

PRACTICE EXAM 18: LIFE SCIENCE: BIOLOGY SIMULATION (50 QUESTIONS)

1. The basic unit of structure and function in all living things is the:
 - A. Tissue, a group of similar cells that work together to carry out a function
 - B. Organ, a structure of several tissues that performs a specific function
 - C. Cell, the smallest unit capable of carrying out the processes of life
 - D. Organ system, a group of organs that work together for a major function

2. Some organisms are made of a single cell, while others are made of many cells. A multicellular organism is one that is:
 - A. Made of a single cell that carries out all of the organism's life functions
 - B. Made of many cells, often specialized to perform different functions
 - C. Always microscopic and impossible to see without using a microscope
 - D. Unable to carry out the basic life processes needed for its survival

3. In a cell, the genetic information that directs the cell's activities is found in a molecule called:
 - A. Glucose, a simple sugar that supplies the cell with usable energy
 - B. ATP, the molecule that stores and releases energy for cell activities
 - C. Cellulose, a carbohydrate that makes up the cell walls of plant cells
 - D. DNA, the molecule that carries the genetic information of the cell

4. A student observes a cell that has a cell wall, a large central vacuole, and green organelles that capture sunlight. The student is most likely observing:

- A. A plant cell, which has a cell wall, a vacuole, and chloroplasts
- B. An animal cell, which lacks a cell wall and has no chloroplasts at all
- C. A bacterial cell, which has no nucleus or membrane-bound organelles
- D. A virus, which is not a cell and cannot carry out life processes on its own

5. The cell membrane surrounds the cell and controls the movement of materials into and out of it. The cell membrane is able to do this because it is:

- A. Completely solid, blocking all materials from crossing it at any time
- B. Made entirely of a thick layer of carbohydrate that no molecule can cross
- C. Selectively permeable, allowing some materials to cross while blocking others
- D. Open to all materials, allowing anything to move freely in and out of the cell

6. The movement of molecules from an area of higher concentration to an area of lower concentration, without the use of energy by the cell, is called:

- A. Active transport, which requires the cell to use energy to move materials
- B. Endocytosis, in which the cell membrane surrounds material to bring it in
- C. Photosynthesis, the process of making glucose using the energy of sunlight
- D. Diffusion, the movement of molecules from high to low concentration

7. Plants make their own food through the process of photosynthesis. Which of the following are the raw materials that a plant uses during photosynthesis?

- A. Glucose and oxygen, which the plant combines to release stored energy
- B. Carbon dioxide and water, which the plant uses to build glucose using light
- C. Nitrogen and oxygen, which the plant takes in directly from the surrounding air

D. Protein and starch, which the plant breaks down to release its stored energy

8. During cellular respiration, cells break down glucose to release energy. This energy is stored in molecules of:

A. ATP, the molecule that supplies energy for the activities of the cell

B. DNA, the molecule that stores the genetic information of the cell

C. Cellulose, the carbohydrate that forms the cell walls of plant cells

D. Chlorophyll, the green pigment that captures light during photosynthesis

9. Living things must maintain a stable internal environment in order to survive. Which of the following is an example of an organism maintaining homeostasis?

A. A plant growing taller over the course of several weeks during the spring

B. A caterpillar changing into a butterfly during its normal life cycle stages

C. A person sweating to cool down when their body temperature rises too high

D. A tree losing its leaves in the autumn as the days grow shorter and cooler

10. The human body is organized into levels of increasing complexity. A group of different tissues that work together to perform a specific function is called a(n):

A. Cell, the basic unit of structure and function found in living things

B. Tissue, a group of similar cells that work together for one function

C. Organ system, a group of organs that work together for a major task

D. Organ, a group of different tissues that work together for a function

11. In the human digestive system, the small intestine is the main site where digested nutrients are absorbed into the bloodstream. The small intestine is well adapted for absorption because its inner surface:

A. Is folded and covered with tiny villi, greatly increasing the surface area

- B. Is completely smooth, which allows food to pass through it very quickly
- C. Produces strong acids that kill all of the bacteria found in the food
- D. Stores large amounts of food for long periods between the body's meals

12. The human circulatory system transports materials throughout the body. Which structure is responsible for pumping blood through the blood vessels of the body?

- A. The lungs, which add oxygen to the blood and remove carbon dioxide
- B. The heart, a muscular organ that pumps blood through the blood vessels
- C. The kidneys, which filter wastes out of the blood to form urine
- D. The liver, which processes nutrients absorbed from the digestive system

13. In the human respiratory system, the exchange of oxygen and carbon dioxide between the air and the blood takes place in tiny air sacs called the:

- A. Bronchi, the two large tubes that carry air from the trachea to the lungs
- B. Trachea, the tube that carries air from the throat down toward the lungs
- C. Alveoli, the tiny air sacs where gases are exchanged with the blood
- D. Diaphragm, the muscle that contracts and relaxes to move air in and out

14. The nervous system and the endocrine system both help to control and coordinate the body's activities. A key difference between them is that the nervous system uses electrical impulses, while the endocrine system uses:

- A. Hormones, which are chemical messengers carried in the bloodstream
- B. Antibodies, which are proteins that defend the body against pathogens
- C. Enzymes, which speed up the chemical reactions taking place in cells
- D. Red blood cells, which carry oxygen from the lungs to the body's tissues

15. DNA carries the instructions for building proteins. The order of the nitrogen bases in a section of DNA determines the order of the:

- A. Sugar molecules that make up the backbone of the DNA strand itself
- B. Phosphate groups that form part of the structure of the DNA molecule
- C. Glucose molecules that the cell uses as a source of chemical energy
- D. Amino acids in the protein that the section of DNA codes for in the cell

16. During the process of mitosis, a single cell divides to produce two new cells. The two new cells produced by mitosis are:

- A. Genetically different from each other and from the original parent cell
- B. Each containing half the number of chromosomes of the parent cell
- C. Genetically identical to each other and to the original parent cell
- D. Specialized sex cells used by the organism for sexual reproduction

17. Meiosis is a special type of cell division that produces sex cells, or gametes. Compared to a normal body cell, each gamete produced by meiosis contains:

- A. Twice as many chromosomes as are found in a normal body cell
- B. Half as many chromosomes as are found in a normal body cell
- C. The exact same number of chromosomes as a normal body cell
- D. A random number of chromosomes that is different in each gamete

18. In pea plants, the allele for tall stems (T) is dominant over the allele for short stems (t). If a homozygous tall plant (TT) is crossed with a short plant (tt), what will be the appearance of the offspring?

- A. All of the offspring will be tall, since each inherits a dominant T allele
- B. All of the offspring will be short, since they inherit two recessive alleles
- C. Half of the offspring will be tall and half of the offspring will be short

D. Three-quarters of the offspring will be tall and one-quarter will be short

19. A change in the sequence of bases in an organism's DNA is called a mutation. A mutation that occurs in a body cell, rather than in a sex cell, is significant because it:

- A. Is always passed on to all of the organism's future offspring directly
- B. Is guaranteed to cause the immediate death of the entire organism
- C. Will change the traits of every cell in the body of the organism
- D. Affects only the organism itself and is not passed on to its offspring

20. Scientists can insert a gene from one organism into the DNA of another organism to give it a new trait. This type of technology is known as:

- A. Selective breeding, choosing organisms with desired traits to reproduce
- B. Cloning, producing organisms that are genetically identical to one original
- C. Genetic engineering, inserting a gene from one organism into another
- D. Natural selection, in which the environment determines which organisms survive

21. Over thousands of years, humans have bred dogs to produce many different breeds with specific traits, such as size, coat type, and temperament. This process, in which humans choose which organisms reproduce, is called:

- A. Natural selection, in which the environment selects which organisms survive
- B. Selective breeding, in which humans choose which organisms reproduce
- C. Genetic engineering, in which a gene is inserted from one organism to another
- D. Mutation, in which the sequence of bases in the DNA is changed at random

22. Charles Darwin's theory of evolution by natural selection states that organisms with traits that are best suited to their environment are more likely to:

- A. Survive and reproduce, passing those favorable traits on to their offspring
- B. Change their traits during their lifetime to fit their changing surroundings
- C. Produce offspring that are completely identical to one another in every way
- D. Become extinct quickly because they use up resources faster than others

23. A population of beetles contains both green and brown individuals. Birds can easily spot the green beetles against the brown tree bark and eat them, while the brown beetles are camouflaged. Over many generations, the most likely result is that:

- A. The green beetles will become more common because they are easier to see
- B. Both color types will remain in exactly equal numbers in the population
- C. The beetles will all become the same intermediate color over many years
- D. The brown beetles will become more common because they survive longer

24. Fossils are the preserved remains or traces of organisms that lived in the past. Scientists use fossils as evidence for evolution because fossils:

- A. Show that all living species appeared on Earth at exactly the same time
- B. Prove that living species have remained unchanged throughout all of history
- C. Record changes in the types of organisms that lived during different time periods
- D. Are found only in the most recently formed surface layers of the rock

25. The forelimbs of a human, a bat, and a whale all contain a similar arrangement of bones, even though they are used for different purposes. These similar structures, inherited from a common ancestor, are known as:

- A. Vestigial structures, which have lost their original function over time
- B. Homologous structures, which share a common origin from an ancestor
- C. Analogous structures, which serve a similar function but have different origins
- D. Acquired structures, which an organism develops during its own lifetime

26. In an ecosystem, organisms can be grouped by how they obtain energy. An organism that makes its own food using energy from the Sun is called a(n):

- A. Producer, an organism that makes its own food using energy from the Sun
- B. Consumer, an organism that obtains energy by eating other organisms
- C. Decomposer, an organism that breaks down the remains of dead organisms
- D. Predator, an organism that hunts and captures other animals for its food

27. In a food chain, grass is eaten by a grasshopper, which is eaten by a frog, which is eaten by a snake. In this food chain, the grasshopper is best described as a:

- A. Producer, because it makes its own food using the energy from sunlight
- B. Decomposer, because it breaks down the remains of dead organisms in soil
- C. Primary consumer, because it feeds directly on a producer in the food chain
- D. Secondary consumer, because it feeds on another consumer in the food chain

28. As energy is transferred from one organism to the next in a food chain, much of the energy is lost at each step. Because of this energy loss, a food chain usually has:

- A. An unlimited number of links because energy is created at each level
- B. More energy available at the top of the chain than at the bottom of it
- C. The most consumers found at the very top of the entire food chain
- D. Only a few links, because there is not enough energy to support many levels

29. Decomposers, such as bacteria and fungi, perform an essential function in every ecosystem by:

- A. Capturing energy from the Sun and converting it into the chemical energy of food
- B. Breaking down dead organisms and returning their nutrients to the environment
- C. Hunting and consuming the largest animals to keep their populations under control

D. Producing the oxygen that all of the consumers in the ecosystem need to survive

30. A population of rabbits in a meadow grows until the available food and space can no longer support any more individuals. The maximum number of rabbits the meadow can support over time is called the:

A. Carrying capacity, the maximum population the environment can support

B. Biotic potential, the fastest possible rate of reproduction for the species

C. Trophic level, the position an organism occupies within a food chain

D. Niche, the role and the way of life of an organism within its ecosystem

31. Two species of birds in the same area both build their nests in the same kind of tree and eat the same kind of seeds. The two species are most likely to:

A. Form a mutualistic relationship in which both of the species benefit greatly

B. Form a parasitic relationship in which one benefits while the other is harmed

C. Ignore each other completely, since they have no effect on one another at all

D. Compete with each other for the same limited nesting sites and food supply

32. A tick attaches to a dog and feeds on the dog's blood. The tick benefits by getting food, while the dog is harmed. This type of relationship between two species is called:

A. Mutualism, in which both of the organisms involved benefit from each other

B. Commensalism, in which one organism benefits and the other is unaffected

C. Parasitism, in which one organism benefits while the other one is harmed

D. Competition, in which both organisms struggle for the same limited resource

33. Carbon moves continuously through ecosystems in the carbon cycle. During photosynthesis, plants remove carbon dioxide from the air. Carbon dioxide is returned to the air mainly through the process of:

A. Evaporation, in which water changes from a liquid into a gas in the air

- B. Cellular respiration, in which organisms release carbon dioxide as a waste
- C. Condensation, in which water vapor cools and forms liquid droplets in clouds
- D. Photosynthesis, in which plants use carbon dioxide to make glucose and oxygen

34. A farmer's fertilizer washes into a nearby pond and causes a rapid overgrowth of algae. When the algae die and decompose, the oxygen in the pond is used up, and many fish die. This whole process is known as:

- A. Eutrophication, the nutrient enrichment of water that can deplete its oxygen
- B. Succession, the gradual change in the community of an area over time
- C. Biomagnification, the increase in toxin concentration up a food chain
- D. Deforestation, the clearing of forests for farmland and for development

35. A volcanic island rises from the sea, leaving behind bare rock with no soil. Over many years, lichens, then mosses, then larger plants colonize the island as soil slowly forms. This gradual development of a community starting from bare rock is called:

- A. Secondary succession, which begins in an area that already has soil present
- B. Eutrophication, the nutrient enrichment of a body of water over time
- C. Primary succession, which begins in a lifeless area that has no soil at first
- D. Extinction, in which a species permanently disappears from the planet Earth

36. Human activities can reduce the biodiversity of an area. Which of the following human activities would most likely reduce the biodiversity of an ecosystem?

- A. Setting aside land as a protected nature reserve closed to development
- B. Replanting native trees in a forest that had been cleared in the past
- C. Passing laws that protect endangered species from being hunted illegally
- D. Clearing a diverse rainforest to grow a single crop on a large plantation

37. The burning of fossil fuels for energy releases carbon dioxide into the atmosphere. The buildup of carbon dioxide and other greenhouse gases is a concern because it is linked to:

- A. A rapid increase in the amount of oxygen present in Earth's atmosphere
- B. A rise in average global temperatures associated with the greenhouse effect
- C. A steady cooling of the global climate over the last several decades of time
- D. The complete loss of all the protective ozone in the upper atmosphere

38. The body's first line of defense against pathogens includes barriers that prevent pathogens from entering the body. Which of the following is part of the body's first line of defense?

- A. The skin, which forms a physical barrier that keeps many pathogens out
- B. Memory cells, which allow a fast response to a previously seen pathogen
- C. Antibodies, which bind to specific pathogens and mark them for destruction
- D. Vaccines, which expose the body to a weakened or inactivated pathogen

39. A vaccine helps protect a person from a disease in the future. Vaccines work by:

- A. Providing antibiotics that immediately kill all the bacteria in the body
- B. Replacing the person's weak white blood cells with stronger new ones
- C. Stimulating the immune system to produce antibodies and memory cells
- D. Permanently raising the body's temperature in order to kill all pathogens

40. Antibiotics are medicines that are used to treat infections caused by bacteria. Antibiotics are not effective against the common cold because the common cold is caused by:

- A. Bacteria that are far too small for the antibiotics to be able to reach them
- B. Fungi, which are completely unaffected by the action of any antibiotics
- C. A poor diet rather than by any kind of pathogen entering the body at all

D. A virus, and antibiotics target bacteria rather than viruses in the body

41. A scientist wants to find out whether the amount of fertilizer affects the height of bean plants. In this experiment, the amount of fertilizer that the scientist gives to the plants is the:

A. Dependent variable, the factor that the scientist measures at the experiment's end

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

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

D. Hypothesis, the testable prediction the scientist makes before experimenting

42. In the same experiment, the scientist measures the height of each bean plant at the end of the experiment. The height of the bean plants is the:

A. Dependent variable, the factor that the scientist measures as the result

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

C. Control group, the group of plants that receives no fertilizer for comparison

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

43. A scientist collects the following measurements of plant height, in centimeters: 12, 14, 16, 18, and 20. What is the mean (average) height of these five plants?

A. 12 centimeters, which is the smallest value in the entire set of measurements

B. 20 centimeters, which is the largest value in the entire set of measurements

C. 16 centimeters, found by adding all the values and dividing the sum by five

D. 80 centimeters, found by adding together all five of the height measurements

44. A student concludes from a single experiment that a certain plant food makes tomato plants grow taller. Before this conclusion can be widely accepted, other scientists should:

A. Accept the conclusion immediately because the student worked very hard on it

- B. Reject the conclusion entirely without testing it because it is only one study
- C. Change the data from the experiment so that it supports a different conclusion
- D. Repeat the experiment to see whether the same results are obtained again

45. A scientist wants to compare the average heights of plants grown with three different brands of fertilizer. The most appropriate type of graph for comparing these separate categories would be a:

- A. Line graph, which is best for showing how a single value changes over time
- B. Bar graph, which is best for comparing values across separate categories
- C. Pie chart, which is best for showing how a single whole is divided into parts
- D. Labeled diagram, which is best for showing the parts of a single structure

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

- A. Community, which includes all the different species that live in the area
- B. Ecosystem, which includes the living things and the nonliving factors of 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 plant life

47. Viruses are different from living cells in several ways. One reason that scientists do not consider viruses to be fully alive is that viruses:

- A. Cannot reproduce on their own and must use a living host cell to make copies
- B. Are made of many cells, each containing a nucleus and other organelles
- C. Are able to make their own food using the energy that they capture from sunlight
- D. Carry out all of the basic life processes entirely on their own without a host

48. Prokaryotic cells, such as those of bacteria, differ from eukaryotic cells, such as those of plants and animals. The main difference is that prokaryotic cells:

- A. Are always much larger in size than any of the eukaryotic cells that exist
- B. Contain many more membrane-bound organelles than eukaryotic cells contain
- C. Are the only kind of cell that contains genetic material in the form of DNA
- D. Lack a true nucleus and the membrane-bound organelles found in eukaryotic cells

49. Energy flows through an ecosystem in one direction, while matter such as carbon and nitrogen is recycled. Which statement correctly describes the flow of energy in an ecosystem?

- A. Energy is recycled over and over among the organisms in the ecosystem
- B. Energy flows from the Sun to producers and then to consumers, decreasing at each step
- C. Energy increases at each level because predators are larger than their prey
- D. Energy flows from consumers down to the producers at the base of the food web

50. Conservation is the careful management and protection of natural resources. Which of the following is an example of a conservation practice?

- A. Protecting a forest habitat so that the species living there can survive
- B. Clearing a wetland to build a large new shopping center and parking lot
- C. Releasing untreated waste from a factory into a nearby river or stream
- D. Hunting a species of animal until its population becomes completely extinct

ANSWER KEY WITH EXPLANATIONS – Practice Exam 18

1. C — The cell is the basic unit of structure and function in all living things, the smallest unit capable of carrying out life's processes. All larger structures, such as tissues and organs, are built from cells. This makes the cell the foundation of the biological hierarchy.
2. B — A multicellular organism is made of many cells, which are often specialized to perform different functions. This division of labor allows complex bodies to function efficiently. It contrasts with unicellular organisms, which carry out all functions in a single cell.
3. D — DNA is the molecule that carries the genetic information directing a cell's activities. Its sequence of bases codes for the proteins the cell builds. Glucose, ATP, and cellulose serve energy and structural roles, not genetic storage.

4. A — A cell wall, a large central vacuole, and chloroplasts together are features of a plant cell. The chloroplasts carry out photosynthesis to capture sunlight. Animal cells lack walls and chloroplasts, and bacterial cells lack a nucleus, so the cell is a plant cell.
5. C — The cell membrane is selectively permeable, allowing some materials to cross while blocking or limiting others. This control over movement is essential for maintaining the cell's internal balance. The membrane is neither fully solid nor open to everything.
6. D — Diffusion is the movement of molecules from an area of higher concentration to lower concentration without the cell using energy. It is a passive process driven by the concentration difference. Active transport, by contrast, requires energy.
7. B — In photosynthesis, plants use carbon dioxide and water as raw materials, along with light energy, to build glucose and release oxygen. These are the inputs of the process. Glucose and oxygen are products, not raw materials.
8. A — During cellular respiration, the energy released from glucose is stored in molecules of ATP, the cell's usable energy currency. Cells then use ATP to power their activities. DNA, cellulose, and chlorophyll have other functions.
9. C — Sweating to cool down when body temperature rises is an example of maintaining homeostasis, keeping internal conditions stable. The body counteracts the rise in temperature. Growth, metamorphosis, and seasonal leaf loss are developmental or seasonal changes, not homeostatic regulation.
10. D — An organ is a group of different tissues that work together to perform a specific function. Tissues are groups of similar cells, and organ systems are groups of organs. The combination of several tissues into a functional structure is an organ.
11. A — The inner surface of the small intestine is folded and covered with tiny villi, which greatly increase the surface area available for absorbing nutrients. More surface area means more efficient uptake into the bloodstream. This adaptation is specifically suited to absorption.
12. B — The heart is the muscular organ that pumps blood through the body's blood vessels. Its contractions drive circulation. The lungs, kidneys, and liver perform gas exchange, filtration, and processing, but the pumping organ is the heart.
13. C — Gas exchange between the air and the blood occurs in the alveoli, the tiny air sacs of the lungs surrounded by capillaries. Their thin walls and large surface area make exchange efficient. The bronchi, trachea, and diaphragm move air but are not the exchange site.
14. A — The endocrine system uses hormones, chemical messengers carried in the bloodstream, to coordinate body activities, in contrast to the nervous system's electrical impulses. Hormones produce slower, longer-lasting effects. Antibodies, enzymes, and red blood cells serve other roles.
15. D — The sequence of bases in a section of DNA determines the order of amino acids in the protein that section codes for. This is how the genetic code directs protein structure. The base sequence does not set the order of sugars, phosphates, or glucose.
16. C — Mitosis produces two daughter cells that are genetically identical to each other and to the parent cell. This genetic continuity supports growth and tissue repair. Meiosis, not mitosis, produces varied cells with half the chromosome number.
17. B — Meiosis produces gametes with half the number of chromosomes found in a normal body cell. This reduction ensures the full number is restored at fertilization. Gametes do not have the same, double, or a random number of chromosomes.
18. A — Crossing TT with tt gives all offspring the genotype Tt, so every offspring inherits a dominant T allele and is tall. The homozygous dominant parent can pass only T, and the recessive parent only t. All offspring therefore show the tall phenotype.

19. D — A mutation in a body (somatic) cell affects only the organism itself and is not passed on to its offspring, because it does not occur in the reproductive cells. Only mutations in sex cells can be inherited. Somatic mutations are confined to the individual.
20. C — Genetic engineering is the technology of inserting a gene from one organism into another to give it a new trait. This differs from selective breeding, cloning, and natural selection. Transferring a gene between organisms defines genetic engineering.
21. B — Breeding dogs for desired traits by choosing which individuals reproduce is selective breeding, in which humans direct reproduction. This differs from natural selection, where the environment selects survivors. Human-guided choice of parents is the defining feature.
22. A — Natural selection states that organisms with traits best suited to their environment are more likely to survive and reproduce, passing those traits to their offspring. Over generations, favorable traits become more common. Organisms do not change their own traits or all become identical.
23. D — Because birds eat the more visible green beetles, the camouflaged brown beetles survive and reproduce more, so they become more common over generations. This is natural selection favoring the better-hidden variant. The population shifts toward brown coloration.
24. C — Fossils record changes in the types of organisms that lived during different time periods, providing evidence that life has changed over time. The sequence of fossils through rock layers documents evolutionary change. Fossils do not show all species appearing at once or remaining unchanged.
25. B — Homologous structures, like the forelimbs of humans, bats, and whales, share the same basic bone arrangement inherited from a common ancestor, despite different functions. This shared structure is evidence of common descent. It differs from analogous or vestigial structures.
26. A — A producer makes its own food using energy from the Sun through photosynthesis, forming the base of the food web. Consumers, decomposers, and predators obtain energy from other organisms. The self-feeding, sunlight-using organism is the producer.
27. C — The grasshopper feeds directly on grass, a producer, so it is a primary consumer. Primary consumers occupy the level just above producers. Organisms that eat other consumers, like the frog, are secondary consumers.
28. D — Because much energy is lost as heat at each step, a food chain usually has only a few links, since there is not enough energy to support many levels. This energy loss limits chain length. Energy is not created and decreases, rather than increases, up the chain.
29. B — Decomposers break down dead organisms and wastes, returning their 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.
30. A — Carrying capacity is the maximum population an environment can support over time, given its resources. When the meadow can support no more rabbits, the population stabilizes at this level. Resource limits set the carrying capacity.
31. D — When two species use the same nesting sites and food, they compete for those limited resources. Each species' use reduces what is available to the other. This struggle for shared resources is competition.
32. C — A tick feeding on a dog's blood benefits while harming the host, which is parasitism. One organism gains at the expense of the other. This differs from mutualism, commensalism, or competition.
33. B — Cellular respiration returns carbon dioxide to the atmosphere as organisms release it as a waste product. This balances the removal of carbon dioxide by photosynthesis. Evaporation and condensation involve water, and photosynthesis removes rather than releases carbon dioxide.

34. A — The sequence in which fertilizer runoff causes algal overgrowth, decomposition, and oxygen depletion that kills fish is called eutrophication. Excess nutrients drive this oxygen-robbing process. It differs from succession, biomagnification, and deforestation.
35. C — Primary succession begins in a lifeless area with no soil, such as bare volcanic rock, where pioneer species like lichens slowly build soil. This distinguishes it from secondary succession, which starts where soil already exists. The lack of initial soil is the defining feature.
36. D — Clearing a diverse rainforest to grow a single crop destroys habitat and replaces many species with one, reducing biodiversity. Protecting land, replanting natives, and anti-hunting laws all help conserve biodiversity. Habitat destruction for monoculture lowers diversity.
37. B — The buildup of carbon dioxide and other greenhouse gases is linked to a rise in average global temperatures through the greenhouse effect. Trapped heat warms the planet. This warming, not cooling, increased oxygen, or ozone loss, is the concern.
38. A — The skin is part of the body's first line of defense, forming a physical barrier that keeps many pathogens out before any immune response is needed. This nonspecific barrier blocks entry. Memory cells, antibodies, and vaccines act in later, specific defenses.
39. C — A vaccine stimulates the immune system to produce antibodies and memory cells against a pathogen without causing the disease, preparing the body to respond quickly if the real pathogen appears. This prepared response provides protection. Vaccines do not rely on antibiotics or new blood cells.
40. D — The common cold is caused by a virus, and antibiotics target bacteria rather than viruses, so they are not effective against it. Viruses lack the bacterial structures antibiotics attack. This is why antibiotics do not treat viral colds.
41. B — The independent variable is the factor the scientist deliberately changes, which here is the amount of fertilizer given to the plants. It is the variable being tested. The resulting plant height would be the dependent variable.
42. A — The dependent variable is the factor measured as the result of the experiment, which here is the height of the bean plants. It depends on the independent variable, the fertilizer. Measuring it shows how the plants respond.
43. C — The mean is found by adding all the values ($12 + 14 + 16 + 18 + 20 = 80$) and dividing by the number of values (5), giving $80 \div 5 = 16$ centimeters. The mean is the average of the data. It is not simply the smallest, largest, or total value.
44. D — Before a conclusion from a single experiment can be accepted, other scientists should repeat the experiment to see whether the same results occur. Reproducibility confirms reliability. Accepting, rejecting without testing, or altering data would violate scientific practice.
45. B — A bar graph is best for comparing values across separate categories, such as the average heights of plants grown with three different fertilizer brands. Line graphs show change over time, pie charts show parts of a whole, and diagrams show structures. Comparing categories calls for a bar graph.
46. 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.
47. A — Viruses are not considered fully alive because they cannot reproduce on their own and must use a living host cell to make copies of themselves. They lack the machinery to function independently. This dependence sets them apart from living cells.

48. D — The main difference is that prokaryotic cells lack a true nucleus and the membrane-bound organelles found in eukaryotic cells. Their genetic material is not enclosed in a nuclear membrane. Both cell types contain DNA, but only eukaryotes have membrane-bound organelles.
49. B — Energy flows from the Sun to producers and then to consumers, decreasing at each step as it is lost as heat. Unlike matter, energy is not recycled and moves in one direction. This decreasing one-way flow is a fundamental feature of ecosystems.
50. A — Protecting a forest habitat so the species living there can survive is an example of conservation, the careful management and protection of natural resources. Clearing wetlands, releasing untreated waste, and hunting to extinction all damage resources. Safeguarding habitat is a conservation practice.