Biochemistry

Unit Study Guide

1. What does a water molecule look like? (draw)
	1. 
2. What is a polar bond?
	1. Uneven sharing of electrons
3. What happens between water molecules because they are polar?
	1. They form Hydrogen bonds
4. What is surface tension?
	1. A force that prevents certain objects denser than water from sinking
5. What causes surface tension?
	1. Hydrogen bonds between water molecules hold them together making it difficult to disrupt surface of water
6. Why is surface tension important in biology, give an example?
	1. Some organisms like water striders can move across the surface of bodies of water
7. How would you compare and contrast cohesion and adhesion?
	1. Both are due to hydrogen bonds; cohesion refers to how water molecules hold onto each other, adhesion refers to how water molecules hold onto other charged surfaces
8. What parts does water dissociate into?
	1. OH- and H+ ions
9. What pH or pH range indicates that something is acidic, neutral, or basic?
	1. Acidic: 0-6.9, Neutral =7, Basic: 7.1-14
10. What are the characteristics of water that make it so critical for life?
	1. A) Water is a universal solvent and most life reactions occur in water
	2. Plants can transport water from roots to leaves thanks to cohesion of water molecules to each other and adhesion of water to stems
	3. Because as a solid water is less dense than a liquid, only tops of lakes freeze and lake organisms can survive winters that make it so critical for life?
	4. Water’s high heat capacity helps maintain temperatures compatible with life in oceans
11. What subunits makeup carbohydrates?
	1. Carbohydrates are made up of monosaccharides (simple sugars like glucose)
12. What important functions do carbohydrates play in living organisms?
	1. Structure (like cellulose, chitin) and energy storage (like starch, glycogen)
13. What structures are lipids made of?
	1. Nonpolar hydrocarbon chains and glycerol
14. How do lipids interact with water?
	1. They do not want to mix (lipids are hydrophobic)
15. Why are lipids so important to life, give three examples?
	1. They make up the phospholipid bilayer (cell membranes), insulate, and participate in signaling between cells (hormones)
16. What subunits make up nucleic acids?
	1. Nucleotides
17. List the 4 nitrogenous bases and which ones bind to each other?
	1. Adenine, Guanine, Thymine and Cytosine; A binds with T, G binds with C
18. What nucleic Acid is a heritable material passed from parents to offspring?
	1. DNA, deoxyribonucleic acid
19. What subunits make up a protein chain?
	1. Amino Acids
20. What are the levels of protein folding?
	1. Primary, Secondary, tertiary and quaternary
21. What directs and is ultimately responsible for the order of protein subunits?
	1. DNA sequence
22. What are 4 examples of different types of proteins and how are they used within organisms?
	1. Structural (give shape to cells and organisms), channels (control flow of chemicals in and out of cells), signals (ligands and receptors establish communication between cells), enzymes (speed up chemical reactions)
23. Which of the four macromolecules makes up most enzymes?
	1. Proteins
24. How do enzymes function?
	1. They are catalysts that speed up chemical reactions by lowering activation energy
25. Why are enzymes so important to cells?
	1. Without them many reactions would be too slow for cells to survive
26. What is a substrate?
	1. A chemical (reactant) that binds to an active site if an enzyme
27. How do enzymes and substrates interact?
	1. They fit together like puzzle pieces or a key and its lock, by matching shapes
28. What is the name of the energy necessary for reactants to come together and react in cells?
	1. Activation energy
29. How would you distinguish between an exergonic and an endergonic reaction?
	1. An endergonic reaction is one to which energy is added and an exergonic reaction is one where energy is released (answers can vary but should convey the same general principles.)
30. How would you design an experiment to test if light affects plant growth (questions 21-28 refer to this experiment)?
	1. Grow at least 3 plants (such as seedlings of kidney beans) of the same type in the presence of light and 3 without light.
31. What are the independent and dependent variable being manipulated is light and the growth (how tall a plant becomes) is the dependent variable.
32. How are you going to use positive and negative controls in your experiment?
	1. A positive control could be a plant grown with light to make sure conditions are conducive to growth, a negative control could be an empty pot of soil to make sure there is no contamination.
33. What are some sources of bias you may encounter and how could you minimize them?
	1. One source of bias could be due to variables other than light affecting plant growth. To minimize this I would grow both groups of plants under exactly the same conditions (watering frequency, temperature and humidity); only one variable will be different (presence or absence of light)
34. How will you collect and record your data (how often and what types of measurements)?
	1. Measuring tape will be used to record plant height in cm every day for 4 weeks in the same lab notebook. Other observations (such as leaf color and appearance) will also be recorded.
35. What type of analysis, such as summary statistics, do you expect to perform (how will you know what your data means)?
	1. I will average the change in height of the 3 plants in each group and compare them using a two-sample t-test to obtain p values- values below 0.5 would support my hypothesis that light affects plant growth.
36. What would be two types of possible outcomes of your experiment and what conclusions could you draw from them?
	1. Plants grew better with light therefore plants need light to grow).
	2. Plants grew equally well in light or dark conditions therefore light may not be critical for these plants to grow.
37. What parts of the experiment would you present to others and how would you showcase your results and conclusions?
	1. I would use figures for procedures; graphs and tables for results; and concise statements for conclusions.