Biology 101 Notes

1. Introduction to Biology

- **Definition**: The study of life and living organisms.
- **Key Characteristics of Living Things**:
  - Growth and development
  - Response to stimuli
  - Reproduction
  - Metabolism (energy processing)
  - Homeostasis (maintaining internal balance)
  - Cellular organization

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2. Levels of Biological Organization

1. **Molecular Level**: DNA, proteins, lipids
2. **Cellular Level**: Cells are the basic unit of life
3. **Tissue Level**: Groups of similar cells
4. **Organ Level**: Structures with specific functions
5. **Organ System**: Group of organs working together
6. **Organism**: An individual living being
7. **Population**: Group of the same species
8. **Community**: Interaction of multiple populations
9. **Ecosystem**: Communities and their physical environment
10. **Biosphere**: All ecosystems on Earth

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3. The Cell

- **Types of Cells**:
  - Prokaryotic: No nucleus, e.g., bacteria
  - Eukaryotic: Has a nucleus, e.g., plant and animal cells
- **Cell Theory**:
  1. All living things are made of cells.
  2. Cells are the basic unit of structure and function.
  3. All cells come from pre-existing cells.

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4. DNA and Genetics

- **DNA Structure**:
  - Double helix
  - Composed of nucleotides (A, T, G, C)
- **Central Dogma**:
  - DNA → RNA → Protein
- **Mendelian Genetics**:

    - Dominant vs recessive traits
    - Punnett squares to predict inheritance patterns

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5. Photosynthesis

- **Definition**: The process by which plants convert light energy into chemical energy.
- **Equation**: