What is Meiosis?

Worksheet

Meiosis is a two-round nuclear division (meiosis I and II) that halves the chromosome number, producing four genetically unique haploid gametes from one diploid cell.

Questions

1. How many haploid gametes does one diploid cell produce through meiosis?

A) 1
B) 2
C) 4
D) 8

2. A species has n = 5 chromosome pairs. How many gamete combinations are possible from independent assortment?

A) 10
B) 16
C) 32
D) 25

3. Crossing over occurs during which stage?

A) Prophase I
B) Metaphase II
C) Anaphase I
D) Telophase II

4. What is separated during meiosis II?

A) Homologous chromosomes
B) Sister chromatids
C) Nucleoli
D) Centrioles

5. A species has 4 chromosome pairs (n = 4). How many genetically distinct gametes can independent assortment alone produce?

6. Garden peas, the organism Mendel studied, have n = 7 chromosome pairs. How many gamete combinations are possible?

7. Humans have n = 23 chromosome pairs. How many chromosomally distinct gametes can one person produce (ignoring crossing over)?

8. Define: What is meiosis?

9. Define: How many cells does meiosis produce, and are they identical?

10. Define: What is crossing over?

Answer Key

1. C) 4 - Meiosis I and II together yield four haploid cells.

2. C) 32 - C = 2^5 = 32.

3. A) Prophase I - Crossing over happens between homologous chromosomes during prophase I.

4. B) Sister chromatids - Meiosis II resembles mitosis, splitting sister chromatids.

5. C = 2^n C = 2^4 = 16 combinations

6. C = 2^n C = 2^7 = 128 combinations

7. C = 2^n C = 2^23 = 8,388,608 combinations

8. A two-division process that produces four haploid gametes from one diploid cell, halving the chromosome number.

9. Four haploid cells, each genetically unique due to crossing over and independent assortment.

10. The exchange of DNA segments between homologous chromosomes during prophase I, increasing genetic variation.