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Biology Grade 11 — Chapter 1

Cells and Sub-Cellular Organelles

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Independent practice MCQs from the supplied Class 11 Biology notes pack. Total: 50 questions.

A. Important / Main Topics

1. Which of the following is the basic structural and functional unit of all living organisms?

(A) Cell
(B) Tissue
(C) Organ
(D) Organelle

Correct Answer: A

Explanation: The notes state that a cell is defined as the structural and functional unit of living organisms and is the basic structural unit of all unicellular and multicellular organisms.

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

(A) Spontaneous generation from non-living matter
(B) Pre-existing cells through cellular division
(C) The nucleus of older cells
(D) The extracellular matrix

Correct Answer: B

Explanation: Rudolf Virchow (1855) observed that new cells develop by the division of pre-existing cells, which became the third statement of the cell theory.

3. Which scientist observed that animal cells lack a cell wall but are covered by a membrane?

(A) Robert Hooke
(B) Schleiden
(C) Schwann
(D) Rudolf Virchow

Correct Answer: C

Explanation: Schwann, a German zoologist, studied animal cells and found that they lack a cell wall and are covered by a membrane, recognizing that the inside of plant and animal cells is identical apart from the cell wall.

4. What is the technique used to view objects that cannot be seen by the naked eye called?

(A) Microbiology
(B) Histology
(C) Cytology
(D) Microscopy

Correct Answer: D

Explanation: The notes define microscopy as the technique used to view objects that cannot be seen by the naked eye.

5. What is the maximum magnification of a light microscope?

(A) 1500X
(B) 100X
(C) 400X
(D) 50 million times

Correct Answer: A

Explanation: The maximum magnification of a light microscope is 1500X, achieved using a 100X objective and a 15X ocular lens.

6. What is the fine structure of the cell as seen with the electron microscope known as?

(A) Cytoplasm
(B) Ultrastructure
(C) Protoplasm
(D) Nucleoplasm

Correct Answer: B

Explanation: The notes define ultrastructure as the fine structure of the cell as seen with the electron microscope.

7. Which of the following is the outer living boundary of a cell?

(A) Cell wall
(B) Capsule
(C) Plasma membrane
(D) Glycocalyx

Correct Answer: C

Explanation: The plasma membrane is the outer living boundary of the cell and is found in all living prokaryotic and eukaryotic cells.

8. Which chemical is the primary component of the plant cell wall?

(A) Chitin
(B) Peptidoglycan
(C) Lignin
(D) Cellulose

Correct Answer: D

Explanation: The notes state that plant cell walls are made up of cellulose, which differs in chemical composition from prokaryotic (peptidoglycan) and fungal (chitin) cell walls.

9. What is the region between the nuclear membrane and the plasma membrane called?

(A) Cytoplasm
(B) Protoplasm
(C) Nucleoplasm
(D) Nucleoid

Correct Answer: A

Explanation: The notes state that cytoplasm is the region between the nuclear membrane and the plasma membrane and is a common component of both prokaryotic and eukaryotic cells.

10. What is the process by which cells communicate with other cells called?

(A) Cell division
(B) Cell signaling
(C) Cell respiration
(D) Cell transport

Correct Answer: B

Explanation: The notes define cell signaling as the process by which cells communicate with other cells within their body or with the external environment.

11. Which type of transport requires the help of transport proteins but does not require energy?

(A) Simple diffusion
(B) Active transport
(C) Facilitated diffusion
(D) Endocytosis

Correct Answer: C

Explanation: Facilitated diffusion is a type of passive transport where molecules move from higher to lower concentration with the help of transport proteins (channel or carrier proteins).

12. What are the two main types of cells based on structural organization?

(A) Plant cells and animal cells
(B) Unicellular and multicellular cells
(C) Somatic and germ cells

(D) Prokaryotic cells and eukaryotic cells

Correct Answer: D

Explanation: The notes state that two kinds of structurally different cells have evolved over time: prokaryotic cells and eukaryotic cells.

13. What is a cell with the unique ability to develop into specialized cell types in the body called?

(A) Stem cell
(B) Zygote
(C) Somatic cell
(D) Germ cell

Correct Answer: A

Explanation: A stem cell is defined as a cell with the unique ability to develop into specialized cell types in the body.

14. Which process allows large molecules, bacteria, and waste materials to cross the cell membrane by engulfing or releasing them in vesicles?

(A) Diffusion and osmosis
(B) Endocytosis and exocytosis
(C) Active transport
(D) Facilitated diffusion

Correct Answer: B

Explanation: Exocytosis and endocytosis are processes that allow large molecules, bacteria, and waste materials that cannot diffuse through the lipid bilayer to cross the cell membrane.

15. Which type of cell division is used for the growth and repair of somatic cells?

(A) Meiosis
(B) Binary fission
(C) Mitosis
(D) Budding

Correct Answer: C

Explanation: The notes state that somatic cells divide by mitosis, whereas germ line cells divide by meiosis.

16. A student observes a cell under a microscope and notices that it has a cell wall, chloroplasts, and a large central vacuole. To which type of organism does this cell most likely belong?

(A) Animal
(B) Fungus
(C) Bacterium
(D) Plant

Correct Answer: D

Explanation: Plant cells are characterized by the presence of a cell wall (cellulose), chloroplasts, and a large central vacuole, distinguishing them from animal cells.

17. Which of the following experimental evidences validates the cell theory by disproving spontaneous generation?

(A) Experiments by Francesco Redi and Louis Pasteur showed cells cannot grow in sealed, sterile conditions.
(B) Cells removed from tissues can survive independently.
(C) Nothing smaller than a cell can live independently.
(D) Cells arise from pre-existing cells through cellular division.

Correct Answer: A

Explanation: Redi and Pasteur demonstrated that cells cannot grow in sealed and sterile conditions, validating the cell theory by disproving spontaneous generation.

18. Why does an electron microscope have a much higher resolving power than a light microscope?

(A) It uses more lenses.
(B) It uses electron beams with a much shorter wavelength.
(C) It uses a higher intensity of light.
(D) It uses thicker specimens.

Correct Answer: B

Explanation: It uses electron beams with a much shorter wavelength. — this correctly answers the question.

19. Which part of the plasma membrane is responsible for controlling the fluidity of the membrane?

(A) Proteins
(B) Carbohydrates
(C) Lipids
(D) Cytoskeleton

Correct Answer: C

Explanation: The notes state that the lipid part of the plasma membrane controls the fluidity of the membrane. Higher concentrations of unsaturated fatty acids increase fluidity, while cholesterol stabilizes the bilayer.

20. A protein hormone cannot pass through the plasma membrane. Which of the following correctly describes its signaling pathway?

(A) It binds to an intracellular receptor and directly affects gene expression.
(B) It diffuses through the membrane and acts as a transcription factor.
(C) It enters the nucleus through nuclear pores and activates genes.
(D) It binds to a cell surface receptor, generating a second messenger like cAMP.

Correct Answer: D

Explanation: Protein and peptide hormones are water-soluble and cannot pass through the plasma membrane. They bind to receptors on the cell surface, initiating a signal transduction pathway that generates a second messenger, such as cAMP.

21. Which mechanism of membrane transport is responsible for the movement of water molecules across a semipermeable membrane from a region of low solute concentration to high solute concentration?

(A) Osmosis
(B) Simple diffusion
(C) Facilitated diffusion
(D) Active transport

Correct Answer: A

Explanation: Osmosis is the process by which molecules (water) pass from a solution of low concentration to a solution of high concentration through a semipermeable membrane.

22. Which organelle is known as the "suicidal bag" of the cell because it can digest the cell's own components during autolysis?

(A) Peroxisome
(B) Lysosome
(C) Golgi apparatus
(D) Vacuole

Correct Answer: B

Explanation: Lysosomes are called suicidal bags because during autolysis (programmed cell death), they burst and release their enzymes to disintegrate the cell.

23. What is the primary function of the smooth endoplasmic reticulum (SER)?

(A) Protein synthesis
(B) Carbohydrate synthesis
(C) Lipid synthesis and detoxification
(D) ATP production

Correct Answer: C

Explanation: Lipid synthesis and detoxification — this correctly answers the question.

24. Which of the following statements correctly describes the arrangement of phospholipids in the plasma membrane?

(A) Hydrophilic tails face each other, and hydrophobic heads face outward.
(B) Both heads and tails face outward.

(C) Both heads and tails face inward.
(D) Hydrophobic tails face each other, and hydrophilic heads face outward.

Correct Answer: D

Explanation: The fluid mosaic model describes the phospholipid bilayer with hydrophobic ends facing each other (inward) and hydrophilic ends on the surface (outward).

25. How do prokaryotic ribosomes differ from eukaryotic ribosomes?

(A) Prokaryotic ribosomes are 70S with 30S and 50S subunits; eukaryotic are 80S with 40S and 60S subunits.
(B) Prokaryotic ribosomes are 80S; eukaryotic are 70S.
(C) Both are 70S.
(D) Prokaryotic ribosomes lack RNA.

Correct Answer: A

Explanation: The notes state prokaryotic ribosomes are 70S (30S + 50S) and eukaryotic are 80S (40S + 60S).

B. Less Important / Secondary Topics

26. A cell is placed in a hypotonic solution. What will happen to an animal cell?

(A) It will swell and may burst due to water entering.
(B) It will shrink due to water loss.
(C) It will remain unchanged.
(D) It will actively pump out water.

Correct Answer: A

Explanation: In a hypotonic solution, water enters the cell by osmosis. Animal cells lack a cell wall, so they may swell and burst.

27. Which organelle is responsible for modifying, sorting, and packaging proteins and lipids?

(A) Ribosome
(B) Golgi apparatus
(C) Lysosome
(D) Peroxisome

Correct Answer: B

Explanation: The Golgi complex processes cell secretions, modifies proteins from the RER, and packages them into vesicles for transport.

28. What is the function of the nucleolus?

(A) Synthesizes DNA
(B) Produces ATP
(C) Constructs ribosomes
(D) Modifies proteins

Correct Answer: C

Explanation: The nucleolus is involved in the construction of ribosomes. It contains granular and fibrillar areas with rRNA and rDNA.

29. Which part of the chloroplast is the site of the light-dependent reactions of photosynthesis?

(A) Stroma
(B) Outer membrane
(C) Intermembrane space
(D) Grana (thylakoids)

Correct Answer: D

Explanation: The light-dependent reaction takes place in the grana region of the chloroplast, where photosynthetic pigments are located on the thylakoid membranes.

30. During which phase of the cell cycle are chromosomes duplicated?

(A) S phase
(B) G□ phase

(C) G□ phase
(D) M phase

Correct Answer: A

Explanation: Chromosomes are duplicated only during the S (synthesis) phase of interphase.

31. A cell that has a single circular chromosome and divides by binary fission is most likely a:

(A) Plant cell
(B) Prokaryotic cell
(C) Animal cell
(D) Fungal cell

Correct Answer: B

Explanation: A cell that has a single circular chromosome and divides by binary fission is most likely a Prokaryotic cell.

32. What is the primary function of the electron transport chain in mitochondria?

(A) Glycolysis
(B) Krebs cycle
(C) ATP production via oxidative phosphorylation
(D) Protein synthesis

Correct Answer: C

Explanation: The inner mitochondrial membrane contains the electron transport chain and ATP synthase (FO-F1 particles), which generate ATP via oxidative phosphorylation.

33. Which type of stem cells can differentiate into all possible cell types, including the placenta?

(A) Pluripotent
(B) Multipotent
(C) Unipotent
(D) Totipotent

Correct Answer: D

Explanation: Totipotent stem cells can differentiate into all possible cell types. The first few cells that appear as the zygote starts to divide are totipotent.

34. In cystic fibrosis, a defective chloride channel protein causes the disease. Which function of membrane proteins is primarily affected?

(A) Transport
(B) Enzymatic activity
(C) Cell-cell recognition
(D) Signal transduction

Correct Answer: A

Explanation: The defective protein in cystic fibrosis is a chloride channel, which is involved in the transport of chloride ions across the membrane.

35. Which of the following is a function of the cytoskeleton in a eukaryotic cell?

(A) Synthesizing proteins
(B) Providing structural support and maintaining cell shape
(C) Producing ATP
(D) Storing genetic information

Correct Answer: B

Explanation: Providing structural support and maintaining cell shape — this correctly answers the question.

36. A researcher treats a cell with a drug that inhibits microtubule formation. Which process would be most directly affected?

(A) Protein synthesis
(B) DNA replication
(C) Mitotic spindle formation during cell division
(D) ATP synthesis

Correct Answer: C

Explanation: Microtubules are the main components of the mitotic spindle, which is required for chromosome separation during cell division.

37. If the concentration of unsaturated fatty acids in the phospholipids of a plasma membrane increases, what is the most likely consequence?

(A) The membrane becomes less fluid and more rigid.
(B) The membrane becomes impermeable to all substances.
(C) The membrane loses its protein components.
(D) The membrane becomes more fluid and flexible.

Correct Answer: D

Explanation: The notes state that when the concentration of unsaturated fatty acids in phospholipids increases, the bilayer becomes more fluid, making the cell membrane more flexible.

38. A plant cell is placed in a hypertonic solution. What will happen to the cell?

(A) It will lose water and undergo plasmolysis.
(B) It will swell and burst.
(C) It will become turgid.
(D) It will actively pump in water.

Correct Answer: A

Explanation: In a hypertonic solution, water leaves the cell by osmosis. The protoplast shrinks away from the cell wall, a process called plasmolysis.

39. Which structural difference between prokaryotic and eukaryotic cells has the greatest impact on the speed of gene expression (transcription and translation)?

(A) Prokaryotes have 80S ribosomes, making translation faster.
(B) Prokaryotes lack a nuclear envelope, allowing transcription and translation to occur simultaneously.
(C) Eukaryotes have a single circular chromosome, which speeds up transcription.
(D) Prokaryotes have linear DNA, which is easier to transcribe.

Correct Answer: B

Explanation: Prokaryotes lack a nuclear envelope, allowing transcription and translation to occur simultaneously. — this correctly answers the question.

40. A mutation in a gene results in the production of a protein that lacks a signal peptide. Which organelle would be unable to process this protein?

(A) Ribosome
(B) Smooth Endoplasmic Reticulum
(C) Rough Endoplasmic Reticulum
(D) Mitochondrion

Correct Answer: C

Explanation: Signal peptides are required for proteins to be directed to the rough ER. Without a signal peptide, the protein cannot enter the RER for processing.

41. If a cell's lysosomes were unable to fuse with autophagosomes, what would be the most likely consequence?

(A) The cell would be unable to synthesize proteins.
(B) The cell would divide uncontrollably.
(C) The cell would be unable to produce ATP.
(D) Damaged organelles and cellular waste would accumulate in the cell.

Correct Answer: D

Explanation: Damaged organelles and cellular waste would accumulate in the cell. — this correctly answers the question.

42. Which statement best explains why the fluid mosaic model describes the membrane as "mosaic"?

(A) Proteins are scattered throughout the lipid bilayer in an irregular pattern.
(B) The membrane is rigid and static.

(C) Lipids are distributed evenly and symmetrically.
(D) The membrane is composed of only one type of molecule.

Correct Answer: A

Explanation: The fluid mosaic model describes the membrane as a mosaic because proteins are scattered throughout the lipid bilayer in an irregular pattern, like tiles in a mosaic.

43. During an experiment, a cell is treated with a chemical that prevents the hydrolysis of ATP. Which process would be most directly inhibited?

(A) Simple diffusion
(B) Active transport
(C) Facilitated diffusion
(D) Osmosis

Correct Answer: B

Explanation: Active transport — this correctly answers the question.

44. A cell has a high concentration of Na outside and a high concentration of K inside. Which mechanism is responsible for maintaining these concentration gradients?

(A) Simple diffusion
(B) Osmosis
(C) The sodium-potassium pump (active transport)
(D) Facilitated diffusion

Correct Answer: C

Explanation: The sodium-potassium pump (active transport) — this correctly answers the question.

45. In an experiment, a plant cell is immersed in a solution with a water potential equal to that of the cell's cytoplasm. What is the expected result?

(A) The cell will swell and burst.
(B) The cell will shrink and plasmolyze.
(C) The cell will actively pump out water.
(D) There will be no net movement of water.

Correct Answer: D

Explanation: When the water potential of the external solution equals the water potential of the cell, there is no net movement of water across the membrane.

46. If a cell is treated with a drug that blocks the function of the Golgi apparatus, which of the following would be most directly affected?

(A) Packaging and secretion of proteins
(B) Synthesis of ATP
(C) DNA replication
(D) Breakdown of hydrogen peroxide

Correct Answer: A

Explanation: The Golgi apparatus is responsible for modifying, sorting, and packaging proteins and lipids for secretion or delivery to other organelles.

47. Which of the following observations provides the strongest evidence that mitochondria and chloroplasts were once free-living prokaryotes?

(A) They are present in all eukaryotic cells.
(B) They contain their own circular DNA and 70S ribosomes.
(C) They are surrounded by a single membrane.
(D) They are produced by the Golgi apparatus.

Correct Answer: B

Explanation: They contain their own circular DNA and 70S ribosomes. — this correctly answers the question.

48. A cell is treated with a chemical that disrupts the nuclear pores. What process would be most directly blocked?

(A) Replication of DNA within the nucleus

(B) Transcription of DNA into mRNA within the nucleus
(C) Transport of mRNA from the nucleus to the cytoplasm
(D) Synthesis of ribosomal proteins in the cytoplasm

Correct Answer: C

Explanation: Nuclear pores regulate the nucleo-cytoplasmic exchange. Disruption would block the transport of mRNA from the nucleus to the cytoplasm.

49. In which of the following scenarios would a cell be most likely to undergo apoptosis (programmed cell death)?

(A) When the cell is actively dividing to repair tissue.
(B) When a cell is infected by a virus and is producing viral proteins.
(C) When a cell is exposed to a mitogen.
(D) During normal development, when specific cells are no longer needed.

Correct Answer: D

Explanation: Apoptosis is a programmed cell death that occurs during developmental phases when specific cells are required to be disintegrated (e.g., tadpole tail resorption).

50. A researcher observes that a particular cell has a high number of mitochondria and extensive rough ER. Which of the following is the most likely function of this cell?

(A) Rapid protein synthesis and high energy demand
(B) Storage of lipids
(C) Photosynthesis
(D) DNA replication without cell division

Correct Answer: A

Explanation: A cell with a high number of mitochondria has a high energy demand, and extensive rough ER indicates active protein synthesis (e.g., a secretory cell).

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Biology Grade 11 — Chapter 2

Molecular Biology

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Independent practice MCQs from the supplied Class 11 Biology notes pack. Total: 50 questions.

A. Important / Main Topics

1. Which of the following is the study of the chemical processes taking place within living organisms?

(A) Biochemistry
(B) Cell biology
(C) Histology
(D) Physiology

Correct Answer: A

Explanation: Biochemistry is defined as the study of the composition and structure of chemical compounds in living organisms and the chemical processes taking place within them.

2. Which bond is formed by the mutual sharing of electrons between two atoms?

(A) Ionic bond
(B) Covalent bond
(C) Hydrogen bond
(D) Hydrophobic interaction

Correct Answer: B

Explanation: A covalent bond is formed by the mutual sharing of electrons between two atoms to achieve a s.

3. What is the general formula for carbohydrates?

(A) C_nH□nO_n
(B) C_nH_nO□n
(C) C_n(H□O)_n
(D) (CH□)_nO_n

Correct Answer: C

Explanation: According to the classic concept, carbohydrates have the generalized formula C_n(H□O)_n, where n is the number of carbon atoms.

4. Which of the following is a monosaccharide?

(A) Sucrose
(B) Maltose
(C) Starch
(D) Glucose

Correct Answer: D

Explanation: Glucose is a single saccharide unit (monosaccharide) with the formula C□H□□O□.

5. What is the bond that links two monosaccharides to form a disaccharide?

(A) Glycosidic bond
(B) Peptide bond
(C) Ester bond
(D) Phosphodiester bond

Correct Answer: A

Explanation: A glycosidic bond is a covalent bond formed by a condensation reaction between two sugar molecules.

6. Which polysaccharide is the major structural component of plant cell walls?

(A) Starch
(B) Cellulose
(C) Glycogen

(D) Chitin

Correct Answer: B

Explanation: Cellulose is the structural carbohydrate of plants and the major constituent of the plant cell wall.

7. What are the building blocks (monomers) of proteins?

(A) Nucleotides
(B) Fatty acids
(C) Amino acids
(D) Monosaccharides

Correct Answer: C

Explanation: Amino acids are the building blocks of proteins. There are 20 commonly found in proteins.

8. How many essential amino acids must be obtained from the diet?

(A) 5
(B) 11
(C) 20
(D) 9

Correct Answer: D

Explanation: There are nine essential amino acids that cannot be produced by the body and must be acquired through diet.

9. Which bond forms between the carboxylic acid group of one amino acid and the amino group of another?

(A) Peptide bond
(B) Glycosidic bond
(C) Ester bond
(D) Phosphodiester bond

Correct Answer: A

Explanation: A peptide bond is established between the C of the carboxylic acid group and the N of the amino group of two amino acids.

10. Which of the following is the defining characteristic of lipids?

(A) They are highly soluble in water.
(B) They are insoluble in water but soluble in organic solvents.
(C) They are made of nucleotides.
(D) They always contain phosphorus.

Correct Answer: B

Explanation: Lipids are a heterogeneous group of organic compounds that are hydrophobic (insoluble in water) but soluble in organic solvents.

11. What is the most common type of phospholipid found in cell membranes?

(A) Phosphatidylserine
(B) Phosphatidylethanolamine
(C) Phosphatidylcholine (lecithin)
(D) Phosphatidylinositol

Correct Answer: C

Explanation: Phosphatidylcholine, also called lecithin, is the most common phospholipid, where choline is attached to the phosphate group.

12. Which of the following is the energy currency of the cell?

(A) NAD
(B) FAD
(C) DNA
(D) ATP

Correct Answer: D

Explanation: ATP (Adenosine Triphosphate) is a mononucleotide known as the energy currency of cells.

13. Which nitrogenous base is found only in RNA and not in DNA?

(A) Uracil
(B) Thymine
(C) Adenine
(D) Guanine

Correct Answer: A

Explanation: Uracil is found only in RNA, whereas thymine is found only in DNA.

14. According to the Watson and Crick model, how many hydrogen bonds form between Guanine and Cytosine?

(A) 1
(B) 3
(C) 2
(D) 4

Correct Answer: B

Explanation: There are three hydrogen bonds between Guanine and Cytosine, while there are two between Adenine and Thymine.

15. What is the process of synthesizing mRNA from a DNA template called?

(A) Translation
(B) Replication
(C) Transcription
(D) Transformation

Correct Answer: C

Explanation: Transcription is the first step of gene expression, where a single strand of mRNA is synthesized from the DNA template.

16. Why is water considered the "universal solvent"?

(A) It has a high specific heat capacity.
(B) It has a high heat of vaporization.
(C) It is less dense as a solid than as a liquid.
(D) It is a polar molecule, allowing it to dissolve ionic and polar substances.

Correct Answer: D

Explanation: The polarity of water molecules makes it an excellent solvent for polar substances and ionic compounds.

17. A molecule has the formula C□H□□O□ but contains a ketone group instead of an aldehyde group. This molecule is:

(A) Fructose
(B) Glucose
(C) Galactose
(D) Ribose

Correct Answer: A

Explanation: Both glucose and fructose are hexoses (C□H□□O□), but glucose is an aldo sugar and fructose is a keto sugar.

18. In a DNA molecule, if the percentage of Adenine is 20%, what is the percentage of Guanine?

(A) 20%
(B) 30%
(C) 40%
(D) 60%

Correct Answer: B

Explanation: According to Chargaff's rule, A = T (20% + 20% = 40%). The remaining 60% is divided equally between G and C, so G = 30%.

19. Which of the following is a major function of cholesterol in the plasma membrane?

(A) It acts as a channel for ions.
(B) It serves as a receptor for hormones.
(C) It stabilizes the lipid bilayer and restricts the entry/exit of polar molecules.
(D) It acts as an antigen for cell recognition.

Correct Answer: C

Explanation: It stabilizes the lipid bilayer and restricts the entry/exit of polar molecules. — this correctly answers the question.

20. Which level of protein structure is stabilized by hydrogen bonds between the C=O and N-H groups of the polypeptide backbone?

(A) Primary structure
(B) Tertiary structure
(C) Quaternary structure
(D) Secondary structure

Correct Answer: D

Explanation: Secondary structures (α-helix or β-pleated sheets) are established by hydrogen bonding between opposite charge-bearing groups of different amino acids.

21. Sickle cell anemia is caused by a single amino acid substitution. What is this change in the β-chain of hemoglobin?

(A) Glutamic acid is replaced by Valine.
(B) Valine is replaced by Glutamic acid.
(C) Glycine is replaced by Alanine.
(D) Alanine is replaced by Glycine.

Correct Answer: A

Explanation: Sickle cell hemoglobin shows one difference from normal: glutamic acid is replaced by valine at position number six in the β-chain.

22. Which of the following is a fibrous protein?

(A) Enzymes
(B) Collagen
(C) Hormones
(D) Antibodies

Correct Answer: B

Explanation: Fibrous proteins have a fibre-like shape, are insoluble, and are structural. Collagen is a fibrous protein.

23. Which type of fatty acid has a higher melting point?

(A) Unsaturated and short-chain
(B) Unsaturated and long-chain
(C) Saturated and long-chain
(D) Saturated and short-chain

Correct Answer: C

Explanation: Saturated and long-chain — this correctly answers the question.

24. In the formation of a nucleotide, the nitrogenous base is linked to which carbon of the pentose sugar?

(A) 2' carbon
(B) 3' carbon
(C) 5' carbon
(D) 1' carbon

Correct Answer: D

Explanation: During nucleotide formation, the nitrogenous base is linked with the 1' carbon of the pentose sugar, forming a nucleoside.

25. Which enzyme is responsible for transcribing viral RNA into DNA in retroviruses like HIV?

(A) Reverse transcriptase

(B) DNA polymerase
(C) RNA polymerase
(D) Protease

Correct Answer: A

Explanation: Reverse transcriptase — this correctly answers the question.

B. Less Important / Secondary Topics

26. What is the primary role of mRNA in the cell?

(A) It carries the genetic message from the nucleus to the ribosome.
(B) It forms part of the ribosome.
(C) It transports amino acids to the ribosome.
(D) It acts as a catalytic molecule.

Correct Answer: A

Explanation: mRNA takes the genetic message from the nucleus to the ribosome in the cytoplasm to form a particular protein (translation).

27. What is the sequence of the Central Dogma of Life?

(A) RNA → DNA → Protein
(B) DNA → RNA → Protein
(C) DNA → Protein → RNA
(D) Protein → RNA → DNA

Correct Answer: B

Explanation: The flow of biological information from DNA to RNA and from RNA to protein is known as the central dogma of life.

28. Which of the following is formed when a protein is covalently attached to a carbohydrate?

(A) Glycolipid
(B) Lipoprotein
(C) Glycoprotein
(D) Nucleoprotein

Correct Answer: C

Explanation: Glycoproteins are formed when proteins are covalently attached to carbohydrates.

29. In a DNA molecule, which of the following is true regarding the two polynucleotide chains?

(A) They are parallel and identical in direction.
(B) They are parallel but have identical base sequences.
(C) They are antiparallel but not complementary.
(D) They are antiparallel and complementary to each other.

Correct Answer: D

Explanation: According to the Watson and Crick model, the two chains are opposite in direction (antiparallel) and complementary to each other.

30. What is the function of the 2' hydroxyl (-OH) group in RNA?

(A) It can participate in reactions that cleave the phosphodiester bond, making RNA less stable.
(B) It makes RNA more stable than DNA.
(C) It allows RNA to form a double helix.
(D) It binds to the phosphate group.

Correct Answer: A

Explanation: The hydroxyl group at the 2' position can participate in reactions that cleave the phosphodiester bond, making RNA less s.

31. Which type of bond is formed during the polymerization of nucleotides in DNA and RNA?

(A) Peptide bond
(B) Phosphodiester bond
(C) Glycosidic bond

(D) Hydrogen bond

Correct Answer: B

Explanation: Nucleotides are linked by phosphodiester bonds between the 5' phosphate of one nucleotide and the 3' hydroxyl of the next.

32. When a protein signal (first messenger) binds to a cell surface receptor, what is typically generated inside the cell?

(A) A steroid hormone
(B) A new DNA strand
(C) A second messenger like cAMP
(D) A polysaccharide

Correct Answer: C

Explanation: Protein signaling involves the generation of a second messenger, such as cAMP, which triggers changes in the cell.

33. Which of the following is an example of a conjugated molecule consisting of a lipid and a carbohydrate?

(A) Glycoprotein
(B) Lipoprotein
(C) Nucleoprotein
(D) Glycolipid

Correct Answer: D

Explanation: Glycolipids are complex lipids containing one or more simple sugars in connection with long fatty acids or alcohol.

34. Which structural feature of water allows it to absorb a large amount of heat with a minimal change in temperature?

(A) High specific heat capacity due to hydrogen bonding
(B) High polarity
(C) Lower density of ice
(D) Ionization

Correct Answer: A

Explanation: Much of the heat absorbed by water is used to break hydrogen bonds, so a large amount of heat causes very little increase in temperature.

35. Which of the following is a stereoisomer of glucose that is a non-superimposable mirror image?

(A) Anomer
(B) Enantiomer
(C) Epimer
(D) Diastereoisomer

Correct Answer: B

Explanation: Enantiomers are stereoisomers that are non-superimposable mirror images of one another, like D-glucose and L-glucose.

36. If a protein is treated with a chemical that breaks disulfide bridges, which level(s) of protein structure would be most directly affected?

(A) Primary structure
(B) Secondary structure
(C) Tertiary structure
(D) Quaternary structure

Correct Answer: C

Explanation: Disulfide bridges are important for stabilizing the tertiary structure of proteins.

37. A molecule of DNA has the sequence 5'-ATGC-3' on one strand. What is the sequence of the complementary strand?

(A) 5'-TACG-3'

(B) 5'-GCAT-3'
(C) 3'-ATGC-5'
(D) 3'-TACG-5'

Correct Answer: D

Explanation: The complementary strand is antiparallel and pairs A with T and G with C. The complementary sequence to 5'-ATGC-3' is 3'-TACG-5'.

38. Which of the following explains why water is less dense as a solid (ice) than as a liquid?

(A) Ice has a giant lattice structure with maximum hydrogen bonding, creating more space between molecules.
(B) Ice has a more compact structure.
(C) Water molecules in ice have less kinetic energy.
(D) Ice contains fewer hydrogen bonds than liquid water.

Correct Answer: A

Explanation: Ice has a lattice-like arrangement due to maximum hydrogen bonding, which creates empty spaces, making it less dense than liquid water.

39. In a DNA double helix, if the total number of purines is 40%, what is the percentage of pyrimidines?

(A) 20%
(B) 40%
(C) 60%
(D) 80%

Correct Answer: B

Explanation: According to Chargaff's rule, the total purines and total pyrimidines are in a 1:1 ratio, so if purines are 40%, pyrimidines are also 40%.

40. Which of the following best describes the structural difference between a nucleoside and a nucleotide?

(A) A nucleoside contains a phosphate group, while a nucleotide does not.
(B) A nucleoside contains only a phosphate group and a base.
(C) A nucleoside consists of a sugar and a base, while a nucleotide consists of a sugar, a base, and a phosphate group.
(D) A nucleotide lacks a pentose sugar.

Correct Answer: C

Explanation: A nucleoside is a base linked to a sugar. When a phosphate is added to the 5' carbon, it becomes a nucleotide.

41. During the formation of a phosphodiester bond between two nucleotides, what is released?

(A) Water
(B) Carbon dioxide
(C) Ammonia
(D) Pyrophosphate

Correct Answer: D

Explanation: Pyrophosphate — this correctly answers the question.

42. A mutation changes a single nucleotide in a gene, resulting in the substitution of one amino acid in the protein. What is this type of mutation called?

(A) Point mutation
(B) Frameshift mutation
(C) Deletion
(D) Insertion

Correct Answer: A

Explanation: Sickle cell anemia is an example of a point mutation where a single nucleotide change results in the substitution of glutamic acid with valine.

43. Which of the following is the primary function of glycolipids and glycoproteins on the cell surface?

(A) Transport of ions
(B) Cell-to-cell recognition and sticking cells together in tissues
(C) Synthesis of ATP
(D) DNA replication

Correct Answer: B

Explanation: Glycolipids and glycoproteins act as cell surface markers involved in cell-to-cell recognition.

44. In a steroid signaling pathway, where is the receptor for the steroid hormone typically located?

(A) On the cell surface
(B) In the cell membrane
(C) Inside the cell (cytoplasm or nucleus)
(D) On the mitochondrial membrane

Correct Answer: C

Explanation: Steroids are lipid-soluble and can freely diffuse across the plasma membrane to bind to receptors inside the cell.

45. What is the role of the R group in an amino acid?

(A) It forms the peptide bond.
(B) It binds to the phosphate group.
(C) It forms the backbone of the protein.
(D) It determines the individual chemical properties of the amino acid.

Correct Answer: D

Explanation: It determines the individual chemical properties of the amino acid. — this correctly answers the question.

46. In a molecule of ATP, what is the significance of the two covalent bonds linking the three phosphates?

(A) They are high-energy bonds.
(B) They are low-energy bonds.
(C) They are hydrogen bonds.
(D) They are glycosidic bonds.

Correct Answer: A

Explanation: The two covalent bonds linking the three phosphates together are called high-energy bonds and can be broken by hydrolysis to release energy.

47. Why does a protein lose its function if its tertiary structure is disrupted?

(A) The primary sequence changes.
(B) The active site loses its specific 3D shape, preventing substrate binding.
(C) The peptide bonds break.
(D) The protein becomes a carbohydrate.

Correct Answer: B

Explanation: The active site loses its specific 3D shape, preventing substrate binding. — this correctly answers the question.

48. If a cell is placed in a solution with a high concentration of solutes, what will happen to the water potential?

(A) Water potential will increase.
(B) Water potential will remain unchanged.
(C) Water potential will decrease.
(D) Water potential becomes zero.

Correct Answer: C

Explanation: Adding solutes lowers the water potential, making it more negative. Water moves from high water potential (low solute) to low water potential (high solute).

49. Which of the following statements about enzymes is supported by their protein nature?

(A) They can be crystallized.

(B) They are unaffected by temperature.

(C) They are always fibrous.

(D) They are highly specific and catalyze biochemical reactions.

Correct Answer: D

Explanation: Enzymes are mostly proteins, and their specific 3D structure allows them to catalyze specific biochemical reactions.

50. A student states that DNA is more stable than RNA because it lacks a 2'-OH group. Is this correct?

(A) Yes, the absence of a 2'-OH group makes DNA more stable because it cannot participate in reactions that cleave the phosphodiester bond.

(B) No, DNA is less stable than RNA.

(C) No, both have the same stability.

(D) No, RNA is more stable because it has a 2'-OH group.

Correct Answer: A

Explanation: The notes state that DNA can act as a s.

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Biology Grade 11 — Chapter 3

Enzymes

by Public Library

Independent practice MCQs from the supplied Class 11 Biology notes pack. Total: 50 questions.

A. Important / Main Topics

1. Which of the following best defines an enzyme?

(A) A biological polymer that catalyzes biochemical reactions
(B) A lipid that speeds up reactions
(C) A carbohydrate that provides energy
(D) A nucleic acid that stores genetic information

Correct Answer: A

Explanation: The notes define enzymes as biological polymers that catalyze biochemical reactions.

2. What is the sum of all chemical reactions going on in a cell known as?

(A) Catabolism
(B) Metabolism
(C) Anabolism
(D) Hydrolysis

Correct Answer: B

Explanation: The sum of all chemical reactions going on in a cell is known as metabolism.

3. Where is the catalytic activity of an enzyme located?

(A) In the entire enzyme molecule
(B) In the cofactor
(C) In the active site
(D) In the substrate

Correct Answer: C

Explanation: In the active site — this correctly answers the question.

4. How many amino acids typically make up an active site?

(A) 1–2
(B) 15–20
(C) 20–50
(D) 3–12

Correct Answer: D

Explanation: The active site consists of 3–12 amino acids which may be scattered in the polypeptide but are brought together by folding.

5. Which type of cofactor is permanently attached to the enzyme and does not detach after the reaction?

(A) Prosthetic group
(B) Coenzyme
(C) Inorganic ion
(D) Activator

Correct Answer: A

Explanation: A prosthetic group is a covalently bonded part of an enzyme which is permanently attached and does not detach after the completion of the reaction.

6. What is the inactive protein part of an enzyme called when its cofactor is not attached?

(A) Holoenzyme
(B) Apoenzyme

(C) Cofactor
(D) Substrate

Correct Answer: B

Explanation: If the cofactor is not available, the remaining protein part of the enzyme becomes catalytically inactive and is called apoenzyme.

7. Which model of enzyme action compares the enzyme to a lock and the substrate to a key?

(A) Induced fit model
(B) Fluid mosaic model
(C) Lock and key model
(D) Chemiosmotic model

Correct Answer: C

Explanation: Emil Fischer proposed the lock and key model (1894), where the enzyme is a lock and the substrate is a key that fits precisely into the active site.

8. What is the energy required to break existing bonds and begin a reaction called?

(A) Free energy
(B) Kinetic energy
(C) Potential energy
(D) Energy of activation

Correct Answer: D

Explanation: The energy of activation is defined as the energy required to break the existing bonds and begin the reaction.

9. At what temperature do most human enzymes show maximum activity?

(A) 37–38°C
(B) 0–10°C
(C) 20–25°C
(D) 70°C or higher

Correct Answer: A

Explanation: 37–38°C — this correctly answers the question.

10. Which enzyme works best in a highly acidic environment (pH 2)?

(A) Trypsin
(B) Pepsin
(C) Papain
(D) Amylase

Correct Answer: B

Explanation: Pepsin functions most effectively at an optimum pH of 2, as found in the stomach.

11. In competitive inhibition, where does the inhibitor bind?

(A) Allosteric site
(B) Cofactor
(C) Active site
(D) Substrate

Correct Answer: C

Explanation: A competitive inhibitor is structurally similar to the substrate and competes with it for binding to the active site.

12. Which of the following is an example of an irreversible non-competitive inhibitor?

(A) Malonate
(B) Sulphonamide
(C) Substrate analog
(D) Cyanide

Correct Answer: D

Explanation: Cyanides are potent poisons that irreversibly inhibit cytochrome oxidase by combining with the iron in the prosthetic group.

13. What is the term for the process where the end product of a pathway inhibits an enzyme earlier in the pathway?

(A) Feedback inhibition
(B) Competitive inhibition
(C) Positive feedback
(D) Allosteric activation

Correct Answer: A

Explanation: Feedback inhibition — this correctly answers the question.

14. Which class of enzymes catalyzes oxidation-reduction reactions?

(A) Transferases
(B) Oxidoreductases
(C) Hydrolases
(D) Ligases

Correct Answer: B

Explanation: Oxidoreductases — this correctly answers the question.

15. Which class of enzymes joins two molecules together using energy from ATP?

(A) Lyases
(B) Isomerases
(C) Ligases
(D) Hydrolases

Correct Answer: C

Explanation: Ligases (synthetases) bring about the joining together of two molecules, with energy derived from the hydrolysis of ATP.

16. A certain enzyme requires Mg^{2}□ ions to function. These ions are only attached when the substrate binds. What type of cofactor is Mg^{2}□?

(A) Prosthetic group
(B) Coenzyme
(C) Apoenzyme
(D) Inorganic ion (activator)

Correct Answer: D

Explanation: Inorganic cofactors like Mg^{2}□ are detachable and are only attached to the enzyme when the substrate binds. They are also called activators.

17. How does an enzyme speed up a chemical reaction?

(A) By lowering the energy of activation
(B) By increasing the overall free energy change (Δ G)
(C) By increasing the temperature of the reaction
(D) By changing the equilibrium of the reaction

Correct Answer: A

Explanation: By lowering the energy of activation — this correctly answers the question.

18. Why is an enzyme denatured at very high temperatures?

(A) The peptide bonds break, destroying the primary structure.
(B) The secondary and tertiary structures are disrupted, and the active site loses its shape.
(C) The enzyme becomes more active.
(D) The substrate is destroyed.

Correct Answer: B

Explanation: The secondary and tertiary structures are disrupted, and the active site loses its shape. — this correctly answers the question.

19. How does a non-competitive inhibitor affect the Vmax and K_m of an enzyme?

(A) Vmax remains unchanged, K_m increases
(B) Both Vmax and K_m increase
(C) Vmax decreases, K_m remains unchanged
(D) Both Vmax and K_m decrease

Correct Answer: C

Explanation: Non-competitive inhibitors bind to the allosteric site, decreasing the maximum rate (Vmax) without affecting the affinity of the enzyme for the substrate (K_m).

20. In a metabolic pathway, the amino acid aspartate is converted to threonine through five enzymatic reactions. When threonine is in excess, it binds to an allosteric site on enzyme 1 and inhibits it. What is this an example of?

(A) Competitive inhibition
(B) Irreversible inhibition
(C) Enzyme activation
(D) Feedback inhibition

Correct Answer: D

Explanation: This is a classic example of feedback inhibition, where the end product (threonine) inhibits an earlier enzyme in its own biosynthetic pathway.

21. Which class of enzymes breaks large complex organic molecules into smaller ones by adding water?

(A) Hydrolases
(B) Lyases
(C) Ligases
(D) Transferases

Correct Answer: A

Explanation: Hydrolases — this correctly answers the question.

22. If a competitive inhibitor is present, how can its effect be overcome?

(A) By increasing the concentration of the inhibitor
(B) By increasing the concentration of the substrate
(C) By decreasing the temperature
(D) By adding a non-competitive inhibitor

Correct Answer: B

Explanation: Because the inhibitor and substrate compete for the active site, increasing the substrate concentration increases the chance of substrate binding, overcoming the inhibition.

23. What is the role of the enzyme complex pyruvate dehydrogenase?

(A) It catalyzes the conversion of glucose to pyruvate.
(B) It catalyzes the Krebs cycle.
(C) It catalyzes the oxidation, decarboxylation, and addition of coenzyme A to pyruvate.
(D) It breaks down ATP.

Correct Answer: C

Explanation: It catalyzes the oxidation, decarboxylation, and addition of coenzyme A to pyruvate. — this correctly answers the question.

24. Which of the following is an example of an enzyme that exhibits absolute specificity?

(A) Lipase
(B) Hexokinase
(C) Carbonic anhydrase
(D) Urease

Correct Answer: D

Explanation: Absolute specificity means the enzyme can catalyze only one substrate and essentially no others. Urease acts only on urea.

25. Which model of enzyme action proposes that the active site is flexible and molds itself around the substrate?

(A) Induced fit model
(B) Lock and key model
(C) Fluid mosaic model
(D) Chemiosmotic model

Correct Answer: A

Explanation: Koshland's induced fit model (1959) proposes that the active site is flexible and is modified as the substrate interacts, allowing the enzyme to perform its catalytic function effectively.

B. Less Important / Secondary Topics

26. Which of the following environmental factors affects the rate of enzyme action by influencing the charges on amino acid side chains?

(A) pH
(B) Temperature
(C) Substrate concentration
(D) Enzyme concentration

Correct Answer: A

Explanation: PH — this correctly answers the question.

27. Why are enzymes from thermophilic bacteria used in biological washing powders?

(A) They work best at low temperatures.
(B) They are stable and active at high temperatures.
(C) They are cheaper to produce.
(D) They break down stains without water.

Correct Answer: B

Explanation: Thermophilic bacteria have enzymes with optimum temperatures of 70°C or higher, making them sui.

28. What happens to an enzyme when it is cooled to near or below freezing point?

(A) It is permanently denatured.
(B) Its active site is destroyed.
(C) It is inactivated but not denatured, and regains activity when warmed.
(D) It catalyzes reactions faster.

Correct Answer: C

Explanation: Low temperatures inactivate enzymes, but they are not denatured. They will regain their catalytic influence when higher temperatures are restored.

29. Which of the following is a coenzyme?

(A) Zn^{2}□
(B) Iron-containing porphyrin ring
(C) Pepsinogen
(D) NAD□

Correct Answer: D

Explanation: Coenzymes are organic cofactors, often derivatives of vitamins. NAD□ is a common coenzyme involved in redox reactions.

30. What type of enzyme catalyzes the transfer of a phosphate group from ATP to glucose?

(A) Transferase
(B) Oxidoreductase
(C) Hydrolase
(D) Lyase

Correct Answer: A

Explanation: Hexokinase is a transferase that transfers a phosphate group from ATP to glucose. Transferases catalyze the transfer of specific functional groups from one substrate to another.

31. How is the enzyme pepsinogen converted to its active form, pepsin?

(A) By adding a phosphate group
(B) By exposure to HCl, which removes an additional polypeptide fragment
(C) By cooling the enzyme
(D) By adding a coenzyme

Correct Answer: B

Explanation: Pepsinogen is secreted in an inactive form with an extra polypeptide fragment. Exposure to HCl in the stomach removes this fragment, converting it to active pepsin.

32. Which of the following statements about enzyme concentration is correct, assuming substrate is not limiting?

(A) Increasing enzyme concentration decreases the reaction rate.
(B) Enzyme concentration has no effect on the reaction rate.
(C) Increasing enzyme concentration increases the reaction rate proportionally.
(D) The reaction rate reaches a maximum when the enzyme concentration is zero.

Correct Answer: C

Explanation: When substrate is not limiting, increasing enzyme concentration increases the reaction rate proportionally, as more active sites are available.

33. In an enzyme-catalyzed reaction, what is the Michaelis constant (K_m) a measure of?

(A) Maximum reaction rate
(B) Enzyme concentration
(C) Activation energy
(D) Enzyme affinity for the substrate

Correct Answer: D

Explanation: K_m is the substrate concentration at which the reaction rate is half of Vmax. A low K_m indicates high affinity, and a high K_m indicates low affinity.

34. Which of the following enzymes acts upon proteins?

(A) Protease
(B) Lipase
(C) Amylase
(D) Nuclease

Correct Answer: A

Explanation: Protease — this correctly answers the question.

35. Which diagnostic enzyme is used to assess liver function?

(A) Creatine Phosphokinase
(B) Gamma-glutamyl Transpeptidase
(C) Lipase
(D) Aldolase

Correct Answer: B

Explanation: Gamma-glutamyl Transpeptidase is used in assessing liver function. Other diagnostic enzymes have different uses (e.g., lipase for pancreas damage).

36. A researcher discovers a new inhibitor that binds to an enzyme's allosteric site. Adding more substrate does not overcome the inhibition. What type of inhibitor is this?

(A) Competitive inhibitor
(B) Irreversible inhibitor
(C) Non-competitive inhibitor
(D) Reversible competitive inhibitor

Correct Answer: C

Explanation: Non-competitive inhibitors bind to the allosteric site, and their effect cannot be overcome by increasing substrate concentration because they do not compete for the active site.

37. Why does an enzyme's activity decrease at a pH above or below its optimum?

(A) The substrate is destroyed.
(B) The enzyme becomes more specific.
(C) The activation energy increases.
(D) The enzyme is denatured due to changes in ionization of amino acid side chains.

Correct Answer: D

Explanation: The enzyme is denatured due to changes in ionization of amino acid side chains. — this correctly answers the question.

38. An enzyme is found to have a Vmax of 100 units and a K_m of 5 mM. In the presence of a competitive inhibitor, what happens to Vmax and K_m?

(A) Vmax remains unchanged, K_m increases
(B) Vmax decreases, K_m remains unchanged
(C) Vmax increases, K_m decreases
(D) Both Vmax and K_m decrease

Correct Answer: A

Explanation: Competitive inhibitors increase the apparent K_m (decreasing affinity) but do not affect the Vmax, because at high substrate concentrations the inhibitor can be outcompeted.

39. A patient is poisoned with cyanide. Which enzyme is most directly inhibited, and what is the consequence?

(A) Pepsin; digestion stops.
(B) Cytochrome oxidase; cellular respiration stops.
(C) Amylase; starch breakdown stops.
(D) ATP synthase; ATP synthesis increases.

Correct Answer: B

Explanation: Cyanide inhibits cytochrome oxidase, an essential enzyme in the electron transport chain, by binding to iron in the prosthetic group. This halts cellular respiration and can be fatal.

40. Which of the following best explains why the induced fit model is more widely accepted than the lock and key model?

(A) It explains why enzymes are highly specific.
(B) It shows that enzymes are rigid structures.
(C) It accounts for the flexibility of enzymes and their ability to act on related substrates.
(D) It requires no energy of activation.

Correct Answer: C

Explanation: The induced fit model explains that the active site is flexible and can mold itself to fit related substrates, allowing the enzyme to catalyze related reactions, which the rigid lock and key model cannot explain.

41. In a cell, the enzyme hexokinase transfers a phosphate from ATP to glucose. Which class of enzyme is hexokinase?

(A) Hydrolase
(B) Oxidoreductase
(C) Isomerase
(D) Transferase

Correct Answer: D

Explanation: Hexokinase is a transferase, specifically a phosphotransferase, that catalyzes the transfer of a phosphate group from ATP to glucose.

42. Which of the following describes the role of a coenzyme in an enzymatic reaction?

(A) It is a detachable organic cofactor, often derived from vitamins, that participates in catalysis.
(B) It serves as a permanent structural component.
(C) It is a metallic ion that activates the enzyme.
(D) It is the substrate of the reaction.

Correct Answer: A

Explanation: Coenzymes are organic cofactors that are detachable and often derived from vitamins (e.g., NAD□, FAD). They participate in catalytic processes by carrying chemical groups.

43. What is the effect of a non-competitive inhibitor on the active site of an enzyme?

(A) It directly blocks the active site.
(B) It binds to an allosteric site, causing a conformational change that distorts the active site.
(C) It binds to the active site but is not catalyzed.
(D) It permanently destroys the substrate.

Correct Answer: B

Explanation: Non-competitive inhibitors bind to a site other than the active site (allosteric site), causing a change in the enzyme's shape that prevents the substrate from being converted to product.

44. A mutation changes the amino acid sequence of an enzyme's active site. What is the most likely consequence?

(A) The enzyme becomes more efficient.
(B) The enzyme becomes a structural protein.
(C) The enzyme may lose its ability to bind its specific substrate.
(D) The enzyme's activation energy increases.

Correct Answer: C

Explanation: The shape of the active site is determined by its amino acid sequence. A mutation that changes this sequence can alter the active site's shape, preventing the specific substrate from binding.

45. How does the enzyme catalase protect cells from oxidative damage?

(A) It produces hydrogen peroxide.
(B) It breaks down ATP.
(C) It synthesizes proteins.
(D) It breaks down hydrogen peroxide into water and oxygen.

Correct Answer: D

Explanation: Catalase is an enzyme that breaks down hydrogen peroxide (H□O□), a toxic molecule, into water and oxygen, protecting cells from oxidative damage.

46. Which of the following statements about the effect of substrate concentration on enzyme activity is true?

(A) The reaction rate increases until all active sites are saturated, reaching Vmax.
(B) The reaction rate increases indefinitely with substrate concentration.
(C) The reaction rate decreases as substrate concentration increases.
(D) Substrate concentration has no effect on the reaction rate.

Correct Answer: A

Explanation: As substrate concentration increases, the reaction rate increases until all enzyme active sites are occupied (saturated), at which point the rate reaches a maximum (Vmax).

47. Why does the enzyme activity of human enzymes decrease drastically at 60°C?

(A) Substrate molecules move too fast.
(B) The enzyme is denatured due to the disruption of hydrogen bonds.
(C) The enzyme becomes more specific.
(D) The pH changes.

Correct Answer: B

Explanation: At high temperatures (above the optimum 37–38°C), the secondary and tertiary structures of the enzyme are disrupted. Hydrogen bonds break, causing denaturation and loss of active site shape.

48. A competitive inhibitor is added to an enzyme-catalyzed reaction. If the inhibitor concentration is very high, what happens to the K_m?

(A) K_m decreases.
(B) K_m remains unchanged.
(C) K_m increases.
(D) K_m becomes zero.

Correct Answer: C

Explanation: A competitive inhibitor increases the apparent K_m because a higher substrate concentration is required to achieve half-maximal velocity in the presence of the inhibitor.

49. Which class of enzyme catalyzes the intra-molecular rearrangement of atoms to form an isomer?

(A) Lyase
(B) Ligase
(C) Hydrolase
(D) Isomerase

Correct Answer: D

Explanation: Isomerases bring about intra-molecular rearrangement of atoms in molecules, forming one isomer from another (e.g., phosphohexose isomerase).

50. A patient has damage to the pancreas. Which diagnostic enzyme is likely to be elevated in their blood?

(A) Lipase
(B) Creatine Phosphokinase
(C) Lactic Dehydrogenase
(D) Aldolase

Correct Answer: A

Explanation: Lipase is used to diagnose damage to the pancreas. (Creatine phosphokinase is for muscle damage, LDH for heart/liver, and aldolase for muscle/prostate).

Biology Grade 11 — Chapter 4

Bioenergetics

by Public Library

Independent practice MCQs from the supplied Class 11 Biology notes pack. Total: 50 questions.

A. Important / Main Topics

1. Which process converts light energy into chemical energy in plants?

(A) Photosynthesis
(B) Respiration
(C) Digestion
(D) Transpiration

Correct Answer: A

Explanation: Photosynthesis is the process by which green plants convert light energy into chemical energy stored in glucose.

2. What is the ultimate source of energy for life on Earth?

(A) Water
(B) Sunlight
(C) Carbon dioxide
(D) Glucose

Correct Answer: B

Explanation: Sunlight is the ultimate source of energy which is continuously flowing one way from the Sun to life and ecosystem.

3. Which gas is taken in by plants during photosynthesis?

(A) Oxygen
(B) Nitrogen
(C) Carbon dioxide
(D) Hydrogen

Correct Answer: C

Explanation: Carbon dioxide is one of the raw materials of the photosynthetic reaction where it acts as a carbon source.

4. Which organelle is the site of photosynthesis?

(A) Mitochondrion
(B) Ribosome
(C) Nucleus
(D) Chloroplast

Correct Answer: D

Explanation: Chloroplast is the site of photosynthesis in a plant cell, containing chlorophyll and other pigments.

5. Which pigment is the primary photosynthetic pigment in plants?

(A) Chlorophyll
(B) Carotene
(C) Xanthophyll
(D) Phycoerythrin

Correct Answer: A

Explanation: Chlorophyll is the primary photosynthetic pigment. Chlorophyll-a is found in all photosynthetic organisms except photosynthetic bacteria.

6. What is the process of breaking down glucose to release energy called?

(A) Photosynthesis

(B) Cellular respiration
(C) Transpiration
(D) Fermentation

Correct Answer: B

Explanation: Cellular respiration is a series of complex oxidation-reduction reactions by which living cells obtain energy through the breakdown of organic matter.

7. Where does glycolysis occur in the cell?

(A) Mitochondrial matrix
(B) Chloroplast
(C) Cytoplasm
(D) Nucleus

Correct Answer: C

Explanation: Glycolysis occurs in the cytoplasm and is the common first step of both aerobic and anaerobic respiration.

8. Which of the following is the end product of glycolysis?

(A) Acetyl-CoA
(B) Ethanol
(C) Lactic acid
(D) Pyruvate

Correct Answer: D

Explanation: Glycolysis is the breakdown of glucose into two molecules of pyruvate, releasing ATP and NADH.

9. How many ATPs are produced in anaerobic respiration per glucose molecule?

(A) 2
(B) 36
(C) 38
(D) 4

Correct Answer: A

Explanation: 2 — this correctly answers the question.

10. Where does the Krebs cycle take place?

(A) Cytoplasm
(B) Mitochondrial matrix
(C) Inner mitochondrial membrane
(D) Chloroplast stroma

Correct Answer: B

Explanation: Mitochondrial matrix — this correctly answers the question.

11. Which of the following is the final electron acceptor in the electron transport chain?

(A) NAD□
(B) FAD
(C) Oxygen
(D) Water

Correct Answer: C

Explanation: Oxygen is the ultimate acceptor of electrons in the electron transport chain, forming water when it picks up hydrogen ions.

12. Which process produces the majority of ATP in aerobic respiration?

(A) Glycolysis
(B) Krebs cycle
(C) Fermentation
(D) Electron transport chain / oxidative phosphorylation

Correct Answer: D

Explanation: Electron transport chain / oxidative phosphorylation — this correctly answers the question.

13. What is the role of the enzyme RuBisCO in photosynthesis?

(A) It fixes carbon dioxide in the Calvin cycle.
(B) It breaks down glucose.
(C) It produces ATP.
(D) It splits water.

Correct Answer: A

Explanation: It fixes carbon dioxide in the Calvin cycle. — this correctly answers the question.

14. What is photorespiration?

(A) Respiration that occurs in the dark.
(B) A wasteful process where RuBisCO binds oxygen instead of carbon dioxide.
(C) The process of making glucose from light.
(D) The breakdown of glucose in the mitochondria.

Correct Answer: B

Explanation: Photorespiration occurs when RuBisCO binds oxygen instead of carbon dioxide, producing toxic phosphoglycolate and releasing CO□ without producing ATP or sugar.

15. In which organisms does the C4 pathway of photosynthesis occur?

(A) All plants
(B) Only C3 plants
(C) Plants adapted to tropical climates, like maize and sugarcane
(D) Only aquatic plants

Correct Answer: C

Explanation: C4 plants, such as maize, sugarcane, and sorghum, have adapted the C4 pathway to reduce photorespiration in tropical climates.

16. In the light-dependent reactions, what is the primary role of water?

(A) It acts as a source of carbon.
(B) It absorbs light energy.
(C) It produces ATP directly.
(D) It acts as a hydrogen and electron donor, releasing oxygen.

Correct Answer: D

Explanation: Water acts as a hydrogen and electron donor in photosynthesis. Through photolysis, it breaks down into 2H□, 2e□, and ½O□.

17. During non-cyclic photophosphorylation, which photosystem is involved first in the electron transport chain?

(A) Photosystem II
(B) Photosystem I
(C) Both are involved simultaneously
(D) Neither; it is cyclic

Correct Answer: A

Explanation: In non-cyclic photophosphorylation, PS-II is utilized first, then electrons flow to PS-I.

18. What is the net ATP yield of glycolysis per glucose molecule, considering the preparatory phase?

(A) 0 ATP
(B) 2 ATP
(C) 4 ATP
(D) 38 ATP

Correct Answer: B

Explanation: Glycolysis produces 4 ATP by substrate-level phosphorylation, but 2 ATP are consumed in the preparatory phase, resulting in a net gain of 2 ATP.

19. Which of the following is the primary role of NADH and FADH□ in the electron transport chain?

(A) They directly produce ATP.
(B) They act as final electron acceptors.
(C) They donate electrons to the electron transport chain, which pumps protons to create a gradient.
(D) They break down glucose.

Correct Answer: C

Explanation: NADH and FADH□ are oxidized in the electron transport chain, donating electrons which pass through carriers, releasing energy to pump protons from the matrix to the intermembrane space.

20. In the Calvin cycle, what is the primary product of the reduction phase?

(A) 3-phosphoglycerate (3-PGA)
(B) Ribulose bisphosphate (RuBP)
(C) Glucose
(D) Glyceraldehyde-3-phosphate (G3P)

Correct Answer: D

Explanation: In the reduction phase of the Calvin cycle, 3-PGA is phosphorylated by ATP and reduced by NADPH to produce G3P.

21. Why does photorespiration reduce crop yield?

(A) It consumes energy and releases CO□ without producing sugar.
(B) It increases the rate of photosynthesis.
(C) It produces more glucose.
(D) It reduces the need for water.

Correct Answer: A

Explanation: It consumes energy and releases CO□ without producing sugar. — this correctly answers the question.

22. How do C4 plants minimize photorespiration?

(A) By keeping their stomata open all day.
(B) By concentrating CO□ in bundle sheath cells, where RuBisCO operates.
(C) By using RuBisCO exclusively in mesophyll cells.
(D) By not using the Calvin cycle.

Correct Answer: B

Explanation: C4 plants use PEP carboxylase in mesophyll cells to fix CO□ and transport it as malate to bundle sheath cells, where it is decarboxylated. This creates a high CO□ concentration that favors RuBisCO's carboxylase.

23. In alcoholic fermentation, which two products are formed from pyruvate?

(A) Lactic acid and ATP
(B) Acetyl-CoA and CO□
(C) Ethanol and CO□
(D) Glucose and O□

Correct Answer: C

Explanation: Ethanol and CO□ — this correctly answers the question.

24. Which process regenerates NAD□ in a muscle cell during intense exercise when oxygen is limited?

(A) Glycolysis
(B) Krebs cycle
(C) Electron transport chain
(D) Lactic acid fermentation

Correct Answer: D

Explanation: Lactic acid fermentation occurs in muscle cells during strenuous exercise when oxygen is exhausted. Pyruvate is reduced by NADH to lactic acid, regenerating NAD□.

25. What is the role of the enzyme ATP synthase in oxidative phosphorylation?

(A) It uses the proton gradient to synthesize ATP from ADP and Pi.
(B) It breaks down ATP.
(C) It transfers electrons to oxygen.
(D) It pumps protons from the matrix.

Correct Answer: A

Explanation: It uses the proton gradient to synthesize ATP from ADP and Pi. — this correctly answers the question.

B. Less Important / Secondary Topics

26. What is the function of the enzyme pyruvate dehydrogenase complex in the link reaction?

(A) It converts pyruvate to acetyl-CoA.
(B) It converts glucose to pyruvate.
(C) It converts acetyl-CoA to glucose.
(D) It converts lactate to pyruvate.

Correct Answer: A

Explanation: The pyruvate dehydrogenase complex catalyzes the oxidation of pyruvate to acetyl-CoA, which links glycolysis to the Krebs cycle.

27. Which of the following correctly describes the role of light in photosynthesis?

(A) It directly reduces CO□ to glucose.
(B) It excites electrons in pigments, which then flow through the electron transport chain to generate ATP and NADPH.
(C) It acts as a source of carbon atoms.
(D) It splits water into hydrogen and oxygen without pigments.

Correct Answer: B

Explanation: Light energy excites electrons in the reaction center of photosystems, initiating the electron transport chain that generates ATP and NADPH.

28. In the electron transport chain, which step produces the most ATP?

(A) Electron transfer from NADH to Complex I
(B) Electron transfer from Complex III to Complex IV
(C) ATP synthase generating ATP from the proton gradient
(D) Transfer of electrons to oxygen

Correct Answer: C

Explanation: ATP synthase uses the proton gradient generated by the electron transport chain to produce ATP via chemiosmosis. This is the primary mechanism of ATP production in aerobic respiration.

29. Which process directly produces ATP during glycolysis?

(A) Oxidative phosphorylation
(B) Photophosphorylation
(C) Chemiosmosis
(D) Substrate-level phosphorylation

Correct Answer: D

Explanation: During glycolysis, ATP is produced by substrate-level phosphorylation, where a phosphate group is directly transferred from a substrate to ADP.

30. Which of the following best describes the role of the Krebs cycle in aerobic respiration?

(A) It oxidizes acetyl-CoA, producing NADH, FADH□, ATP, and CO□.
(B) It generates ATP solely through oxidative phosphorylation.
(C) It converts glucose to pyruvate.
(D) It produces ethanol.

Correct Answer: A

Explanation: It oxidizes acetyl-CoA, producing NADH, FADH□, ATP, and CO□. — this correctly answers the question.

31. What is the energy source for the C4 pathway in mesophyll cells?

(A) The breakdown of glucose
(B) Light energy captured by ATP
(C) The proton gradient
(D) The Calvin cycle

Correct Answer: B

Explanation: The C4 pathway uses ATP generated from light-dependent reactions to regenerate PEP from pyruvate.

32. Which of the following is an example of an organism that performs anaerobic respiration?

(A) Escherichia coli
(B) Mycobacterium tuberculosis
(C) Yeast
(D) Both A and B

Correct Answer: C

Explanation: Yeast — this correctly answers the question.

33. What is the fate of the G3P produced in the Calvin cycle?

(A) It is used to regenerate RuBP only.
(B) It is excreted as a waste product.
(C) It is broken down to release energy.
(D) It is used to synthesize glucose and other organic compounds, or to regenerate RuBP.

Correct Answer: D

Explanation: G3P is a versatile intermediate. It is used to synthesize glucose and other organic compounds, and it is also used to regenerate the CO□ acceptor RuBP in the Calvin cycle.

34. Which of the following conditions would increase the rate of photorespiration in a C3 plant?

(A) High temperature and low CO□ concentration
(B) High CO□ concentration
(C) Low temperature
(D) Closed stomata and high CO□ concentration

Correct Answer: A

Explanation: Photorespiration increases when CO□ levels are low and O□ levels are high, which often occurs at high temperatures when stomata are closed to conserve water, limiting CO□ intake.

35. Which part of the ATP molecule is considered the "high-energy bond" that is broken during ATP hydrolysis?

(A) The bond between the adenine and ribose
(B) The bonds between the three phosphate groups
(C) The bond between the alpha and beta phosphates
(D) The bond between the phosphate and ribose

Correct Answer: B

Explanation: The two covalent bonds linking the three phosphates together are called high-energy bonds, and their hydrolysis releases a significant amount of energy.

36. A plant is exposed to a toxin that blocks the electron transport chain in chloroplasts. What immediate effect would this have?

(A) Glycolysis would stop.
(B) The Krebs cycle would stop.
(C) Photosynthesis would stop because ATP and NADPH production would cease.
(D) The plant would switch to anaerobic respiration.

Correct Answer: C

Explanation: The electron transport chain in chloroplasts is part of the light-dependent reactions, which produce ATP and NADPH required for the Calvin cycle. Blocking ETC stops these processes, halting photosynthesis.

37. If a cell is treated with a drug that increases the permeability of the inner mitochondrial membrane to protons, what would happen to ATP production?

(A) ATP production would increase.
(B) ATP production would remain unchanged.
(C) ATP would be imported from the cytoplasm.
(D) ATP production would decrease or stop.

Correct Answer: D

Explanation: Increased permeability of the inner mitochondrial membrane to protons would allow protons to leak across without passing through ATP synthase. This would dissipate the proton gradient required for chemiosmotic ATP production.

38. In a C3 plant, the enzyme RuBisCO has dual activity. What determines whether it binds CO□ or O□?

(A) The relative concentration of CO□ and O□ in the leaf
(B) The concentration of ATP
(C) The temperature only
(D) The concentration of RuBP

Correct Answer: A

Explanation: The activity of RuBisCO depends on the relative concentration of O□ and CO□ in leaves. When CO□ levels are low (e.g., stomata closed) and O□ levels are high, RuBisCO binds O□, causing photorespiration.

39. During the Krebs cycle, at which step is substrate-level phosphorylation directly producing GTP/ATP?

(A) Oxidation of isocitrate to α-ketoglutarate
(B) Conversion of succinyl-CoA to succinate
(C) Dehydrogenation of succinate to fumarate
(D) Dehydrogenation of malate to oxaloacetate

Correct Answer: B

Explanation: In the Krebs cycle, the conversion of succinyl-CoA to succinate is coupled with the phosphorylation of GDP to GTP (which then forms ATP). This is a substrate-level phosphorylation.

40. In the electron transport chain, what is the primary role of oxygen?

(A) It acts as a proton pump.
(B) It donates electrons to Complex I.
(C) It acts as the final electron acceptor, forming water.
(D) It produces ATP directly.

Correct Answer: C

Explanation: Oxygen is the ultimate acceptor of electrons in the ETC. Each oxygen atom picks up a pair of hydrogen ions from the aqueous solution forming water.

41. Why is the actual ATP yield from aerobic respiration slightly lower in eukaryotes (36 ATP) than in prokaryotes (38 ATP)?

(A) Eukaryotes use ATP for more processes.
(B) Prokaryotes have more efficient mitochondria.
(C) Eukaryotes lack a Krebs cycle.
(D) In eukaryotes, NADH from glycolysis cannot enter the mitochondria, and its electrons are transferred via FADH□, yielding fewer ATP.

Correct Answer: D

Explanation: The two molecules of NADH produced in glycolysis are in the cytoplasm. Because the mitochondrial membrane is impermeable to NADH, its electrons are transferred via FADH□, which yields fewer ATP (2 ATP per FADH□ instead of 3 per NADH).

42. A mutation in a plant's RuBisCO enzyme causes it to have a higher affinity for O□ than for CO□. What would be the most likely consequence for the plant?

(A) Increased rate of photorespiration and decreased photosynthetic efficiency.
(B) Increased rate of photosynthesis.
(C) More glucose production.
(D) No effect on the plant.

Correct Answer: A

Explanation: Increased rate of photorespiration and decreased photosynthetic efficiency. — this correctly answers the question.

43. Which of the following statements about the light-dependent and light-independent reactions is correct?

(A) Both require light to occur.
(B) The light-dependent reactions occur in the thylakoid membranes, while the light-independent reactions occur in the stroma.
(C) The light-independent reactions produce ATP and NADPH.
(D) The light-dependent reactions use ATP and NADPH.

Correct Answer: B

Explanation: The light-dependent reactions occur in the thylakoid membranes, while the light-independent reactions occur in the stroma. — this correctly answers the question.

44. In the electron transport chain, what is the function of ubiquinone (Coenzyme Q)?

(A) It is a proton channel.
(B) It is a permanent structural component of Complex IV.
(C) It acts as a mobile carrier of electrons between Complex I/II and Complex III.
(D) It breaks down ATP.

Correct Answer: C

Explanation: Ubiquinone is a mobile carrier of electrons. It transfers electrons from Complex I and II to Complex III.

45. What happens to the proton gradient in mitochondria if oxygen is absent?

(A) The proton gradient increases.
(B) The proton gradient remains unchanged.
(C) The proton gradient is converted to ATP.
(D) The proton gradient is not maintained because electrons cannot be passed to oxygen, halting the ETC and proton pumping.

Correct Answer: D

Explanation: Without oxygen as the final electron acceptor, the electron transport chain backs up, and protons are no longer pumped. The proton gradient dissipates, and ATP synthesis via chemiosmosis stops.

46. During the Calvin cycle, how many ATP and NADPH molecules are required to produce one molecule of G3P?

(A) 9 ATP and 6 NADPH
(B) 3 ATP and 2 NADPH
(C) 6 ATP and 3 NADPH
(D) 12 ATP and 9 NADPH

Correct Answer: A

Explanation: The notes state that the Calvin cycle uses three molecules of CO□, six molecules of NADPH, and nine molecules of ATP to release just one molecule of G3P from the cycle.

47. Which of the following is the primary role of the C4 pathway in mesophyll cells?

(A) To carry out the Calvin cycle.
(B) To fix CO□ into a 4-carbon compound using PEP carboxylase.
(C) To produce ATP via oxidative phosphorylation.
(D) To break down glucose.

Correct Answer: B

Explanation: In C4 plants, PEP carboxylase in mesophyll cells fixes CO□ to form oxaloacetate (a 4-carbon compound), which is then converted to malate and transported to bundle sheath cells.

48. In the Krebs cycle, what is the net gain of ATP, NADH, and FADH□ per acetyl-CoA?

(A) 2 ATP, 4 NADH, 2 FADH□
(B) 3 ATP, 6 NADH, 2 FADH□
(C) 1 ATP, 3 NADH, 1 FADH□
(D) 0 ATP, 2 NADH, 1 FADH□

Correct Answer: C

Explanation: Per acetyl-CoA (one turn of the Krebs cycle), there is a net gain of 1 ATP (or GTP), 3 NADH, and 1 FADH□.

49. During photorespiration, where is glycolate converted to glycine?

(A) Chloroplast
(B) Mitochondria
(C) Cytoplasm
(D) Peroxisome

Correct Answer: D

Explanation: In photorespiration, glycolate is transported to the peroxisome and converted to glyoxalate and then glycine.

50. A student argues that anaerobic respiration is less efficient than aerobic respiration because it produces less ATP. Which of the following best supports this argument?

(A) Anaerobic respiration does not fully oxidize glucose; the products (lactic acid or ethanol) still contain significant chemical energy.
(B) Anaerobic respiration uses more oxygen.
(C) Anaerobic respiration occurs in the mitochondria.
(D) Anaerobic respiration produces more CO□.

Correct Answer: A

Explanation: In anaerobic respiration, glucose is only partially broken down. The end products (lactic acid or ethanol) still contain substantial chemical energy that is not extracted, resulting in a net yield of only 2 ATP compared to 36–38 ATP in aerobic respiration.

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Biology Grade 11 — Chapter 5

Acellular Life

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Independent practice MCQs from the supplied Class 11 Biology notes pack. Total: 50 questions.

A. Important / Main Topics

1. What is a complete viral particle called?

(A) Virion
(B) Capsid
(C) Prion
(D) Viroid

Correct Answer: A

Explanation: A complete viral particle is called a virion, which consists of a core and a coat.

2. Which scientist first crystallized the tobacco mosaic virus (TMV)?

(A) Iwanowsky
(B) W. M. Stanley
(C) Charles Chamberlain
(D) Louis Pasteur

Correct Answer: B

Explanation: W. M. Stanley (1935) crystallized the infectious particle, now known as tobacco mosaic virus (TMV).

3. Which part of a virus contains its genetic material?

(A) Capsid
(B) Envelope
(C) Core
(D) Glycoprotein spikes

Correct Answer: C

Explanation: The core is the inner part of the virion which consists of the viral genome and various proteins (enzymes).

4. What are the protein subunits that make up the capsid called?

(A) Peptidoglycans
(B) Glycoproteins
(C) Nucleoproteins
(D) Capsomeres

Correct Answer: D

Explanation: The capsid is composed of identical repeating subunits called capsomeres.

5. Which of the following viruses has a complex capsid with a head and a tail?

(A) Bacteriophage
(B) Tobacco mosaic virus
(C) Adenovirus
(D) Influenza virus

Correct Answer: A

Explanation: Bacteriophage — this correctly answers the question.

6. What is the name of the enzyme present in retroviruses that converts RNA into DNA?

(A) DNA polymerase
(B) Reverse transcriptase
(C) RNA polymerase
(D) Protease

Correct Answer: B

Explanation: Reverse transcriptase — this correctly answers the question.

7. Which of the following is a non-living characteristic of viruses?

(A) They can reproduce inside a host.
(B) They have genetic material.
(C) They can be crystallized and stored in bottles.
(D) They can undergo mutation.

Correct Answer: C

Explanation: They can be crystallized and stored in bottles. — this correctly answers the question.

8. What is the primary host of a bacteriophage?

(A) Plants
(B) Animals
(C) Fungi
(D) Bacteria

Correct Answer: D

Explanation: The bacteriophage is a virus that specifically attacks and infects bacteria.

9. Which structure is responsible for the attachment of a bacteriophage to a bacterial cell?

(A) Tail fibres and tail pins
(B) Head
(C) Capsid
(D) Envelope

Correct Answer: A

Explanation: The tail fibres and tail pins/spikes are involved in the binding of the phage to specific receptors on the bacterial cell.

10. What is the process by which a bacteriophage DNA integrates into the host bacterial chromosome?

(A) Lytic cycle
(B) Lysogeny
(C) Binary fission
(D) Transduction

Correct Answer: B

Explanation: In the lysogenic cycle, the phage DNA integrates into the host chromosome, a process known as lysogeny.

11. Which cells does HIV primarily target?

(A) Red blood cells
(B) Liver cells
(C) Helper T cells (CD4 cells)
(D) Muscle cells

Correct Answer: C

Explanation: HIV attacks cells with CD4 receptors, primarily helper T cells, macrophages, and certain brain cells.

12. What does the acronym AIDS stand for?

(A) Auto Immune Disease Syndrome
(B) Acute Infection Disease Syndrome
(C) Antibody Immune Deficiency Syndrome
(D) Acquired Immune Deficiency Syndrome

Correct Answer: D

Explanation: AIDS stands for Acquired Immune Deficiency Syndrome, which is caused by HIV.

13. Which protein on the HIV envelope is needed to attach to the host cell?

(A) gp 120
(B) gp 41

(C) p24
(D) Reverse transcriptase

Correct Answer: A

Explanation: gp 120 is the outer glycoprotein needed to attach to the CD4 receptor on the host cell.

14. Which of the following diseases is caused by a prion?

(A) Hepatitis D
(B) Mad cow disease
(C) Polio
(D) Herpes

Correct Answer: B

Explanation: Prions cause fatal neurodegenerative diseases such as Kuru in humans and mad cow disease in cattle.

15. Which of the following is the only human disease known to be caused by a viroid?

(A) Hepatitis A
(B) Hepatitis B
(C) Hepatitis D
(D) Hepatitis E

Correct Answer: C

Explanation: The only human disease known to be caused by a viroid is hepatitis D.

16. Why are viruses considered obligate intracellular parasites?

(A) They can reproduce independently.
(B) They can synthesize their own proteins.
(C) They do not require any host cell.
(D) They lack their own metabolic enzymes and ribosomes, requiring a host cell to reproduce.

Correct Answer: D

Explanation: Viruses are obligate intracellular parasites because they cannot multiply outside a living cell. They lack metabolic enzymes and ribosomes to make proteins.

17. What is the significance of the Hershey-Chase experiment using T2 bacteriophage?

(A) It proved that DNA is the hereditary material.
(B) It proved that bacteria can divide by binary fission.
(C) It discovered the structure of the ribosome.
(D) It discovered reverse transcriptase.

Correct Answer: A

Explanation: In 1952, Alfred D. Hershey and Martha Chase used T2 bacteriophage and bacteria to prove that DNA is the hereditary material.

18. In the lytic cycle, what happens immediately after the viral DNA is injected into the host bacterium?

(A) The host cell divides.
(B) The host DNA is degraded.
(C) The host DNA is integrated into the viral DNA.
(D) The virus enters the lysogenic cycle.

Correct Answer: B

Explanation: In the lytic cycle, the host genomic DNA is immediately disintegrated by the virally encoded DNA digesting enzyme (DNAase).

19. Which of the following enables a virus to evade the host immune system?

(A) It has a thick peptidoglycan cell wall.
(B) It produces antibodies.
(C) It hides inside the host cell and rapidly changes its genetic constitution.
(D) It uses the host's immune system to attack itself.

Correct Answer: C

Explanation: Once inside a host cell, the virus hides from the immune system. It also rapidly changes its genetic constitution so that host antibodies and vaccines become ineffective.

20. In the HIV life cycle, what is the role of the enzyme integrase?

(A) It converts viral RNA to DNA.
(B) It breaks down viral proteins.
(C) It assists in viral assembly.
(D) It integrates viral DNA into the host cell DNA.

Correct Answer: D

Explanation: Integrase is a virus-encoded enzyme that mediates the integration of the double-stranded cDNA into the host cell DNA.

21. Why are non-enveloped viruses generally able to survive longer outside the host than enveloped viruses?

(A) They have a tough protein capsid.
(B) They have a lipid envelope that protects them.
(C) They can form spores.
(D) They are larger in size.

Correct Answer: A

Explanation: Non-enveloped viruses have a tough protein capsid, making them resistant to drying and heat. Enveloped viruses have a lipid envelope that is sensitive to degradation.

22. Which of the following is an example of a disease caused by a virus that affects the liver?

(A) Poliomyelitis
(B) Hepatitis B
(C) Herpes
(D) Cotton leaf curl disease

Correct Answer: B

Explanation: Hepatitis B is caused by HBV, which infects the liver.

23. Which vector is responsible for transmitting Cotton Leaf Curl Disease (CLCuD)?

(A) Mosquito
(B) Housefly
(C) Whitefly
(D) Aphid

Correct Answer: C

Explanation: Cotton leaf curl disease (CLCuD) is transmitted by the whitefly.

24. What is the primary reason why a flu vaccine must be updated every year?

(A) The vaccine loses its potency over time.
(B) The virus can no longer be cultured.
(C) New vaccines are cheaper to produce.
(D) The flu virus constantly evolves new strains, and the immune response changes over time.

Correct Answer: D

Explanation: The flu virus constantly evolves new strains, and the immune response changes over time. — this correctly answers the question.

25. What is the primary difference between a viroid and a prion?

(A) A viroid consists of a short, circular RNA without a protein coat, while a prion is an infectious protein particle without nucleic acids.
(B) A viroid is made of protein, while a prion is made of RNA.
(C) Viroids infect only animals, while prions infect only plants.
(D) Viroids are larger than prions.

Correct Answer: A

Explanation: Viroids are composed of short, circular, single-stranded RNA and lack a protein coat. Prions are infectious protein particles with no nucleic acids.

B. Less Important / Secondary Topics

26. Which type of hepatitis is transmitted primarily by the faecal-oral route?

(A) Hepatitis A
(B) Hepatitis B
(C) Hepatitis C
(D) Hepatitis D

Correct Answer: A

Explanation: Hepatitis A is transmitted by the faecal-oral route. Hepatitis B and C are transmitted via blood.

27. What is the function of the enzyme lysozyme in the bacteriophage infection process?

(A) It synthesizes viral proteins.
(B) It digests the host cell wall to allow core tube penetration.
(C) It degrades the viral DNA.
(D) It helps in the assembly of new phages.

Correct Answer: B

Explanation: It digests the host cell wall to allow core tube penetration. — this correctly answers the question.

28. Which of the following is true regarding the capsid symmetry of a tobacco mosaic virus (TMV)?

(A) Icosahedral
(B) Complex
(C) Helical
(D) Enveloped

Correct Answer: C

Explanation: Helical — this correctly answers the question.

29. Which of the following is a characteristic feature of a lysogenic phage?

(A) It immediately lyses the host cell.
(B) It develops a Master-Slave relationship with the host.
(C) It lacks a capsid.
(D) It can integrate its DNA into the host chromosome as a prophage.

Correct Answer: D

Explanation: Lysogenic (temperate) phages can enter a dormant state by integrating their DNA into the host chromosome, forming a prophage.

30. What is the clinical name for the disease caused by a prion in humans?

(A) Kuru
(B) HIV
(C) Hepatitis D
(D) Polio

Correct Answer: A

Explanation: Kuru is a fatal neurodegenerative disease in humans caused by prions.

31. Which of the following is a method of transmission for HIV?

(A) Shaking hands
(B) Blood transfusion with unscreened blood
(C) Hugging
(D) Mosquito bites

Correct Answer: B

Explanation: HIV is transmitted through blood, semen, and other body fluids. Shaking hands, hugging, and mosquito bites do not transmit HIV.

32. What is the purpose of using reverse transcriptase in the life cycle of HIV?

(A) To synthesize viral proteins.
(B) To degrade host DNA.
(C) To convert viral RNA into cDNA, which can then integrate into the host genome.

(D) To help in the assembly of virions.

Correct Answer: C

Explanation: Reverse transcriptase synthesizes a single-stranded DNA complementary to virus RNA. This cDNA is then replicated into double-stranded cDNA and integrated into the host genome.

33. What is the significance of the structural feature of the HIV capsid?

(A) It is helical and helps in attachment.
(B) It is surrounded by a cell wall.
(C) It is composed of cellulose.
(D) It is conical shaped and composed of capsomeres.

Correct Answer: D

Explanation: The HIV capsid is somewhat conical shaped and is composed of capsomeres.

34. Which of the following is a reason for the global economic losses due to COVID-19?

(A) Widespread lockdowns slowed economic activity and caused job losses.
(B) The virus directly attacked all food crops.
(C) The virus increased the cost of oil.
(D) The virus caused a sudden increase in agricultural productivity.

Correct Answer: A

Explanation: The notes state that lockdowns slowed global economic.

35. What is the primary reason why developing a vaccine for the common cold is not practical?

(A) The cold virus is too large.
(B) There are more than 200 viruses that cause cold.
(C) Cold is caused by bacteria.
(D) The cold virus cannot be cultured.

Correct Answer: B

Explanation: The notes state that there are more than 200 viruses that cause cold, making developing a single vaccine against the infection impractical.

36. A virus is discovered that has a single-stranded RNA genome. It is classified under the Baltimore classification system. Which group is it likely to belong to based on its genome and mode of replication?

(A) Group I (dsDNA)
(B) Group III (dsRNA)
(C) Group IV (positive-sense ssRNA)
(D) Group V (negative-sense ssRNA)

Correct Answer: C

Explanation: The Baltimore classification groups viruses based on genome type and mode of replication. A single-stranded RNA genome that serves directly as mRNA would belong to Group IV (positive-sense ssRNA).

37. If a bacterium is infected by a lysogenic phage, what is the most likely immediate consequence?

(A) The bacterium will immediately lyse.
(B) The bacterium will become more pathogenic by expressing viral genes.
(C) The bacterium will produce new phages continuously.
(D) The phage DNA will integrate into the bacterial chromosome as a prophage, and the cell will survive and replicate.

Correct Answer: D

Explanation: In the lysogenic cycle, phage DNA integrates into the host chromosome as a prophage, and the host cell survives and replicates.

38. Why is HIV considered a retrovirus?

(A) It has an RNA genome and uses reverse transcriptase to synthesize DNA.
(B) It has a DNA genome and uses reverse transcriptase to synthesize RNA.
(C) It can replicate both as DNA and RNA.
(D) It causes a disease that cannot be cured.

Correct Answer: A

Explanation: It has an RNA genome and uses reverse transcriptase to synthesize DNA. — this correctly answers the question.

39. In a severe case of HIV infection, a patient experiences a drastic decrease in CD4 T cells. What is the most likely consequence?

(A) Enhanced immune response to infections.
(B) Increased risk of opportunistic infections.
(C) Increased production of red blood cells.
(D) Faster wound healing.

Correct Answer: B

Explanation: CD4 T cells are critical for activating other immune cells. Their destruction leads to severe immunodeficiency, making the patient vulnerable to opportunistic infections.

40. What is the primary mechanism by which prions cause disease?

(A) They destroy the host's DNA.
(B) They produce toxins that kill cells.
(C) They induce normal proteins to misfold and clump, causing neurodegeneration.
(D) They consume all the nutrients in the brain.

Correct Answer: C

Explanation: They induce normal proteins to misfold and clump, causing neurodegeneration. — this correctly answers the question.

41. Which of the following is a key difference between the lytic and lysogenic cycles?

(A) In the lytic cycle, the host cell survives; in the lysogenic cycle, it dies.
(B) Lytic cycles involve RNA viruses; lysogenic cycles involve DNA viruses.
(C) Only the lytic cycle produces new virions.
(D) In the lysogenic cycle, viral DNA integrates into the host genome; in the lytic cycle, it does not.

Correct Answer: D

Explanation: In the lysogenic cycle, viral DNA integrates into the host genome; in the lytic cycle, it does not. — this correctly answers the question.

42. If a viroid is treated with a protease (an enzyme that breaks down proteins), what would be the expected result?

(A) The viroid would remain unaffected because it lacks a protein coat.
(B) The viroid would be destroyed.
(C) The viroid would become more infectious.
(D) The viroid would replicate faster.

Correct Answer: A

Explanation: Viroids are composed of RNA only and lack a protein coat. Therefore, protease treatment would not affect them.

43. A new vaccine is developed against a specific strain of influenza. Why might it be ineffective the following year?

(A) The vaccine loses its potency over time.
(B) The virus undergoes mutation and reassortment, creating new strains not covered by the previous year's vaccine.
(C) The immune system forgets the vaccine.
(D) The vaccine is only effective for a single day.

Correct Answer: B

Explanation: The virus undergoes mutation and reassortment, creating new strains not covered by the previous year's vaccine. — this correctly answers the question.

44. What would be the most likely consequence of a drug that blocks the activity of reverse transcriptase in a cell infected with HIV?

(A) The virus would immediately integrate into the host DNA.

(B) The virus would enter the lytic cycle.
(C) The viral RNA could not be converted into cDNA, preventing integration and replication.
(D) The host immune system would be completely restored.

Correct Answer: C

Explanation: Reverse transcriptase is essential for converting viral RNA into cDNA. Blocking its.

45. Which of the following accurately describes the role of the capsid in a virus?

(A) It synthesizes viral proteins.
(B) It contains the viral genome.
(C) It produces energy for the virus.
(D) It protects the viral genome from nucleases and helps in host cell attachment.

Correct Answer: D

Explanation: The capsid protects the viral genome from nucleases of the host cell and helps in attachment to host cell receptors.

46. A researcher discovers a new infectious agent that consists only of RNA and lacks a protein coat. It infects plant cells. What is this agent most likely to be?

(A) A viroid
(B) A prion
(C) A bacteriophage
(D) A retrovirus

Correct Answer: A

Explanation: Viroids are pathogens that consist of a short, circular, single-stranded RNA without a protein coat or envelope. They cause several plant diseases.

47. If a virus's envelope is destroyed, what is the most likely consequence?

(A) The virus would become more infectious.
(B) The virus's capsid would be exposed, and it may lose its ability to infect host cells.
(C) The virus would be able to infect a wider range of hosts.
(D) The virus would turn into a viroid.

Correct Answer: B

Explanation: The virus's capsid would be exposed, and it may lose its ability to infect host cells. — this correctly answers the question.

48. Which of the following statements about the transmission of Hepatitis C is accurate?

(A) It is transmitted by the faecal-oral route.
(B) It is transmitted by sexual contact.
(C) It is only transmitted via blood.
(D) It is transmitted by mosquito bites.

Correct Answer: C

Explanation: Hepatitis C is caused by HCV and is only transmitted via blood.

49. What is the significance of the observation that lysosomes digest excess mitochondria in a cell?

(A) It proves that lysosomes are the main site of ATP production.
(B) It proves that mitochondria can reproduce outside the cell.
(C) It shows that lysosomes can synthesize proteins.
(D) It shows how cellular organelles are regulated and recycled through autophagy.

Correct Answer: D

Explanation: It shows how cellular organelles are regulated and recycled through autophagy. — this correctly answers the question.

50. A bacterium is infected with a phage, but the phage enters the lysogenic cycle. Later, the bacterium is exposed to UV radiation. What is the most likely consequence?

(A) The prophage will be induced to enter the lytic cycle, causing cell lysis and release of new phages.
(B) The bacterium will be permanently immune to the phage.
(C) The bacterium will divide normally with the prophage.

(D) The phage DNA will be permanently destroyed.

Correct Answer: A

Explanation: Exposure to UV radiation is a condition that induces the termination of the lysogenic state. The prophage is excised, initiating the lytic cycle, leading to cell lysis and release of phages.

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Biology Grade 11 — Chapter 6

Prokaryotes

by Public Library

Independent practice MCQs from the supplied Class 11 Biology notes pack. Total: 50 questions.

A. Important / Main Topics

1. Who introduced the five-kingdom system in 1969?

(A) Robert H. Whittaker
(B) Carl Woese
(C) Lynn Margulis
(D) Anton van Leeuwenhoek

Correct Answer: A

Explanation: In 1969, American biologist Robert H. Whittaker introduced a five-kingdom system that included the fundamental distinction between prokaryotes and eukaryotes.

2. Which scientist identified that archaea have a separate evolutionary lineage from bacteria in 1977?

(A) Robert H. Whittaker
(B) Carl Woese
(C) Lynn Margulis
(D) Louis Pasteur

Correct Answer: B

Explanation: A significant milestone occurred in 1977 when Carl Woese identified that archaea have a separate evolutionary lineage from bacteria.

3. Which of the following is a unifying feature of Archaea?

(A) Presence of peptidoglycan in the cell wall
(B) Presence of unbranched carbon chains in membrane lipids
(C) Absence of peptidoglycan in the cell wall
(D) Presence of a well-organized nucleus

Correct Answer: C

Explanation: Absence of peptidoglycan in the cell wall — this correctly answers the question.

4. What are methane-producing archaea called?

(A) Halophiles
(B) Thermoacidophiles
(C) Cyanobacteria
(D) Methanogens

Correct Answer: D

Explanation: Methanogens are methane producers that survive in anaerobic settings such as swamps, marshes, and the intestinal tracts of animals.

5. Which group of archaea lives in salty environments?

(A) Halophiles
(B) Methanogens
(C) Thermoacidophiles
(D) Actinomycetes

Correct Answer: A

Explanation: Halophiles — this correctly answers the question.

6. What is the primary method of asexual reproduction in bacteria?

(A) Conjugation
(B) Binary fission

(C) Transduction
(D) Transformation

Correct Answer: B

Explanation: The primary method of asexual reproduction in bacteria is binary fission, where one cell divides into two identical daughter cells.

7. Which type of bacteria can survive harsh conditions by forming a thick, keratin-like coat?

(A) Cyanobacteria
(B) Actinomycetes
(C) Endospore-forming bacteria
(D) Proteobacteria

Correct Answer: C

Explanation: Endospore-forming bacteria — this correctly answers the question.

8. What is the cell wall of Gram-positive bacteria primarily composed of?

(A) A thin peptidoglycan layer with an outer membrane
(B) Cellulose
(C) Chitin
(D) A thick peptidoglycan layer

Correct Answer: D

Explanation: A thick peptidoglycan layer — this correctly answers the question.

9. Which of the following is a key feature of Gram-negative bacteria?

(A) Presence of an outer membrane containing lipopolysaccharides
(B) Presence of teichoic acid
(C) Thick peptidoglycan layer
(D) Absence of a periplasmic space

Correct Answer: A

Explanation: Presence of an outer membrane containing lipopolysaccharides — this correctly answers the question.

10. Which pigment is primarily responsible for the blue-green color of cyanobacteria?

(A) Chlorophyll a
(B) Phycocyanin
(C) Carotenoid
(D) Xanthophyll

Correct Answer: B

Explanation: Phycocyanin, a blue pigment, is the predominant phycobilin in cyanobacteria.

11. What is the shape of a spherical bacterium called?

(A) Bacillus
(B) Spirillum
(C) Coccus
(D) Vibrio

Correct Answer: C

Explanation: A coccus is a spherical bacterium. Cocci generally appear in groups like diplococci, streptococci, and staphylococci.

12. What is the region in a bacterial cell where the circular DNA is located called?

(A) Nucleus
(B) Plasmid
(C) Nucleolus
(D) Nucleoid

Correct Answer: D

Explanation: In prokaryotes, the genetic material is typically a single circular chromosome located in the nucleoid region.

13. Which type of bacteria are photosynthetic and produce oxygen?

(A) Cyanobacteria
(B) Green sulfur bacteria
(C) Purple bacteria
(D) Methanogens

Correct Answer: A

Explanation: Cyanobacteria are phototrophic bacteria that produce oxygen during photosynthesis.

14. What is the term for bacteria that can grow either in the presence or absence of oxygen?

(A) Aerobic bacteria
(B) Facultative bacteria
(C) Anaerobic bacteria
(D) Microaerophilic bacteria

Correct Answer: B

*Explanation: Facultative bacteria like *E. coli* can grow either in the presence or absence of oxygen.*

15. Which bacterial structure is used for attachment to surfaces and conjugation?

(A) Flagella
(B) Capsule
(C) Pili
(D) Endospore

Correct Answer: C

Explanation: Pili are hair-like structures on the bacterial surface that facilitate adhesion and are involved in conjugation.

16. A bacterium is observed to have a thick peptidoglycan layer and teichoic acid in its cell wall. How would this bacterium be classified in a Gram stain?

(A) Gram-negative
(B) Acid-fast
(C) Non-staining
(D) Gram-positive

Correct Answer: D

Explanation: Gram-positive bacteria have a thicker peptidoglycan layer and teichoic acid that protrudes outside the peptidoglycan layer.

17. What is the advantage of the branched carbon chains in the membrane lipids of archaea?

(A) They allow archaea to live in extreme environments like high temperatures and acidity.
(B) They make archaea more susceptible to antibiotics.
(C) They help archaea produce methane.
(D) They are the same as bacterial membrane lipids.

Correct Answer: A

Explanation: Archaea have special lipids in their membranes with branched carbon chains that help them live in extreme places like very hot or acidic environments.

18. During which phase of the bacterial growth curve is the rate of cell division equal to the rate of cell death?

(A) Lag phase
(B) Stationary phase
(C) Log phase
(D) Death phase

Correct Answer: B

Explanation: In the stationary phase, the growth rate is zero, and any increase in the number of cells is offset by the death of other cells, so the number of living cells remains constant.

19. Which type of genetic recombination in bacteria requires direct contact between a donor and recipient cell through a bridge-like connection?

(A) Transformation
(B) Transduction
(C) Conjugation
(D) Mutation

Correct Answer: C

Explanation: Conjugation involves the transfer of genetic material from one bacterium (donor) to another (recipient) through a bridge-like connection.

20. What is the function of the enzyme lysozyme in a bacteriophage infection?

(A) It synthesizes viral DNA.
(B) It degrades the viral genome.
(C) It helps in the assembly of new phages.
(D) It digests a portion of the bacterial cell wall to allow core tube penetration.

Correct Answer: D

Explanation: Lysozyme is released upon contraction of the tail and digests the host cell wall so that the core tube can penetrate into the host cell.

21. Why are cyanobacteria considered the most prominent photosynthetic bacteria?

(A) They are the only bacteria that produce oxygen during photosynthesis.
(B) They are the largest bacteria.
(C) They can fix nitrogen.
(D) They are the oldest bacteria.

Correct Answer: A

Explanation: They are the only bacteria that produce oxygen during photosynthesis. — this correctly answers the question.

22. What is the primary role of heterocysts in cyanobacteria?

(A) Photosynthesis
(B) Nitrogen fixation
(C) Reproduction
(D) Motility

Correct Answer: B

Explanation: Approximately one-third of cyanobacteria have the capability to fix atmospheric nitrogen, often occurring within heterocysts, specialized cells with thick walls and no nuclei.

23. Which process involves the uptake of free DNA from the environment by a bacterial cell?

(A) Conjugation
(B) Transduction
(C) Transformation
(D) Binary fission

Correct Answer: C

Explanation: Transformation is the absorption of DNA into a cell. When bacteria die, they release DNA fragments that can be taken up by a recipient cell.

24. A bacterial infection is treated with penicillin. Why does this antibiotic work?

(A) It inhibits protein synthesis by binding to 70S ribosomes.
(B) It destroys the bacterial DNA.
(C) It prevents the formation of the cell membrane.
(D) It targets the peptidoglycan cell wall, causing the bacterium to burst.

Correct Answer: D

Explanation: Penicillin targets the peptidoglycan cell wall, which is essential for bacterial survival. Human cells lack a cell wall, so they are unaffected.

25. Which of the following statements correctly describes the process of transduction?

(A) DNA is transferred by a bacteriophage from one bacterium to another.
(B) DNA is transferred through direct contact between two bacteria.

(C) Free DNA is taken up from the environment.
(D) A bacterium divides by binary fission.

Correct Answer: A

Explanation: Transduction is a genetic transfer process in bacteria facilitated by bacteriophages. During infection, phages inject their genetic material into bacteria.

B. Less Important / Secondary Topics

26. What is the function of the capsule in some bacteria?

(A) It aids in the adherence of bacteria to human tissues.
(B) It provides motility.
(C) It is the site of protein synthesis.
(D) It stores nutrients.

Correct Answer: A

Explanation: It aids in the adherence of bacteria to human tissues. — this correctly answers the question.

27. Which bacterial shape is described as a curved rod resembling a comma?

(A) Bacillus
(B) Vibrio
(C) Coccus
(D) Spirillum

Correct Answer: B

Explanation: Rod-shaped bacteria curved into a form resembling a comma are called Vibrio.

28. How do obligate anaerobic bacteria differ from facultative bacteria?

(A) Obligate anaerobes require oxygen; facultative bacteria do not.
(B) Obligate anaerobes are photosynthetic; facultative bacteria are not.
(C) Obligate anaerobes cannot grow in the presence of oxygen; facultative bacteria can grow with or without oxygen.
(D) Obligate anaerobes are larger than facultative bacteria.

Correct Answer: C

*Explanation: Anaerobic bacteria like *Spirochaeta* do not require oxygen. Facultative bacteria like *E. coli* can grow with or without oxygen.*

29. Which of the following is a method of bacterial control that involves the use of steam under pressure?

(A) Pasteurization
(B) Refrigeration
(C) Freezing
(D) Autoclaving (Sterilization)

Correct Answer: D

Explanation: Autoclaving (Sterilization) — this correctly answers the question.

30. What is the role of the basal body in a bacterial flagellum?

(A) It produces rotatory motion.
(B) It connects the flagellum to the cell membrane.
(C) It is the propeller that causes the cell to spin.
(D) It synthesizes proteins.

Correct Answer: A

Explanation: The basal body originates just beneath the cell membrane and is a complex structure that produces rotatory motion.

31. In the Gram stain, what color do Gram-positive bacteria appear?

(A) Pink
(B) Purple
(C) Green

(D) Colorless

Correct Answer: B

Explanation: Purple — this correctly answers the question.

32. What is the function of the enzyme catalase in bacteria?

(A) It synthesizes ATP.
(B) It fixes nitrogen.
(C) It breaks down hydrogen peroxide into water and oxygen.
(D) It repairs DNA.

Correct Answer: C

Explanation: Peroxisomes contain catalase, which breaks down hydrogen peroxide (a toxic molecule) into water and oxygen.

33. Which of the following is a bacterial disease transmitted by contaminated water?

(A) Tetanus
(B) Tuberculosis
(C) Anthrax
(D) Typhoid

Correct Answer: D

*Explanation: Typhoid is caused by *Salmonella typhi* and is prevented mainly by public health measures that ensure a clean water supply.*

34. What is the primary characteristic of eubacteria?

(A) They have a thick peptidoglycan cell wall.
(B) They have a true nucleus.
(C) They have 80S ribosomes.
(D) They lack a cell membrane.

Correct Answer: A

Explanation: Eubacteria are prokaryotes, and their cell walls contain peptidoglycan.

35. Which of the following is an example of a bacterium that causes food poisoning?

(A) *Lactobacillus*
(B) *Clostridium botulinum*
(C) *Rhizobium*
(D) *Nitrosomonas*

Correct Answer: B

*Explanation: *Clostridium botulinum* is a bacterium that causes food poisoning (botulism) and makes several different toxins.*

36. A new antibiotic is found to be effective against Gram-negative bacteria but not Gram-positive bacteria. What is the most likely explanation?

(A) The antibiotic targets the thick peptidoglycan layer unique to Gram-negative bacteria.
(B) The antibiotic targets the outer membrane of Gram-negative bacteria.
(C) The antibiotic cannot penetrate the thick peptidoglycan layer of Gram-positive bacteria.
(D) The antibiotic targets the teichoic acid in Gram-positive bacteria.

Correct Answer: C

Explanation: Gram-positive bacteria have a notably thicker peptidoglycan layer that may prevent the penetration of certain antibiotics.

37. What would happen to a bacterial cell if its gene for DNA polymerase were mutated and non-functional?

(A) The cell would be unable to synthesize proteins.
(B) The cell would be unable to fix nitrogen.
(C) The cell would be unable to move.
(D) The cell would be unable to replicate its DNA and divide.

Correct Answer: D

Explanation: DNA polymerase is essential for DNA replication. Without it, the cell cannot replicate its DNA and divide.

38. Why is the presence of introns in some archaeal genes considered evidence for their closer relationship to eukaryotes?

(A) Introns are only found in eukaryotes and archaea, not in bacteria.
(B) Introns are only found in bacteria.
(C) Introns are absent in all organisms.
(D) Introns are found in all prokaryotes.

Correct Answer: A

Explanation: Introns (noncoding parts of genes) are present in some archaeal genes and in eukaryotic genes, but are absent in eubacteria.

39. If a patient is infected with a bacterium that produces an endotoxin, what is the most likely source of this toxin?

(A) The peptidoglycan layer
(B) The lipopolysaccharide (LPS) in the outer membrane
(C) The teichoic acid in the cell wall
(D) The flagella

Correct Answer: B

Explanation: Endotoxins are often lipopolysaccharides (LPS) found in the outer membrane of Gram-negative bacteria.

40. A bacterium is placed in a hypertonic solution. What will happen to the bacterial cell?

(A) It will swell and burst.
(B) It will remain unchanged.
(C) It will lose water and undergo plasmolysis.
(D) It will actively pump out water.

Correct Answer: C

Explanation: It will lose water and undergo plasmolysis. — this correctly answers the question.

41. How does the structure of the bacterial flagellum differ from that of eukaryotic cilia and flagella?

(A) Bacterial flagella are made of tubulin; eukaryotic cilia and flagella are made of flagellin.
(B) Bacterial flagella use ATP; eukaryotic cilia use a proton motive force.
(C) Bacterial flagella are larger than eukaryotic cilia and flagella.
(D) Bacterial flagella are made of flagellin and lack microtubules; eukaryotic cilia and flagella are made of microtubules.

Correct Answer: D

Explanation: Bacterial flagella are composed of flagellin and lack microtubules, while eukaryotic flagella have a 9+2 microtubule arrangement.

42. A bacterium is exposed to a mutagen that damages its DNA. Which repair mechanism would be most critical for its survival?

(A) DNA repair enzymes (e.g., DNA polymerase with proofreading)
(B) Binary fission
(C) Conjugation
(D) Transformation

Correct Answer: A

Explanation: DNA repair enzymes, including DNA polymerase with proofreading.

43. Which of the following correctly describes the mechanism of action of penicillin?

(A) It inhibits protein synthesis by binding to the 30S ribosomal subunit.
(B) It inhibits cell wall synthesis by blocking peptidoglycan cross-linking.
(C) It disrupts the cell membrane.
(D) It inhibits DNA replication.

Correct Answer: B

Explanation: It inhibits cell wall synthesis by blocking peptidoglycan cross-linking. — this correctly answers the question.

44. If a bacterial cell is treated with an enzyme that degrades pili, which of the following processes would be most directly affected?

(A) Motility
(B) Binary fission
(C) Conjugation
(D) Protein synthesis

Correct Answer: C

Explanation: Pili are involved in the adhesion of bacteria to surfaces and are also involved in conjugation, which requires direct contact between cells.

45. What would be the most likely consequence of a mutation that prevents a bacterium from forming endospores?

(A) The bacterium would be unable to reproduce by binary fission.
(B) The bacterium would become more pathogenic.
(C) The bacterium would grow faster.
(D) The bacterium would be more susceptible to harsh environmental conditions.

Correct Answer: D

Explanation: Endospores are a survival strategy that allows bacteria to endure extreme conditions. Without the ability to form endospores, the bacterium would be more susceptible to environmental stress.

46. Which of the following is a key difference between archaea and bacteria in terms of their cell wall composition?

(A) Archaea lack peptidoglycan, while bacteria typically have it.
(B) Archaea have peptidoglycan, while bacteria do not.
(C) Both archaea and bacteria have peptidoglycan.
(D) Archaea have chitin, while bacteria have cellulose.

Correct Answer: A

Explanation: Archaea lack peptidoglycan, while bacteria typically have it. — this correctly answers the question.

47. Which of the following statements correctly describes the nitrogen cycle?

(A) Nitrogen gas is converted to ammonia by nitrifying bacteria.
(B) Nitrogen gas is converted to ammonium by nitrogen-fixing bacteria like *Rhizobium*.
(C) Ammonia is converted to nitrogen gas by decomposers.
(D) Nitrates are converted to ammonia by *Nitrosomonas*.

Correct Answer: B

*Explanation: Within the root nodules of legumes, nitrogen-fixing bacilli bacteria, like those from the genus *Rhizobium*, transform nitrogen gas into ammonium.*

48. A researcher isolates a new bacterium that grows optimally at 70°C. How would this bacterium be classified based on its temperature preference?

(A) Psychrophile
(B) Mesophile
(C) Thermophile
(D) Acidophile

Correct Answer: C

Explanation: Bacteria living in hot springs may have an optimum temperature of 70°C or higher. Such bacteria are called thermophiles.

49. What is the main difference between a lytic and a lysogenic cycle?

(A) In the lytic cycle, the host cell survives; in the lysogenic cycle, it dies.
(B) Lytic cycles involve RNA viruses; lysogenic cycles involve DNA viruses.
(C) Only the lytic cycle produces new virions.
(D) In the lysogenic cycle, the viral DNA integrates into the host genome; in the lytic cycle, it does not.

Correct Answer: D

Explanation: In the lysogenic cycle, the phage DNA integrates into the host chromosome as a prophage. In the lytic cycle, it replicates independently and lyses the host.

50. If a bacterium is treated with a chemical that blocks the function of the 70S ribosome, what would happen?

(A) Protein synthesis would stop.
(B) DNA replication would stop.
(C) The cell wall would break down.
(D) The cell would be unable to produce ATP.

Correct Answer: A

Explanation: 70S ribosomes are the site of protein synthesis in prokaryotes. Blocking their function would stop protein synthesis.

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Biology Grade 11 — Chapter 7

Protista and Fungi

by Public Library

Independent practice MCQs from the supplied Class 11 Biology notes pack. Total: 50 questions.

A. Important / Main Topics

1. The term "polyphyletic" refers to organisms that:

(A) Do not share a common evolutionary ancestor and evolved independently
(B) Share a single common ancestor
(C) Belong to the same species
(D) Have identical genetic material

Correct Answer: A

Explanation: Polyphyletic refers to a grouping of organisms that do not share a common evolutionary ancestor and may have evolved independently from different ancestral sources.

2. Which of the following is a heterotrophic protist?

(A) Algae
(B) Protozoa
(C) Diatoms
(D) Euglena

Correct Answer: B

Explanation: Protozoa and slime molds are heterotrophic protists, while algae are autotrophic.

3. The term "protozoa" is derived from Greek words meaning:

(A) Tiny plants
(B) Simple cells
(C) First animals
(D) Ancient life

Correct Answer: C

Explanation: The term "protozoa" comes from "proto" (first) and "zoo" (animals), describing microscopic, single-celled organisms with animal-like behaviors.

4. Which organelle helps freshwater protozoa pump excess water out of the cell?

(A) Food vacuole
(B) Nucleus
(C) Mitochondrion
(D) Contractile vacuole

Correct Answer: D

Explanation: Contractile vacuole — this correctly answers the question.

5. Which of the following algae is responsible for producing about 50-60% of photosynthesis on Earth?

(A) Algae in general
(B) Green algae
(C) Brown algae
(D) Red algae

Correct Answer: A

Explanation: Algae, collectively, play a vital role in ecosystems as they are responsible for about 50 to 60% of photosynthesis on our planet.

6. Which protozoan uses pseudopodia for movement and feeding?

(A) Paramecium
(B) Amoeba

(C) Trypanosoma
(D) Plasmodium

Correct Answer: B

Explanation: Amoebas use pseudopodia for both movement and feeding.

7. What is a defining feature of dinoflagellates?

(A) They are always green.
(B) They lack a nucleus.
(C) Many are bounded by protective cellulose plates and have two flagella.
(D) They are multicellular.

Correct Answer: C

Explanation: Many dinoflagellates are bounded by protective cellulose plates impregnated with silica and most have two flagella.

8. The body of most fungi is called:

(A) Thallus
(B) Hyphae
(C) Lichen
(D) Mycelium

Correct Answer: D

Explanation: The thallus or the body of most fungi is a multicellular structure known as mycelium, a network of filaments called hyphae.

9. What is the cell wall of fungi primarily made of?

(A) Chitin
(B) Cellulose
(C) Peptidoglycan
(D) Lignin

Correct Answer: A

Explanation: Chitin — this correctly answers the question.

10. Which of the following is a key characteristic of fungi that distinguishes them from plants?

(A) They have a cell wall.
(B) They are heterotrophic and lack chlorophyll.
(C) They are non-motile.
(D) They produce spores.

Correct Answer: B

Explanation: They are heterotrophic and lack chlorophyll. — this correctly answers the question.

11. In fungi, the filaments that make up the mycelium are called:

(A) Sporangia
(B) Conidia
(C) Hyphae
(D) Rhizoids

Correct Answer: C

Explanation: The mycelium is a network of filaments called hyphae.

12. What type of hyphae lack cross walls and are multinucleate?

(A) Septate
(B) Branched
(C) Vegetative
(D) Coenocytic

Correct Answer: D

*Explanation: Nonseptate (aseptate) hyphae are multinucleate and are called coenocytic hyphae, e.g., in *Rhizopus*.*

13. How do fungi reproduce asexually by forming small outgrowths?

(A) Budding
(B) Fragmentation
(C) Spore formation
(D) Binary fission

Correct Answer: A

Explanation: Budding — this correctly answers the question.

14. Which type of fungi are known as "sac fungi"?

(A) Zygomycota
(B) Ascomycota
(C) Basidiomycota
(D) Deuteromycota

Correct Answer: B

Explanation: Ascomycota are commonly referred to as sac fungi, named after their characteristic reproductive structures called asci.

15. What is the main characteristic of Deuteromycota?

(A) They reproduce sexually.
(B) They are all aquatic.
(C) They are called "imperfect fungi" because they lack a sexual stage.
(D) They lack a cell wall.

Correct Answer: C

Explanation: Deuteromycota are called "imperfect fungi" owing to the absence of a sexual stage in their life cycle.

16. Amoeba proteus and Entamoeba histolytica are both:

(A) Ciliates
(B) Zooflagellates
(C) Dinoflagellates
(D) Amoebas

Correct Answer: D

Explanation: Both are examples of amoebas, which use pseudopodia for movement and feeding.

17. Which protist causes malaria?

(A) Plasmodium
(B) Entamoeba histolytica
(C) Giardia intestinalis
(D) Trypanosoma

Correct Answer: A

Explanation: Plasmodium species are responsible for malaria, a deadly disease affecting millions worldwide.

18. What is the first stable product of the Calvin cycle?

(A) Glucose
(B) 3-phosphoglycerate (3-PGA)
(C) Glyceraldehyde-3-phosphate (G3P)
(D) Ribulose bisphosphate (RuBP)

Correct Answer: B

Explanation: The first stable compound in the Calvin cycle is a three-carbon compound (3-PGA), which is why the Calvin cycle is also known as the C3 pathway.

19. Which part of the mushroom is considered the fruiting body?

(A) Mycelium
(B) Hyphae
(C) Basidiocarp
(D) Rhizoid

Correct Answer: C

Explanation: A mushroom which consists of a stalk and a cap is more formally referred to as a basidiocarp.

20. How does a lysogenic phage differ from a lytic phage?

(A) The lysogenic phage immediately lyses the host cell.
(B) The lytic phage can enter a dormant state.
(C) The lysogenic phage cannot replicate its DNA.
(D) The lysogenic phage integrates its DNA into the host chromosome as a prophage.

Correct Answer: D

Explanation: In the lysogenic cycle, the phage DNA integrates into the host chromosome as a prophage, and the host cell survives.

21. Which of the following is a beneficial role of fungi?

(A) Producing antibiotics like penicillin
(B) Causing athlete's foot
(C) Spoiling food
(D) Causing plant diseases

Correct Answer: A

Explanation: Producing antibiotics like penicillin — this correctly answers the question.

22. How do fungi digest their food?

(A) They ingest food particles and digest them internally.
(B) They secrete enzymes to break down organic matter externally and then absorb the nutrients.
(C) They use photosynthesis to make food.
(D) They rely on a host organism for pre-digested food.

Correct Answer: B

Explanation: They secrete enzymes to break down organic matter externally and then absorb the nutrients. — this correctly answers the question.

23. In a basidiomycete life cycle, where are basidiospores produced?

(A) In the ascocarp
(B) In the sporangium
(C) In the gills of the mushroom
(D) In the mycelium

Correct Answer: C

Explanation: In the gills of the mushroom — this correctly answers the question.

24. What type of symbiotic relationship is a lichen?

(A) Parasitic
(B) Commensal
(C) Predatory
(D) Mutualistic

Correct Answer: D

Explanation: Lichens are an association between a fungus and a cyanobacterium or green alga. Traditionally, they were thought to have mutualistic relationships.

25. Why are some protozoans considered "polyphyletic"?

(A) They have many different origins and do not share a common ancestor.
(B) They share a single common ancestor.
(C) They are all parasites.
(D) They are all autotrophic.

Correct Answer: A

Explanation: Protozoa are a polyphyletic group, meaning they have many different origins and do not share a common evolutionary ancestor.

B. Less Important / Secondary Topics

26. Which of the following is a key feature of the phylum Oomycota?

(A) They have cell walls made of cellulose and are commonly called water molds.
(B) They have cell walls made of chitin.
(C) They are all parasitic.
(D) They lack a cell wall.

Correct Answer: A

Explanation: Oomycetes include water molds, white rusts, and downy mildews. The cell wall in oomycetes contains cellulose, unlike fungi which have chitin.

27. In what form do slime molds (Myxomycota) typically exist?

(A) As a multicellular fruiting body
(B) As a diploid multinucleated cytoplasmic mass called a plasmodium
(C) As a single-celled flagellated organism
(D) As a spore

Correct Answer: B

Explanation: Slime molds, specifically plasmodial slime molds, typically exist as plasmodium, a diploid multinucleated cytoplasmic mass wrapped in slime sheath.

28. What is the main function of rhizoids in bryophytes?

(A) Photosynthesis
(B) Reproduction
(C) Anchoring the plant to the substrate
(D) Transport of water

Correct Answer: C

Explanation: Bryophytes have rhizoids instead of roots, which anchor the plant to the substrate.

29. Why are fungi not classified as plants?

(A) They have a cell wall.
(B) They are non-motile.
(C) They produce spores.
(D) They lack chlorophyll and are heterotrophic.

Correct Answer: D

Explanation: They lack chlorophyll and are heterotrophic. — this correctly answers the question.

30. Which type of fungi is *Rhizopus nigricans* (black bread mold)?

(A) Zygomycota
(B) Ascomycota
(C) Basidiomycota
(D) Deuteromycota

Correct Answer: A

*Explanation: *Rhizopus nigricans* is a zygomycete, known as black bread mold.*

31. Which structure in a fungus produces spores by meiosis?

(A) Sporangium
(B) All of the above
(C) Ascus
(D) Basidium

Correct Answer: B

Explanation: Sporangia, asci, and basidia are all reproductive structures that produce spores by meiosis.

32. Which of the following is a function of mycorrhizae?

(A) Causing plant diseases
(B) Producing antibiotics
(C) Enhancing nutrient uptake, especially phosphorus, in plants
(D) Breaking down pollutants

Correct Answer: C

Explanation: Mycorrhizal fungi form mutually beneficial partnerships with plants, helping them absorb nutrients like phosphorus.

33. What is the primary role of the enzyme reverse transcriptase in HIV?

(A) It synthesizes viral proteins.
(B) It degrades the viral genome.
(C) It helps in viral assembly.
(D) It converts viral RNA into DNA.

Correct Answer: D

Explanation: It converts viral RNA into DNA. — this correctly answers the question.

34. Which of the following is a sexually transmitted viral disease?

(A) Hepatitis B
(B) Hepatitis A
(C) Polio
(D) Common cold

Correct Answer: A

Explanation: Hepatitis B is transmitted through blood, sexual contact, and prenatally from mother to newborn.

35. What is the main difference between viroids and prions?

(A) Viroids contain DNA and no protein coat; prions contain RNA.
(B) Viroids contain RNA and no protein coat; prions contain protein and no nucleic acid.
(C) Viroids cause animal diseases; prions cause plant diseases.
(D) Viroids are larger than viruses; prions are smaller.

Correct Answer: B

Explanation: Viroids consist of a short, circular, single-stranded RNA without a protein coat. Prions are infectious protein particles containing no nucleic acids.

36. What would be the consequence of a mutation in a flowering plant that prevents the formation of the Casparian strip in the root endodermis?

(A) The plant would be unable to absorb water.
(B) The plant would be unable to perform photosynthesis.
(C) The plant would be unable to regulate the entry of water and dissolved substances into the vascular cylinder.
(D) The plant would be unable to reproduce.

Correct Answer: C

Explanation: The Casparian strip is a waxy layer in the endodermis that forces water and dissolved substances to pass through cell membranes, regulating their entry into the vascular cylinder.

37. A researcher finds a new organism that is unicellular, has a nucleus, and is photosynthetic. It is not a plant. Which group does it belong to?

(A) Fungi
(B) Protozoa
(C) Bacteria
(D) Algae

Correct Answer: D

Explanation: Algae are plant-like protists that are photosynthetic, can be unicellular or multicellular, and have a nucleus.

38. Which of the following is a key difference between the lytic and lysogenic cycles of a bacteriophage?

(A) In the lysogenic cycle, the viral DNA integrates into the host chromosome and is passed to daughter cells.
(B) In the lysogenic cycle, the host cell is immediately lysed.
(C) In the lytic cycle, the host cell survives and reproduces with the viral DNA.
(D) In the lytic cycle, the viral DNA becomes a prophage.

Correct Answer: A

Explanation: In the lysogenic cycle, the phage DNA integrates into the host chromosome as a prophage and is replicated along with the host chromosome.

39. A patient is diagnosed with a fungal infection of the lungs. Which of the following fungi is the most likely causative agent?

(A) *Penicillium*
(B) *Aspergillus fumigatus*
(C) *Saccharomyces cerevisiae*
(D) *Rhizopus nigricans*

Correct Answer: B

*Explanation: *Aspergillus fumigatus* is a respiratory fungal pathogen that causes aspergillosis.*

40. Why are fungi considered to have a closer evolutionary relationship to animals than to plants?

(A) Fungi have a cell wall, while animals do not.
(B) Fungi are motile, while plants are not.
(C) Fungi are heterotrophic and store glycogen, while plants are autotrophic and store starch.
(D) Fungi are photosynthetic, while animals are not.

Correct Answer: C

Explanation: Fungi are heterotrophic and store glycogen, while plants are autotrophic and store starch. — this correctly answers the question.

41. Which of the following is a unique feature of the sexual reproduction of Ascomycota?

(A) Production of basidiospores
(B) Production of zygospores
(C) Production of motile spores
(D) Production of ascospores inside an ascus

Correct Answer: D

Explanation: Ascomycota produce ascospores within sac-like cells called asci. Typically, eight haploid ascospores are formed within each ascus.

42. Which of the following correctly describes the role of the Calvin cycle in photosynthesis?

(A) It fixes carbon dioxide into organic molecules.
(B) It generates ATP and NADPH.
(C) It splits water into hydrogen and oxygen.
(D) It produces oxygen directly.

Correct Answer: A

Explanation: The Calvin cycle (light-independent reaction) fixes carbon dioxide into organic molecules, producing G3P, which is used to make glucose.

43. Which of the following is a major difference between the cell walls of fungi and plants?

(A) Fungi have cellulose; plants have chitin.
(B) Fungi have chitin; plants have cellulose.
(C) Both have the same composition.
(D) Fungi have no cell wall.

Correct Answer: B

Explanation: Fungi have chitin; plants have cellulose. — this correctly answers the question.

44. What would be the most likely effect of a drug that inhibits the formation of the mitotic spindle in a eukaryotic cell?

(A) The cell would be unable to replicate its DNA.
(B) The cell would be unable to synthesize proteins.
(C) The cell would be unable to separate its chromosomes during cell division.
(D) The cell would be unable to produce ATP.

Correct Answer: C

Explanation: The mitotic spindle is essential for chromosome separation during mitosis. Inhibiting its formation would prevent chromosome segregation.

45. Which of the following statements about HIV is correct?

(A) HIV is a DNA virus that infects red blood cells.
(B) HIV is a bacterium that causes AIDS.
(C) HIV is a viroid that infects liver cells.
(D) HIV is a retrovirus that infects helper T cells.

Correct Answer: D

Explanation: HIV is a retrovirus that attacks the immune system, specifically the CD4 cells (helper T cells).

46. A cell is placed in a solution that is hypertonic to the cell's cytoplasm. What will happen to the cell?

(A) It will shrink due to water loss.
(B) It will swell and burst.
(C) It will remain unchanged.
(D) It will actively pump in water.

Correct Answer: A

Explanation: In a hypertonic solution, the concentration of solutes outside the cell is higher than inside, causing water to move out of the cell by osmosis, leading to shrinkage.

47. Which of the following is a characteristic feature of the phylum Basidiomycota?

(A) Production of ascospores
(B) Production of basidiospores on a club-shaped basidium
(C) Absence of a sexual stage
(D) Presence of non-septate hyphae

Correct Answer: B

Explanation: Basidiomycota are named for their unique spore-forming structures called basidia. Each basidium typically generates four basidiospores on its tip.

48. Which of the following organisms is an example of a ciliate?

(A) Amoeba
(B) Trypanosoma
(C) Paramecium
(D) Plasmodium

Correct Answer: C

Explanation: Paramecium is a ciliate, named after the tiny hair-like structures called cilia that cover its cell.

49. What is the primary role of the enzyme lysozyme in bacteriophage infection?

(A) It synthesizes viral DNA.
(B) It degrades the viral genome.
(C) It helps in the assembly of new phages.
(D) It digests a portion of the bacterial cell wall to allow core tube penetration.

Correct Answer: D

Explanation: Lysozyme is released upon contraction of the tail and digests the host cell wall so that the core tube can penetrate into the host cell.

50. Which of the following is a key difference between prokaryotic and eukaryotic cells?

(A) Eukaryotic cells have membrane-bound organelles; prokaryotic cells do not.
(B) Prokaryotic cells have a nucleus; eukaryotic cells do not.
(C) Prokaryotic cells are always multicellular; eukaryotic cells are always unicellular.
(D) Prokaryotic cells have 80S ribosomes; eukaryotic cells have 70S ribosomes.

Correct Answer: A

Explanation: Eukaryotic cells have membrane-bound organelles; prokaryotic cells do not. — this correctly answers the question.

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Biology Grade 11 — Chapter 8

Kingdom Plantae

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Independent practice MCQs from the supplied Class 11 Biology notes pack. Total: 50 questions.

A. Important / Main Topics

1. Plants are believed to have evolved from which group of organisms?

(A) Green algae
(B) Red algae
(C) Brown algae
(D) Fungi

Correct Answer: A

Explanation: Plants are believed to have evolved from green algae, sharing characteristics like a cellulose cell wall, chlorophyll a and b, and starch storage.

2. Which of the following is a non-vascular plant?

(A) Fern
(B) Moss
(C) Pine
(D) Rose

Correct Answer: B

Explanation: Bryophytes, such as mosses, are non-vascular plants. They lack true roots, stems, and leaves.

3. Which plant group is commonly known as "naked seed" plants?

(A) Angiosperms
(B) Pteridophytes
(C) Gymnosperms
(D) Bryophytes

Correct Answer: C

Explanation: Gymnosperms are called "naked seed" plants because their seeds are not enclosed within an ovary or fruit.

4. What are the true roots, stems, and leaves of a fern collectively called?

(A) Thallus
(B) Rhizoids
(C) Gametophyte
(D) Fronds

Correct Answer: D

Explanation: Fern leaves are called fronds. Pteridophytes are the first true land plants with well-developed vascular tissues, true roots, stems, and leaves.

5. Which of the following is a primary function of the root?

(A) Anchorage and absorption of water
(B) Photosynthesis
(C) Transport of sugars
(D) Reproduction

Correct Answer: A

Explanation: The root is the underground part of the plant that anchors the plant and absorbs water and minerals from the soil.

6. Which plant tissue is responsible for the transport of water and minerals?

(A) Phloem

(B) Xylem
(C) Parenchyma
(D) Collenchyma

Correct Answer: B

Explanation: Xylem is the vascular tissue that transports water and minerals from roots to leaves.

7. What is the main function of the leaf?

(A) Absorption of water
(B) Support of the plant
(C) Photosynthesis
(D) Storage of food

Correct Answer: C

Explanation: The leaf is the flattened, green, lateral appendage of the stem that is the primary site of photosynthesis.

8. Which plant hormone promotes cell elongation?

(A) Abscisic acid
(B) Cytokinin
(C) Ethylene
(D) Auxin

Correct Answer: D

Explanation: Auxins are plant hormones that promote cell elongation and are involved in various growth processes.

9. What is a directional growth response of a plant towards or away from a stimulus called?

(A) Tropism
(B) Nastic movement
(C) Photoperiodism
(D) Vernalization

Correct Answer: A

Explanation: A tropism is a directional growth response of a plant towards or away from a stimulus.

10. Which type of tropism is a response to light?

(A) Gravitropism
(B) Phototropism
(C) Thigmotropism
(D) Hydrotropism

Correct Answer: B

Explanation: Phototropism is the growth response of a plant towards or away from light.

11. Which plant hormone promotes seed dormancy and stomatal closure?

(A) Auxin
(B) Gibberellin
(C) Abscisic acid
(D) Cytokinin

Correct Answer: C

Explanation: Abscisic acid is a plant hormone that inhibits growth and promotes dormancy and stress responses, including stomatal closure.

12. What are plants called that flower when the day length is longer than a critical length?

(A) Short-day plants
(B) Day-neutral plants
(C) Biennial plants
(D) Long-day plants

Correct Answer: D

Explanation: Long-day plants flower when the day length is longer than a critical length (i.e., when the night length is shorter).

13. What is the primary role of the phloem in a plant?

(A) Transport of sugars and organic nutrients
(B) Transport of water and minerals
(C) Providing structural support
(D) Photosynthesis

Correct Answer: A

Explanation: Phloem is the vascular tissue that transports sugars and organic nutrients from leaves to other parts of the plant.

14. In which part of the flower is pollen produced?

(A) Stigma
(B) Anther
(C) Ovary
(D) Style

Correct Answer: B

Explanation: Pollen grains are produced in the anther, which is part of the stamen (male reproductive organ).

15. What is the transfer of pollen from the anther to the stigma called?

(A) Fertilization
(B) Germination
(C) Pollination
(D) Reproduction

Correct Answer: C

Explanation: Pollination is the transfer of pollen grains from the anther (male part) to the stigma (female part) of a flower.

16. Which group of plants is considered the first to have well-developed vascular tissues?

(A) Bryophytes
(B) Gymnosperms
(C) Angiosperms
(D) Pteridophytes

Correct Answer: D

Explanation: Pteridophytes are the first true land plants with well-developed vascular tissues (xylem and phloem), true roots, stems, and leaves.

17. In bryophytes, the dominant stage in the life cycle is the:

(A) Gametophyte
(B) Sporophyte
(C) Zygote
(D) Seed

Correct Answer: A

Explanation: In bryophytes, the gametophyte is the dominant stage, while the sporophyte is dependent on it.

18. Why is the gametophyte of a fern independent, unlike that of a bryophyte?

(A) It has vascular tissue.
(B) It is photosynthetic and can live independently.
(C) It is larger than the sporophyte.
(D) It is a parasite on the sporophyte.

Correct Answer: B

Explanation: In pteridophytes, the gametophyte (prothallus) is small but independent and photosynthetic.

19. Which characteristic of gymnosperms distinguishes them from angiosperms?

(A) Gymnosperms have enclosed seeds.

(B) Gymnosperms have flowers.
(C) Gymnosperms have naked seeds not enclosed in a fruit.
(D) Gymnosperms are non-vascular.

Correct Answer: C

Explanation: Gymnosperms are "naked seed" plants; their seeds are not enclosed in an ovary or fruit, unlike angiosperms.

20. The plant hormone responsible for promoting cell division and delaying senescence is:

(A) Auxin
(B) Gibberellin
(C) Ethylene
(D) Cytokinin

Correct Answer: D

Explanation: The plant hormone responsible for promoting cell division and delaying senescence is Cytokinin.

21. A plant that flowers only when the night length is shorter than a critical length is a:

(A) Long-day plant
(B) Short-day plant
(C) Day-neutral plant
(D) None of the above

Correct Answer: A

Explanation: Long-day plants flower when the day length is longer than a critical length, which corresponds to a shorter night length.

22. Which of the following is an example of a short-day plant?

(A) Spinach
(B) Chrysanthemum
(C) Radish
(D) Wheat

Correct Answer: B

Explanation: Chrysanthemum is a short-day plant, flowering when days are short and nights are long.

23. What is the primary function of root hairs?

(A) Anchoring the plant
(B) Storing food
(C) Increasing surface area for absorption
(D) Photosynthesis

Correct Answer: C

Explanation: Root hairs greatly increase the surface area of the root for absorption of water and minerals.

24. Which tissue in a leaf is responsible for gas exchange?

(A) Xylem
(B) Phloem
(C) Mesophyll
(D) Stomata

Correct Answer: D

Explanation: Stomata are small openings on the leaf surface that allow gas exchange (CO_2 and O_2) and transpiration.

25. What type of reproduction involves the fusion of gametes?

(A) Sexual reproduction
(B) Asexual reproduction
(C) Vegetative propagation
(D) Fragmentation

Correct Answer: A

Explanation: Sexual reproduction — this correctly answers the question.

B. Less Important / Secondary Topics

26. What is the name of the process by which a seed begins to grow into a new plant?

(A) Germination
(B) Pollination
(C) Fertilization
(D) Dispersal

Correct Answer: A

Explanation: Germination is the process by which a seed begins to grow into a new plant.

27. Which part of the seed stores food for the developing embryo?

(A) Seed coat
(B) Cotyledon
(C) Radicle
(D) Plumule

Correct Answer: B

Explanation: The cotyledon (seed leaf) stores food for the developing embryo in many seeds.

28. A root that grows towards water is exhibiting:

(A) Phototropism
(B) Thigmotropism
(C) Hydrotropism
(D) Gravitropism

Correct Answer: C

Explanation: Hydrotropism is the growth response of a plant towards water.

29. Which plant hormone is a gas that promotes fruit ripening?

(A) Auxin
(B) Gibberellin
(C) Cytokinin
(D) Ethylene

Correct Answer: D

Explanation: Ethylene is a gaseous plant hormone that promotes fruit ripening, senescence, and abscission.

30. What is the primary role of the xylem?

(A) Transport of water and minerals
(B) Transport of sugars
(C) Support of the plant
(D) Photosynthesis

Correct Answer: A

Explanation: Xylem transports water and minerals from roots to leaves.

31. Which of the following is a monocot characteristic?

(A) Two cotyledons
(B) Parallel leaf veins
(C) Netted leaf veins
(D) Taproot system

Correct Answer: B

Explanation: Parallel leaf veins — this correctly answers the question.

32. Which type of plant has a taproot system?

(A) Monocot
(B) Fern
(C) Dicot

(D) Moss

Correct Answer: C

Explanation: Dicots typically have a taproot system, along with two cotyledons and netted leaf veins.

33. What is the function of the ovary in a flower?

(A) Produce pollen
(B) Receive pollen
(C) Attract pollinators
(D) Protect the developing seeds and develop into a fruit

Correct Answer: D

Explanation: After fertilization, the ovary develops into a fruit, which protects the seeds and aids in dispersal.

34. Which of the following is an example of a gymnosperm?

(A) Pine
(B) Rose
(C) Fern
(D) Moss

Correct Answer: A

Explanation: Pine is a conifer, which is a gymnosperm. Gymnosperms have naked seeds produced in cones.

35. In which structure does fertilization occur in angiosperms?

(A) Stigma
(B) Ovule
(C) Style
(D) Anther

Correct Answer: B

Explanation: In angiosperms, fertilization occurs in the ovule, where the male gamete fuses with the egg.

36. Which of the following is a key difference between bryophytes and pteridophytes?

(A) Bryophytes have vascular tissue; pteridophytes do not.
(B) Bryophytes have seeds; pteridophytes do not.
(C) Pteridophytes have true roots, stems, and leaves; bryophytes do not.
(D) Pteridophytes are non-vascular; bryophytes are vascular.

Correct Answer: C

Explanation: Bryophytes lack true roots, stems, and leaves and have no vascular tissue. Pteridophytes are the first true vascular plants with true roots, stems, and leaves.

37. Which of the following best explains why seed plants are better adapted to land than seedless plants?

(A) They have flagellated sperm that require water for fertilization.
(B) They lack vascular tissue.
(C) They are smaller in size.
(D) They have seeds that protect the embryo and allow dispersal without water.

Correct Answer: D

Explanation: Seeds protect the embryo from desiccation and allow dispersal without dependence on water, making seed plants better adapted to land.

38. A plant is exposed to light from one direction. The stem bends towards the light. Which of the following best explains this?

(A) Auxin accumulates on the shaded side, causing cells to elongate more on the shaded side.
(B) Auxin accumulates on the lit side, causing cells to elongate more on the lit side.
(C) Gibberellin accumulates on the shaded side.
(D) The stem grows towards light due to photoperiodism.

Correct Answer: A

Explanation: In phototropism, auxin accumulates on the shaded side of the stem, promoting cell elongation on that side and causing the stem to bend towards the light.

39. Why is the Calvin cycle also called the C3 pathway?

(A) It requires 3 ATP molecules.
(B) It produces a 3-carbon compound (3-PGA) as its first stable product.
(C) It occurs in C3 plants only.
(D) It produces 3 molecules of G3P.

Correct Answer: B

Explanation: The Calvin cycle is also called the C3 pathway because the first s.

40. In a flowering plant, a mutation prevents the formation of the endosperm. What would be the most likely consequence?

(A) The seed would not develop a seed coat.
(B) The flower would not produce pollen.
(C) The developing embryo would lack a food supply.
(D) The plant would be unable to photosynthesize.

Correct Answer: C

Explanation: The developing embryo would lack a food supply. — this correctly answers the question.

41. Which of the following statements about the alternation of generations is correct?

(A) The sporophyte produces gametes by mitosis.
(B) The gametophyte produces spores by meiosis.
(C) Both sporophyte and gametophyte are diploid.
(D) The sporophyte produces spores by meiosis, and the gametophyte produces gametes by mitosis.

Correct Answer: D

Explanation: The sporophyte produces spores by meiosis, and the gametophyte produces gametes by mitosis. — this correctly answers the question.

42. If a long-day plant is exposed to a shorter photoperiod (shorter day, longer night), what will happen?

(A) It will not flower or flowering will be delayed.
(B) It will flower earlier.
(C) It will flower continuously.
(D) It will switch to being a short-day plant.

Correct Answer: A

Explanation: It will not flower or flowering will be delayed. — this correctly answers the question.

43. Which of the following is a primary difference between the root and the stem?

(A) Roots are photosynthetic; stems are not.
(B) Roots are typically underground and absorb water; stems are typically aerial and support leaves.
(C) Roots have nodes and internodes; stems do not.
(D) Roots have chlorophyll; stems do not.

Correct Answer: B

Explanation: The root is the underground part that anchors the plant and absorbs water and minerals. The stem is the aerial part that supports leaves, flowers, and fruits, and conducts water and nutrients.

44. What would happen if the xylem in a plant were blocked?

(A) The plant would be unable to transport sugars.
(B) The plant would be unable to photosynthesize.
(C) The plant would be unable to transport water and minerals from roots to leaves.
(D) The plant would be unable to reproduce.

Correct Answer: C

Explanation: Xylem is responsible for transporting water and minerals from roots to leaves. Blockage would prevent this transport.

45. Which of the following is an example of vegetative propagation?

(A) A seed growing into a new plant
(B) Pollen fertilizing an ovule
(C) A spore growing into a new plant
(D) A potato tuber sprouting into a new plant

Correct Answer: D

Explanation: Vegetative propagation is a type of asexual reproduction where new plants grow from vegetative parts like tubers. A potato tuber is a modified stem that can sprout into a new plant.

46. A plant is observed to have netted leaf veins, two cotyledons, and a taproot system. What type of plant is it?

(A) Dicot
(B) Monocot
(C) Gymnosperm
(D) Bryophyte

Correct Answer: A

Explanation: Dicots are characterized by two cotyledons, netted leaf veins, and a taproot system.

47. What is the main advantage of sexual reproduction over asexual reproduction in plants?

(A) It is faster.
(B) It produces genetically diverse offspring, which may be better adapted to changing environments.
(C) It requires less energy.
(D) It produces identical clones.

Correct Answer: B

Explanation: Sexual reproduction produces genetically diverse offspring due to the fusion of gametes and genetic recombination. This diversity can provide a survival advantage in changing environments.

48. During double fertilization in angiosperms, what does the second sperm cell fuse with?

(A) The egg cell
(B) The synergids
(C) The polar nuclei to form endosperm
(D) The antipodal cells

Correct Answer: C

Explanation: In double fertilization, one sperm fuses with the egg to form the zygote, and the other fuses with two polar nuclei to form the triploid endosperm, which provides nutrition to the embryo.

49. Why is the leaf considered the primary site of photosynthesis?

(A) It is the largest part of the plant.
(B) It has a waxy cuticle.
(C) It is green.
(D) It contains chloroplasts and stomata for gas exchange.

Correct Answer: D

Explanation: The leaf is the primary site of photosynthesis because it contains chloroplasts (which contain chlorophyll for capturing light) and stomata (for gas exchange).

50. A plant's roots are found to be growing upwards instead of downwards. This is likely due to a disruption in:

(A) Gravitropism
(B) Phototropism
(C) Thigmotropism
(D) Hydrotropism

Correct Answer: A

Explanation: Gravitropism (geotropism) is the growth response to gravity. Roots typically show positive gravitropism (growing downwards). Disruption would cause roots to lose this directional growth.