PRACTICE EXAM 13: LIFE SCIENCE: BIOLOGY SIMULATION (50 QUESTIONS)

1. In a laboratory investigation, a student adds Benedict's solution to a sample and heats it, and the solution turns orange. This result indicates the presence of:

A. Protein, which is detected by a color change to violet in the sample

B. Starch, which is detected by a blue-black color change in the sample

C. Lipid, which is detected by a translucent spot left on brown paper

D. Simple sugar, which is detected by an orange-to-red color when heated

2. Two test tubes contain the same enzyme and substrate. Tube 1 is kept at pH 7 and tube 2 at pH 2. The reaction proceeds quickly in tube 1 but barely at all in tube 2. The best explanation is that:

A. The substrate was completely used up in tube 2 before any reaction began

B. The low pH altered the enzyme's shape so that it no longer functioned well

C. Enzymes only function in tubes that are exposed to bright light energy

D. The pH of tube 2 destroyed the substrate before it could react at all

3. A cell is placed in a solution, and water begins to move into the cell, causing it to swell. Compared to the cell's contents, the surrounding solution must be:

A. Hypotonic, with a lower solute concentration than that inside the cell

B. Hypertonic, with a higher solute concentration than that inside the cell

C. Isotonic, with a solute concentration equal to that inside of the cell

D. Saturated, holding the maximum solute that the water could dissolve

4. During protein synthesis, the sequence of bases in mRNA is read in groups of three. Each group of three mRNA bases is called a:

A. Gene, a segment of DNA that codes for one entire protein

B. Nucleotide, the single subunit that makes up a nucleic acid

C. Codon, a three-base unit that specifies one particular amino acid

D. Chromosome, a condensed structure made of DNA wound with protein

5. A scientist removes all of the ribosomes from a cell. Which cell function would be most directly affected by their removal?

A. The synthesis of proteins from amino acids would be halted

B. The storage of genetic information within the cell's nucleus

C. The production of ATP during aerobic cellular respiration

D. The movement of the cell using its flagella or cilia structures

6. Some single-celled freshwater organisms constantly take in water by osmosis. To avoid bursting, many of them use a structure that pumps the excess water back out of the cell. This structure helps the organism maintain:

A. Reproduction by dividing the single cell into two new daughter cells

B. Digestion by breaking down food particles into much smaller pieces

C. Locomotion by moving the organism through the surrounding water

D. Homeostasis by keeping the internal water balance of the cell stable

7. In humans, gas exchange between the blood and the air occurs across the thin walls of the alveoli. The movement of oxygen and carbon dioxide across these walls takes place by the process of:

A. Active transport, which requires energy to move the gases across membranes

B. Diffusion, in which gases move from an area of higher to lower concentration

C. Osmosis, in which water moves across a selectively permeable membrane

D. Endocytosis, in which the cell engulfs gases inside membrane-bound vesicles

8. A person's blood sugar drops several hours after their last meal, and in response the pancreas releases glucagon. Glucagon helps restore normal blood sugar by signaling the liver to:

A. Absorb additional glucose from the blood and store it away as fat reserves

B. Stop producing any new glucose until the next meal has been fully digested

C. Break down stored glycogen and release glucose into the bloodstream

D. Convert excess amino acids into proteins that are then stored in muscle

9. The human body contains several systems that work together. Which pair of systems works most directly together to deliver oxygen from the air to the body's cells?

A. The digestive system and the excretory system working together

B. The nervous system and the endocrine system working together

C. The muscular system and the skeletal system working together

D. The respiratory system and the circulatory system working together

10. A student studies a cross between two pea plants. One parent is homozygous dominant for tall (TT) and the other is homozygous recessive for short (tt). What is the expected genotype of all the offspring in the first generation?

A. Heterozygous (Tt), inheriting one allele from each of the two parents

B. Homozygous dominant (TT), since tall is dominant over short in peas

C. Homozygous recessive (tt), since both parents contribute a t allele

D. A mixture of TT and tt genotypes in a one-to-one ratio overall

11. A mutation changes a single base in a gene, but the protein that is produced is identical to the original protein. This outcome can occur because:

A. All mutations are automatically repaired before any protein is made

B. More than one codon can code for the same amino acid in the cell

C. Proteins are built directly from DNA without ever using mRNA at all

D. The mutation occurred in a gene that codes for a completely different protein

12. In a flower species, the allele for red color (R) is incompletely dominant over the allele for white (r), so heterozygous plants are pink. If a pink plant is crossed with a white plant, which phenotype ratio is expected in the offspring?

A. All of the offspring will be pink, blending the two parent flower colors

B. Three pink offspring for every one white offspring produced in the cross

C. One half of the offspring pink and one half white from this same cross

D. All of the offspring will be red, since red is dominant over white here

13. DNA replication occurs before a cell divides. The most important result of accurate DNA replication is that:

A. Each new cell receives a complete and identical copy of the DNA

B. The two new cells each receive only half of the original DNA

C. The DNA is converted into protein before the cell is able to divide

D. The chromosome number is reduced by half in each of the new cells

14. Genetic engineering allows scientists to insert a gene from one organism into another. A gene from a bacterium that produces a natural insecticide has been inserted into corn plants. The most likely purpose of producing such corn is to:

A. Increase the sugar content so the corn tastes sweeter to consumers

B. Make the corn grow taller than other varieties in the same field

C. Allow the corn to survive without any water during a long drought

D. Protect the corn from certain insect pests without spraying chemicals

15. In cattle, a cross between a red bull and a white cow produces calves whose coats contain both red and white hairs appearing together, a color called roan. This pattern, in which both alleles are fully expressed at the same time, is an example of:

A. Incomplete dominance, producing a blended pink coat color in the calves

B. Codominance, in which both the red and white alleles are fully expressed

C. Complete dominance, in which red fully masks the white coat color

D. A sex-linked trait carried on the X chromosome of the parent cattle

16. Sexual reproduction increases genetic variation in a population. Which process contributes to this variation by producing gametes that are genetically different from one another?

A. Meiosis, which shuffles alleles through independent assortment and crossing over

B. Mitosis, which produces two cells that are genetically identical to each other

C. Replication, which copies the DNA exactly before the cell begins to divide

D. Differentiation, which causes cells to become specialized for their functions

17. Asexual reproduction produces offspring that are genetically identical to the parent. Which of the following is a disadvantage of asexual reproduction for a population in a changing environment?

A. It requires two parents, which is difficult when individuals are very rare

B. It produces too much genetic variation for the population to survive well

C. The lack of genetic variation makes it harder to adapt to new conditions

D. It always produces far fewer offspring than sexual reproduction would

18. A population of bacteria is repeatedly exposed to an antibiotic over many generations, and each generation contains more bacteria that are resistant to the drug. This increasing proportion of resistant bacteria over time is a direct result of:

A. The bacteria choosing to develop resistance in response to the antibiotic

B. The antibiotic adding new resistance genes directly into each bacterium

C. The bacteria copying resistance from nearby resistant human body cells

D. Natural selection favoring resistant bacteria that survive and reproduce

19. Two species of finch live on the same island and once ate seeds of the same size. Over time, one species evolved a larger beak suited to large seeds while the other kept a small beak for small seeds. This change most likely reduced competition by:

A. Causing the two species to interbreed and merge into a single species

B. Allowing the two species to use different food resources on the island

C. Forcing one species to leave the island entirely in search of new food

D. Eliminating all of the genetic variation in beak size within both species

20. The fossil record shows that many species that once lived on Earth no longer exist today. The permanent disappearance of an entire species is called:

A. Speciation, in which a single species splits into two separate new species

B. Adaptation, in which a species becomes better suited to its environment

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

D. Migration, in which a species moves to an entirely new geographic location

21. Biologists compare the early embryos of fish, birds, and mammals and find that they share many similar features during early development. This similarity is often used as evidence that these animals:

A. Share a common ancestor from which they inherited these features

B. Are all currently evolving into the same type of animal over time

C. Live in identical environments that shaped their early development

D. Reproduce asexually and therefore develop in exactly the same way

22. A population of mice lives in an area with both light and dark soil, and hawks hunt the mice by sight. In areas of dark soil, dark mice survive better, while in areas of light soil, light mice survive better. Over time, this is most likely to result in:

A. All of the mice in both areas becoming the same intermediate color

B. The complete extinction of the entire mouse population in both areas

C. Dark mice and light mice interbreeding until only one color remains

D. Dark mice becoming common on dark soil and light mice on light soil

23. Vestigial structures, such as the reduced hip and leg bones found in some whales, are structures that have lost most or all of their original function. These structures provide evidence for evolution because they suggest that:

A. The structures developed recently to perform a brand-new function

B. The structures will grow larger and more useful in future generations

C. The ancestors of these organisms once used the structures fully

D. The organisms acquired the structures during their own lifetimes

24. In an ecosystem, the total mass of living material is greatest at the level of the producers and decreases at each higher feeding level. The best explanation for this decrease is that:

A. Producers reproduce far more slowly than the consumers above them

B. Energy is lost at each level, so less is available to support higher levels

C. Consumers are always physically smaller than the producers they eat

D. Decomposers remove most of the living material from the higher levels

25. A farmer applies large amounts of nitrogen and phosphorus fertilizer to fields near a lake. After heavy rain, these nutrients wash into the lake. The most likely immediate effect on the lake is:

A. A sharp decrease in the number of algae growing in the lake water

B. An increase in the amount of dissolved oxygen available to the fish

C. A permanent rise in the clarity and cleanliness of the lake water

D. A rapid increase in algae growth, known as an algal bloom, in the lake

26. In a food web, an organism that feeds at more than one trophic level — for example, a bear that eats both berries and fish — is best described as a(n):

A. Omnivore, an organism that consumes both producers and other consumers

B. Herbivore, an organism that consumes only plants and other producers

C. Decomposer, an organism that breaks down dead material into nutrients

D. Autotroph, an organism that makes its own food using sunlight energy

27. Carbon moves between the atmosphere and living things through several processes. Which of the following processes returns carbon dioxide to the atmosphere?

A. Photosynthesis carried out by green plants and algae during daylight

B. The absorption of carbon dioxide by the surface waters of the ocean

C. Cellular respiration carried out by plants, animals, and decomposers

D. The formation of glucose from carbon dioxide inside plant leaf cells

28. A new highway is built that divides a large forest into two separate sections, preventing animals from moving between them. Over many years, the most likely effect on the animal populations is:

A. An immediate increase in genetic variation within each separated group

B. Reduced gene flow between the two groups, which may lead to differences

C. A rapid merging of the two populations into one larger interbreeding group

D. No effect at all, since animals do not depend on movement between areas

29. An invasive plant species is introduced to a wetland and spreads rapidly, crowding out the native plants. Which outcome is the most likely long-term effect on the wetland ecosystem?

A. A large increase in the number of native plant species in the wetland

B. An immediate improvement in the overall water quality of the wetland

C. The invasive plant quickly dying out because it has no natural habitat

D. A decrease in biodiversity as native species are displaced by the invader

30. Ecologists describe the maximum number of individuals of a species that an environment can support over time, given its available resources, as the:

A. Carrying capacity of that environment for the species

B. Biotic potential of the species under perfect conditions

C. Limiting factor that slows the growth of the population

D. Trophic level occupied by the species in the food web

31. A predator and its prey often show linked population cycles: when the prey population rises, the predator population later rises, and when the prey falls, the predator later falls. The predator population rises after the prey because:

A. The predators cause the prey population to increase by hunting it more

B. The prey animals begin to reproduce only when predators are abundant

C. More available prey provides more food, allowing more predators to survive

D. The predator and prey populations change completely independently of each other

32. A community recovering after a forest fire goes through a series of changes: first grasses and weeds appear, then shrubs, then small trees, and finally a mature forest. This gradual, predictable series of changes in a community over time is called:

A. Extinction, in which the original species permanently disappear from the area

B. Ecological succession, the gradual change in a community's species over time

C. Carrying capacity, the limit on how many organisms an area can support

D. Biomagnification, the buildup of toxins in organisms at higher trophic levels

33. Decomposers such as fungi and bacteria are essential to the nutrient cycles of an ecosystem because they:

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

B. Capture energy from sunlight and pass it on to the consumers above them

C. Prey on the largest animals in the ecosystem to control their populations

D. Produce oxygen as a waste product of their normal feeding activities

34. The amount of energy available to organisms decreases at each higher trophic level in a food chain. Which of the following best explains where most of this "lost" energy goes?

A. It is converted into new genetic material stored in the cells of the consumers

B. It is permanently locked away in the undigested remains of the producers

C. It is transferred unchanged to the decomposers at the base of the food chain

D. It is used for life processes and released into the surroundings as heat

35. A scientist studies a sample of pond water and finds many single-celled organisms that have a nucleus and other membrane-bound organelles. These organisms should be classified as:

A. Prokaryotes, because all single-celled organisms lack a true nucleus

B. Viruses, because they are very small and live within the cells of a host

C. Eukaryotes, because their cells contain a nucleus and other organelles

D. Producers, because all microscopic organisms make their own food

36. Two organisms are classified in the same family but in different genera. Compared with two organisms classified in the same genus, the two organisms in the same family are:

A. More closely related, since family is a more specific classification level

B. Less closely related, since family is a broader classification level than genus

C. Exactly equally related, since family and genus are the same kind of group

D. Unrelated, since organisms in different genera share no common ancestor

37. A person cuts their finger, and within minutes the bleeding slows and a clot begins to form. Which component of the blood is most directly responsible for forming the clot?

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

B. White blood cells, which defend the body by destroying invading pathogens

C. Plasma, the liquid portion of blood that carries dissolved nutrients

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

38. The human immune system can develop long-lasting protection against a disease after a person recovers from an infection. This long-lasting protection is provided mainly by:

A. Memory cells that recognize the pathogen and respond rapidly if it returns

B. Red blood cells that increase in number after the infection is over

C. Digestive enzymes that break the pathogen down in the stomach acid

D. Platelets that form a protective barrier over the body's entry points

39. In the human body, the nervous system and the endocrine system both coordinate activities, but they differ in speed and duration. Compared with nerve signals, hormonal signals from the endocrine system are generally:

A. Faster acting and much shorter lasting than the signals of the nerves

B. Identical in both their speed and their duration to nerve impulse signals

C. Slower to act but longer lasting in their effects than nerve impulses

D. Carried along neurons across the small synapse gaps between nerve cells

40. A doctor advises a patient that regular exercise can strengthen the heart and improve the delivery of oxygen to the body's tissues. Exercise improves oxygen delivery mainly by:

A. Increasing the number of nerve cells that carry signals to the muscles

B. Strengthening the heart so it pumps blood more efficiently through the body

C. Reducing the total number of red blood cells circulating in the bloodstream

D. Slowing the rate of cellular respiration to conserve oxygen within the cells

41. A scientist wants to determine whether a new fertilizer increases tomato plant growth. She grows 50 plants with the fertilizer and 50 identical plants without it, keeping all other conditions the same. The 50 plants grown without the fertilizer make up the:

A. Independent variable, the single factor that the scientist is changing here

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

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

D. Control group, which provides a baseline for comparison with the treated plants

42. In a well-designed experiment, a scientist changes only one variable at a time and keeps all other conditions constant. The main reason for keeping all other conditions constant is to:

A. Ensure that any change in the results is caused by the one variable tested

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

C. Guarantee that the original hypothesis will be supported by the final data

D. Allow several different variables to be tested at the exact same time

43. A student measures the height of a plant each week and records the data in a table. To best show how the plant's height changed continuously over several weeks, the student should display the data using a:

A. Pie chart, which shows how a single whole amount is divided into parts

B. Line graph, which shows how a measured value changes over time

C. Bar graph comparing the heights of several completely different plants

D. Labeled diagram showing the internal parts of the plant's structure

44. A scientist observes that corn plants grown in soil treated with a certain mineral are taller than corn plants grown without it. Before concluding that the mineral causes the taller growth, the scientist should:

A. Immediately publish the results so other scientists can use the finding

B. Assume the conclusion is correct because the treated plants were taller

C. Repeat the experiment several times to confirm that the results are reliable

D. Change several variables at once to see which produces the tallest plants

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

A. All living things are made of one or more cells, the basic unit of life

B. Cells can arise spontaneously from nonliving material under the right conditions

C. Only animals and plants are made of cells, while microbes are not

D. Cells are the largest structures found within the bodies of all living things

46. A virus enters a host cell and uses the cell's own materials and machinery to make many copies of itself, eventually destroying the host cell. This relationship, in which the virus benefits while the host is harmed, is most similar to:

A. Mutualism, in which both the virus and the host cell benefit equally

B. Commensalism, in which the virus benefits and the host is left unaffected

C. Competition, in which the virus and host struggle for the same resources

D. Parasitism, in which the virus benefits at the expense of the host cell

47. Plants respond to their environment in various ways. The growth of a plant's stem toward a source of light is an example of a:

A. Reflex, a rapid automatic response controlled by the plant's nervous system

B. Tropism, a growth response of a plant toward or away from a stimulus

C. Mutation, a permanent change in the genetic material of the plant cells

D. Adaptation that the individual plant developed during its own lifetime

48. Antibiotics are medicines used to treat infections caused by bacteria. A major reason that antibiotics are NOT effective against the common cold is that:

A. Antibiotics are too weak to kill the bacteria that cause the common 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 when they are taken together with a flu vaccine shot

49. Human activities have increased the amount of carbon dioxide and other greenhouse gases in the atmosphere. Many scientists link this increase to a long-term rise in average global temperatures, a trend commonly known as:

A. Global climate change, driven in part by rising greenhouse gas levels

B. Ecological succession, the natural replacement of species over time

C. Eutrophication, the nutrient enrichment of lakes and slow-moving water

D. Biomagnification, the buildup of toxins at higher levels of a food chain

50. Conservation efforts such as protecting habitats and establishing wildlife reserves are intended mainly to:

A. Increase the rate at which fossil fuels form deep beneath the ground

B. Preserve biodiversity by protecting species and the ecosystems they need

C. Remove all predators from an ecosystem to protect the prey species there

D. Speed up the extinction of species that compete with humans for resources

PRACTICE EXAM 13—ANSWERS KEYS AND EXPLANATIONS

1. D — Benedict's solution tests for simple (reducing) sugars, turning from blue to green, yellow, orange, or red as sugar concentration increases when heated. An orange color indicates a moderately high amount of simple sugar in the sample. This makes Benedict's a standard indicator for detecting glucose and similar sugars in food labs.
2. B — Each enzyme has an optimal pH, and a strongly acidic environment like pH 2 can alter the enzyme's three-dimensional shape (denaturation), disrupting its active site. With its shape changed, the enzyme can no longer bind the substrate effectively, so the reaction barely proceeds. This illustrates how pH affects enzyme activity.
3. A — Water moves by osmosis from where water is more concentrated (lower solute) to where it is less concentrated (higher solute). Since water enters and swells the cell, the outside solution must have a lower solute concentration than the inside, making it hypotonic. The cell gains water because its interior is comparatively more concentrated with solutes.
4. C — A codon is a sequence of three mRNA bases that specifies one amino acid during translation. The ribosome reads codons in order to assemble the correct amino acid chain. This three-base reading frame is the basis of the genetic code that links genes to proteins.
5. A — Ribosomes are the cellular structures where amino acids are joined to build proteins during translation. Removing them would directly halt protein synthesis. Genetic storage, ATP production, and cell movement depend on other structures, so protein assembly is the function most directly lost.
6. D — A contractile vacuole pumps excess water out of freshwater single-celled organisms, preventing them from swelling and bursting. By controlling internal water balance, it helps the organism maintain homeostasis, a stable internal environment. This is essential because such organisms constantly gain water by osmosis from their dilute surroundings.
7. B — Oxygen and carbon dioxide cross the alveolar walls by diffusion, moving from areas of higher concentration to areas of lower concentration. Oxygen diffuses from the air into the blood while carbon dioxide diffuses the opposite way. This passive process requires no energy and is driven by the concentration gradients of the gases.
8. C — When blood sugar falls, glucagon signals the liver to break down stored glycogen and release glucose into the blood, raising the level back toward normal. This is the opposite action of insulin. Together the two hormones keep blood glucose within a stable range through negative feedback.
9. D — The respiratory system brings oxygen into the alveoli, and the circulatory system carries that oxygen in the blood to cells throughout the body. The two systems are tightly linked at the alveolar capillaries where gas exchange occurs. Their cooperation ensures cells receive the oxygen they need for respiration.
10. A — Crossing TT with tt gives every offspring one T allele and one t allele, making them all heterozygous (Tt). Each parent can contribute only one type of allele, so the genotype is uniform. All the offspring are tall in phenotype but carry the hidden recessive allele.

11. B — The genetic code is redundant, meaning several different codons can specify the same amino acid. If a base change still codes for the original amino acid, the protein is unchanged, a so-called silent mutation. This redundancy buffers organisms against some of the effects of point mutations.
12. C — A pink plant is heterozygous (Rr), and crossing Rr with white (rr) yields half Rr (pink) and half rr (white) offspring. Because color shows incomplete dominance, the heterozygote is pink rather than red. The result is a 1:1 ratio of pink to white plants.
13. A — DNA replication copies the genetic material so that each new cell produced by division receives a complete and identical set of DNA. This accuracy ensures genetic continuity between a cell and its daughter cells. Errors in replication could change traits or harm the cell's function.
14. D — Inserting a bacterial gene that produces a natural insecticide makes the corn able to resist certain insect pests on its own. The purpose is to protect the crop from those pests while reducing the need for chemical spraying. This is a common goal of genetically engineering crops for pest resistance.
15. B — Roan coat color, with red and white hairs both appearing fully, is an example of codominance, in which both alleles are expressed at the same time. This differs from incomplete dominance, where the heterozygote would be a blended intermediate color. The simultaneous full expression of both alleles defines codominance.
16. A — Meiosis increases genetic variation through independent assortment of chromosomes and crossing over between homologous pairs, producing gametes with new allele combinations. This variation is the basis for differences among sexually produced offspring. Mitosis, by contrast, produces genetically identical cells.
17. C — Because asexual reproduction produces genetically identical offspring, the population has little genetic variation, which makes it harder to adapt when the environment changes. If conditions shift, all the identical individuals may be equally vulnerable. Genetic variation, which sexual reproduction provides, allows some individuals to survive new challenges.
18. D — Antibiotic resistance increases through natural selection: a few bacteria already carry resistance, survive the antibiotic, and reproduce, passing resistance to their offspring. Over generations the resistant type becomes more common. The drug selects for pre-existing resistant individuals rather than creating resistance on demand.
19. B — By evolving different beak sizes suited to different seed sizes, the two finch species came to use different food resources, which reduced direct competition between them. This resource partitioning lets similar species coexist on the same island. It does not merge the species or eliminate their variation.
20. C — Extinction is the permanent disappearance of an entire species from Earth, leaving no living members. The fossil record documents many such species that no longer exist. This is distinct from speciation, adaptation, and migration, which describe other evolutionary or ecological processes.
21. A — Shared features in the early embryos of fish, birds, and mammals are evidence that these animals inherited those features from a common ancestor. Such developmental similarities are stronger in more closely related groups. This is one of several independent lines of evidence supporting common descent.
22. D — Hawks hunting by sight remove the more visible mice, so on dark soil dark mice survive better and on light soil light mice survive better. Over time natural selection makes each color predominate where it provides the best camouflage. This produces dark mice on dark soil and light mice on light soil.
23. C — Vestigial structures are reduced remnants of features that were fully functional in an organism's ancestors. The small hip and leg bones in whales suggest that their ancestors had

functional hind limbs and once walked on land. Such structures provide evidence of evolutionary change over time.

24. B — At each trophic level, much of the available energy is used for life processes and lost as heat, so only a small fraction passes to the next level. With less energy available higher up, those levels can support less living mass (biomass). This energy loss explains why biomass decreases at higher feeding levels.
25. D — Excess nitrogen and phosphorus act as fertilizers in the lake, triggering a rapid overgrowth of algae called an algal bloom. This nutrient enrichment, known as eutrophication, is the immediate result of the runoff. Later decomposition of the algae can deplete oxygen and harm aquatic life.
26. A — An omnivore eats both producers (such as berries) and other consumers (such as fish), feeding at more than one trophic level. This contrasts with herbivores, which eat only plants, and decomposers, which consume dead matter. A bear with a mixed diet is a classic example of an omnivore.
27. C — Cellular respiration in plants, animals, and decomposers breaks down glucose and releases carbon dioxide back into the atmosphere. This is the main biological process that returns carbon to the air. Photosynthesis and ocean absorption remove carbon dioxide rather than release it.
28. B — A highway that prevents animals from crossing reduces gene flow between the two separated groups. With less interbreeding, the groups may gradually accumulate genetic differences over many generations. This habitat fragmentation is a common cause of population divergence.
29. D — A fast-spreading invasive plant that crowds out native species reduces biodiversity as those native species are displaced. Lower diversity can weaken the ecosystem's stability and resilience. The invader is unlikely to die out on its own or improve conditions for the natives.
30. A — Carrying capacity is the maximum number of individuals of a species that an environment can sustain over time, given its available resources. When a population reaches this limit, resource scarcity slows further growth. It represents the long-term balance between population size and resource availability.
31. C — When prey become abundant, predators have more food, so more predators survive and reproduce, and the predator population rises after the prey population. As prey then decline, predators have less food and their numbers later fall. This time lag produces the linked predator–prey cycles.
32. B — The gradual, predictable sequence of communities replacing one another over time—grasses, then shrubs, then trees—is ecological succession. After a disturbance like a fire, this process rebuilds the community step by step toward a mature stage. It describes change in the community, not extinction or toxin buildup.
33. A — Decomposers break down dead organisms and wastes, releasing the nutrients they contain back into the soil and environment for reuse. This recycling makes essential nutrients available again to producers. Without decomposers, nutrients would stay locked in dead matter and cycles would stall.
34. D — Most energy at each trophic level is used to power the organisms' own life processes, and that energy is ultimately released to the surroundings as heat. Because heat cannot be reused for growth, less energy passes to the next level. This continuous heat loss is why energy decreases up a food chain.
35. C — Organisms whose cells contain a nucleus and other membrane-bound organelles are eukaryotes. Prokaryotes, by contrast, lack a true nucleus. The presence of these internal membrane-bound structures is the defining feature that places these single-celled organisms among the eukaryotes.

36. B — Family is a broader classification level than genus, so organisms sharing only the same family are less closely related than organisms sharing the same genus. The more specific the shared level, the closer the relationship. Sharing only a broad category indicates a more distant common ancestor.
37. D — Platelets are cell fragments in the blood that gather at a wound and help trigger the clotting process that stops bleeding. Their action seals the injury and prevents excessive blood loss. Red cells, white cells, and plasma serve transport and defense roles rather than clotting.
38. A — After recovering from an infection, the immune system retains memory cells that "remember" the specific pathogen. If that pathogen returns, memory cells trigger a faster, stronger response that prevents illness, which is the basis of long-lasting immunity. This is also how vaccines provide protection.
39. C — Endocrine (hormonal) signals travel through the bloodstream and generally act more slowly but produce longer-lasting effects than rapid, brief nerve impulses. The two systems complement each other in coordinating body activities. Nerve signals are fast and short-lived, while hormones provide sustained regulation.
40. B — Regular exercise strengthens the heart muscle, allowing it to pump blood more efficiently and deliver oxygen-rich blood to the tissues more effectively. A stronger, more efficient heart improves circulation throughout the body. This enhanced delivery, not fewer red cells or slower respiration, is how exercise benefits oxygen supply.
41. D — The group that does not receive the fertilizer is the control group, providing a baseline against which the treated plants are compared. Without a control, the scientist could not tell whether differences were due to the fertilizer. The control is essential for drawing a valid conclusion.
42. A — Keeping all other conditions constant ensures that any difference in the results can be attributed to the single variable being tested. If multiple factors changed at once, the cause of the outcome would be unclear. Controlling variables is what makes an experiment's conclusions reliable.
43. B — A line graph is best for showing how a measured value, such as plant height, changes continuously over time. The connected points reveal the trend across the weeks at a glance. Pie charts, bar graphs, and diagrams do not display change over time as effectively.
44. C — Before concluding that the mineral causes taller growth, the scientist should repeat the experiment several times to confirm that the results are consistent and reliable. Repetition reduces the chance that the outcome was due to error or random variation. Reliable conclusions require reproducible results.
45. A — A core statement of the modern cell theory is that all living things are composed of one or more cells, the basic unit of life. The theory also holds that cells come from preexisting cells. The idea that cells arise spontaneously from nonliving matter is not part of cell theory.
46. D — A virus that benefits by reproducing inside a host cell while harming or destroying that cell parallels parasitism, in which one organism benefits at the host's expense. This one-sided harmful relationship distinguishes it from mutualism or commensalism. The host suffers while the virus gains.
47. B — A tropism is a directional growth response of a plant toward or away from a stimulus, such as a stem growing toward light (phototropism). It results from differential growth rather than a nervous response. Plants lack nerves, so this light-directed growth is best described as a tropism.
48. C — The common cold is caused by a virus, and antibiotics work only against bacteria, not viruses. Because viruses lack the bacterial structures antibiotics target, the drugs have no effect on them. This is why antibiotics are inappropriate for treating viral illnesses like colds.

49. A — The long-term rise in average global temperatures linked to increasing greenhouse gases is known as global climate change. Gases like carbon dioxide trap heat in the atmosphere, contributing to this warming trend. It is distinct from succession, eutrophication, and biomagnification, which describe other processes.
50. B — Conservation measures such as protecting habitats and creating wildlife reserves are aimed mainly at preserving biodiversity by safeguarding species and the ecosystems they depend on. Maintaining diverse, intact habitats helps prevent extinctions. The goal is to sustain natural variety, not to remove species or accelerate extinction.