

Exercise walk-through

5.1

Meiosis

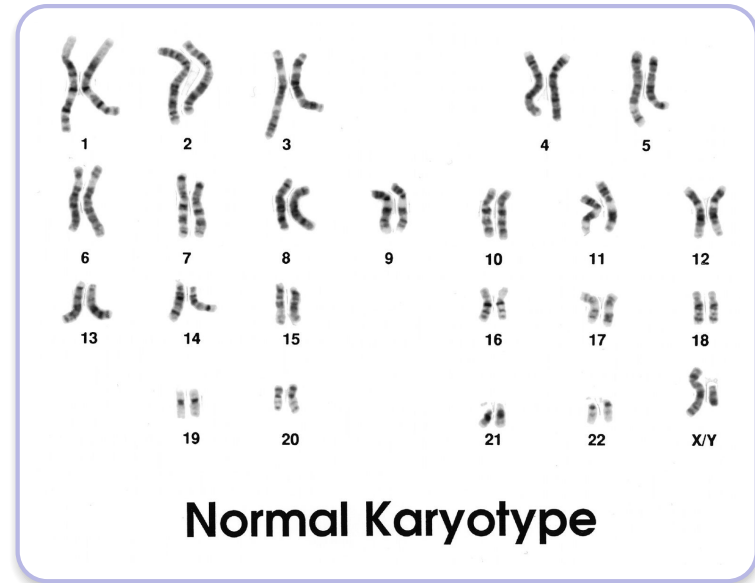
AP Biology

Meiosis

Meiosis turns one **diploid** cell into four **haploid gametes** – halving the chromosome number.

- **meiosis I** separates **homologous** pairs (halving)
- **meiosis II** separates the copies

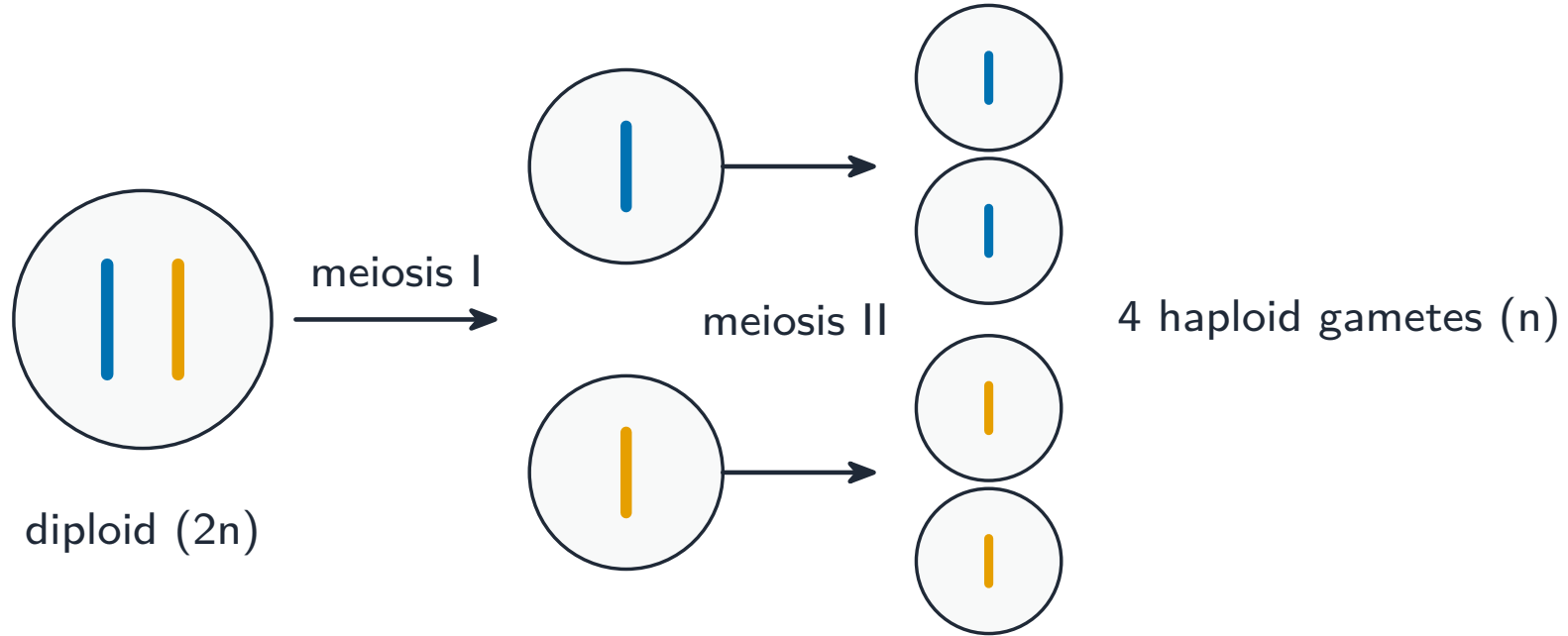
Two haploid gametes join at fertilization to restore the diploid number.



Normal Karyotype

Meiosis halves chromosome sets for gametes

Meiosis halves the chromosome number in two



Meiosis halves the chromosome number in two divisions

Exercises 2.1-2.3

2.1 How many cells does one meiosis produce, and are they haploid or diploid? [2]

2.2 What is separated in meiosis I? [1]

2.3 State one difference between meiosis and mitosis. [1]

Exercises 2.1-2.3

2.1 How many cells does one meiosis produce, and are they haploid or diploid? [2]

2.1

- Four cells; haploid
-

2.2 What is separated in meiosis I? [1]

2.2

- Homologous pairs of chromosomes
-

2.3 State one difference between meiosis and mitosis. [1]

2.3

- Any one: meiosis has two divisions / makes four haploid varied cells vs mitosis' one division making two identical diploid cells

Exercise 3.1

3.1 Meiosis produces gametes that are

[1]

☐

A diploid and identical

B haploid and varied

C diploid and varied

D haploid and identical

Exercise 3.1

3.1 Meiosis produces gametes that are

[1]

☐

A diploid and identical

B haploid and varied

C diploid and varied

D haploid and identical

3.1 B

- haploid and varied

Exercise 3.2 (a)

3.2 A diploid cell with 8 chromosomes undergoes meiosis.

(a) How many chromosomes will each gamete have?

[1]

Exercise 3.2 (a)

3.2 A diploid cell with 8 chromosomes undergoes meiosis.

(a) How many chromosomes will each gamete have?

[1]

(a)

- 4 chromosomes

Exercise 3.2 (b)

3.2 A diploid cell with 8 chromosomes undergoes meiosis.

(b) Explain why gametes must be haploid.

[2]

Exercise 3.2 (b)

3.2 A diploid cell with 8 chromosomes undergoes meiosis.

(b) Explain why gametes must be haploid.

[2]

(b)

- At fertilization two gametes fuse; if they were diploid the chromosome number would double each generation, so they must be haploid to keep it constant

Exercises 3.3-3.4

3.3 Compare the products of mitosis and meiosis in terms of number, ploidy, and variation. [3]

3.4 A diploid cell has $2n = 8$. State its chromosome and chromatid counts after replication and in each product after meiosis II. Explain why DNA replication does not double the chromosome count. [4]

Exercises 3.3-3.4

3.3 Compare the products of mitosis and meiosis in terms of number, ploidy, and variation. [3]

3.3

- Mitosis: 2 cells, diploid, genetically identical; meiosis: 4 cells, haploid, genetically varied

3.4 A diploid cell has $2n = 8$. State its chromosome and chromatid counts after replication and in each product after meiosis II. Explain why DNA replication does not double the chromosome count. [4]

3.4

After replication: 8 chromosomes and 16 chromatids; each final product: 4 chromosomes and 4 chromatids; replicated sister chromatids share a centromere and are counted as one chromosome before separation; meiosis I separates homologues and meiosis II separates sister chromatids.