

Meiosis Revision Notes

What is Meiosis

Meiosis is the division of the nucleus that results in the formation of haploid gametes from a diploid gametocyte.

In diploid cells, chromosomes typically appear as homologous pairs.

Features of Homologous Chromosomes

1. Same size
2. Same gene loci
3. Same centromere position
4. Same sequence of genes

Meiosis

Meiosis occurs in two distinct stages.

Meiosis I

1. The chromosomes, which have replicated prior to meiosis I, each consist of two genetically identical chromatids attached at the centromere.
2. The chromosomes condense and the homologous chromosomes pair up.
3. Chiasmata form at points of contact between the non-sister chromatids of a homologous pair and sections of DNA are exchanged.
4. This crossing over of DNA is random and produces genetically different recombinant chromosomes.
5. Spindle fibres attach to the homologous pairs and line them up at the equator of the cell.
6. The orientation of the pairs of homologous chromosomes at the equator is random
7. The chromosomes of each homologous pair are separated and move towards opposite poles.
8. Cytokinesis occurs and two daughter cells form.

Meiosis II

Each of the two cells produced in meiosis I undergoes a further division during which the sister chromatids of each chromosome are separated.

A total of 4 genetically different haploid cells are produced.

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Causes of Genetically variable Gametes

1. Independent/Random assortment

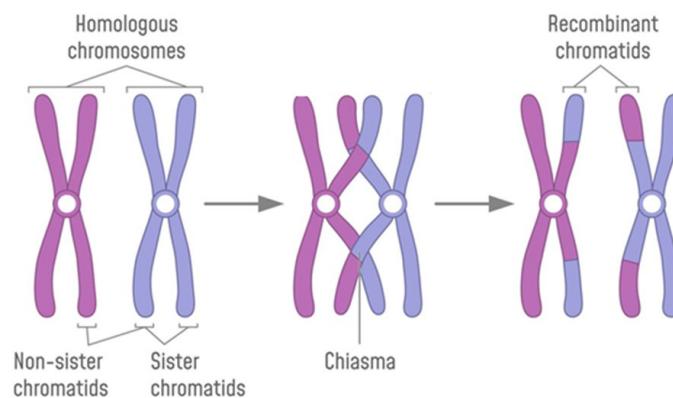
Each pair of homologous chromosomes are positioned independently of the other pairs, irrespective of their maternal or paternal origin.

2. Crossing Over

Chromatids break and rejoin at points called chiasmata which shuffles sections of DNA between homologous chromosomes

Crossing over through recombination of alleles separates linked genes.

Linked genes are those on the same chromosomes. Crossing over can result in new combinations of the alleles of these genes.



Independent Assortment Numeracy

Use 2^n to find number of combinations for independent assortment where n =haploid number for the cell