

6. From which of the following diseases can one be protected by sleeping under the cover of a mosquito net? (1)

- A. Sleeping sickness
B. AIDS
C. ✓ **Malaria**
D. Athlete's foot

Answer: C

Malaria is transmitted by night-biting female *Anopheles* mosquitoes, so sleeping under an insecticide-treated mosquito net effectively prevents transmission.

7. Which of the following parts of the flower did Mendel remove from young flowers to prevent self-population ? (1)

- A. ✓ Stamens
B. Sepals
C. Petals
D. Ovaries

Answer: A

Mendel removed the immature stamens (the male reproductive organs containing pollen) from pea flowers to prevent self-pollination during his hybridization experiments.

8. What do we call the place where organisms live in their ecosystem ? (1)

- A. Abiotic
B. Biotic
C. ✓ **Habitat**
D. Niche

Answer: C

A habitat is the specific physical place or environment where an organism lives, whereas a niche describes its functional role within that community.

9. Which of the following is the sex chromosome constitution of human males? (1)

- A. XX
C. ZZ
- B. ✓ XY
D. ZW

Answer: B

In humans, sex is determined by the sex chromosomes; females typically possess an XX pair and males possess an XY pair.

10. Which of the following plants use CAM photosynthesis? (1)

- A. Sugarcane
B. Sorghum
C. Maize
D. ✓ **Cactus**

Answer: D

Cacti are succulents adapted to arid environments that use Crassulacean Acid Metabolism (CAM) to fix carbon at night, while maize, sorghum, and sugarcane are C4 plants.

11. Which of the following bases is NOT found in RNA? (1)

- A. Adenine
B. Guanine
C. Cytosine
D. ✓ Thymine

Answer: D

Thymine is found exclusively in DNA, whereas RNA contains uracil in place of thymine along with adenine, guanine, and cytosine.

12. In a report of the scientific experiment description of which of the following comes before all the others? (1)
- A. Procedure
 - B. Results
 - C. ✓ **Hypothesis**
 - D. Conclusion

Answer: C

In a standard scientific report, the hypothesis is formulated and stated in the introduction before the procedure is described, followed by results and conclusions.

13. Which one of the following is different from the other three? (1)
- A. Starch
 - B. Glycogen
 - C. Cellulose
 - D. ✓ **Maltose**

Answer: D

Maltose is a disaccharide consisting of two glucose units, whereas starch, glycogen, and cellulose are all large polysaccharides.

14. What happens when a plant cell absorbs in more water? (1)
- A. It shrinks
 - B. ✓ **It becomes turgid**
 - C. It becomes wilted
 - D. It swells and bursts

Answer: B

Unlike animal cells, plant cells possess a rigid cellulose cell wall that exerts wall pressure, preventing lysis and causing the cell to become turgid when it takes up water.

15. Which level of protein structural organization involves two or more polypeptide? (1)
- A. Primary structure
 - B. Secondary structure
 - C. Tertiary structure
 - D. ✓ **Quaternary structure**

Answer: D

Quaternary structure is the specific spatial arrangement and association of two or more distinct polypeptide subunits into a functional protein complex.

16. Which of the following do biologists consider ancestral to the higher organisms of today? (1)
- A. Plantae
 - B. Animalia
 - C. Fungi
 - D. ✓ **Protista**

Answer: D

Kingdom Protista is widely considered the ancestral eukaryotic group from which plants, animals, and fungi independently evolved.

17. Which type of fatty acids is healthier when used as a human food source? (1)
- A. Saturated fatty acids
 - B. Mono unsaturated fatty acids
 - C. ✓ **Polyunsaturated fatty acid**
 - D. Fatty acids in animal products

Answer: C

Polyunsaturated fatty acids contain essential fatty acids (such as omega-3 and omega-6) that the body cannot synthesize and help lower bad cholesterol (LDL).

18. Which of the following is NOT recycled in the ecosystem? (1)

- A. Sulphur
- B. ✓ **Energy**
- C. Carbon
- D. Phosphorus

Answer: B

Nutrients such as carbon, nitrogen, sulfur, and phosphorus are recycled through biogeochemical cycles, whereas energy flows unidirectionally through ecosystems and is eventually dissipated as heat.

19. What kind of cross is performed to determine whether the parent was homozygous or heterozygous ? (1)

- A. Mono hybrid cross
- B. Di-hybrid cross
- C. ✓ **Back cross**
- D. Double cross

Answer: C

A back cross (specifically a test cross, which is a type of back cross to a homozygous recessive individual) is used to determine whether an organism expressing a dominant phenotype is homozygous or heterozygous.

20. Which type of animal behavior happens with out learning? (1)

- A. ✓ **Innate**
- B. Latent
- C. Insight
- D. Conditioned

Answer: A

Innate behavior is genetically programmed and inherited, allowing an animal to perform it correctly the first time without prior experience or learning.

21. Which drop of iodine solution is added to a solution of a foodstuff and the foodstuff turns dark blue what dose the foodstuff contain (1)

- A. Reducing sugar
- B. Disaccharide
- C. Glucose
- D. ✓ **Starch**

Answer: D

Iodine solution reacts specifically with starch to form a characteristic dark blue or blue-black complex.

22. Which of the following has the highest risk of HIV transmission? (1)

- A. Hand shaking
- B. ✓ **Needle sharing**
- C. Towel Sharing
- D. Toilet Sharing

Answer: B

Sharing needles directly introduces contaminated blood into the bloodstream, making it a very high-risk behavior for HIV transmission, unlike casual contact.

23. Which of the following organelles is common to both plant and animal cells? (1)

- A. Cell wall
- B. Chloroplast
- C. ✓ **Mitochondria**
- D. Central vacuole

Answer: C

Mitochondria are present in both plant and animal cells for cellular respiration, whereas chloroplasts, cell walls, and large central vacuoles are characteristic of plant cells.

24. Among the following organic molecules, identify the one that does not contain nitrogen. (1)

- A. ✓ **Starch**
- B. Protein
- C. DNA
- D. RNA

Answer: A

Starch is a polysaccharide composed solely of carbon, hydrogen, and oxygen atoms, while proteins, DNA, and RNA all contain nitrogen.

25. If a cell fails to form lysosomes, which of the following cellular functions will get disturbed first? (1)

- A. Protein synthesis
- B. Chromosome replication
- C. ✓ **Removal of cellular debris**
- D. Transport across cell membrane

Answer: C

Lysosomes contain hydrolytic enzymes responsible for intracellular digestion, autophagy, and the degradation of cellular debris.

26. Most co-enzymes are the derivatives of which of the following enzymes would one use? (1)

- A. Proteins
- B. ✓ **Vitamins**
- C. Carbohydrates
- D. Fats

Answer: B

Many coenzymes (such as NAD⁺, FAD, and coenzyme A) are derived from water-soluble vitamins, especially the B-complex vitamins.

27. To produce from starch, which of the following enzymes would one use? (1)

- A. Isomerases
- B. Lyases
- C. ✓ **Hydrolases**
- D. Ligases

Answer: C

The breakdown of starch (e.g., by amylase) involves the cleavage of glycosidic bonds by the addition of water, which is catalyzed by hydrolases.

28. Which class of enzyme inhibitors has similar shape as that of the normal substrate? (1)

- A. Allosteric
- B. ✓ **Competitive**
- C. Denaturing
- D. Irreversible

Answer: B

Competitive inhibitors have a chemical structure and shape similar to the natural substrate, allowing them to bind reversibly to the active site.

29. For a substance to easily pass across the cell membrane by simple diffusion which of the following properties should it possess? (1)

- A. Large size
- B. ✓ **Ability to dissolve in lipid**
- C. Positive charge
- D. Negative charge

Answer: B

Because the cell membrane's core consists of a hydrophobic lipid bilayer, lipid-soluble (nonpolar) substances diffuse across it most readily.

30. Among the following factors that affect enzyme activity, which one does NOT cause enzyme denaturation? (1)
- A. High pH
 - B. Low pH
 - C. High temperature
 - D. ✓ **Competitive inhibitor**

Answer: D

Competitive inhibitors bind reversibly to the active site without disrupting the tertiary structure of the enzyme, whereas extreme pH levels and high temperatures break chemical bonds and cause denaturation.

31. Which of the following is a type of ecological succession that starts from a cleared forest area? (1)
- A. Hydrosere
 - B. Primary
 - C. ✓ **Secondary**
 - D. Pioneer

Answer: C

Secondary succession occurs in areas where an existing ecological community has been cleared or disturbed, but the underlying soil remains intact.

32. Which of the following stages of photosynthesis can take place in the dark? (1)
- A. Photolysis of water
 - B. Photosystem I
 - C. Photosystem II
 - D. ✓ **Calvin cycle**

Answer: D

The Calvin cycle represents the light-independent reactions of photosynthesis, utilizing ATP and NADPH to fix carbon dioxide without the direct requirement of light.

33. Which of the following is the major role played by bacteria and fungi in the ecosystem? (1)
- A. Causing diseases
 - B. ✓ **Nutrient recycling**
 - C. Fixing carbon dioxide
 - D. Producing antibiotics

Answer: B

Bacteria and fungi function primarily as decomposers in ecosystems, breaking down dead organic matter and recycling essential nutrients back into the soil and atmosphere.

34. If a heterozygous tall pea plant (Tt) is crossed with a short pea plant (tt), what percentage of the progeny is expected to be short? (1)
- A. 100%
 - B. 75%
 - C. ✓ **50%**
 - D. 25%

Answer: C

A test cross between a heterozygous tall plant (Tt) and a homozygous recessive short plant (tt) produces 50% heterozygous tall (Tt) and 50% homozygous short (tt) offspring.

35. Which of the following human cell types is attacked by HIV? (1)
- A. Red blood cells
 - B. White
 - C. ✓ **T-lymphocytes**
 - D. Leukocytes

Answer: C

HIV specifically targets and infects CD4⁺ T-lymphocytes (helper T cells) via the CD4 receptor on their cell surface.

36. Which of the following processes is most important to release nutrients from dead organic matter in to the soil? (1)
- A. Fixation
B. ✓ **Decomposition**
C. Excretion
D. Respiration

Answer: B

Decomposition is the biological breakdown of complex organic molecules in dead organisms into simpler inorganic nutrients that are returned to the soil.

37. Which of the following biomes supports the highest diversity of plant and animal life? (1)
- A. ✓ **Tropical rain forest**
B. Deciduous forest
C. Grassland
D. African savannah

Answer: A

Tropical rain forests support the highest biodiversity of any terrestrial biome due to year-round warm temperatures, ample sunlight, and high precipitation.

38. Which of the following demographic factors can increase the size of the world population? (1)
- A. ✓ **Natality**
B. Migration
C. Emigration
D. Immigration

Answer: A

At the global level, migration, immigration, and emigration only redistribute people across borders; natality (births exceeding deaths) is the sole demographic factor that increases the world population.

39. When Mendel crossed a tall pea plant with a short plant the F_1 progeny were all tall what F_1 did he obtain when he made the reciprocal cross? (1)
- A. Short plants
B. ✓ **Tall plants**
C. Extra-tall plants
D. Plants of average height

Answer: B

Mendel's reciprocal crosses gave identical results regardless of which sex contributed the dominant or recessive trait, so all F_1 progeny remained tall.

40. Among the following ABO blood group genotype, which one produces two types of antigens? (1)
- A. $I^A I^O$
B. $I^B I^O$
C. ✓ $I^A I^B$
D. $I^B I^B$

Answer: C

The genotype $I^A I^B$ exhibits codominance, meaning both alleles are fully expressed to produce both A and B surface antigens on red blood cells.

41. Which of the following methods do animal breeders use to produce domestic animals with hybrid vigor? (1)
- A. Feeding with nutritive food
B. Mating together related animals
C. Giving proper veterinary care
D. ✓ **Crossbreeding their animals**

Answer: D

Crossbreeding individuals from different breeds or inbred lines combines distinct beneficial alleles, resulting in offspring that exhibit hybrid vigor (heterosis). Inbreeding, by contrast, often leads to inbreeding depression.

42. Which of the following groups are believed to be the first photosynthetic organisms to evolve on earth? (1)
- A. Green plants
 - B. Green algae
 - C. ✓ **Blue green algae**
 - D. Lichens

Answer: C

Cyanobacteria, traditionally referred to as blue-green algae, are prokaryotes that evolved approximately 2.5 to 3 billion years ago and were the first organisms to perform oxygenic photosynthesis on Earth.

43. Which of the following factors brings about changes during both evolution and breeding of plants and animals? (1)
- A. Limited resources
 - B. Production of excess progeny
 - C. ✓ **Selection**
 - D. Competition

Answer: C

Selection is the common driving mechanism: natural selection drives evolutionary adaptation in nature, whereas artificial selection drives desired traits during plant and animal breeding.

44. Among the following which one is held most responsible for the present fast depletion of the world biodiversity ? (1)
- A. Herbivores
 - B. Carnivores
 - C. Grazers
 - D. ✓ **Humans**

Answer: D

Human activities, including habitat destruction, overexploitation, pollution, climate change, and introduction of invasive species, are the primary drivers of the current sixth mass extinction.

45. Which of the following reproductive isolating mechanisms keeps the horse and donkey as two independent species? (1)
- A. Hybrid inviability
 - B. ✓ **Hybrid infertility**
 - C. Ecological isolation
 - D. Habitat isolation

Answer: B

Horses and donkeys can mate to produce a mule, but the offspring is sterile due to incompatible chromosome numbers, a post-zygotic barrier known as hybrid infertility (or hybrid sterility).

46. Which of the following activities of an organism do we call a behavior ? (1)
- A. Reception of external stimulus
 - B. Responding of internal stimulus
 - C. ✓ **Responding of stimulus**
 - D. Lack of receptors to receive stimulus

Answer: C

Behavior is broadly defined as the observable response or action of an organism to an internal or external stimulus.

47. A reflex that involves internal organs such as the heart is referred to as: (1)
- A. Somatic reflex
 - B. External reflex
 - C. Spinal reflex
 - D. ✓ **Autonomic reflex**

Answer: D

Reflexes that regulate the activity of visceral effectors such as cardiac muscle, smooth muscle, and glands are known as autonomic (or visceral) reflexes, whereas somatic reflexes involve skeletal muscles.

48. At which of the following generation of crosses between dominant and recessive homozygote parents are all the progeny heterozygote? (1)
- A. P_1 generation ? B. ✓ F_1 generation
- C. F_2 generation D. F_3 generation

Answer: B

Crossing a homozygous dominant parent (AA) with a homozygous recessive parent (aa) results in 100% heterozygous progeny (Aa) in the first filial (F_1) generation.

49. Which of the following organs serves as a coordinating system in a reflex action? (1)
- A. ✓ **Spinal cord** B. Dehydrogenase
- C. Nerve cells D. Oxidoreductase

Answer: A

In a simple reflex arc, the spinal cord acts as the central coordinating/integrating organ that receives sensory input and directly sends motor output, bypassing the conscious brain.

50. Which type of enzyme catalyzes the joining of two molecules by the formation of new bonds? (1)
- A. Decarboxylase B. Dehydrogenase
- C. ✓ **Ligase** D. Oxidoreductase

Answer: C

Ligases are a class of enzymes that catalyze the joining of two molecules by forming a new chemical bond, typically coupled with the hydrolysis of ATP.

51. Which of the following statement about enzyme is NOT correct? (1)
- A. Enzymes speed up on a chemical reaction
- B. Enzymes are very specific in their reaction
- C. ✓ **The presence of an enzyme will change the outcome of a reaction**
- D. Enzymes lower the energy of activation for a reaction to occur

Answer: C

Enzymes act as biological catalysts that increase reaction rates without changing the chemical equilibrium or the final products (outcome) of the reaction.

52. Glycolysis occurs in the (1)
- A. ✓ **Cytoplasm** B. Mitochondrion
- C. Nucleus D. Chloroplast

Answer: A

Glycolysis takes place entirely within the cytoplasm (cytosol) of the cell and does not require membrane-bound organelles like mitochondria.

53. Anaerobic metabolism refers to the generation of ATP: (1)
- A. Without the involvement of ADP B. Without the use of glycogen
- C. ✓ **Without the use of oxygen** D. by the conversion of pyruvate to lactate

Answer: C

Anaerobic metabolism refers specifically to the metabolic pathways that produce ATP in the absence of oxygen.

54. The conversion of one molecule of glucose to two molecule of pyruvate results in the net formation of: (1)
- A. ✓ **Two molecule of ATP** B. Six molecules of water
C. Three molecules of ATP D. Thirty -eight molecules of ATP

Answer: A

The conversion of one glucose molecule into two pyruvate molecules during glycolysis consumes 2 ATP molecules and generates 4 ATP, yielding a net gain of 2 ATP.

55. During alcohol fermentation pyruvic acid in the presence of pyruvate decarboxylase is first converted to . (1)
- A. Glucose B. Lactose
C. Lactic acid D. ✓ **Acetaldehyde**

Answer: D

In alcoholic fermentation, pyruvate decarboxylase first removes a carboxyl group from pyruvic acid to form acetaldehyde and carbon dioxide, which is then reduced to ethanol.

56. The total amount of living tissue within a given trophic level is called: (1)
- A. Organic mass B. Energy mass
C. Trophic mass D. ✓ **Biomass**

Answer: D

Biomass is defined as the total mass of living organic matter within a specific trophic level or given ecosystem.

57. Biomes where trees predominant are called (1)
- A. Polar biomes B. desert biomes
C. ✓ **Trophic mass** D. Grassland biomes

Answer: C

58. The goals of biodiversity conservation include all of the following EXCEPT (1)
- A. Protecting individual species
B. ✓ **Introducing exotic species in to new environments efforts**
C. Preserving habitats and ecosystem
D. making sure local people benefit from conservation efforts

Answer: B

Introducing exotic species disrupts ecosystems and is a major threat to native biodiversity rather than a conservation goal.

59. The maximum population growth rate characteristic of a species is called (1)
- A. limiting factor B. ✓ **biotic potential**
C. carrying capacity D. exponential growth pattern

Answer: B

Biotic potential is the maximum reproductive capacity of an organism or population under ideal environmental conditions without limiting factors.

60. from among the following choice the field which is a branch or a part of biotechnology. (1)

- A. parasitology
- B. Immunology
- C. Phycology
- D. ✓ **Genetic engineering**

Answer: D

Genetic engineering is the core branch and tool of modern biotechnology, involving direct manipulation of an organism's genes.

61. which of the following is publicly an UNDESIRE research activity (1)

- A. breeding a new crop variety
- B. synthesis of a new vaccine
- C. manufacture of a new effective medicine
- D. ✓ **breeding a new pathogenic microorganism**

Answer: D

Breeding pathogenic microorganisms poses severe biosafety and biosecurity risks, making it an ethically and publicly undesired research activity.

62. which of the following alternatives contain ONLY organic molecule? (1)

- A. calcium carbonate, glucose, methane
- B. carbon dioxide, sodium chloride, lysine
- C. ✓ **linoleic acid, glycine, methane**
- D. water, carbon dioxide, calcium carbonate

Answer: C

Linoleic acid (a fatty acid), glycine (an amino acid), and methane (a hydrocarbon) are all carbon-containing organic molecules, whereas calcium carbonate and carbon dioxide are classified as inorganic.

63. which test is suitable for checking the presence of lipids in foodstuffs ? (1)

- A. biuret test
- B. Benedict's test
- C. ✓ **emulsion test**
- D. Iodine test

Answer: C

The ethanol emulsion test is the standard qualitative test for lipids, producing a cloudy white emulsion when lipids are present.

64. How do heavy metal ions reduce the reaction rate of enzymes? (1)

- A. ✓ **by destroying the 3-dimensional shape of the enzyme's active site**
- B. by raising the temperature above the optimum level for the enzyme
- C. by dropping the pH well below the optimum level for the enzyme
- D. by inducing mutation that disrupts the functioning of the enzyme

Answer: A

Heavy metal ions (like lead and mercury) bind to functional groups such as sulfhydryl groups, disrupting the tertiary structure and altering the shape of the enzyme's active site.

65. What happens when enzymes become denatured? (1)

- A. They can normally catalyze the reactions
- B. ✓ **their active sites are changed**
- C. rate of the reaction increases
- D. bonds holding amino acids are unaffected

Answer: B

Denaturation disrupts the secondary and tertiary bonds maintaining an enzyme's structure, causing a conformational change in the active site and loss of catalytic function.

66. What happens when human red blood cell are kept in a hypertonic solution ? (1)
- A. the same net gain and loss of water
 - B. more water gets into the cell than leaving it
 - C. ✓ **more water goes out of the cell then getting in**
 - D. the cell prevent water from getting in or leaving out

Answer: C

A hypertonic solution has a lower water potential than the red blood cell, causing water to leave the cell by osmosis faster than it enters, leading to cell shrinkage (crenation).

67. Among the following which one best describes the cell of bacteria? (1)
- A. Eukaryotic
 - B. ✓ **Prokaryotic**
 - C. Both eukaryotic and prokaryotic
 - D. Neither prokaryotic nor eukaryotic

Answer: B

Bacterial cells lack a membrane-bound nucleus and membrane-bound organelles, which defines them as prokaryotic organisms.

68. Which of the following nitrogenous bases of nucleic acids is a purine base? (1)
- A. ✓ **Adenine**
 - B. Cytosine
 - C. Thymine
 - D. Uracil

Answer: A

Adenine and guanine are double-ringed purine bases, whereas cytosine, thymine, and uracil are single-ringed pyrimidine bases.

69. Which of the plants with the following genotype is hetrozygyous? (1)
- A. BBYY
 - B. ✓ **BbYb**
 - C. bbyy
 - D. YYBB

Answer: B

An individual with different alleles for a gene (such as Bb) is heterozygous, whereas BBYY and YYBB are homozygous dominant and bbyy is homozygous recessive.

70. Which of the following groups of viruses copy their RNA to DNA? (1)
- A. Bacteriophages
 - B. DNA viruses
 - C. RNA viruses
 - D. ✓ **Retroviruses**

Answer: D

Retroviruses possess an RNA genome and use the enzyme reverse transcriptase to transcribe their RNA into DNA inside the host cell.

71. During the Krebs cycle, to which of the following molecule is most of the energy released from food transferred? (1)
- A. ATP
 - B. ✓ **NAD**
 - C. ADP
 - D. AMP

Answer: B

During each turn of the Krebs cycle, most of the energy harvested from oxidation is used to reduce NAD⁺ to NADH (3 NADH per turn, compared to 1 FADH₂ and 1 ATP/GTP).

72. During which stage of aerobic respiration does oxidative phosphorylation occur? (1)
- A. Glycolysis
 - B. Krebs cycle
 - C. Link reaction
 - D. ✓ **Chemiosmosis**

Answer: D

Oxidative phosphorylation occurs via chemiosmosis, where ATP synthase utilizes the proton gradient established by the electron transport chain to phosphorylate ADP to ATP.

73. What mode of feeding do soil organisms that release nutrients from dead organic matter in to the soil have? (1)
- A. Photoautotrophic
 - B. ✓ **Saprophytic**
 - C. Chemoautotrophic
 - D. Parasitic

Answer: B

Saprophytic organisms (decomposers like many fungi and bacteria) feed by secreting enzymes onto dead organic matter and absorbing the digested nutrients, returning minerals to the soil.

74. When farmers are using fewer and fewer number of crop varieties, what would happen to the genetic diversity of our crop plants? (1)
- A. ✓ **It would get eroded**
 - B. It would be more conserved
 - C. It would be more diverse
 - D. Nothing would happen to it

Answer: A

Relying on a reduced number of crop varieties leads to genetic erosion, which is the loss of genetic diversity within a species.

75. During anaerobic respiration, what is the gross number of ATP molecules that are produced per glucose molecule? (1)
- A. Two
 - B. Three
 - C. ✓ **Four**
 - D. Six

Answer: C

Glycolysis, the ATP-generating pathway of anaerobic respiration, produces a gross total of 4 ATP molecules from one glucose molecule (with an investment of 2 ATP, resulting in a net gain of 2 ATP).

76. Among the following four processes, identify the one that probably evolved before all the other three. (1)
- A. Aerobic respiration
 - B. ✓ **Anaerobic respiration**
 - C. Oxidizing atmosphere
 - D. Photosynthesis

Answer: B

The early Earth possessed a reducing, anoxic atmosphere; thus, anaerobic respiration and fermentation pathways evolved before oxygenic photosynthesis and the subsequent rise of an oxidizing atmosphere and aerobic respiration.

77. Which of the following is NOT a learned behavior? (1)
- A. ✓ **Imprinting**
 - B. Habituation
 - C. Conditioning
 - D. Trial and error

Answer: A

While imprinting involves learning during a critical period, it is constrained by strong innate programming, distinguishing it from purely learned behaviors like habituation, conditioning, and trial-and-error learning.

78. If an actively growing seedling is kept horizontally, which of the following would eventually happen to the seedling? (1)

- A. ✓ **The shoot would bend upward**
- B. The root would bend upward
- C. The seedling would stop growing
- D. The seedling would grow horizontally

Answer: A

Due to negative gravitropism (geotropism), auxin accumulates on the lower side of a horizontally placed shoot, causing faster cell elongation on that side and making the shoot bend upward.

79. Which of the following was the most possible mode of evolution by which the many species of Darwin's finches evolved on the Galapagos Islands? (1)

- A. Phyletic evolution
- B. ✓ **Divergent evolution**
- C. Convergent evolution
- D. Sympatric evolution

Answer: B

Darwin's finches diversified from a single ancestral species into multiple distinct species occupying different ecological niches, which is a classic example of divergent evolution (adaptive radiation).

80. For which of the following processes is ATP NOT required? (1)

- A. ✓ **Diffusion of oxygen in to cells**
- B. Synthesis of molecules
- C. Active transport of molecules from one site to another
- D. Muscle contraction

Answer: A

Diffusion of oxygen is a passive transport mechanism that relies on a concentration gradient and does not consume cellular energy (ATP).

81. Mutation may be described as: (1)

- A. Phenotypic change
- B. ✓ **Change in gene structure**
- C. Continuous variation
- D. Change due to hybridization

Answer: B

A mutation is fundamentally defined as a permanent alteration or change in the nucleotide sequence or structure of a gene or DNA molecule.

82. Which of the following is the most UNLIKELY action that would be expected from Ethiopians who have been given adequate biological literacy? (1)

- A. ✓ **Engagement in activities resulting in biodiversity loss**
- B. Supporting activities concerned with food security
- C. Awareness about climate change and its problem
- D. Engagement in biological resources conservation

Answer: A

Adequate biological literacy teaches the value of ecosystems and conservation, making it very unlikely that such individuals would willingly engage in activities that cause biodiversity loss.

83. Which form of mutation is responsible for the diseases known as leukemia? (1)

- A. Duplication
- B. Insertion
- C. ✓ **Inversion**
- D. Deletion

Answer: C

84. Which of the following characteristic can show the evolutionary relationships among organisms? (1)
- A. Structure having similar functions
 - B. Presence of analogous structures
 - C. ✓ **Presence of homologous structures**
 - D. Structure having different origins

Answer: C

Homologous structures share a common developmental origin and ancestral anatomy, thereby directly reflecting evolutionary relationships among organisms.

85. Which of the following species isolating processes could lead to the evolution of a new species by the mechanisms known as sympatric speciation? (1)
- A. A river that change its course for many years
 - B. A new mountain range that was created many years
 - C. ✓ **population of a species having different breeding seasons**
 - D. A land mass that separated two water bodies for many years

Answer: C

Sympatric speciation takes place without geographic barriers; temporal isolation, such as populations developing different breeding seasons in the same area, is a mechanism of sympatric speciation.

86. What is an apoenzyme? (1)
- A. ✓ **A protein molecule**
 - B. An active enzyme
 - C. A non- protein molecule
 - D. A non- protein cofactor

Answer: A

An apoenzyme is the purely protein component of a conjugated enzyme that requires a cofactor or coenzyme to become catalytically active.

87. For which of the following can divergent evolution be taken as an alternative name? (1)
- A. Allopatric speculation
 - B. ✓ **Adaptive radiation**
 - C. Stabilizing selection
 - D. A non- protein cofactor

Answer: B

Adaptive radiation describes the evolutionary diversification of a single ancestral line into many ecologically varied forms, making it essentially synonymous with divergent evolution.

88. Which one of the following is the result of the similarity observed between the wings of a bird and a pterodactyl? (1)
- A. ✓ **Convergent evolution**
 - B. Directional selection
 - C. Stabilizing selection
 - D. Divergent evolution

Answer: A

The wings of birds and pterodactyls are analogous structures that arose independently through convergent evolution to serve the function of flight.

89. Which of the following played an important role in the evolution of human being? (1)
- A. Emergency of wings in addition to limbs
 - B. Development of even toes in the forearms
 - C. Development of feathers and hallow bones
 - D. ✓ **Development of opposable thumb to grasp**

Answer: D

The evolution of an opposable thumb allowed for precise manipulation and tool-making, which was a pivotal adaptation in human evolutionary history.

90. In which one of the following do we use genetically modified bacteria for purpose other than human health? (1)
- A. Production of insulin
 - B. Production of antibiotics
 - C. ✓ **Production of herbicides**
 - D. Production of vaccines

Answer: C

Herbicides are applied in agriculture for weed management, unlike insulin, antibiotics, and vaccines, which are used directly for human health and therapeutics.

91. which knowledge about cell biology scientists discover after all the others? (1)
- A. The first understanding that all living things are made of cells
 - B. Knowledge about how chromosomes behave during mitosis
 - C. First understanding about the double helix structure of DNA
 - D. ✓ **First understanding about the DNA sequence in human genome**

Answer: D

The sequencing of the human genome was completed in the early 2000s, long after the cell theory (1830s), mitosis chromosome tracking (1880s), and the DNA double helix (1953).

92. Which of the following statements can be considered as the better definition of the biological concept of behavior? (1)
- A. The reaction of a person or an animal in response to an external or internal stimulus
 - B. The responses or reactions or movements that a living plant makes in any situation
 - C. ✓ **A system of coordinated response by an organism to an external or internal stimulus**
 - D. A receptor of some kind of stimulus that an organism has which produces a response

Answer: C

Biologically, behavior is best defined as an organism's coordinated system of responses to internal or external stimuli.

93. To which category of behavior does the human behavior that involves the strengthening of existing responses or the formation of new responses to existing stimuli that occur because of practice or repetition belong? (1)
- A. ✓ **Learned behavior**
 - B. Instinctive behavior
 - C. Innate behavior
 - D. Inborn behavior

Answer: A

Behavior that is modified, strengthened, or acquired through practice, experience, or repetition is classified as learned behavior.

94. Which of the following is NOT grouped under genetically pre-programmed pattern of behavior? (1)
- A. Reflex actions in humans
 - B. Orientation behavior
 - C. ✓ **Conditioned behavior**
 - D. Instinctive behaviors

Answer: C

Conditioned behavior is a type of learned behavior acquired through experience, whereas reflexes, orientation behaviors, and instincts are genetically pre-programmed (innate).

95. Which group of bacteria reduces nitrate to nitrogen gas in the nitrogen cycle? (1)
- A. Nitrogen fixing bacteria
 - B. Ammonium ion forming
 - C. ✓ **Denitrifying bacteria**
 - D. photosynthetic bacteria

Answer: C

Denitrifying bacteria convert soil nitrates back into atmospheric nitrogen gas (N₂) during the nitrogen cycle.

96. The main factors that determine the types of terrestrial biomes in a certain geographical area are: (1)
- A. Soil and vegetation
 - B. Soil and biological diversity
 - C. Complexity in ecological succession
 - D. ✓ **Precipitation & temperature**

Answer: D

The geographic distribution of terrestrial biomes is primarily determined by climate, specifically mean annual temperature and precipitation.

97. In which parts of Ethiopian are Lions, Elephants, & Giraffes found more community? (1)
- A. In the afroalpine and subafroalpine zones
 - B. In the highland areas of northern Ethiopian
 - C. ✓ **In the grasslands of southwestern Ethiopian**
 - D. In central and northern parts of the rift valley

Answer: C

Large savanna mammals such as elephants, giraffes, and lions in Ethiopia are predominantly found in the southwestern grasslands and lowlands (e.g., Gambella and Omo regions).

— END OF MARKING KEY —

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