Module 9: Cell Division and Mitosis

Comprehension & Critical Thinking Questions

Part 1: Understanding Core Concepts

1. **The DNA Blueprint**
    - Define **Genome**, **Chromosome**, **Chromatin**, and **Gene**.
    - Differentiate between **Haploid (n)** and **Diploid (2n)** cells. What are the numbers for humans?

2. **The Cell Cycle**
    - List the phases of the Cell Cycle (**Interphase** + **Mitotic Phase**).
    - What happens during **G1**, **S**, and **G2** phases of Interphase? Which phase involves DNA replication?

3. **Mitosis Phases**
    - Describe the major events of **Prophase**, **Metaphase**, **Anaphase**, and **Telophase**.
    - What is the role of the **Spindle Fibers** and **Centrosomes**?

Part 2: Applying Biological Principles

1. **Cytokinesis**
    - Mitosis divides the nucleus; Cytokinesis divides the cytoplasm. Compare how this process looks in **Animal Cells** (Cleavage Furrow) vs. **Plant Cells** (Cell Plate).
    - Why can't plant cells just pinch in two like animal cells?

2. **Control and Regulation**
    - The cell cycle has "Checkpoints" (G1, G2, M). What is the cell checking for at each point?

- Explain the role of **Apoptosis** (Programmed Cell Death). Why would a cell voluntarily kill itself?

Part 3: Analyzing & Evaluating

1. **Cancer Biology**
    - Defined Cancer in terms of the cell cycle.
    - Differentiate between **Proto-oncogenes** and **Tumor Suppressor Genes** (like p53). Analogy: Which is the gas pedal and which is the brake?
    - What is the difference between a **Benign** and **Malignant** tumor?
2. **Prokaryotic Division**
    - Bacteria do not do Mitosis. Describe **Binary Fission**. Why is it simpler?