PRACTICE EXAM 20: LIFE SCIENCE: BIOLOGY SIMULATION (50 QUESTIONS)

1. Biology is the study of living things. Which of the following is a characteristic that all living organisms have in common?

A. They are made of cells and carry out the basic processes of life

B. They are able to make their own food using energy from the Sun

C. They move from one location to another under their own power

D. They have a brain and a nervous system to control their actions

2. Water makes up a large part of the bodies of living things and is involved in many life processes. One reason water is important to cells is that it:

A. Provides the carbon atoms needed to build all of the body's proteins

B. Stores the genetic information that controls the activities of the cell

C. Acts as a solvent in which many substances dissolve and react in cells

D. Releases large amounts of usable energy when it is broken apart by cells

3. The four main types of organic compounds in living things are carbohydrates, lipids, proteins, and nucleic acids. The building blocks (subunits) of proteins are:

A. Simple sugars, which are linked together to form long carbohydrate chains

B. Amino acids, which are joined together to form the chains of a protein

C. Fatty acids, which combine with glycerol to form the structure of a lipid

D. Nucleotides, which are linked together to build the strands of a DNA molecule

4. A scientist examines a cell and finds that it has no nucleus and no membrane-bound organelles, but it does contain DNA and ribosomes. The cell is most likely a:

A. Plant cell, which has a cell wall, a large vacuole, and many chloroplasts

B. Animal cell, which has a nucleus but lacks both a cell wall and chloroplasts

C. Fungal cell, which has a nucleus and a cell wall made of a tough material

D. Bacterial cell, which is a prokaryote that lacks a nucleus and organelles

5. The cell membrane controls which substances enter and leave the cell. Small molecules such as oxygen move across the membrane from an area of higher concentration to an area of lower concentration. This movement is called:

A. Active transport, which moves molecules against their concentration gradient

B. Endocytosis, in which the membrane surrounds material to bring it into the cell

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

D. Mitosis, the division of one cell into two genetically identical daughter cells

6. A plant cell is placed in pure water. Water enters the cell by osmosis, but the cell does not burst. The structure that prevents the plant cell from bursting is the:

A. Cell wall, the rigid outer layer that supports and protects the plant cell

B. Nucleus, the structure that contains the genetic information of the cell

C. Chloroplast, the organelle that captures sunlight to make food for the cell

D. Ribosome, the small structure where proteins are assembled in the cell

7. During photosynthesis, plants use carbon dioxide, water, and the energy of sunlight to make glucose. The other product released during photosynthesis is:

A. Nitrogen, which the plant releases into the soil through its root system

B. Carbon dioxide, which the plant releases back into the surrounding air

C. Glucose, which the plant stores as a source of energy for later use

D. Oxygen, which the plant releases into the air as a product of the process

8. In a eukaryotic cell, cellular respiration takes place mainly within an organelle that is sometimes called the "powerhouse of the cell." This organelle is the:

A. Nucleus, which stores and protects the genetic information of the cell

B. Mitochondrion, the organelle where most of the cell's ATP is produced

C. Chloroplast, the organelle where photosynthesis takes place in plant cells

D. Vacuole, the storage sac that holds water and dissolved materials in the cell

9. Maintaining a stable internal environment is essential for survival. Which of the following is an example of an organism maintaining homeostasis?

A. A seed sprouting and growing into a tall plant over the course of a season

B. A tadpole gradually developing into an adult frog during its life cycle

C. A person's body sweating in order to cool down on a very hot day

D. A fruit ripening and changing color after it has been picked from the tree

10. The human body is organized into levels of increasing complexity, from cells up to the whole organism. A group of similar cells that work together to perform a particular function is called a(n):

A. Tissue, a group of similar cells that work together to perform a function

B. Organ, a structure made of several tissues that carries out a function

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

D. Cell, the basic unit of structure and function in every living thing

11. In humans, the heart pumps blood through a network of vessels to all parts of the body. The blood vessels that carry blood away from the heart are called:

A. Veins, which carry blood from the body back toward the heart

B. Capillaries, the tiny vessels where exchange of materials takes place

C. Alveoli, the air sacs where gases are exchanged in the lungs

D. Arteries, which carry blood away from the heart to the body

12. The DNA molecule is shaped like a twisted ladder, known as a double helix. The order of the bases along a strand of DNA is important because it:

A. Determines the total number of chromosomes found within the cell

B. Carries the genetic code that directs the building of proteins in the cell

C. Provides the energy that the cell uses to carry out its many activities

D. Forms the membrane that surrounds and protects the contents of the cell

13. In a certain plant, the allele for tall (T) is dominant over the allele for short (t). Two heterozygous tall plants (Tt) are crossed. What fraction of the offspring is expected to be short?

A. One-quarter of the offspring, which inherit two recessive alleles and are short

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

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

D. None of the offspring, because the tall allele is dominant in every plant

14. A change in the DNA sequence of an organism is called a mutation. Which of the following would most likely cause a mutation in the DNA of a cell?

A. Eating a diet that is rich in fruits, vegetables, and whole grains daily

B. Getting a healthy amount of sleep and exercise on a regular basis

C. Exposure to ultraviolet radiation from the Sun or to certain chemicals

D. Drinking plenty of clean water throughout the course of an entire day

15. Scientists can transfer a gene from one organism into another to give it a useful new trait, such as inserting a gene into corn to make it resist insect pests. This technology is called:

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

B. Genetic engineering, in which a gene is transferred from one organism to another

C. Natural selection, in which the environment determines which organisms survive

D. Cloning, in which an organism that is genetically identical to one parent is made

16. Mitosis produces two new cells that are genetically identical to the parent cell. In the human body, mitosis is mainly used for:

A. Producing sex cells such as sperm and egg cells for reproduction

B. Reducing the number of chromosomes by half in each new daughter cell

C. Introducing genetic variation into the offspring of the organism

D. Growth and the repair of damaged or worn-out tissues in the body

17. Sexual reproduction produces offspring that are genetically different from their parents. This genetic variation is important because it:

A. Increases the chance that some individuals will survive if conditions change

B. Guarantees that all of the offspring will be identical to one of the parents

C. Ensures that every offspring is perfectly adapted to its environment at birth

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

18. According to Charles Darwin's theory of natural selection, organisms that are better suited to their environment are more likely to survive and reproduce. Over many generations, this leads to:

A. All organisms in a population becoming exactly identical to one another

B. The complete loss of all genetic variation within the population over time

C. Populations gradually changing as favorable traits become more common

D. Organisms changing their own traits during their individual lifetimes

19. A population of insects is sprayed with a pesticide. A few insects survive because they carry a gene that makes them resistant, and they reproduce. Over time, the population becomes mostly resistant. This is an example of:

A. An acquired trait that each insect developed during its own lifetime

B. Natural selection acting on inherited variation in the insect population

C. The complete absence of any variation within the insect population

D. The pesticide directly inserting resistance genes into all of the insects

20. Fossils provide important evidence for evolution. Which of the following statements best describes how fossils support the theory of evolution?

A. Fossils prove that all living species have remained unchanged over time

B. Fossils show that every species on Earth appeared at the very same moment

C. Fossils are found only in the most recently formed surface layers of rock

D. Fossils in different rock layers show that organisms have changed over time

21. The forelimbs of a human, a whale, and a bat all share a similar internal bone structure, even though they are used for different functions. These structures, which share a common origin in a shared ancestor, are called:

A. Vestigial structures, which have lost their original function over time

B. Analogous structures, which serve a similar function but have different origins

C. Homologous structures, which share a common origin from a shared ancestor

D. Acquired structures, which an organism develops during its own lifetime

22. A single species of bird arrives on a group of islands and, over many generations, gives rise to several new species, each adapted to a different food source. This process is known as:

A. Adaptive radiation, in which one ancestral species gives rise to many species

B. Extinction, in which a species permanently disappears from the planet Earth

C. Convergent evolution, in which unrelated species develop similar features

D. Genetic drift, the random change in allele frequencies in a small population

23. In an ecosystem, the organisms that make their own food using the energy of sunlight are essential to all the other organisms because they:

A. Break down dead organisms and return their nutrients to the soil for reuse

B. Feed only on the other animals found at the top of the ecosystem's food web

C. Consume the producers in order to obtain energy and important nutrients

D. Form the base of the food web and supply energy to the other organisms

24. In a food chain, an organism that eats only plants is known as a herbivore. Which of the following organisms is a herbivore?

A. A lion that hunts and eats zebras and other large animals for its food

B. A rabbit that eats the grass and other plants growing in a meadow

C. A mushroom that breaks down the remains of dead organisms in the soil

D. A hawk that captures and eats small rodents and other small animals

25. As energy moves from one level of a food chain to the next, only about 10% of the energy is passed on. The rest of the energy is mostly:

A. Used by the organisms for their life processes and released as heat

B. Stored permanently in the bodies of the organisms at that level

C. Passed back down to the producers at the bottom of the food chain

D. Converted into new genetic material within the cells of the organisms

26. Decomposers, such as bacteria and fungi, are an important part of an ecosystem. The role of decomposers is to:

A. Capture energy from the Sun and convert it into the chemical energy of food

B. Hunt and capture the largest animals in order to control their populations

C. Break down dead organisms and return their nutrients to the environment

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

27. A population of rabbits in a field grows quickly until food and space become limited, and then it stops growing. The maximum number of rabbits that the field can support over time is the field's:

A. Biotic potential, the fastest possible rate at which the rabbits could breed

B. Trophic level, the position the rabbits occupy in the food chain of the field

C. Niche, the particular role and way of life of the rabbits in their ecosystem

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

28. A small fish removes and eats parasites from the skin of a larger fish. The small fish gets food, and the larger fish is cleaned of harmful parasites. Both organisms benefit from this relationship, which is an example of:

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

B. Mutualism, in which both of the organisms involved benefit from the relationship

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

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

29. Carbon moves through ecosystems in the carbon cycle. Which of the following processes removes carbon dioxide from the atmosphere?

A. Photosynthesis, in which plants use carbon dioxide to make glucose and oxygen

B. Cellular respiration, in which organisms release carbon dioxide as a waste product

C. The burning of fossil fuels such as coal, oil, and natural gas for energy

D. The decay of dead organisms by bacteria and fungi in the soil over time

30. A pollutant that does not break down easily enters a food chain at the producer level. As it passes up the food chain, the pollutant becomes more concentrated in organisms at higher levels. This increase in concentration is called:

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

B. Succession, the gradual change in the community of an area over time

C. Biomagnification, the increase in a pollutant's concentration up a food chain

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

31. After a forest fire, an area is recolonized over many years, beginning with grasses and ending with a mature forest. This gradual, predictable change in the community over time is called:

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

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

C. Biomagnification, the buildup of toxins in higher levels of a food chain

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

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

A. Creating a protected nature reserve that is closed to all development

B. Replanting native trees in a forest that had been cut down in the past

C. Passing laws that limit the hunting of certain endangered animal species

D. Clearing a tropical rainforest to grow a single crop on a large plantation

33. The burning of fossil fuels releases carbon dioxide, a greenhouse gas, into the atmosphere. The buildup of greenhouse gases is associated with:

A. A rise in average global temperatures linked to the greenhouse effect

B. A steady cooling of the global climate over the past several decades

C. A rapid increase in the amount of oxygen present in the atmosphere

D. The complete removal of the protective ozone layer in the upper atmosphere

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

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

B. Is much larger than the cells of the organisms that it infects and harms

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

D. Makes its own food using the energy that it captures from the Sun's light

35. A person becomes sick with the flu, recovers, and later is exposed to the same flu virus but does not become sick again. This protection is provided by the immune system through the production of:

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

B. Digestive enzymes, which break down the virus inside of the person's stomach

C. Platelets, which form clots to seal cuts where pathogens might enter the body

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

36. A vaccine helps protect a person against a disease. A vaccine works by:

A. Providing antibiotics that immediately kill all the bacteria in the body

B. Exposing the immune system to a harmless form of a pathogen's antigens

C. Permanently raising the body's temperature in order to kill all the pathogens

D. Replacing the person's weak white blood cells with stronger, healthier ones

37. Antibiotics are used to treat infections caused by bacteria, but they are not effective against viral infections such as the common cold. This is because:

A. Antibiotics are too weak to kill the bacteria that actually cause the cold

B. The common cold is caused by fungi, which antibiotics cannot affect at all

C. The common cold is caused by a virus, and antibiotics do not kill viruses

D. Antibiotics only work after a person has already received a flu vaccine shot

38. A scientist wants to test whether the amount of sunlight affects the rate at which a plant grows. In this experiment, the amount of sunlight the plant receives is the:

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

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

C. Control group, which is the group of plants that receives no sunlight at all

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

39. In a well-designed experiment, a scientist tests only one variable at a time and keeps all the other conditions the same. This is important because it allows the scientist to:

A. Finish the experiment much more quickly than would otherwise be possible

B. Guarantee in advance that the results will support the scientist's hypothesis

C. Test several different variables at the same time to save effort and time

D. Be sure that any change in the results is due to the one variable being tested

40. A scientist measures the masses of five objects, in grams: 6, 8, 10, 12, and 14. What is the mean (average) mass of these five objects?

A. 6 grams, which is the smallest mass found among the five objects measured

B. 10 grams, found by adding all the masses and dividing the sum by five

C. 14 grams, which is the largest mass found among the five objects measured

D. 50 grams, found by adding together all five of the object masses measured

41. A scientist wants to display data that compares the average heights of plants grown using four different brands of fertilizer. The most appropriate type of graph to use would be a:

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

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

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

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

42. A student forms a hypothesis, conducts an experiment, and finds that the results do not support the hypothesis. The best thing for the student to do next is to:

A. Revise the hypothesis or form a new one and test it with another experiment

B. Change the data from the experiment so that it supports the original hypothesis

C. Ignore the results and publish the original hypothesis as a proven scientific fact

D. Conclude that the question being studied cannot be investigated by science at all

43. All of the different populations of organisms that live and interact together in the same area make up a(n):

A. Population, which is made up of one single species living in an area

B. Community, which includes all the interacting populations in an area

C. Organism, which is a single complete living thing of one species

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

44. Energy flows through an ecosystem in one direction, while matter is recycled. Which statement correctly describes how energy moves through an ecosystem?

A. Energy is recycled over and over again among the organisms in the ecosystem

B. Energy flows from the consumers down to the producers at the base of the web

C. Energy increases at each higher level because predators are larger than prey

D. Energy flows from the Sun to producers and then to consumers, decreasing at each level

45. Living things are organized into levels that increase in complexity. Which of the following correctly orders these levels from the smallest to the largest?

A. Population, organism, community, ecosystem, in order of decreasing size

B. Ecosystem, community, population, organism, in order of increasing size

C. Organism, population, community, ecosystem, in order of increasing size

D. Community, ecosystem, organism, population, in order of increasing size

46. Producers, consumers, and decomposers each play a role in an ecosystem. Which of the following correctly describes the role of a consumer?

A. A consumer obtains energy by feeding on other organisms in the ecosystem

B. A consumer makes its own food using the energy that it captures from sunlight

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

D. A consumer produces all of the oxygen that the other organisms in the area need

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

A. Guarantees that the population of each species will remain exactly constant

B. Increases the ecosystem's stability and ability to recover from disturbances

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

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

48. Using natural resources in a way that meets the needs of the present without harming the ability of future generations to meet their own needs is known as:

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

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

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

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

49. Prokaryotic cells and eukaryotic cells are the two main types of cells. The main difference between them is that eukaryotic cells:

A. Are always much smaller in size than any of the prokaryotic cells that exist

B. Lack any genetic material in the form of DNA within their cell structure

C. Contain a true nucleus and membrane-bound organelles that prokaryotes lack

D. Are the only type of cell that is unable to carry out the basic life processes

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

A. Dumping untreated industrial waste into a river that flows past a factory

B. Setting aside a wilderness area as a protected park where habitats are preserved

C. Clearing a large forest to make room for a new highway and shopping center

D. Hunting a species of animal until its population has completely disappeared

ANSWER KEY WITH EXPLANATIONS — Practice Exam 20

1. A — All living organisms are made of cells and carry out the basic processes of life, which is a universal characteristic of life. Making food, moving independently, and having a nervous system apply only to some organisms. The cell-based nature of life is shared by all.

2. C — Water acts as a solvent in which many substances dissolve and react, providing the medium for the cell's chemical reactions. Its ability to dissolve materials is central to metabolism. Water does not supply carbon, store genetic information, or release energy when broken down.
3. B — The building blocks of proteins are amino acids, which are joined together to form protein chains. The order of amino acids determines the protein's structure and function. Simple sugars, fatty acids, and nucleotides build carbohydrates, lipids, and nucleic acids instead.
4. D — A cell lacking a nucleus and membrane-bound organelles but containing DNA and ribosomes is a prokaryote, such as a bacterial cell. Prokaryotes have genetic material that is not enclosed in a nucleus. Plant, animal, and fungal cells are eukaryotes with a true nucleus.
5. C — Diffusion is the movement of molecules from an area of higher concentration to lower concentration, as with oxygen crossing the membrane. It is a passive process needing no energy. Active transport moves against the gradient, and mitosis is cell division.
6. A — The rigid cell wall surrounds and supports the plant cell, preventing it from bursting when water enters by osmosis. The wall resists the internal pressure. The nucleus, chloroplast, and ribosome do not provide this structural protection.
7. D — Photosynthesis produces glucose and releases oxygen as a byproduct into the air. The oxygen comes from the splitting of water during the process. Nitrogen is not produced, and carbon dioxide and glucose are a reactant and the main product, not the released gas.
8. B — The mitochondrion, often called the powerhouse of the cell, is where most ATP is produced during cellular respiration. Its folded inner membranes provide surface area for the reactions. The nucleus, chloroplast, and vacuole serve other functions.
9. C — Sweating to cool down on a hot day is an example of maintaining homeostasis, keeping internal conditions stable. The body counteracts the rise in temperature. Sprouting, metamorphosis, and ripening are developmental changes, not homeostatic regulation.
10. A — A tissue is a group of similar cells that work together to perform a function. Organs are made of several tissues, and organ systems are groups of organs. The grouping of similar cells for one function is a tissue.
11. D — Arteries carry blood away from the heart to the body. Veins return blood to the heart, capillaries are sites of exchange, and alveoli handle gas exchange in the lungs. The vessels leaving the heart are the arteries.
12. B — The order of bases along a DNA strand carries the genetic code that directs the building of proteins. This sequence determines which proteins the cell makes. It does not provide energy, form the membrane, or by itself set the chromosome number.
13. A — Crossing two heterozygotes (Tt × Tt) gives a 3:1 ratio, so one-quarter of the offspring are homozygous recessive (tt) and short. Only tt shows the recessive phenotype. The other three-quarters carry at least one dominant T allele and are tall.
14. C — Mutations can be caused by mutagens such as ultraviolet radiation and certain chemicals, which damage DNA. These agents increase the mutation rate. A healthy diet, sleep, exercise, and water do not cause mutations.
15. B — Genetic engineering is the technology of transferring a gene from one organism into another to give it a new trait, such as pest resistance in corn. This differs from selective breeding, natural selection, and cloning. Inserting a gene between organisms defines genetic engineering.
16. D — In the human body, mitosis is used mainly for growth and the repair of tissues, producing genetically identical cells. It maintains genetic continuity in body cells. Meiosis, not mitosis, produces sex cells and introduces variation by halving the chromosome number.

17. A — Genetic variation increases the chance that some individuals will survive if conditions change, because varied traits allow some to cope with new challenges. This variety is the raw material for adaptation. It does not keep offspring identical or guarantee perfect adaptation.
18. C — Natural selection over many generations causes populations to change gradually as favorable traits become more common. Better-suited individuals survive and reproduce more, passing on their traits. Organisms do not change their own traits or all become identical.
19. B — Pesticide resistance spreading through a population is natural selection acting on inherited variation: resistant insects survive and reproduce. The trait is inherited, not acquired during a lifetime, and the pesticide does not insert genes. Selection on existing variation drives the change.
20. D — Fossils in different rock layers show that the types of organisms have changed over time, supporting evolution. The sequence through the layers documents this change. Fossils do not show species remaining unchanged or all appearing at once.
21. C — Homologous structures, like the forelimbs of a human, whale, and bat, share a common origin from a shared ancestor despite different functions. This shared structure is evidence of common descent. It differs from analogous, vestigial, or acquired structures.
22. A — Adaptive radiation is the diversification of one ancestral species into many new species, each adapted to a different niche, as with island birds. One lineage fills a variety of food sources and habitats. It is distinct from extinction, convergence, or genetic drift.
23. D — Producers form the base of the food web and supply energy to all other organisms by making food with sunlight. Consumers and decomposers depend on this captured energy. The energy-supplying foundation is the producers.
24. B — A herbivore eats only plants, so a rabbit that eats grass and other plants is a herbivore. A lion and a hawk are carnivores, and a mushroom is a decomposer. The plant-eating animal is the herbivore.
25. A — Most energy at each trophic level is used for the organisms' life processes and released as heat, which is why only about 10% passes to the next level. This heat loss cannot be reused for growth. The energy is not stored permanently or returned to producers.
26. C — Decomposers break down dead organisms and return 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.
27. D — Carrying capacity is the maximum population an environment can support over time, given its resources, which is where the rabbit population stabilizes. Resource limits set this level. It differs from biotic potential, trophic level, and niche.
28. B — A small fish gaining food while cleaning parasites from a larger fish that benefits is mutualism, since both organisms benefit. Each partner helps the other. This differs from parasitism, competition, and commensalism.
29. A — Photosynthesis removes carbon dioxide from the atmosphere as plants use it to make glucose. Respiration, fossil fuel burning, and decay all release carbon dioxide instead. Photosynthesis is the process that draws atmospheric carbon into living matter.
30. C — A persistent pollutant becomes more concentrated at each higher trophic level through biomagnification, so top predators accumulate the most. Each consumer takes in the stored pollutant from all its prey. This differs from eutrophication, succession, and homeostasis.
31. B — The gradual, predictable recolonization of a burned area from grasses to a mature forest is ecological succession. This process rebuilds the community step by step. It differs from extinction, biomagnification, and eutrophication.

32. D — Clearing a tropical rainforest to grow a single crop destroys habitat and replaces many species with one, reducing biodiversity. Protecting reserves, replanting natives, and anti-hunting laws all help conserve biodiversity. Habitat destruction for monoculture lowers diversity.
33. A — The buildup of greenhouse gases like carbon dioxide is associated with 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.
34. C — Viruses are not considered fully alive because they cannot reproduce on their own and must use a living host cell to make copies. They lack the machinery to function independently. This dependence sets them apart from living cells.
35. D — Protection against catching the same flu again comes from memory cells, which respond quickly if the same virus enters the body. These cells "remember" the pathogen. Red blood cells, digestive enzymes, and platelets do not provide this specific immunity.
36. B — A vaccine works by exposing the immune system to a harmless form of a pathogen's antigens, prompting it to make antibodies and memory cells without causing disease. This prepares the body to respond quickly later. Vaccines do not rely on antibiotics, heat, or new blood cells.
37. C — The common cold is caused by a virus, and antibiotics do not kill viruses, so they are ineffective against it. Antibiotics target bacterial structures that viruses lack. This is why antibiotics do not treat viral colds.
38. A — The independent variable is the factor the scientist deliberately changes, which here is the amount of sunlight the plant receives. It is the variable being tested. The resulting growth would be the dependent variable.
39. D — Testing one variable while keeping all other conditions the same ensures that any change in the results is due to the one variable being tested. If multiple factors varied, the cause would be unclear. Controlling variables makes the conclusion valid.
40. B — The mean is found by adding all the masses ($6 + 8 + 10 + 12 + 14 = 50$) and dividing by the number of objects (5), giving $50 \div 5 = 10$ grams. The mean is the average of the data. It is not simply the smallest, largest, or total value.
41. C — A bar graph is best for comparing values across separate categories, such as plant heights under four 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.
42. A — When results do not support a hypothesis, the proper next step is to revise the hypothesis or form a new one and test it again. Science advances by adjusting ideas to fit evidence. Altering data or ignoring results would violate scientific practice.
43. B — A community includes all the interacting populations of different species living in the same area. A population is one species, and a biome is a large climatic region. The grouping of all interacting populations is the community.
44. D — Energy flows from the Sun to producers and then to consumers, decreasing at each level 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.
45. C — The correct order from smallest to largest is organism → population → community → ecosystem. A population is many organisms of one species, a community is many populations, and an ecosystem adds nonliving factors. This reflects increasing size and complexity.
46. A — A consumer obtains energy by feeding on other organisms, rather than making its own food. This distinguishes consumers from producers, which photosynthesize, and decomposers, which break down dead matter. Feeding on other organisms defines a consumer.

47. B — High biodiversity increases an ecosystem's stability and its ability to recover from disturbances, because many species can fill different roles and respond to change. This resilience helps it withstand events like disease or fire. Greater diversity supports stability rather than guaranteeing unchanging populations.
48. D — Using resources to meet present needs without harming future generations' ability to meet their own is sustainability. Practices like conservation support this long-term balance. It is the opposite of deforestation, extinction, and biomagnification.
49. C — Eukaryotic cells differ from prokaryotic cells in containing a true nucleus and membrane-bound organelles, which prokaryotes lack. This internal compartmentalization is the key distinction. Both cell types contain DNA and carry out life processes.
50. B — Setting aside a wilderness area as a protected park preserves habitats, which is an example of conservation. Dumping waste, clearing forests, and hunting to extinction all damage resources. Safeguarding habitat is a conservation practice.