

Questions to Ponder...

1– What makes you who you are?



2– If you are looking at a couple who are expecting a child, what traits would you predict for the child just by observing the parents?

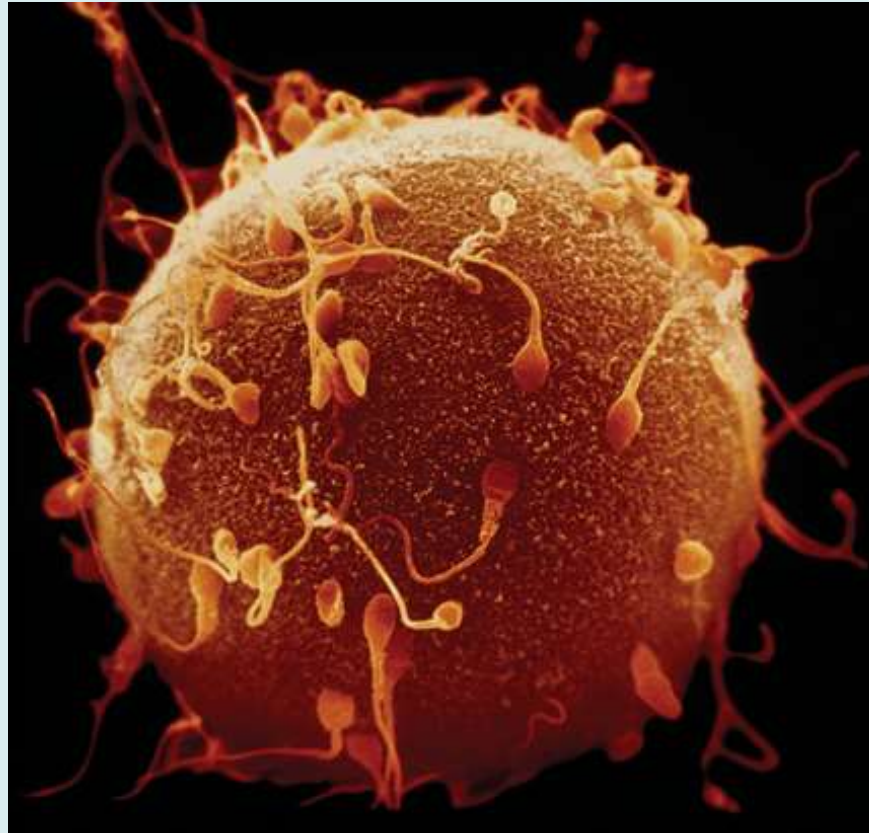
3– What affects the traits & development of an offspring after he or she is born?

4– What is distinctive about sex cells (gametes), as compared to other cells found in the body (somatic cells)?

MEIOSIS

KEY CONCEPT - During meiosis, diploid cells undergo two cell divisions that result in haploid cells.

EQ – What is meiosis and how does it contribute to variations in offspring?



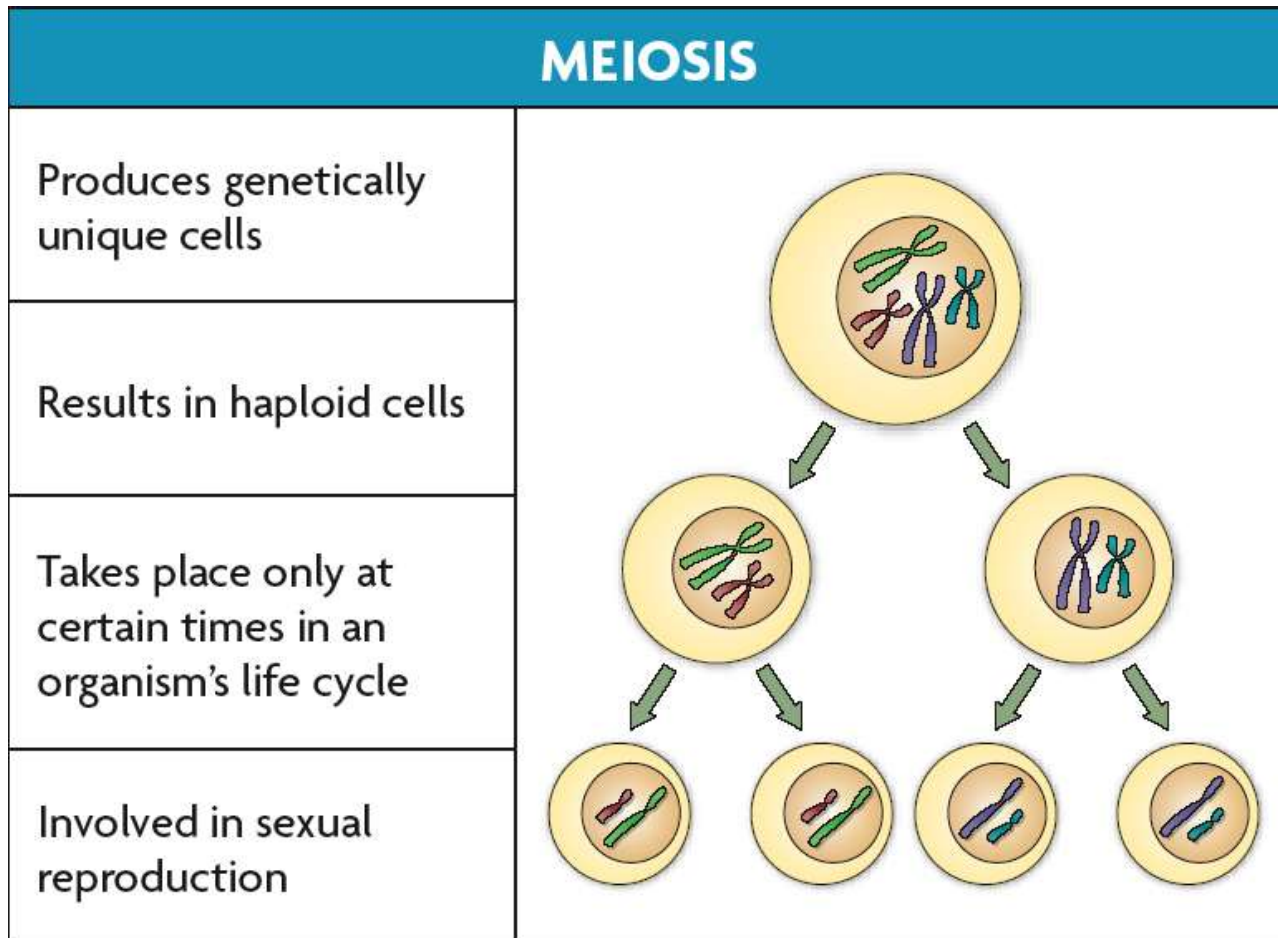
Colored SEM; 1300x

SB1.a. Explain the role of cell organelles for both prokaryotic & eukaryotic cells, including the cell membrane, in maintaining homeostasis and cell reproduction.

SB2.c. Using Mendel's laws, explain the role of meiosis in reproductive variability.

6.1 Chromosomes and Meiosis

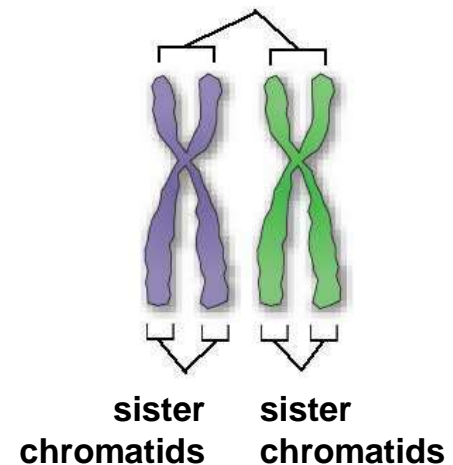
- ▶ Cells go through **two** rounds of division in meiosis.
- Meiosis reduces chromosome number and creates genetic diversity.



6.1 Chromosomes and Meiosis

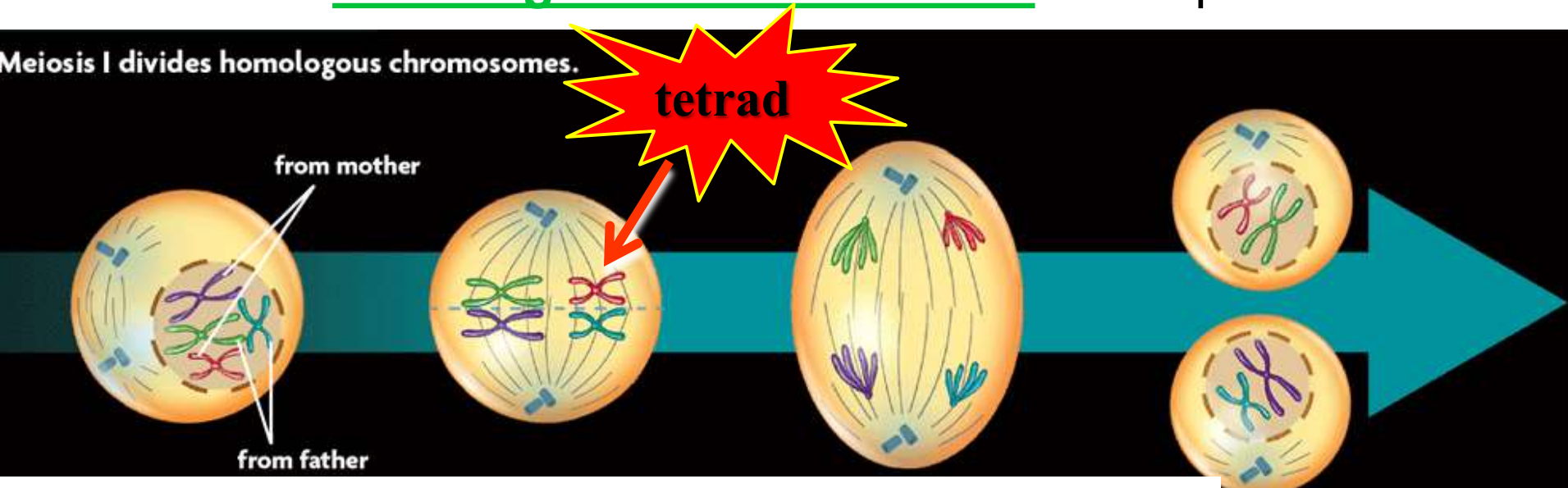
- Meiosis I and meiosis II each have four phases, similar to those in mitosis.
 - Homologous chromosomes
 - Pairs of homologous chromosomes separate in meiosis I.
 - Homologous chromosomes are similar but not identical.
 - Sister chromatids
 - Sister chromatids divide in meiosis II.
 - Sister chromatids are copies of the same chromosome.

homologous chromosomes



6.1 Chromosomes and Meiosis

- **Meiosis I:**
 - occurs after **DNA has been replicated.**
 - divides **homologous chromosomes** in four phases.



Prophase I

Chromosomes condense, homologous chromosomes start to pair, nuclear envelope breaks down, spindle fibers form

Metaphase I

Spindle fibers align homologous chromosomes along the cell equator

Anaphase I

Homologous chromosomes separate to opposite sides of cell, sister chromatids remain attached

Telophase I

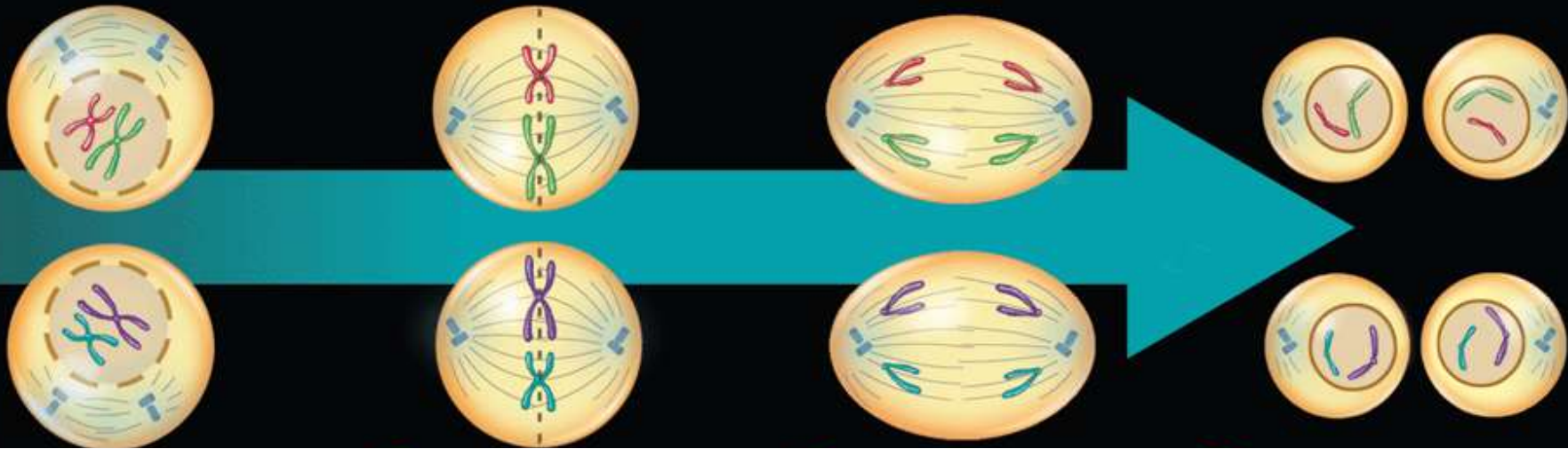
Spindle fibers fall apart, nuclear membrane may form again, cytokinesis

6.1 Chromosomes and Meiosis

- **Meiosis II:**

- divides sister chromatids in four phases.
- DNA is not replicated between meiosis I and meiosis II.

Meiosis II divides sister chromatids. The overall process produces haploid cells.



Prophase II

Nuclear envelope breaks down if necessary, spindle fibers form

Metaphase II

Spindle fibers align chromosomes along the cell equator

Anaphase II

Chromatids separate to opposite sides of cell

Telophase II

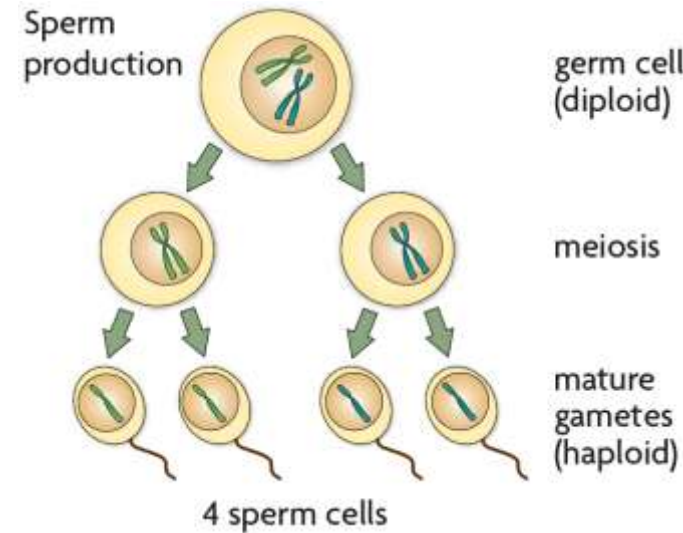
Nuclear envelopes form, chromosomes decondense, spindle fibers fall apart, cytokinesis

6.1 Chromosomes and Meiosis

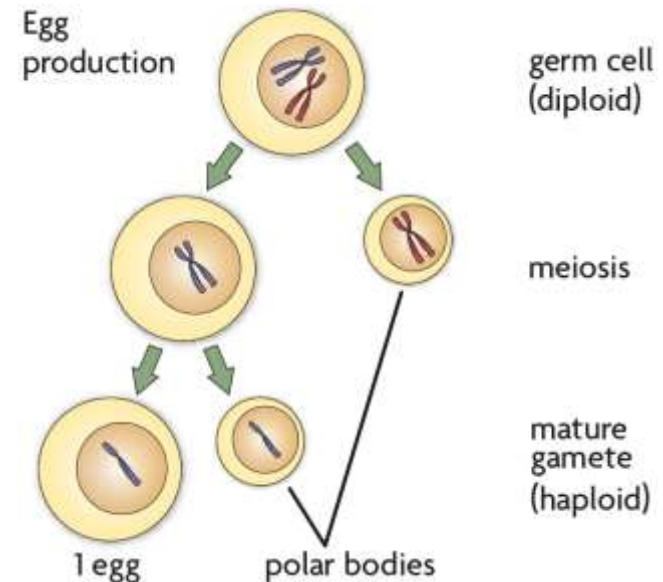
▶ Haploid cells develop into mature gametes.

- **Gametogenesis** is the production of gametes.
- Gametogenesis differs between females and males.
 - Sperm become streamlined and **motile (flagella)**.
 - Sperm primarily contribute DNA to an embryo.
 - Eggs contribute DNA, cytoplasm, and organelles to an embryo.
 - During meiosis, the egg gets most of the contents; the other cells form **polar bodies**.

spermatogenesis

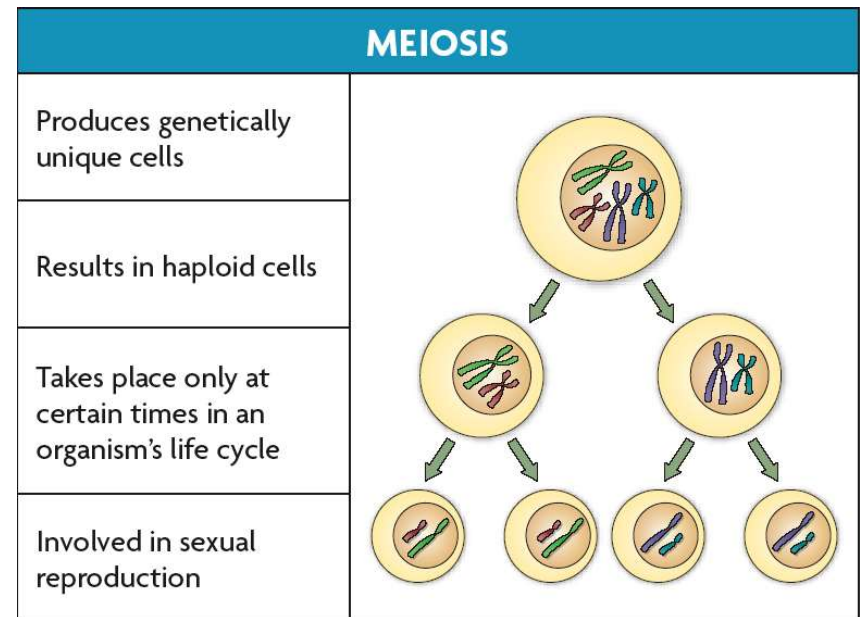
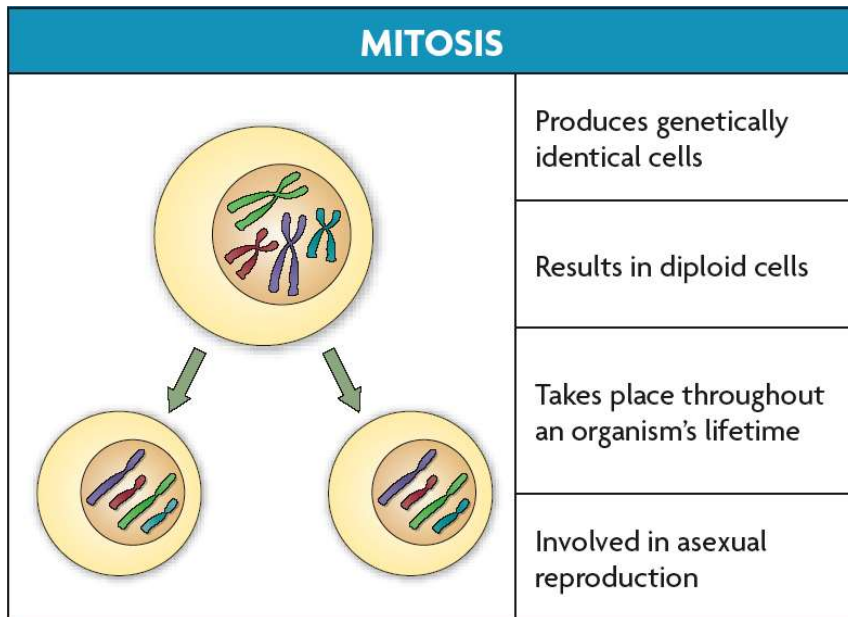


oogenesis



6.1 Chromosomes and Meiosis

- Meiosis differs from mitosis in significant ways.
 - Meiosis has **two** cell divisions while mitosis has **one**.
 - In mitosis, homologous chromosomes never pair up.
 - Meiosis results in **haploid cells**; mitosis results in **diploid cells**.



6.1 Chromosomes and Meiosis

▶ Separate

- [Meiosis Animation](#)

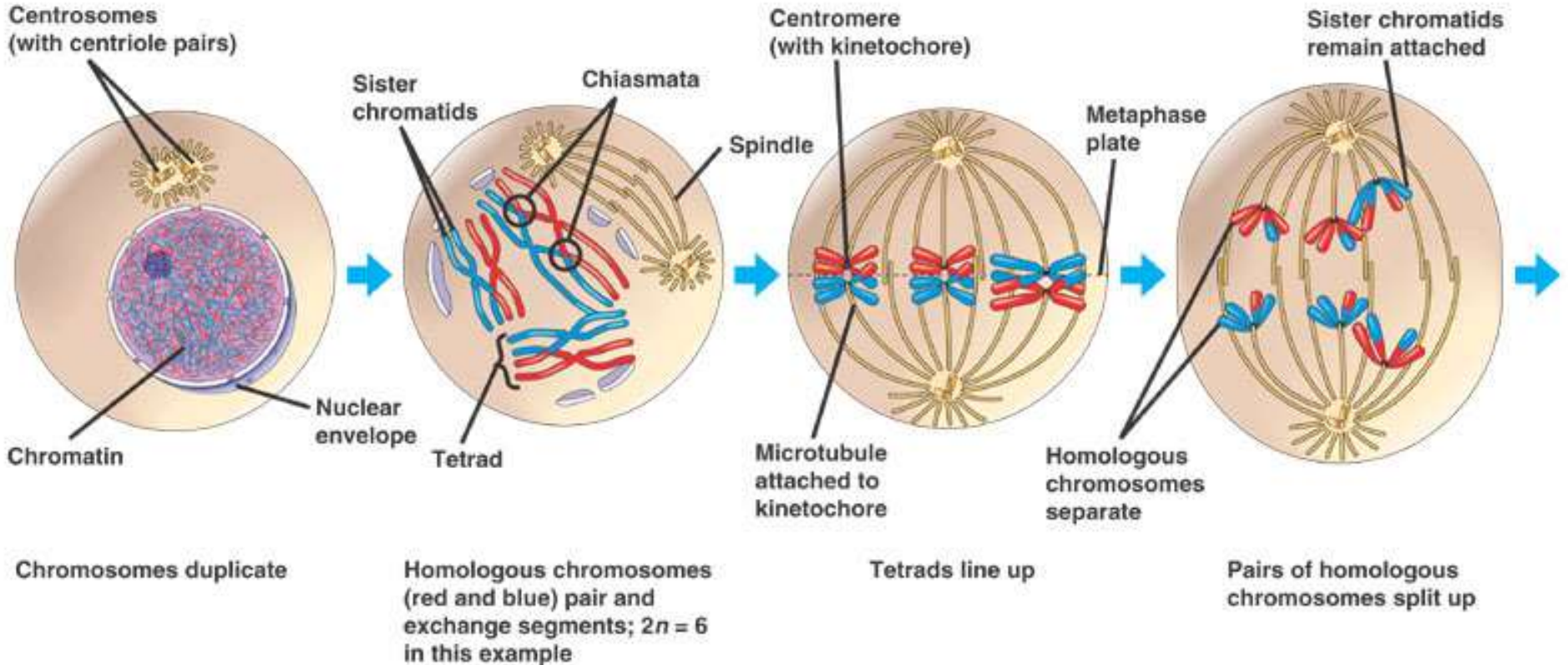
INTERPHASE

MEIOSIS I: Separates homologous chromosomes

PROPHASE I

METAPHASE I

ANAPHASE I



MEIOSIS II: Separates sister chromatids

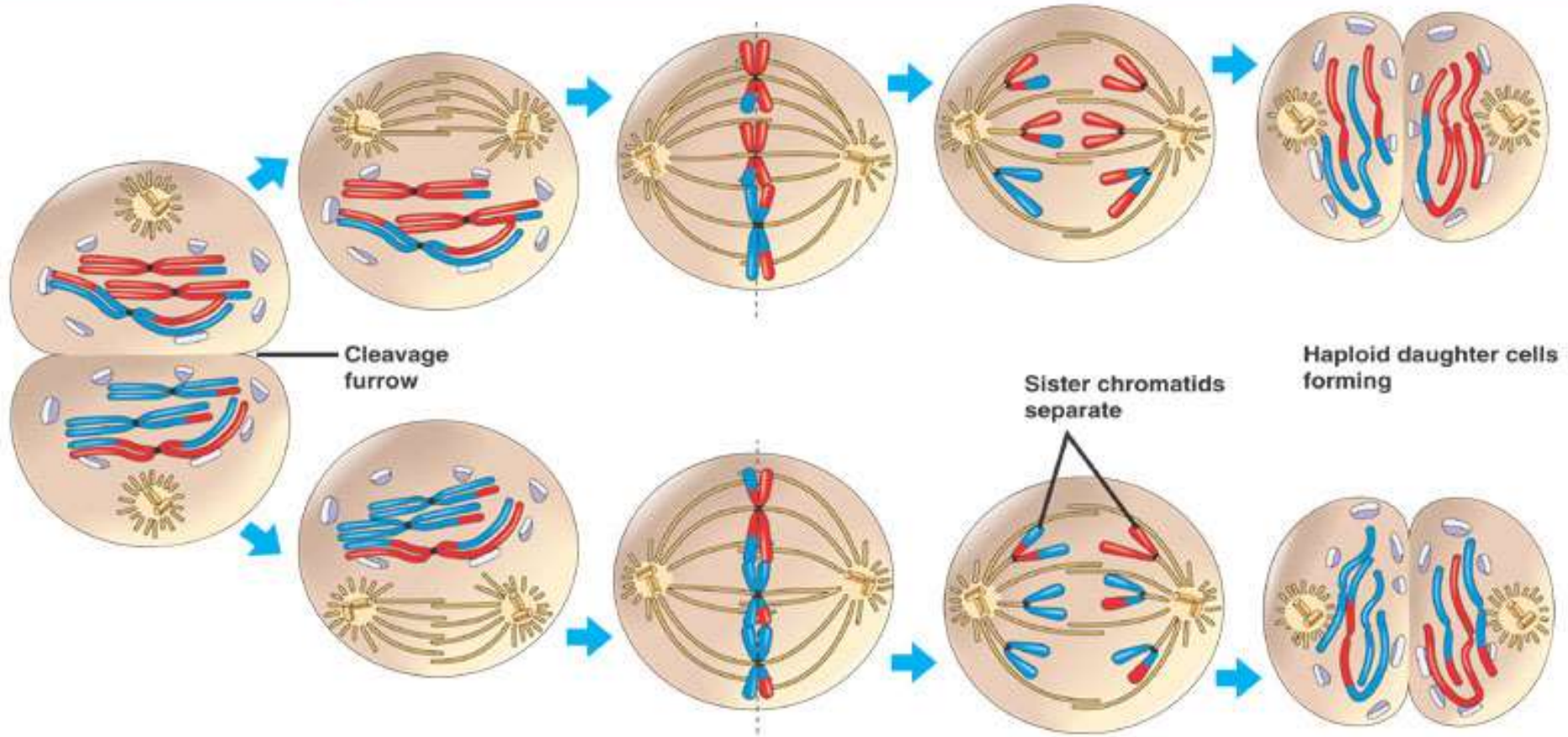
TELOPHASE I AND CYTOKINESIS

PROPHASE II

METAPHASE II

ANAPHASE II

TELOPHASE II AND CYTOKINESIS



Two haploid cells form; chromosomes are still double

During another round of cell division, the sister chromatids finally separate; four haploid daughter cells result, containing single chromosomes