

# PRACTICE EXAM 8: LIFE SCIENCE: BIOLOGY SIMULATION (50 QUESTIONS)

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1. A researcher wants the results of an experiment to be considered valid by other scientists. One of the most important things the researcher can do to support the validity of the results is to:

- A. Keep the methods secret so that no one else can repeat the experiment
- B. Use a large sample size and repeat the experiment several times
- C. Test only one subject a single time to keep the experiment simple
- D. Change several variables at once to save time during the experiment

2. A single-celled organism living in pond water keeps the amount of salt and water inside its cell fairly constant even though the pond water around it changes. This ability to keep internal conditions stable is known as:

- A. Reproduction, the production of new organisms similar to the parent
- B. Digestion, the breakdown of large molecules into smaller usable ones
- C. Excretion, the removal of metabolic wastes from inside the organism
- D. Homeostasis, the maintenance of stable conditions inside the organism

3. Enzymes are essential to nearly every chemical reaction in a living cell. Chemically, enzymes belong to which group of organic compounds?

- A. Proteins, which are made of amino acids linked together in a chain
- B. Carbohydrates, which are made of simple sugars joined into long chains
- C. Lipids, which are made of fatty acids and glycerol joined together

D. Nucleic acids, which are made of nucleotides linked into long strands

4. Each enzyme in a cell speeds up only one particular reaction or a small group of similar reactions. The main reason an enzyme works on only a specific substrate is that:

- A. Each enzyme is destroyed immediately after the reaction it controls
- B. Each enzyme can change its shape to fit any substrate in the cell
- C. The shape of the enzyme's active site matches only its specific substrate
- D. The enzyme contains the substrate inside it from the moment it is made

5. A plant cell often contains a single large, fluid-filled structure that stores water and dissolved substances and helps the cell keep its shape. This structure is the:

- A. Nucleus, which holds the genetic material that controls the cell
- B. Ribosome, which assembles amino acids into proteins for the cell
- C. Chloroplast, which captures light energy to make food for the cell
- D. Vacuole, which stores water and dissolved substances within the cell

6. According to the cell theory, where do all new cells come from?

- A. From existing cells that divide to produce new cells
- B. From nonliving matter that spontaneously becomes living
- C. Only from the cells found in animals and not in any plants
- D. From the cell membrane forming a brand-new cell out of water

7. Carbon dioxide produced by a body cell moves out of the cell and into the blood, where its concentration is lower, without the cell using energy. This movement of carbon dioxide is an example of:

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

- B. Active transport, the movement of a substance using energy from ATP
- C. Mitosis, the division of a cell into two genetically identical cells
- D. Photosynthesis, the production of sugar from carbon dioxide and water

8. In a leaf, photosynthesis takes place inside organelles that contain a green pigment. During photosynthesis, these organelles use carbon dioxide and water to produce:

- A. Carbon dioxide and water, which the plant releases back into the air
- B. Glucose and oxygen, with the glucose storing energy for the plant
- C. Nitrogen and proteins, which the plant uses to build new cell walls
- D. Light energy and heat, which the plant stores within its roots and stems

9. In both plant and animal cells, the energy stored in glucose is released for the cell to use during cellular respiration. The organelle where most of this energy is released is the:

- A. Nucleus, which stores and protects the cell's genetic information
- B. Cell membrane, which controls what materials enter and leave the cell
- C. Chloroplast, which captures light energy to manufacture sugar molecules
- D. Mitochondrion, which releases the energy stored in glucose as usable ATP

10. Much of the oxygen in Earth's atmosphere is continually replaced by living organisms. Which organisms are mainly responsible for adding oxygen to the atmosphere?

- A. Plants and algae, which release oxygen as they carry out photosynthesis
- B. Predators, which release oxygen as they hunt and capture their prey
- C. Decomposers, which release oxygen as they break down dead organisms
- D. Fungi, which release oxygen as they absorb nutrients from the soil

11. Which of the following situations in a multicellular organism most directly depends on the process of mitosis?

- A. The production of egg and sperm cells for sexual reproduction
- B. The release of energy from food molecules within the cells
- C. The growth of an organism and the healing of an injured tissue
- D. The removal of liquid wastes from the blood by the kidneys

12. Sexual reproduction combines a sperm cell and an egg cell to form a new organism. Meiosis is necessary before this combination because it:

- A. Doubles the chromosome number in the sperm and egg before they combine
- B. Reduces the chromosome number by half so the offspring has the correct number
- C. Produces sperm and egg cells that are exact genetic copies of the parent
- D. Removes all genetic variation so the offspring is identical to its parents

13. A molecule of DNA is shaped like a twisted ladder, with the rungs of the ladder made of paired bases. In a normal DNA molecule, the base adenine (A) always pairs with:

- A. Guanine (G), forming one of the rungs of the DNA ladder
- B. Cytosine (C), forming one of the rungs of the DNA ladder
- C. Another adenine (A), forming one of the rungs of the DNA ladder
- D. Thymine (T), forming one of the rungs of the DNA ladder

14. The information stored in an organism's genes ultimately affects the organism's traits because the genes direct the cell to:

- A. Build specific proteins, which determine the organism's traits
- B. Produce sunlight, which the cell uses to develop its traits
- C. Remove all wastes, which gives the organism its inherited traits
- D. Store extra water, which the cell uses to express its traits

15. In a population, a new version of a gene can appear that was not present in either parent. This brand-new genetic variation arises through:

- A. Digestion, in which large food molecules are broken into smaller ones
- B. Respiration, in which the cell releases the energy stored in glucose
- C. Mutation, in which a change occurs in the DNA sequence of a gene
- D. Excretion, in which the body removes the wastes its cells produce

16. A gardener takes a cutting from a prize-winning rose bush and grows it into a new plant that is genetically identical to the original. The new plant is best described as a:

- A. Hybrid, formed by crossing two genetically different parent plants
- B. Clone, a plant that is genetically identical to the original plant
- C. Mutant, a plant whose genes were randomly changed during growth
- D. New species, a plant that can no longer breed with the original rose

17. Scientists have engineered some crop plants to contain a gene that makes them resistant to a common plant disease. The most direct benefit of producing these genetically modified crops is that they:

- A. Are less likely to be destroyed by the disease the gene protects against
- B. Grow into many genetically different varieties from a single seed
- C. No longer need any sunlight, water, or soil in order to grow well
- D. Can reproduce only by cloning and never by forming any seeds

18. In genetics, the actual combination of alleles that an organism carries for a trait is called its genotype, while the trait that can be observed is called its:

- A. Allele, which is one of the alternative forms of a gene for a trait
- B. Mutation, which is a change in the DNA sequence of a particular gene
- C. Chromosome, which is a structure that carries many genes within the cell

D. Phenotype, which is the observable trait that results from the genotype

19. In pea plants, round seeds (R) are dominant over wrinkled seeds (r). Two heterozygous round plants (Rr) are crossed. What fraction of the offspring is expected to have wrinkled seeds?

- A. Three-fourths, because most offspring inherit at least one r allele
- B. One-half, because half of the offspring receive a single r allele each
- C. One-fourth, because only the offspring with two r alleles are wrinkled
- D. None, because the dominant round allele blocks all wrinkled offspring

20. A weightlifter develops very large muscles through years of training. His children, however, are not born with unusually large muscles. This is because the large muscles are:

- A. An inherited trait that should have been passed on to all his children
- B. An acquired trait, gained during his lifetime and not coded in his genes
- C. A mutation that changed the DNA in every cell of his entire body
- D. A dominant allele that his children failed to inherit by random chance

21. For natural selection to act on a population of organisms, the individuals in that population must first show:

- A. Variation in their inherited traits, so that some are better suited than others
- B. Identical traits, so that every individual has exactly the same chance to survive
- C. A complete absence of any genetic differences among the individuals
- D. The ability to consciously change their own traits whenever needed

22. Whales have small hip bones embedded in their bodies that are not attached to any limbs and serve no clear function. These reduced, functionless structures provide evidence that whales:

- A. Are currently in the process of growing brand-new hind limbs

- B. Belong to the same species as the land animals that have hip bones
- C. Descended from ancestors that had functional hind limbs and hips
- D. Developed the hip bones recently to help them swim more quickly

23. On a group of islands, a single ancestral species of finch gave rise to many different finch species, each with a beak suited to a different food source. The formation of many new species from one ancestor is called:

- A. Convergent evolution, in which unrelated species come to resemble each other
- B. Natural selection, in which the best-suited individuals survive and reproduce
- C. Genetic drift, in which allele frequencies change randomly in a population
- D. Adaptive radiation, in which one ancestor gives rise to many new species

24. When scientists find that two different species share many of the same proteins and DNA sequences, they conclude that the two species most likely:

- A. Live in exactly the same habitat and eat exactly the same foods
- B. Share a common ancestor from which they inherited those similarities
- C. Are able to interbreed freely and produce large numbers of offspring
- D. Developed their similarities by chance with no evolutionary connection

25. In winter, a ground squirrel enters a deep sleep called hibernation, during which its body processes slow down so it can survive the cold months with little food. Hibernation is best classified as a:

- A. Structural adaptation, an inherited physical feature of the squirrel's body
- B. Random mutation that the squirrel develops during a single cold winter
- C. Behavioral adaptation that improves the squirrel's chance of survival
- D. Learned response that the squirrel must be taught by its parents each year

26. In a typical food chain, energy flows from one organism to the next. The organisms that capture energy from sunlight and form the base of most food chains are the:

- A. Producers, which make their own food using energy from the Sun
- B. Consumers, which obtain energy by feeding on other living organisms
- C. Decomposers, which obtain energy by breaking down dead organisms
- D. Predators, which obtain energy by hunting and capturing other animals

27. In a grassland food web, grasses are eaten by grasshoppers and rabbits, which are eaten by snakes and hawks. If a long drought killed off most of the grasses, the most immediate effect on the food web would be a decrease in the number of:

- A. Hawks, because hawks depend on the grass directly for their food
- B. Snakes, because snakes feed directly on the grasses in the grassland
- C. Decomposers, because they can no longer break down the living grasses
- D. Grasshoppers and rabbits, because they feed directly on the grasses

28. Fleas live on the bodies of dogs, feeding on the dog's blood. The fleas gain food and shelter, while the dog is harmed by the irritation and loss of blood. This relationship is best described as:

- A. Mutualism, in which both the fleas and the dog benefit from the relationship
- B. Parasitism, in which the fleas benefit while the dog is harmed by them
- C. Commensalism, in which the fleas benefit while the dog is unaffected
- D. Competition, in which the fleas and the dog struggle for the same food

29. When a rabbit eats grass, only a small part of the energy stored in the grass becomes new rabbit tissue. What happens to most of the rest of the energy taken in by the rabbit?

- A. It is passed on completely to the next organism that eats the rabbit
- B. It is stored permanently and never used by the rabbit at any point

- C. It is used by the rabbit for life processes and lost largely as heat
- D. It is converted back into grass to replace what the rabbit consumed

30. A disease spreads more easily through a crowded population than through a sparse one, so it affects a population more strongly as that population grows larger. A factor like disease, whose effect increases as the population grows, is called a:

- A. Density-dependent factor, whose effect grows stronger as crowding increases
- B. Density-independent factor, whose effect is the same at any population size
- C. Producer, which forms the base of the ecosystem's energy supply
- D. Climax community, the final stable stage reached during succession

31. A fire burns through a forest but leaves the soil intact. Over the following years, grasses grow first, then shrubs, and finally trees return. Because the soil was already present, this gradual recovery is an example of:

- A. Primary succession, which begins on bare rock with no soil present
- B. Eutrophication, in which excess nutrients deplete the oxygen in water
- C. Biomagnification, in which toxins build up at higher trophic levels
- D. Secondary succession, which begins on land where soil already exists

32. A pesticide that does not break down easily is sprayed on crops near a lake. Over time it is found in the highest concentrations in the fish-eating birds at the top of the food chain. This increasing concentration of the pesticide at higher trophic levels is called:

- A. Eutrophication, in which excess nutrients cause oxygen levels to drop
- B. Succession, in which one community gradually replaces another over time
- C. Biomagnification, in which a toxin becomes more concentrated up the food chain
- D. Carrying capacity, the largest population the lake is able to support

33. In the human digestive system, large molecules in food are broken down into smaller molecules that the body can absorb. The substances that speed up the chemical breakdown of food during digestion are called:

- A. Hormones, chemical messengers that travel in the blood to target organs
- B. Enzymes, proteins that speed up the chemical breakdown of food molecules
- C. Antibodies, proteins that recognize and help destroy invading pathogens
- D. Vitamins, nutrients that the body must obtain from the food it eats

34. In the human body, the respiratory system and the circulatory system work closely together. The most direct way these two systems cooperate is that the:

- A. Respiratory system takes in oxygen that the circulatory system delivers to cells
- B. Circulatory system digests the food that the respiratory system absorbs
- C. Respiratory system filters the wastes that the circulatory system produces
- D. Circulatory system produces the oxygen that the respiratory system breathes in

35. The nervous system allows a person to sense and respond to the environment. Which of the following is a function of the nervous system?

- A. Breaking down food into small molecules the body's cells can absorb
- B. Filtering wastes out of the blood and removing them from the body
- C. Pumping blood through the vessels to deliver oxygen to body cells
- D. Carrying rapid signals that let the body respond to a stimulus

36. When a particular virus enters the body, the immune system produces proteins that are specific to that virus and help destroy it. These specific proteins are called:

- A. Enzymes, which speed up the chemical reactions involved in digestion
- B. Hormones, which travel through the blood to regulate the body's organs

- C. Antibodies, which are specific to a pathogen and help destroy it
- D. Platelets, cell fragments that gather at a wound to help blood clot

37. On a very hot day, the body releases sweat, and as the sweat evaporates it removes heat and helps cool the body down. This response is part of a feedback system that helps the body:

- A. Raise its internal temperature higher and higher throughout the day
- B. Keep its internal temperature within a stable, healthy range
- C. Stop carrying out chemical reactions until the weather becomes cooler
- D. Permanently change its DNA to survive better in the hot weather

38. In humans, the cell formed when a sperm cell joins with an egg cell during fertilization is called a zygote. This single cell is important because it:

- A. Divides repeatedly and develops into a complete new organism
- B. Remains a single cell for the entire lifetime of the organism
- C. Contains only half of the genetic information needed for development
- D. Produces the energy that the parents need to carry out reproduction

39. All of the different specialized cells in a person's body, such as muscle and skin cells, contain the same complete set of genes. The cells become different from one another because:

- A. Each cell receives a completely different set of genes during development
- B. Cells gradually lose most of their genes as the person grows older
- C. The environment changes the actual DNA sequence inside each kind of cell
- D. Different genes are switched on or off in different types of cells

40. As energy flows through a food chain, the total amount of usable energy decreases at each step. This decrease occurs because energy:

- A. Is created at each level and stored permanently in the organisms there
- B. Is lost at each level, mainly as heat released during life processes
- C. Is recycled back to the producers at the base of the food chain
- D. Is converted directly into new matter that organisms add to their bodies

41. A scientist studies how the amount of fertilizer affects the height of corn plants. She gives different amounts of fertilizer to identical plants and then measures how tall each plant grows. In this experiment, the height of the corn plants is the:

- A. Independent variable, the factor the scientist deliberately changes
- B. Control group, the group of plants that receives no fertilizer at all
- C. Dependent variable, the factor measured as the result of the experiment
- D. Constant, a factor kept exactly the same for every plant in the study

42. A student observes that plants on a sunny windowsill seem greener than plants kept in a dark corner. Which of the following statements would be the best hypothesis for the student to test?

- A. Plants grown in more sunlight will develop greener leaves than plants grown in the dark
- B. Green is a color that many people find pleasant to look at in their homes
- C. Houseplants are commonly kept on windowsills and in corners of rooms
- D. Sunlight is a form of energy that travels to Earth from the distant Sun

43. A scientist records that a population of bacteria doubles in number every 30 minutes for several hours when food is plentiful. Based on these data, the most reasonable conclusion is that, under these conditions, the bacterial population:

- A. Stays exactly the same in size no matter how much time passes
- B. Decreases steadily in size as the hours of the experiment go by
- C. Is completely unaffected by the amount of available food present
- D. Increases rapidly over time as long as food remains plentiful

44. A biology student wants to study the structure of the individual cells in a thin layer of plant tissue. The most appropriate instrument for this investigation would be a:

- A. Balance, which is used to measure the mass of an object precisely
- B. Microscope, which magnifies tiny objects so that cells can be seen
- C. Graduated cylinder, which is used to measure the volume of a liquid
- D. Thermometer, which is used to measure the temperature of a sample

45. In a forest ecosystem, fungi and bacteria break down fallen leaves and dead animals. This activity is essential to the ecosystem because these organisms:

- A. Capture energy from sunlight and pass it on to the forest producers
- B. Hunt and capture living animals to control the forest's populations
- C. Break down dead material and return nutrients to the soil for reuse
- D. Prevent any new plants from growing on the floor of the forest

46. Two organisms are found to share a large number of physical and genetic characteristics. Based on the principles of classification, these two organisms are most likely:

- A. Closely related and grouped near each other in the classification system
- B. Completely unrelated despite their many shared characteristics
- C. Members of two entirely different kingdoms of living organisms
- D. Unable to be classified at all because they are too similar to compare

47. Although some bacteria cause disease, many are important to living things and the environment. Which of the following describes a helpful role that bacteria can play?

- A. Producing the sunlight that green plants need for photosynthesis
- B. Breaking down dead matter and helping recycle nutrients in the soil
- C. Preventing all of the chemical reactions inside of living cells

D. Replacing the need for producers at the base of every food chain

48. Unlike bacteria, viruses are not made of cells and cannot reproduce by themselves. In order to make copies of itself, a virus must:

- A. Find sunlight and water to use as raw materials for making copies
- B. Absorb nutrients directly from the soil the way a fungus does
- C. Divide on its own into two identical halves the way bacteria do
- D. Enter a living host cell and use that cell's machinery to reproduce

49. In a population of bacteria, a few individuals carry a gene that makes them resistant to an antibiotic. When the antibiotic is used repeatedly, the resistant bacteria become more and more common over time. This change occurs because the resistant bacteria:

- A. Were taught by the antibiotic how to defend against the drug
- B. Each gradually built up their resistance during their own lifetimes
- C. Survived the antibiotic and passed the resistance gene to their offspring
- D. Caused the antibiotic to create new resistance genes in every cell

50. An ecologist studying two ponds finds that the pond with a greater variety of species is better able to recover after a pollution event than the pond with fewer species. This observation best supports the idea that greater biodiversity tends to:

- A. Make an ecosystem weaker and far less able to recover from disturbance
- B. Have no effect at all on how well an ecosystem recovers from disturbance
- C. Increase an ecosystem's stability and ability to recover from disturbance
- D. Cause more harm to an ecosystem during a pollution event than less diversity

## ANSWER KEY – Practice Exam 8: Life Science: Biology Simulation

1. B — Using a large sample size and repeating the experiment several times supports the validity of results by reducing the effect of chance. Reproducible results based on many trials are more trustworthy. This is a basic principle of sound experimental design.
2. D — Keeping internal conditions such as salt and water content stable despite changes in the surroundings is homeostasis. The organism actively regulates its internal environment. This balance is essential for the cell to function properly.
3. A — Enzymes are proteins, made of amino acids linked together in chains. Their protein structure gives them the specific shapes needed to catalyze reactions. This places enzymes within the protein group of organic compounds.
4. C — An enzyme acts on a specific substrate because the shape of its active site matches only that substrate, like a lock and key. This specificity ensures each enzyme catalyzes only its intended reaction. The matching shape is the basis of enzyme specificity.
5. D — The large fluid-filled structure that stores water and dissolved substances and helps maintain shape is the vacuole. In plant cells it is often a single large central vacuole. Its storage role supports the cell's structure and function.
6. A — The cell theory states that all new cells come from existing cells that divide. Cells do not arise spontaneously from nonliving matter. This principle applies to all living organisms, not just animals.
7. A — Carbon dioxide moving from higher to lower concentration without using energy is diffusion. The gas moves down its concentration gradient out of the cell. This passive process allows wastes like carbon dioxide to leave cells.
8. B — Photosynthesis uses carbon dioxide and water to produce glucose and oxygen, with the glucose storing chemical energy. The chloroplasts carry out this process using chlorophyll. Glucose and oxygen are the products of photosynthesis.
9. D — The mitochondrion is the organelle where most energy from glucose is released as usable ATP during cellular respiration. Its role is to supply energy for the cell's activities. Both plant and animal cells rely on mitochondria for this purpose.
10. A — Plants and algae add oxygen to the atmosphere as a byproduct of photosynthesis. Their photosynthetic activity continually replenishes atmospheric oxygen. This makes them the main producers of the oxygen other organisms breathe.
11. C — Growth of an organism and healing of injured tissue depend on mitosis, which produces new genetically identical body cells. These processes require many new cells identical to the originals. Mitosis is the cell division responsible for growth and repair.
12. B — Meiosis reduces the chromosome number by half so that, when sperm and egg combine, the offspring has the correct number. Without this reduction, the chromosome number would double each generation. Halving the number in gametes keeps it constant over generations.
13. D — In DNA, adenine always pairs with thymine, forming one type of rung on the DNA ladder. This specific pairing follows the base-pairing rules. Correct pairing allows DNA to be accurately copied.
14. A — Genes affect traits by directing the cell to build specific proteins, and those proteins determine the organism's characteristics. The link from gene to protein to trait is central to inheritance. This is how genetic information shapes an organism.

15. C — A brand-new version of a gene arises through mutation, a change in the DNA sequence. Mutations are the original source of new genetic variation. This new variation can then be acted on by natural selection.
16. B — A plant grown from a cutting that is genetically identical to the original is a clone. Cloning produces an exact genetic copy from a single parent. This differs from combining the genes of two parents.
17. A — A disease-resistance gene makes the modified crop less likely to be destroyed by that disease, which is the direct benefit. The plant expresses the protective trait carried by the inserted gene. This targeted improvement is the goal of the engineering.
18. D — The observable trait that results from an organism's genotype is its phenotype. While genotype is the allele combination, phenotype is what can be seen. Distinguishing the two is fundamental to genetics.
19. C — Crossing  $Rr \times Rr$  gives a 1:2:1 genotype ratio, and only the  $rr$  offspring are wrinkled, so one-fourth are expected to be wrinkled. Only the homozygous recessive combination shows the recessive trait. This 25% result is typical of a heterozygous cross.
20. B — Large muscles gained through training are an acquired trait, developed during the person's lifetime and not coded in the genes. Acquired traits are not passed to offspring. Only inherited, gene-based traits can be passed on.
21. A — Natural selection requires variation in inherited traits so that some individuals are better suited to survive than others. Without such variation, there would be nothing for selection to act upon. This variation is a necessary starting condition for natural selection.
22. C — Reduced, functionless hip bones in whales are vestigial structures, providing evidence that whales descended from ancestors with functional hind limbs and hips. These remnants point to an evolutionary past. Vestigial structures are a line of evidence for common descent.
23. D — The formation of many new species from one ancestor, each adapted to a different food source, is adaptive radiation. This diversification fills different ecological roles. The finches are a classic example of adaptive radiation.
24. B — Shared proteins and DNA sequences between species indicate descent from a common ancestor that passed on those similarities. Molecular similarity reflects evolutionary relatedness. The more shared sequences, the closer the relationship.
25. C — Hibernation is a behavioral adaptation, an inherited behavior that improves the squirrel's chance of surviving cold months with little food. It is an action rather than a body structure. Such behaviors arise through natural selection like physical adaptations.
26. A — Producers capture energy from sunlight and form the base of most food chains. They make their own food through photosynthesis. This places them at the foundation of the ecosystem's energy flow.
27. D — A loss of grasses would most immediately reduce the grasshoppers and rabbits, which feed directly on the grass. Organisms higher in the web are affected later. The most direct effect falls on the primary consumers that eat the producer.
28. B — Fleas benefiting at the dog's expense, gaining food while harming the host, is parasitism. One organism benefits and the other is harmed. This one-sided harm distinguishes parasitism from mutualism.
29. C — Most of the energy a rabbit takes in is used for its life processes and lost largely as heat, with only a small part stored as new tissue. This loss is why energy decreases at each step of a food chain. It limits how much energy reaches higher levels.

30. A — Disease that affects a population more strongly as it becomes crowded is a density-dependent factor. Its impact increases with population density. Such factors help regulate populations near their carrying capacity.
31. D — Recovery on land where soil remains intact, such as after a fire, is secondary succession. Because the soil was not destroyed, the process begins further along than primary succession. The pre-existing soil identifies it as secondary succession.
32. C — A persistent toxin found in the highest concentrations in top predators illustrates biomagnification, the increasing concentration of a toxin up the food chain. Because the pesticide does not break down, it accumulates at higher levels. This is why top predators are most affected.
33. B — Enzymes are the proteins that speed up the chemical breakdown of food during digestion. They act as biological catalysts in the digestive system. Their activity allows food to be broken down at a useful rate.
34. A — The respiratory system takes in oxygen that the circulatory system then delivers to cells, which is how the two systems cooperate. Their teamwork accomplishes gas delivery that neither could do alone. This interdependence keeps the body's cells supplied with oxygen.
35. D — A function of the nervous system is carrying rapid signals that let the body respond to a stimulus. These fast signals allow quick reactions to the environment. This distinguishes the nervous system from slower hormonal control.
36. C — Antibodies are proteins specific to a particular pathogen that help destroy it. Their specificity lets the immune system target a particular virus. This targeted defense is central to fighting infection.
37. B — Sweating to remove heat helps the body keep its internal temperature within a stable, healthy range. This feedback response counteracts the rise in temperature. Maintaining steady temperature is an example of homeostasis.
38. A — The zygote is important because it divides repeatedly and develops into a complete new organism. From this single cell arise all the body's cells. The zygote is the starting point of development.
39. D — Specialized cells differ because different genes are switched on or off in different cell types, even though all cells share the same genes. This differential gene expression produces cell diversity. It explains how one fertilized egg gives rise to many cell types.
40. B — Usable energy decreases at each step of a food chain because energy is lost at each level, mainly as heat released during life processes. Only a fraction passes to the next level. This loss limits the length of food chains.
41. C — The height of the corn plants is the dependent variable because it is measured as the result of changing the fertilizer amount. The plant height depends on the fertilizer given. Identifying the measured outcome is key to interpreting the experiment.
42. A — A good hypothesis is a testable prediction, such as that more sunlight will produce greener leaves. This statement can be tested by experiment. The other options are facts or observations, not testable predictions.
43. D — Bacteria doubling every 30 minutes while food is plentiful shows that the population increases rapidly over time under these conditions. The data describe fast, repeated growth. This conclusion follows directly from the observed doubling.
44. B — A microscope is the appropriate instrument because it magnifies tiny objects so that individual cells can be seen. Cells are too small for the unaided eye. The microscope makes cellular structures visible for study.

45. C — Fungi and bacteria that break down dead material and return nutrients to the soil are essential because they recycle nutrients for reuse. This decomposition keeps the ecosystem supplied with the materials life needs. Without decomposers, nutrients would stay locked in dead matter.
46. A — Organisms sharing many physical and genetic characteristics are most likely closely related and grouped near each other in the classification system. Shared traits reflect close relationship. Classification is based on such shared characteristics.
47. B — A helpful role of bacteria is breaking down dead matter and recycling nutrients in the soil. These decomposing bacteria return nutrients for producers to use. Their activity supports the cycling of matter in ecosystems.
48. D — Because a virus is not made of cells and cannot reproduce on its own, it must enter a living host cell and use that cell's machinery to make copies. This dependence on a host defines how viruses reproduce. It is why viruses can multiply only inside cells.
49. C — Resistant bacteria become more common because they survive the antibiotic and pass the resistance gene to their offspring. The antibiotic selects for already-resistant individuals rather than creating resistance. This is natural selection acting on a bacterial population.
50. C — The more diverse pond recovering better supports the idea that greater biodiversity increases an ecosystem's stability and ability to recover from disturbance. Higher diversity tends to make ecosystems more resilient. This finding highlights the value of biodiversity.