Biology Reference Sheet

Ch2: Chemistry of Life

1. Difference between matter, elements, and atoms
2. 5 main elements in living things: C, H, O, N, P
3. Structure of an atom
4. Isotopes
    - Uses in medicine: radioactive isotopes used to diagnose cancer and treat illnesses
5. 3 types of bonds: covalent (and polar covalent) and hydrogen
    - Ex: C = water and H = bonds between water and between DNA strands
6. 3 types of chemical reactions: synthesis, decomposition, and reversible
    - Ex: S = making proteins, D = breaking down food, R = enzyme catalyzed reactions

Ch2: Chemistry of Life

7. Acids and Bases: pH range of each, amount of H+ in the solutions, and examples
8. Buffers
9. Properties of water
10. Salts/Electrolytes
11. Macromolecules: carbohydrates, proteins, lipids, and nucleic acids
    - Carbohydrates: C,H,O, immediate source of energy, glucose/starch
    - Protein: C,H,O,N, chemical reactions, structure, and movement, enzymes/antibodies/transport proteins
    - Lipids: C-H chains, structure, stored energy, insulation/protection, fats/phospholipids/steroids
    - Nucleic acids: C,H,O,N,P, genetic information, DNA/RNA/ATP

Ch3: Cells

12. Cell organelle main functions: cell membrane, cytoplasm, endoplasmic reticulum, ribosome, golgi apparatus, mitochondria, lysosome, nucleus, chromosome, vacuole, microfilaments, cilia/flagella

Ch4: Cell Metabolism

13. Structure of DNA
    - Double helix, phosphate and sugar backbone, A – T, G – C are the base pair rules
    - Sequence of A,T,G,C determines how and what proteins are made in the ribosome
    - DNA → RNA → Protein: DNA separates and an mRNA is built from the DNA, then mRNA leaves the nucleus, attaches to a ribosome, tRNAs come over to the ribosome and bring the amino acids, a chain of amino acids is built and then folds into a protein
    - Genes (segments of DNA) determine what traits a person will have

Ch3: Cells

14. Differences between passive and active transport
    - Passive: move particles or water from high to low concentration, no energy
    - Active: move particles from low to high concentration, requires energy
15. Diffusion: define and example from cardiovascular/respiratory system
16. Facilitated diffusion: define and examples
17. Osmosis and 3 solutions: isotonic, hypertonic, hypotonic (in the kidneys or blood/tissues)
    - Define each and discuss the movement of water and effect on the size of the cell for the 3 solutions
18. Types of active transport: endocytosis, exocytosis, and Na/K pump
    - Na/K Pump: pushes K into the cell and Na out of the cell to create an electrical impulse (nerve cells)

Ch3: Cells

19. Parts of cell cycle
    - Interphase: G1: cell grows S: DNA replicates G2: cell prepares to divide
    - M Phase (Mitosis): list what the DNA is doing in each phase
        - Prophase, Metaphase, Anaphase, Telophase
    - Cytokinesis (Cytoplasmic division)
20. Cell differentiation and stem cells
    - This is important because this is how our body creates many cells that have very specific functions
21. Apoptosis
    - This is important because the body can get rid of excess cells or damaged/cancerous cells

Ch4: Cell Metabolism

22. Enzymes
    - Structure: active site, substrate, it is a protein
    - Function
    - Activation energy
    - Specific enzymes bind to specific substrates
    - Structure determines its function
    - Factors that affect enzymes
23. Cell (Aerobic) Respiration
    - Equation: O_2 + Glucose → CO_2 + H_2O + energy (ATP)
    - Main goal: to produce energy for the cells of the body – 38 ATP from one glucose
    - Steps: Glucose is split in two, goes into the mitochondria, through a series of steps a lot of carrier molecules are produced, then the carriers are used with the help of oxygen to produce ATP
24. Lactic acid fermentation (anaerobic respiration)
    - If no O_2 is present, then the body makes lactic acid and only the 2 ATP (just the first step of regular cell respiration will occur)