A young girl is staring at the raindrops running down her window. She notices that the raindrops remain more or less intact, even as they cascade down the windowpane. This is a result of: - ANShydrogen bonds between water molecules

All organisms use what to carry out cellular work such as growth and movement - ANSATP

Amino acids with hydrophobic R groups are most often found buried in the interior of folded proteins. - ANStrue

Aminoacyl tRNA synthase (ARS) is involved in which step of translation? - ANStRNA charging

Aminoacyl tRNA synthetases:
Question options: - ANSattach amino acids to uncharged tRNAs.

An mRNA coding sequence is 30 nucleotides long. The first codon is 5'-AUG-3' and the last codon is 5'-UGA-3'. How many amino acids (AA) does it encode? - ANS9 AA

An RNA molecule is synthesized in which direction? - ANS5' end to 3' end

As part of their normal function, many proteins bind to DNA briefly and then release it again. Which types of bonds might be involved in these transient protein-DNA interactions? - ANSCovalent
Hydrogen

At physiological pH (i.e., pH 7), the ionized state of the carboxyl (COOH) in the R group of aspartic acid is: - ANSCOO-

At physiological pH, the ionized state of the amino (NH2) group in the R group of lysine is: - ANSNH3+

At some point in their life cycle, all cells have a ____, whereas not all cells have a(n) - ANSPlasma membrane; nuclear membrane

Based on these statements pick the most correct answer.
Statement 1 - All polypeptides a have tertiary structure. Statement 2 - All proteins have a quaternary structure. - ANSStatement 1 is true, but statement 2 is false

Because of hydrogen bonding, water is uniquely suited for its central role in life. Many hydrophilic molecules interact freely with water, but a number of hydrophobic molecules are important for life, too. How does the interaction between water and hydrophobic molecules help to organize biological systems? (Hint: look back at Class 2). - ANSBecause water molecules preferentially associate with each other, they force hydrophobic molecules to associate with each other and not with water molecules.

Which functional group contains only non-polar covalent bonds - ANSMethyl

Which functional group does RNA have that DNA does not? - ANSHydroxyl

Which functional group typically has a negative charge at the pH of the cell - ANSPhosphate

Which functional groups are found at the beginning and end of a protein? - ANSAmino group at the beginning, Carboxyl group at end.

Which group helps in stabilization of protein structure by forming covalent cross-links? - ANSSulfhydryl

Which of the following brings amino acids to the ribosome for use in translation? - ANStRNA

Which of the following CORRECTLY describes the complementary base pairing of adenine in both DNA and RNA? - ANSAdenine pairs with thymine in DNA and with uracil in RNA.

Which of the following double stranded DNA molecules would maintain its double helical structure longer as temperature increases? - ANSA DNA molecule that has more guanine and cytosine nucleotides.

Which of the following is not a key feature of individual cells? - ANSThe presence of a nucleus

Which of the following is not a macromolecule? - ANSamino acids

Which of the following is not one of the five parts of an amino acid - ANSThe carbonyl group

Which of the following is true about the structure of a double-stranded DNA molecule? - ANSThe diameter of a DNA molecule is the same along its entire length due to the specific complementary base pairing of the DNA nucleotide

Which of the following occur(s) in the cytoplasm of eukaryotic cells? (Select all of the correct answers.) - ANSProtein synthesis,
Translation

Which of the following would affect the secondary structure of a protein? (Hint: Each of these affects a different level of protein structure. Can you identify the level of structure that would be disrupted for each answer?) - ANSDisruption of the hydrogen bonds that hold different regions of the poly-peptide backbone together.

Plasma Membrane - ANSsurrounds cell provides sufficient surface area for exchange of oxygen, nutrients, and wastes relative to cell volume, consists of lipids and proteins, phospholipid bilayer

polysaccharides - ANSEnergy Storage and Structural Support

Positive DG vs Negative DG - ANSPositive: not spontaneous or favorable
Negative: spontaneous and favorable

Predict how changes in lipid structure related to the degree of saturation and polarity will impact their behavior in biological systems - ANSIncreasing amount of double bonds (degree of unsaturation) increases the fluidity of the membrane because more double bonds means more unsaturated and ability to flow
Increasing the amount of fatty acid saturation decreases the fluidity of the membrane
Increasing the temperature increases the likelihood for the membrane to flow

Pyruvate Oxidation ins and outs - ANSIn: Pyruvate
Out: CO2, acetyl-CoA and NADH

Pyruvate oxidations and Krebs location - ANSmitochondrial Matrix

Second Law of thermodynamics - ANSThe disorder or entropy(S)of the universe always increases. The only way to create order in one part of the universe is to increase total disorder (entropy) of the universe by a even more.

Since the entropy of the Universe always increases, how is it possible that the highly organized structures of life arose? - ANScells create order at the cost of increasing entropy in the rest of the universe.

site of ETC - ANSinner membrane of mitochondria

site of proton gradient - ANSinter membrane space

Sodium Pump DG - ANSThus for the system DG is negative and this happens spontaneously.

Starch - ANScontains long chains with a1->4 linkages and is used to store energy.

Steriods - ANSlipids with carbon skeleton consisting of four fused rings

Temperature - ANSmeasure of molecular movement

The movement of protons through ATP synthase occurs from the - ANSinter membrane space to matrix

17. A cell receiving a signal from distant cells is an example of: - ANSEndocrine signaling

17. All cell signaling pathways between cells involve: - ANSReceptors that change shape after ligand binding

17. Fill in the blanks:
Cell-surface receptors bind (?) signaling molecules; intracellular receptors bind (?) signaling molecules - ANSpolar; non-polar

17. free response: The ligand shown below is applied to cells, which leads to a cellular response of a change in gene expression.
Which of the following images correctly depicts how this ligand generates the cellular response? Arrows indicate signal transduction events.

Make a claim about which image (A, B, C, or D) best depicts how this ligand generates the cellular response. - ANSClaim: image A

Support: polar ligand and cell surface receptor

Reasoning: The ligand contains more polar covalent bonds (carboxyl, amino) than nonpolar so it is overall polar. This means it cannot cross the cell membrane and would have to interact with a receptor on the cell surface. As a result, when the receptor is activated, the receptor would need to activate other signal transduction proteins inside the cell to cause a change in gene expression. Because image A shows the ligand binding to a cell surface receptor and signal transduction occurring inside the cell, this shows how the cellular response is generated.

17. The end result of pathway activation in the figure shown here is cell division. What will happen to cell division in the absence of signaling molecule if the RAS protein is always bound to GTP and why will this - ANSCell division would increase because the Ras-GTP is activating signal transduction when the receptor is not active.

17. What do endocrine, paracrine, and autocrine signaling have in common? - ANSThe ligand binds to a protein receptor and causes a cellular response.

17. What impact does a phosphatase have on a signal transduction protein? - ANSThe phosphatase removes a phosphate causing the protein to change shape.

17. What is the order of events in signal processing? - ANSReceptor activation; Signal transduction; Response; Termination

17. When a steroid hormone binds to an intracellular receptor, what happens after the receptor changes shape? - ANSThe receptor activates transcription.

17. Which of the following become deactivated when bound GTP is hydrolyzed to GDP? - ANSG proteins

17. Which of the following is NOT a cell membrane receptor? - ANSIntracellular receptor

17. Which statement below accurately explains the importance of amino acid side chains in receptor function? - ANSAmino acids determine the types of intermolecular forces that can form with a ligand, which determines what ligand will bind to the receptor.

18. (question 4) The image here shows a partial representation of a dividing cell. Which argument accurately indicates the stage of the cell cycle in which the chromosome represented here would be found. - ANSThe cell would be in anaphase because the spindle fiber has separated the sister chromatids.

18. During the metaphase stage of mitosis: - ANSChromosomes align in the center of the cell

18. free response: Imagine a cell is going through S phase and a significant error takes place so one sister chromosome is not completely copied. At the end of prophase, the cell has the chromosomes represented here.

If this cell completes mitosis and cytokinesis, will the two daughter cells have identical genetic information? - ANSThe daughter cells will not have identical genetic information after mitosis. Normally, sister chromatids have identical genetic information. However, on the lower chromosome in the figure, one of the sister chromatids is missing gene Z and therefore missing part of the information. During mitosis, attachment of spindle fibers to the kinetochore of each sister chromatid and separation of the sister chromatids, which normally have identical genetic information, leads to daughter cells with identical genetic information. However, in these cells one of the daughter cells will not get gene Z. Since one of the sister chromatids is missing a gene which is part of the genetic information, mitosis will not produce daughter cells with identical genetic information.

18. Genetic information is most accurately described as: - ANSThe order of nucleotides in a strand of DNA.

18. If a spindle fiber fails to attach to one sister chromosome during prometaphase and the cell continue through mitosis, what will be true about the genetic information in the daughter cells and why will this be true? - ANSThe genetic information will not be identical because sister chromatids will not separate during anaphase.

18. If S phase fails to completely copy a chromosome and the cell continues through G2 and mitosis, what will be true about the genetic information in the daughter cells and