

# Meiosis

6.3 Meiosis

1. A process of nuclear division that reduces the number of chromosomes into half.

2. Produces haploid gametes.

3. Provides genetic variation from one generation to another through the process of crossing-over, independent assortment and random fertilisation.

4. Occurs in the gonads; testes and ova (humans); anther and ovary (flowering plants).

5. Consists of two separate nuclear divisions; meiosis I and meiosis II.

6. The cell undergoes interphase before entering meiosis.

Meiosis I:

Phase	Key event
Prophase I	<div><div></div><div><div>Chromosomes condensed and thickened.</div><div>Homologous chromosomes paired up to form bivalents through synapsis.</div><div>Non-sister chromatids of homologous chromosomes exchange the DNA segments through crossing-over.</div><div>It leads to genetic recombination.</div><div>Centrioles migrate to opposite poles and form spindle fibres.</div><div>Nucleolus and nuclear membrane disappear.</div></div></div>
Metaphase I	<div><div></div><div><div>Spindle fibres pull the homologous chromosomes to the middle cell and aligned at the metaphase plate side by side.</div><div>The homologous chromosomes are arranged independently.</div></div></div>
Anaphase I	<div><div></div><div><div>Spindle fibres pull the homologous chromosomes to the opposite poles.</div><div>Each chromosome still consists of two sister chromatids.</div></div></div>
Telophase I and cytokinesis	<div><div></div><div><div>The chromosomes arrived at both poles.</div><div>Each pole now has a haploid daughter nucleus because it contains one set of chromosome.</div><div>Spindle fibres disappear, nucleolus and nuclear membrane reappear.</div><div>Produce two haploid daughter cells.</div><div>Each daughter cell receives one chromosome from the homologous pair.</div></div></div>

Meiosis II:

1. The process is similar to mitosis.

2. Produce four haploid cells which are genetically different from one another and parent cell.

Effects of Uncontrolled Meiosis:

1. Abnormal meiosis leads to non-disjunction of chromosomes.

2. Non-disjunction chromosomes lead to Turner’s syndrome, Klinefelter’s syndrome, XYY males and XXX females.