AMC/AFNS/NUMS Biology-1 Test Preparation

Cell Biology & Biomolecules

1. Which organelle is called the "suicidal bag" of the cell?
A. Ribosome
B. Lysosome
C. Golgi body
D. Mitochondria
Correct Answer: B. Lysosome
Explanation: Lysosomes are called suicidal bags because they contain powerful hydrolytic enzymes that can digest proteins, lipids, carbohydrates, and worn-out cell organelles. If the lysosomal membrane ruptures, these enzymes may digest the cell's own components, leading to autolysis. This is why lysosomes are very important in intracellular digestion and removal of damaged organelles.

2. The fluid mosaic model of plasma membrane was proposed by:
A. Watson and Crick
B. Schleiden and Schwann
C. Singer and Nicolson
D. Robert Brown
Correct Answer: C. Singer and Nicolson
Explanation: Singer and Nicolson proposed the fluid mosaic model in 1972. According to this model, the plasma membrane is made of a phospholipid bilayer in which proteins are embedded like a mosaic. The term "fluid" means phospholipids and some proteins can move laterally, while "mosaic" refers to the irregular arrangement of proteins.

3. The main chemical component of ribosomes is:
A. DNA and protein
B. RNA and protein
C. Lipid and protein
D. Carbohydrate and lipid
Correct Answer: B. RNA and protein
Explanation: Ribosomes are composed of ribosomal RNA, called rRNA, and proteins. They are responsible for protein synthesis. In prokaryotes, ribosomes are 70S, while in eukaryotes, cytoplasmic ribosomes are 80S. Ribosomes may be free in cytoplasm or attached to rough endoplasmic reticulum.

4. Which cell organelle is absent in mature mammalian red blood cells?
A. Plasma membrane
B. Cytoplasm
C. Nucleus

D. Hemoglobin
Correct Answer: C. Nucleus
Explanation: Mature mammalian red blood cells lose their nucleus during development. This provides more space for hemoglobin, which increases oxygen-carrying capacity. However, because they lack a nucleus, mature RBCs cannot divide or synthesize new proteins efficiently.

5. Which structure controls the movement of substances into and out of the cell?
A. Cell wall
B. Plasma membrane
C. Nucleus
D. Ribosome
Correct Answer: B. Plasma membrane
Explanation: The plasma membrane is selectively permeable, meaning it allows only specific substances to enter or leave the cell. It controls transport through diffusion, osmosis, facilitated diffusion, active transport, and endocytosis/exocytosis. This helps maintain homeostasis inside the cell.

6. Which organelle is directly involved in packaging and secretion of proteins?
A. Golgi apparatus
B. Mitochondria
C. Ribosome
D. Nucleolus
Correct Answer: A. Golgi apparatus
Explanation: The Golgi apparatus modifies, sorts, and packages proteins received from the rough endoplasmic reticulum. These proteins are packed into vesicles and transported either to different parts of the cell or secreted outside the cell. It is highly active in glandular and secretory cells.

7. Cristae are found in:
A. Chloroplast
B. Mitochondria
C. Golgi body
D. Nucleus
Correct Answer: B. Mitochondria
Explanation: Cristae are inward folds of the inner mitochondrial membrane. They increase the surface area for enzymes and electron transport chain proteins involved in aerobic respiration. More cristae mean greater capacity for ATP production.

8. The nucleolus is mainly responsible for:
A. DNA replication
B. Ribosome formation
C. ATP production
D. Lipid synthesis

Correct Answer: B. Ribosome formation
Explanation: The nucleolus is a dense region inside the nucleus where rRNA is synthesized and ribosomal subunits are assembled. These ribosomal subunits later move out through nuclear pores into the cytoplasm, where they help in protein synthesis.

9. Which cell organelle is bounded by a double membrane?
A. Ribosome
B. Lysosome
C. Mitochondria
D. Golgi vesicle
Correct Answer: C. Mitochondria
Explanation: Mitochondria are surrounded by two membranes: an outer membrane and an inner membrane. The inner membrane forms cristae and surrounds the matrix. This double membrane structure helps mitochondria perform aerobic respiration efficiently.

10. Prokaryotic cells differ from eukaryotic cells because prokaryotes lack:
A. Ribosomes
B. Cell membrane
C. True nucleus
D. Cytoplasm
Correct Answer: C. True nucleus
Explanation: Prokaryotic cells do not have a membrane-bound nucleus. Their DNA is present in a nucleoid region. However, they do have ribosomes, cytoplasm, plasma membrane, and genetic material. Bacteria are common examples of prokaryotes.

11. Which biomolecule is the main source of quick energy?
A. Lipid
B. Protein
C. Carbohydrate
D. Nucleic acid
Correct Answer: C. Carbohydrate
Explanation: Carbohydrates are the body's immediate source of energy. Glucose is rapidly broken down during cellular respiration to produce ATP. Although lipids provide more energy per gram, carbohydrates are used first because they are easier and quicker to metabolize.

12. The general formula of carbohydrates is:
A. CnH2nOn
B. CnH2n
C. CnH2nO2
D. CnH2n+2
Correct Answer: A. CnH2nOn
Explanation: Many carbohydrates follow the general formula CnH2nOn, showing a 1:2:1 ratio

of carbon, hydrogen, and oxygen. For example, glucose has the formula C6H12O6. However, not all carbohydrates strictly follow this formula.

13. Which bond joins amino acids together?
A. Glycosidic bond
B. Peptide bond
C. Ester bond
D. Hydrogen bond
Correct Answer: B. Peptide bond
Explanation: A peptide bond forms between the amino group of one amino acid and the carboxyl group of another amino acid through a condensation reaction. A water molecule is removed during this process. Multiple amino acids joined by peptide bonds form a polypeptide chain.

14. Which level of protein structure is stabilized mainly by hydrogen bonds between peptide chains?
A. Primary structure
B. Secondary structure
C. Tertiary structure
D. Quaternary structure
Correct Answer: B. Secondary structure
Explanation: Secondary protein structure includes alpha helix and beta pleated sheet. These structures are stabilized mainly by hydrogen bonds between the backbone atoms of the polypeptide chain. Primary structure is determined by amino acid sequence, while tertiary structure depends on overall folding.

15. Enzymes are mostly:
A. Carbohydrates
B. Lipids
C. Proteins
D. Nucleic acids
Correct Answer: C. Proteins
Explanation: Most enzymes are globular proteins that act as biological catalysts. They speed up biochemical reactions by lowering activation energy. Some RNA molecules, called ribozymes, can also act as enzymes, but most enzymes in living organisms are proteins.

16. Enzymes increase the rate of reaction by:
A. Increasing activation energy
B. Lowering activation energy
C. Changing the final product
D. Being consumed in reaction
Correct Answer: B. Lowering activation energy
Explanation: Enzymes provide an alternative pathway for a reaction with lower activation

energy. This allows more reactant molecules to convert into products in a shorter time. Enzymes do not change the final product and are not consumed during the reaction.

17. Which factor denatures enzymes at high temperature?
A. Breakdown of peptide bonds only
B. Change in active site shape
C. Increase in substrate concentration
D. Formation of more products
Correct Answer: B. Change in active site shape
Explanation: High temperature breaks weak bonds such as hydrogen bonds and ionic bonds that maintain enzyme shape. As a result, the active site changes its shape and the substrate can no longer bind properly. This loss of functional shape is called denaturation.

18. The lock and key model explains:
A. DNA replication
B. Enzyme specificity
C. Osmosis
D. Protein synthesis
Correct Answer: B. Enzyme specificity
Explanation: The lock and key model explains that an enzyme's active site has a fixed shape that matches only a specific substrate, just like a key fits into a particular lock. This explains why enzymes are highly specific in their action.

19. Which lipid is the major component of cell membrane?
A. Triglyceride
B. Phospholipid
C. Steroid
D. Wax
Correct Answer: B. Phospholipid
Explanation: The cell membrane is mainly composed of a phospholipid bilayer. Each phospholipid has a hydrophilic phosphate head and hydrophobic fatty acid tails. This arrangement helps the membrane act as a barrier between the cell and its environment.

20. Fats produce more energy than carbohydrates because they contain more:
A. Oxygen atoms
B. Nitrogen atoms
C. Carbon-hydrogen bonds
D. Phosphate groups
Correct Answer: C. Carbon-hydrogen bonds
Explanation: Fats contain more carbon-hydrogen bonds than carbohydrates. During oxidation, these bonds release a large amount of energy. That is why lipids produce about 9 kcal/g, while carbohydrates produce about 4 kcal/g.

21. DNA differs from RNA because DNA contains:
A. Ribose and uracil
B. Deoxyribose and thymine
C. Ribose and thymine
D. Deoxyribose and uracil
Correct Answer: B. Deoxyribose and thymine
Explanation: DNA contains deoxyribose sugar and thymine nitrogenous base. RNA contains ribose sugar and uracil instead of thymine. DNA is usually double-stranded, while RNA is mostly single-stranded.

22. The bond between complementary nitrogenous bases in DNA is:
A. Peptide bond
B. Glycosidic bond
C. Hydrogen bond
D. Ester bond
Correct Answer: C. Hydrogen bond
Explanation: Complementary bases in DNA are held together by hydrogen bonds. Adenine pairs with thymine through two hydrogen bonds, while guanine pairs with cytosine through three hydrogen bonds. These bonds help maintain the double helix structure.

23. Which base pair has three hydrogen bonds?
A. Adenine-Thymine
B. Adenine-Uracil
C. Guanine-Cytosine
D. Thymine-Uracil
Correct Answer: C. Guanine-Cytosine
Explanation: Guanine and cytosine are connected by three hydrogen bonds, making the G-C pair stronger than the A-T pair, which has only two hydrogen bonds. DNA with more G-C content has greater thermal stability.

24. ATP is called the energy currency of the cell because:
A. It stores genetic information
B. It stores and transfers usable energy
C. It forms cell wall
D. It digests proteins
Correct Answer: B. It stores and transfers usable energy
Explanation: ATP stores energy in its high-energy phosphate bonds. When the terminal phosphate bond breaks, ATP is converted into ADP and inorganic phosphate, releasing energy for cellular activities such as active transport, muscle contraction, and biosynthesis.

25. The monomer of nucleic acids is:
A. Amino acid
B. Nucleotide

C. Monosaccharide
D. Fatty acid
Correct Answer: B. Nucleotide
Explanation: Nucleic acids such as DNA and RNA are polymers made of nucleotides. Each nucleotide consists of three parts: a pentose sugar, a phosphate group, and a nitrogenous base. The sequence of nucleotides stores genetic information.

26. Which polysaccharide is the storage carbohydrate in animals?
A. Cellulose
B. Starch
C. Glycogen
D. Chitin
Correct Answer: C. Glycogen
Explanation: Glycogen is the main storage carbohydrate in animals. It is stored mainly in the liver and muscles. It is highly branched, so it can be quickly broken down into glucose when the body needs energy.

27. Cellulose is difficult for humans to digest because:
A. It contains peptide bonds
B. Humans lack cellulase enzyme
C. It is made of amino acids
D. It is a lipid
Correct Answer: B. Humans lack cellulase enzyme
Explanation: Cellulose is made of glucose units joined by beta-glycosidic bonds. Humans do not produce cellulase enzyme, so they cannot digest cellulose. However, cellulose is useful as dietary fiber and helps in bowel movement.

28. Which organelle is the site of lipid synthesis?
A. Smooth endoplasmic reticulum
B. Rough endoplasmic reticulum
C. Ribosome
D. Lysosome
Correct Answer: A. Smooth endoplasmic reticulum
Explanation: Smooth endoplasmic reticulum is responsible for lipid and steroid synthesis. It also helps in detoxification of harmful substances, especially in liver cells. Unlike rough ER, smooth ER does not have ribosomes attached to its surface.

29. Rough ER appears rough because of:
A. Lysosomes attached to it
B. Ribosomes attached to it
C. Mitochondria attached to it
D. DNA attached to it
Correct Answer: B. Ribosomes attached to it

Explanation: Rough endoplasmic reticulum appears rough under the microscope because ribosomes are attached to its surface. These ribosomes synthesize proteins that are secreted from the cell, inserted into membranes, or sent to lysosomes.

30. Which statement about water is most important for life?
A. Water is non-polar
B. Water has low specific heat
C. Water is a universal solvent due to polarity
D. Water cannot form hydrogen bonds
Correct Answer: C. Water is a universal solvent due to polarity
Explanation: Water is a polar molecule because oxygen is more electronegative than hydrogen. Due to this polarity, water can dissolve many ionic and polar substances. This makes it an excellent medium for biochemical reactions, transport of substances, and temperature regulation in living organisms.