowing the plant to produce sugar. Its light absorption powers the food-making process. Without chlorophyll, the plant could not capture the energy of sunlight.
9. D — Cellular respiration is the process inside cells that releases the energy stored in food molecules so the body can use it. Digestion only breaks food into smaller pieces; respiration extracts the usable energy. This energy release supplies the ATP that powers cell activities.
10. B — Photosynthesis and respiration exchange oxygen and carbon dioxide: plants release oxygen and take in carbon dioxide, while respiration does the reverse. This pairing links the two processes in a continuous cycle. The exchange of these gases connects producers and consumers in ecosystems.
11. A — Mitosis produces new, genetically identical body cells used for growth and the repair of tissue, such as healing skin. The new cells must match the originals to rebuild the damaged area. This is why mitosis underlies wound healing and growth.
12. C — Meiosis halves the chromosome number in sex cells so that, when two gametes unite at fertilization, the normal number is restored. This keeps the chromosome number constant across generations. Without this halving, the count would double each generation.
13. D — DNA is called the molecule of heredity because it stores the genetic instructions passed from parents to offspring. These instructions direct the traits of the next generation. Its role in inheritance is what gives DNA this name.
14. A — The ribosome reads the message carried by messenger RNA and assembles amino acids into a protein in the correct order. This makes the ribosome the site of protein synthesis. Its function links the genetic message to the finished protein.

15. C — A mutation in a sex cell can be passed on to the organism's offspring through reproduction, unlike a mutation in a skin cell. Because gametes give rise to the next generation, changes in them are heritable. This is why sex-cell mutations are evolutionarily significant.
16. B — DNA fingerprinting uses the unique pattern of each individual's DNA to identify people, such as by matching samples from a scene. The uniqueness of DNA patterns makes this identification possible. It is a key tool in forensic investigations.
17. D — Recombinant DNA technology produces human insulin by inserting the human insulin gene into bacteria, which then make the protein as they reproduce in large numbers. The rapid multiplication of bacteria yields large quantities of insulin. This method replaced reliance on animal sources.
18. A — A Tt plant is heterozygous, carrying one dominant (T) and one recessive (t) allele for height. Having two different alleles for the trait defines the heterozygous condition. The dominant allele determines that the plant appears tall.
19. C — Crossing Rr with rr produces half Rr (red) and half rr (white) offspring, so 50% are expected to have white flowers. Each white offspring inherits two recessive alleles. This 1:1 ratio is typical of a heterozygous-by-recessive cross.
20. B — Because genetically identical plants differ in size based on the light they receive, the environment must affect how inherited traits are expressed. Genes set the potential, but conditions shape the outcome. This shows that phenotype depends on both genes and environment.
21. D — Dark moths survive better against darkened bark, so natural selection favors the better-camouflaged individuals, making them more common over time. The environment selects among existing variation rather than creating it. This is a classic example of natural selection in action.
22. A — Shared genes between humans and mice are best explained by descent from a common ancestor from which both inherited those genes. Genetic similarity reflects evolutionary relatedness. The more genes shared, the closer the shared ancestry.
23. B — Long-term geographic separation allows the island birds to gradually become different and possibly form a new species. Isolation prevents gene flow, letting the populations diverge over many generations. This is how geographic isolation can lead to speciation.
24. C — Migration is a behavioral adaptation, an inherited pattern of behavior that improves the birds' chances of survival by reaching better conditions. It is an action rather than a physical structure. Such behaviors arise through natural selection like physical traits.
25. D — These extinctions occurred because the species could not adapt quickly enough to survive rapid environmental change. When conditions shift faster than a population can respond, it dies out. This illustrates the link between adaptation and survival.
26. A — Algae and water plants that make their own food using sunlight are classified as producers. They convert light energy into food through photosynthesis. Producers form the base of the ecosystem's food chain.
27. C — A snake that eats frogs, which eat insects, is a secondary or higher-level consumer because it feeds on animals that consume other organisms. Its position is well above the producers. This classification reflects its place in the flow of energy.
28. B — When organisms struggle over the same limited resources, the interaction is competition, as with two plants needing the same nutrients, water, and light. Their interference with each other's access defines the relationship. Competition can limit the growth of both species.
29. D — Predator and prey populations cycle because changes in the prey population affect the predators, which in turn affect the prey. More prey supports more predators, which then reduce prey numbers. This feedback produces the repeating rise-and-fall pattern.

30. A — The stable forest reached at the end of succession is the climax community, which changes little once established. It represents the endpoint of the successional process. The climax community persists until a major disturbance resets it.
31. C — The sharp drop in fish species downstream indicates the chemicals reduced the water quality, harming the fish living there. The pattern links the factory's discharge to the decline. This shows how pollution can damage aquatic ecosystems.
32. B — Energy sources that are naturally replenished, such as sunlight and wind, are renewable resources. They are not easily used up because nature continually restores them. Using renewable resources helps reduce depletion of natural supplies.
33. A — The digestive system's main function is to break food into small molecules that the body's cells can absorb and use. This breakdown makes nutrients available for energy and growth. Without digestion, the body could not use the food a person eats.
34. D — Muscles pulling on bones to produce movement is an example of two organ systems, the muscular and skeletal, working together. Neither system could produce movement alone. Their cooperation illustrates how body systems function as a team.
35. C — The heart's primary function is to pump blood through the blood vessels to all parts of the body. Its rhythmic contractions keep blood circulating. This circulation delivers oxygen and nutrients and removes wastes.
36. A — During breathing, oxygen passes from the lungs into the blood, which then carries it to cells throughout the body. The cells need this oxygen for cellular respiration. This gas exchange is the central purpose of breathing in.
37. B — Nerves carry the rapid electrical signals that move between the ears, brain, and muscles to produce the quick response. Their fast signaling allows immediate reactions. This speed distinguishes nervous control from slower hormonal signaling.
38. D — A vaccine works because the immune system builds a memory of the pathogen, allowing a fast, strong response if the real pathogen appears later. Memory cells provide this lasting protection. This is the basis of immunity produced by vaccination.
39. C — Sweating to cool the body back toward normal temperature maintains homeostasis through a feedback response that reverses the change. The cooling counteracts the rise in temperature. This stabilizing response keeps internal conditions steady.
40. A — The joining of a sperm and an egg is fertilization, which combines genetic material from two parents into a single cell. This new cell begins the development of the offspring. Fertilization is the starting point of sexual reproduction.
41. D — A good hypothesis must be a testable statement predicting a relationship, such as warmer bread molding faster than cold bread. This prediction can be tested by experiment. The other statements are facts or observations, not testable predictions.
42. B — The amount of water is the independent variable because it is the factor the scientist deliberately changes. The plant growth measured in response would be the dependent variable. Identifying the manipulated factor is key to designing the experiment.
43. C — Since the rate rises steadily as temperature increases, the supported conclusion is that increasing temperature increases the reaction rate within the range tested. The data show a direct relationship. Conclusions should stay within the conditions actually measured.
44. A — A microscope is the appropriate tool because it magnifies small objects so that individual cells can be seen. Cells are too small to observe with the unaided eye. The microscope makes cellular structures visible for study.

45. D — Nearly all energy in an ecosystem traces back to the Sun, whose light energy is captured by producers during photosynthesis. This captured energy then flows to consumers. The Sun is the ultimate source of energy for life.
46. B — Having hair and feeding young with milk are defining characteristics of mammals, so the organism is classified as a mammal. These traits distinguish mammals from other animal groups. Live birth and a backbone are also consistent with this classification.
47. C — A beneficial role of some bacteria is breaking down dead organisms and returning nutrients to the soil. These decomposing bacteria recycle matter through the ecosystem. Their activity supports the growth of producers.
48. C — Because viruses use a host cell's machinery to reproduce, they must invade living cells in order to multiply and spread infection. They cannot reproduce on their own outside a host. This dependence on host cells defines how viruses cause disease.
49. D — The more diverse grassland surviving drought better supports the idea that greater biodiversity tends to increase an ecosystem's stability and resilience. A wider variety of species helps an ecosystem withstand disturbance. This finding highlights the value of biodiversity.
50. B — A responsible decision requires weighing the need for housing against the environmental value of the forest. Considering both sides leads to a balanced choice. Evaluating trade-offs is central to sound environmental decision-making.