AP Biology Practice Test 1

Multiple Choice

1. Which property of water allows lakes to remain liquid during cold winters?
A. Adhesion
B. High specific heat
C. Lower density of ice compared to liquid water
D. Polarity

2. Water is considered a polar molecule because
A. its electrons are shared equally
B. oxygen is more electronegative than hydrogen
C. hydrogen bonds repel nearby molecules
D. it forms ionic bonds

3. Hydrogen bonding between water molecules directly contributes to
A. covalent bonding
B. surface tension
C. ionic dissociation
D. nonpolarity

4. Which functional group is present in all amino acids and enables peptide bond formation?
A. Hydroxyl
B. Carboxyl
C. Phosphate
D. Methyl

5. What is the monomer of proteins?
A. Nucleotide
B. Fatty acid
C. Monosaccharide
D. Amino acid

6. Which macromolecule serves as long-term energy storage in animals?
A. Carbohydrate
B. Lipid
C. Protein
D. Nucleic acid

7. The hydrophobic region of a phospholipid consists of
A. glycerol
B. phosphate groups
C. fatty acid tails
D. carbohydrates

8. Which protein structure level is determined by interactions between R-groups?
A. Primary
B. Secondary
C. Tertiary
D. Quaternary

9. A protein loses its shape due to extreme pH. This process is called
A. dehydration synthesis
B. hydrolysis
C. denaturation
D. replication

10. Which pathway describes the movement of a protein destined for secretion?
A. Ribosome → Golgi → Rough ER → Plasma membrane
B. Rough ER → Ribosome → Golgi → Plasma membrane
C. Ribosome → Rough ER → Golgi → Plasma membrane
D. Nucleus → Ribosome → Plasma membrane

11. Which structure is found in both prokaryotic and eukaryotic cells?
A. Nucleus
B. Ribosome
C. Mitochondrion
D. Lysosome

12. The surface area-to-volume ratio limits cell size because
A. DNA cannot diffuse efficiently
B. nutrients cannot be stored
C. exchange with the environment becomes inefficient
D. membranes become unstable

13. Which cellular adaptation increases surface area for absorption?
A. Flagella
B. Cilia
C. Microvilli
D. Cell wall

14. Cholesterol's role in animal cell membranes is to
A. transport ions
B. form channels
C. maintain membrane fluidity
D. bind receptors

15. Facilitated diffusion differs from simple diffusion because it
A. requires ATP
B. moves against the gradient
C. uses membrane proteins
D. transports large molecules only

16. Which process would stop if ATP hydrolysis were inhibited?
A. Oxygen diffusion
B. Osmosis
C. Active transport
D. Facilitated diffusion

17. What establishes an electrochemical gradient across a membrane?
A. Passive diffusion
B. Ion pumps and selective permeability
C. Vesicle transport
D. Hydrogen bonding

18. Evidence supporting the endosymbiotic theory includes
A. linear DNA in mitochondria
B. similar ribosomes in bacteria and mitochondria
C. mitochondria lacking membranes
D. identical cell division

19. A drug prevents lysosome formation. Where would hydrolytic enzymes accumulate?
A. Smooth ER
B. Golgi apparatus
C. Ribosomes
D. Nucleus

20. Increasing extracellular solute concentration would cause a cell to
A. swell
B. lyse
C. shrink
D. divide

21. A plant cell placed in a hypotonic solution will
A. shrink
B. plasmolyze
C. gain water and become turgid
D. burst

22. Which solution is hypertonic to a cell?
A. Lower solute concentration than the cell
B. Equal solute concentration
C. Higher solute concentration than the cell
D. Pure water

23. The direction of osmosis depends on differences in
A. pressure potential only
B. solute potential only
C. water potential
D. ATP availability

24. If the water potential inside a cell is −0.8 MPa and outside is −1.2 MPa, water will
A. move into the cell
B. move out of the cell
C. not move
D. evaporate

25. Which statement about primary protein structure is NOT true?
A. It is unique to each protein
B. It is held together by peptide bonds
C. It determines function
D. It may be branched

26. Dehydration synthesis between two glucose molecules produces
A. one water molecule
B. two water molecules
C. ATP
D. CO_2

27. A polymer made of 5 glucose molecules would contain how many oxygen atoms?
A. 30
B. 29
C. 24
D. 25

28. Which graph would show reduced protein and nucleic acid synthesis when nitrogen is limited?
A. All macromolecules decrease equally
B. Proteins and nucleic acids decrease most
C. Carbohydrates decrease most
D. Lipids decrease most

29. Which molecule below is a lipid?
A. Polypeptide chain
B. Steroid ring structure
C. Phosphodiester backbone
D. Amino acid

30. Which macromolecule contains nitrogen?
A. Carbohydrates only
B. Lipids only
C. Proteins and nucleic acids
D. Lipids and carbohydrates

31. Which structure directly increases membrane permeability at high temperatures?
A. Cell wall
B. Cholesterol
C. Glycoproteins
D. Cytoskeleton

32. Two spherical cells have radii of 2 μm and 4 μm. Which is correct?
A. Larger cell has higher SA:V
B. Smaller cell has higher SA:V
C. Both have equal SA:V
D. Depends on shape

33. Increasing extracellular hydrogen ions would most directly affect
A. facilitated diffusion
B. proton pumps
C. simple diffusion
D. osmosis

34. A membrane in a non-aqueous environment would most likely have
A. hydrophobic heads outward
B. hydrophilic heads outward
C. no bilayer
D. protein-only structure

35. Tissue is isotonic in a 0.6 M solution. What is its molarity?
A. 0.3 M
B. 0.6 M
C. 1.2 M
D. 0.9 M

36. If $\Psi = \Psi s + \Psi p$ and $\Psi s = -5$ bars and $\Psi p = +2$ bars, Ψ equals
A. −7 bars
B. −3 bars
C. +3 bars
D. +7 bars

37. Polar covalent bonds in water result from
A. equal electron sharing
B. ionic attraction
C. oxygen's higher electronegativity
D. hydrogen bonding

38. A membrane permeable to salt and water but not sucrose will allow
A. sucrose diffusion
B. salt diffusion only
C. water movement only
D. salt and water movement

39. Which pathway describes a membrane protein's synthesis and transport?
A. Nucleus → Ribosome → Golgi → Membrane
B. Ribosome → ER → Golgi → Membrane
C. Ribosome → Lysosome → Membrane
D. ER → Nucleus → Membrane

40. Reusing the same beet slices across temperature treatments is flawed because
A. temperature changes pigment color
B. permeability changes persist
C. beet cells lack membranes
D. water affects diffusion

41. Administering distilled water intravenously would cause cells to
A. shrink
B. lyse
C. remain unchanged
D. stop respiration

42. Peptide bonds form through
A. ionic bonding
B. hydrogen bonding
C. dehydration synthesis
D. hydrolysis

43. A carrot cube gains mass in 0.2 M sucrose but loses mass in 0.6 M. Its molarity is most likely
A. <0.2 M
B. between 0.2–0.6 M
C. >0.6 M
D. exactly 0.4 M

44. Reduced lysosome production lowers mitochondrial activity because
A. ATP synthesis stops
B. macromolecules aren't broken down
C. mitochondria lose DNA
D. enzymes can't be modified

45. Sodium transport out of the cell requires
A. diffusion
B. facilitated diffusion
C. osmosis
D. ATP hydrolysis

46. Bacteriophages inject which molecule into bacteria?
A. Protein
B. Lipid
C. DNA
D. Carbohydrate

47. If 30% of RNA nucleotides are adenine, thymine equals
A. 0%
B. 30%
C. 60%
D. 15%

48. Amino acids embedded in the membrane core are most likely
A. polar
B. charged
C. hydrophobic
D. ionic

49. A paramecium with nearly equal internal and external water potential will have
A. highest contraction rate
B. lowest contraction rate
C. constant swelling
D. cell lysis

50. Net movement of K^+ into animal cells occurs primarily through
A. diffusion
B. facilitated diffusion
C. osmosis
D. active transport