

Directions: Choose the BEST answer from among those given.

- 1) In establishing DNA as the genetic material, the first use of radioactive isotopes was by ?
 - a) Beadle & Tatum
 - b) Alfred Hershey & Martha Chase
 - c) Rosy Franklin
 - d) Fred Sanger
 - e) choose this answer if none of these is the best choice
- 2) The concept of trying to interpret the properties of a living organism by a detailed study of its constituent molecules and their individual properties is often referred to as a ?
 - a) vitalism
 - b) natural selection
 - c) reductionism
 - d) micrographia
 - e) choose this answer if none of these is the best choice
- 3) The Cell Theory is attributed to :
 - a) Gregor Mendel
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 - e) none of these is a best choice
- 4) All organism are believed to have descended from a common ancestral cell through the process of evolution via natural selection?
 - a) true
 - b) false
- 5) Cells are able to become more complex and ordered because they are not bound by the second law of thermodynamics, i.e., entropy?
 - a) true
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- 6) The human colon bacteria that has been so prolific as a model experimental cellular system and in providing information on the cell and its molecular biology ?
 - a) Arabidopsis thaliana
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- 7) The limits of resolution, ability to distinguish between two dots in a prepared specimen, of the transmission electron microscope is around ?
 - a) 2 meters
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- 8) Life and the living state is governed by a unique set of natural and physical laws, which govern the properties of the cell, separate from the rest of the natural world?
 - a) true
 - b) false
- 9) The single and probably most defining characteristic of cells and the living condition is the ability of cells to?
 - a) metabolize
 - b) replicate
 - c) communicate
 - d) grow
 - e) choose this answer if none of these is the best choice
- 10) One of the key events in the origin of life was the evolution of the ability of molecules to catalyze reactions, autocatalytically, that lead to the production of molecules like themselves. Which of the following molecules most likely evolved this property?
 - a) proteins
 - b) lipids
 - c) RNA
 - d) formaldehyde
 - e) choose this answer if none of these is the best choice

The 10 questions above cover test #1, the questions below cover subsequent tests. Answers below.

- 11) The functional group [-C=O] is a ? a) hydroxyl b) carboxyl c) carbonyl
d) mercaptan e) choose this answer if none of these is the best choice
- 12) The difference between a nucleoside and a nucleotide is the presence of which of the following functional groups in the nucleotide?
a) uracil b) b-D-2-deoxyribose c) phosphate
d) histidine e) choose this answer if none of these is the best choice
- 13) The peptide bond is shorter than a C=C , but longer than a C-C , allows no free rotation of groups attached to it and therefore results in R-groups alternating, in zig-zag fashion across the length of a polypeptide chain.
a) true b) false
- 14) Which of the following would have the greatest molecular weight, i.e., be the largest in size?
a) oligopeptide b) dipeptide c) polypeptide d) peptide bond
e) choose this answer if none of these is the best choice
- 15) The spatial arrangement of atoms in a molecule, in which the molecule can not be interconverted to other forms without breaking covalent bonds, is referred to as the molecule's ?
a) conformation b) configuration c) surface contour d) asymmetric isomers
e) choose this answer if none of these is the best choice
- 16) A weak electrochemical attraction between an electronegative atom such as nitrogen or oxygen and a hydrogen atom bound to another electronegative atom is a(n)?
a) hydrogen bond b) hydrophobic interaction c) covalent bond
d) van der Waal forces e) choose this answer if none of these is the best choice
- 17) A weak electrostatic attraction/repulsion, based upon the closeness of atoms to each other, which is important in macromolecular interactions of conformational shapes is a(n)?
a) ionic bond b) hydrogen bond c) dipole d) van der Waal forces
e) choose this answer if none of these is the best choice
- 18) The cleavage of a covalent bond with the accompanying addition of water (-H being added to one product of the cleavage and -OH being added to the other) is referred to as ?
a) condensation b) hydrolysis c) functional group transfer d) redox
e) choose this answer if none of these is the best choice
- 19) Anabolic reactions are the biosynthetic biochemical reactions or pathways in which larger molecules are made from smaller? a) true b) false
- 20) A-kinase (cyclic-AMP-dependent protein kinase) is an enzyme that phosphorylates target proteins in response to a rise in intracellular cyclic-AMP. This enzyme belongs to which of the following major class of enzymes?
a) 1.-oxidoreductases b) 2.-transferases c) 3.-hydrolases d) 4.-lyases
e) choose this answer if none of these is the best choice

- 21) The type of protein, often composed of multiple subunits, that exists in two or more conformations depending upon the binding of a specific ligand at a site other than the catalytic site is a(n) ?
 a) acyl-carrier protein b) redox protein c) allosteric protein d) denatured protein
 e) choose this answer if none of these is the best choice
- 22) A common structural motif of proteins in which a linear sequence of amino acids folds into a right handed elongated structure that twists in regular corkscrew fashion around a central axis, and is stabilized by internal hydrogen bonding between its backbone atoms is referred to as ?
 a) α barrel b) dimer c) beta sheet d) α -helix e) none of these is best
- 23) The free energy of a reaction is often best described as a numerical measure of how far a reaction is from equilibrium?
 a) true b) false
- 24) Entropy is a thermodynamic quantity that measures the degree of disorder of a system. The greater the entropy of a system the greater the degree of order or complexity exhibited by that system.
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- 25) The conversion of 2-phospho-glyceric acid to phospho-enol-pyruvate has a ΔG^0 of +0.4 Kcal/mol and the conversion of phospho-enol-pyruvate to pyruvate has a ΔG^0 of -7.4 Kcal/mol. The overall free energy change for the coupled reaction of 2 phospho-glyceric acid to pyruvate is ?
 a) -7.4 Kcal/mol b) -7.8 Kcal/mol c) +3.4 Kcal/mol d) -7.0 Kcal/mol
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- 26) The group of amino acids which contain only hydrocarbon R-groups and are thus possess hydrophobic properties is(are) ?
 a) acidic amino acids b) polar uncharged amino acids c) basic amino acids
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- 27) A small aliquot (0.1 ml sample) of a 25 ml homogenate of rat liver tissue is shown to contain 3.5 mg of protein by the Biuret test and to convert 7.0 μ moles of phospho-enol-pyruvate to pyruvate at 37°C. What is the specific activity of this enzyme?
 a) 875 units/mg protein b) 1750 μ moles c) 24.5 units/mg protein
 d) 2.0 units/mg protein e) choose this answer if none of these is the best choice
- 28) In the colorimetric tests for the presence and/or amount of protein, the Beer-Lambert Law indicates that there is a linear-proportional relationship between the amount of light absorbed (Absorbance) and the concentration of the protein.
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- 29) Which of the following curves of rate of an enzyme catalyzed reaction would you expect to exhibit a linear relationship. A plot of the rate vs. _____ ?
 a) [S] substrate concentration b) temperature c) [E] enzyme concentration
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 a) transport proteins b) structural proteins c) regulatory proteins
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 a) isoenzymes (isozymes) b) histones c) albumins
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- 34) The native conformation of most globular proteins is an interior pocket of hydrophilic amino acids held in place by their solubility with water and an exterior of hydrophobic, nonpolar amino acids held in place by their interactions with the hydrogen bonds of fatty acids?
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- 35) The separation of subcell organelles or proteins by layering of samples over a 5% to 20% sucrose gradient and subsequent sedimentation in a centrifuge is referred to as ?
 a) velocity sedimentation b) equilibrium density centrifugation c) gel filtration
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- 40) Substrate level phosphorylation takes place ?
 a) in the cytoplasm b) in glycolysis c) in Krebs cycle
 d) in matrix of mitochondria e) choose this answer if all of these is a best choice

- 41) Which of the following stages of intermediary metabolism, in the breakdown of the sandwich you had for lunch today, will generate the most ATP?
- a) glycolysis b) Krebs cycle c) electron transfer chain
d) pyruvate → AcCoA e) choose this answer if none of these is the best choice
- 42) In the oxidation of glucose, decarboxylation does NOT occur during which of the following stages?
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