

# **Module 10: Meiosis and Sexual Reproduction**

## **Comprehension & Critical Thinking Questions**

### **Part 1: Core Concepts**

#### **1. Sexual Reproduction Basics**

- Define gametes and zygotes.
- Why must gametes be haploid ( $n$ ) while somatic cells are diploid ( $2n$ )?

#### **2. Meiosis Phases**

- What is separated in Anaphase I? (Homologous pairs)
- What is separated in Anaphase II? (Sister chromatids)

#### **3. Sources of Variation**

- Describe crossing over (recombination). When does it occur?
- Describe independent assortment. How does random alignment create unique gametes?

### **Part 2: Application**

#### **1. Mitosis vs. Meiosis**

- Create a comparison table:
  - **End Product:** 2 diploid identical cells vs. 4 haploid unique cells.
  - **Purpose:** Growth/repair vs. reproduction.
  - **Divisions:** 1 vs. 2.

#### **2. Human Genetics**

- How many pairs of autosomes do humans have? How many pairs of sex chromosomes?
- What determines biological sex in humans?

## **Part 3: Analysis & Evaluation**

### **1. Nondisjunction Disorders**

- Define nondisjunction.
- If nondisjunction occurs in Meiosis I, how many abnormal gametes result? What if it occurs in Meiosis II?
- Explain the cause of Down Syndrome (Trisomy 21).

### **2. The Cost of Sex**

- Asexual reproduction is efficient; sexual reproduction is costly. Evaluate why sexual reproduction remains prevalent despite this cost. (Genetic diversity)