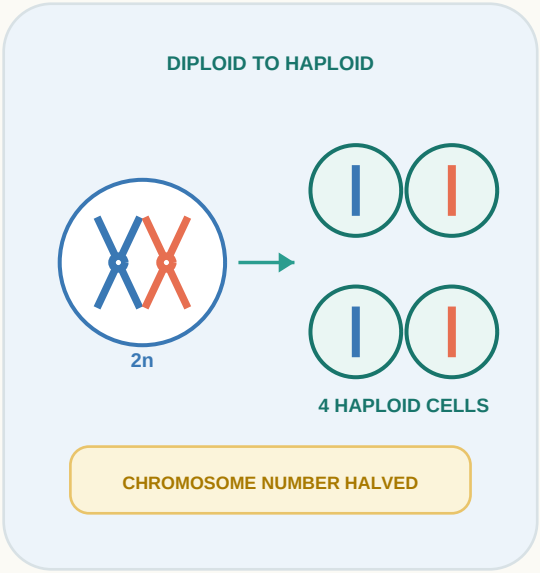
AP BIOLOGY | UNIT 5

TOPIC 5.1

Meiosis

Meiosis uses two divisions after one DNA replication to transmit one chromosome set into each haploid reproductive cell.



THE CORE CAUSAL CHAIN

DNA REPLICATION
chromosomes duplicate

→

MEIOSIS I
homologs separate

→

NO S PHASE
DNA is not recopied

→

MEIOSIS II
sisters separate

BY THE END, YOU SHOULD BE ABLE TO...

1. Track homologs and sister chromatids through meiosis.
2. Explain why meiosis reduces chromosome number.
3. Compare the products of meiosis and mitosis.

CENTRAL IDEA

Meiosis I separates homologous chromosome pairs. Meiosis II separates sister chromatids. The result is usually four haploid cells from one diploid cell.

1 Meiosis I separates homologous chromosomes

Homologs pair during prophase I, align as pairs, and move to opposite cells while sister chromatids remain joined.

THE REDUCTION DIVISION



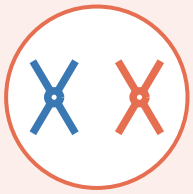
PROPHASE I

synapsis pairs homologs



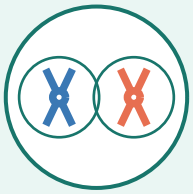
METAPHASE I

pairs align at the middle



ANAPHASE I

homologs separate



END OF I

two haploid cells form

HOMOLOGOUS PAIRS SEPARATE; SISTER CHROMATIDS STAY TOGETHER

WHAT CHANGES AFTER MEIOSIS I?

BEFORE MEIOSIS I

one diploid cell (2n)

homologous pairs are present; chromosomes are duplicated



AFTER MEIOSIS I

two haploid cells (n)

one homolog from each pair; chromosomes remain duplicated



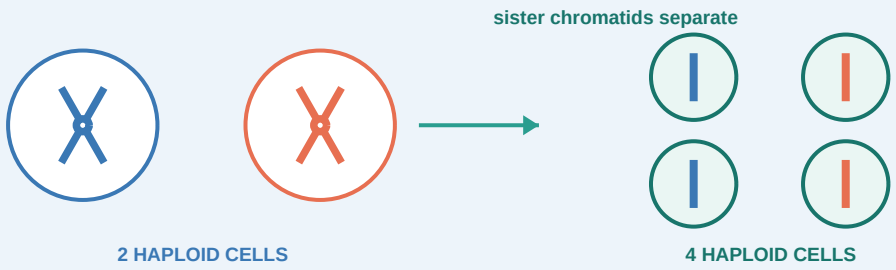
COMMON ERROR

Meiosis I separates homologous chromosomes, not sister chromatids. This division reduces the number of chromosome sets from diploid to haploid.

2 Meiosis II separates sister chromatids

Without another round of DNA replication, the two haploid cells divide again and produce four cells with unduplicated chromosomes.

THE SECOND DIVISION



NO DNA REPLICATION OCCURS BETWEEN MEIOSIS I AND II

MEIOSIS COMPARED WITH MITOSIS

	MEIOSIS	MITOSIS
DIVISIONS	two	one
PRODUCTS	usually 4 haploid cells	usually 2 diploid cells
GENETIC RESULT	cells differ from parent	cells usually match parent
MAIN ROLE	gamete production	growth, repair, replacement

FINAL TRACK

One diploid cell -> DNA replicates once -> homologs separate in meiosis I -> sister chromatids separate in meiosis II -> four haploid cells.