

Module 9: Cell Division and Mitosis

Comprehension & Critical Thinking Questions

Part 1: Core Concepts

1. The Cell Cycle

- Name the three stages of interphase (G₁, S, G₂) and describe what occurs in each.
- List the four phases of mitosis in order: Prophase, Metaphase, Anaphase, Telophase.

2. Chromosome Structure

- Distinguish between chromatin and chromosomes.
- After DNA replication, what are sister chromatids? When do they separate?

3. Cytokinesis

- Compare cytokinesis in animal cells (cleavage furrow) and plant cells (cell plate).

Part 2: Application

1. Cell Cycle Checkpoints

- What are the three main checkpoints (G₁, G₂, M)? What is evaluated at each?
- Why are checkpoints critical for preventing cancer?

2. Cancer Biology

- **Scenario:** A mutation inactivates the Rb (retinoblastoma) protein, a tumor suppressor.
- **Apply:** Predict the effect on cell division.

Part 3: Analysis & Evaluation

1. Mitosis vs. Cancer

- Normal cells divide approximately 50 times before senescence (Hayflick limit). Cancer cells are "immortal." Analyze how telomerase reactivation contributes to this.

2. Binary Fission

- Compare mitosis in eukaryotes with binary fission in prokaryotes. Which is faster? Why?