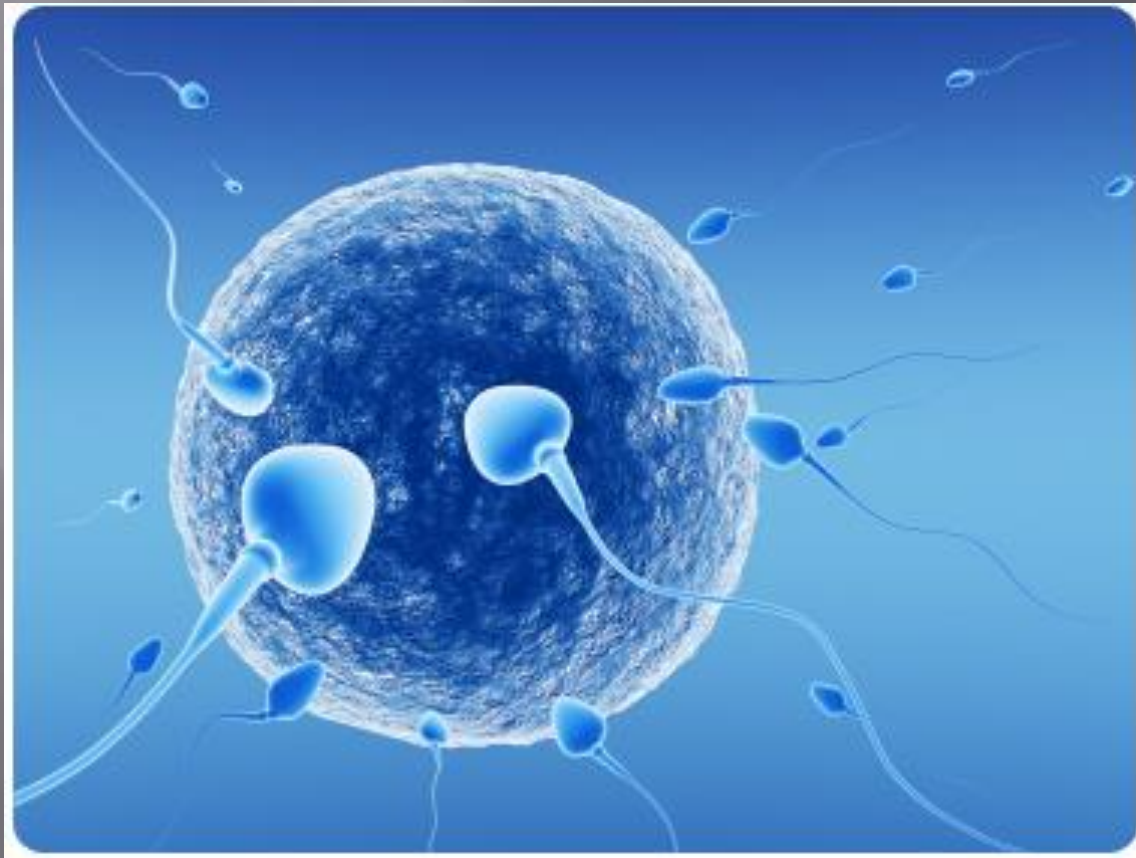


Sexual Reproduction

- ▣ The process of producing offspring by means of two parents each contributing half the genetic information to the offspring.



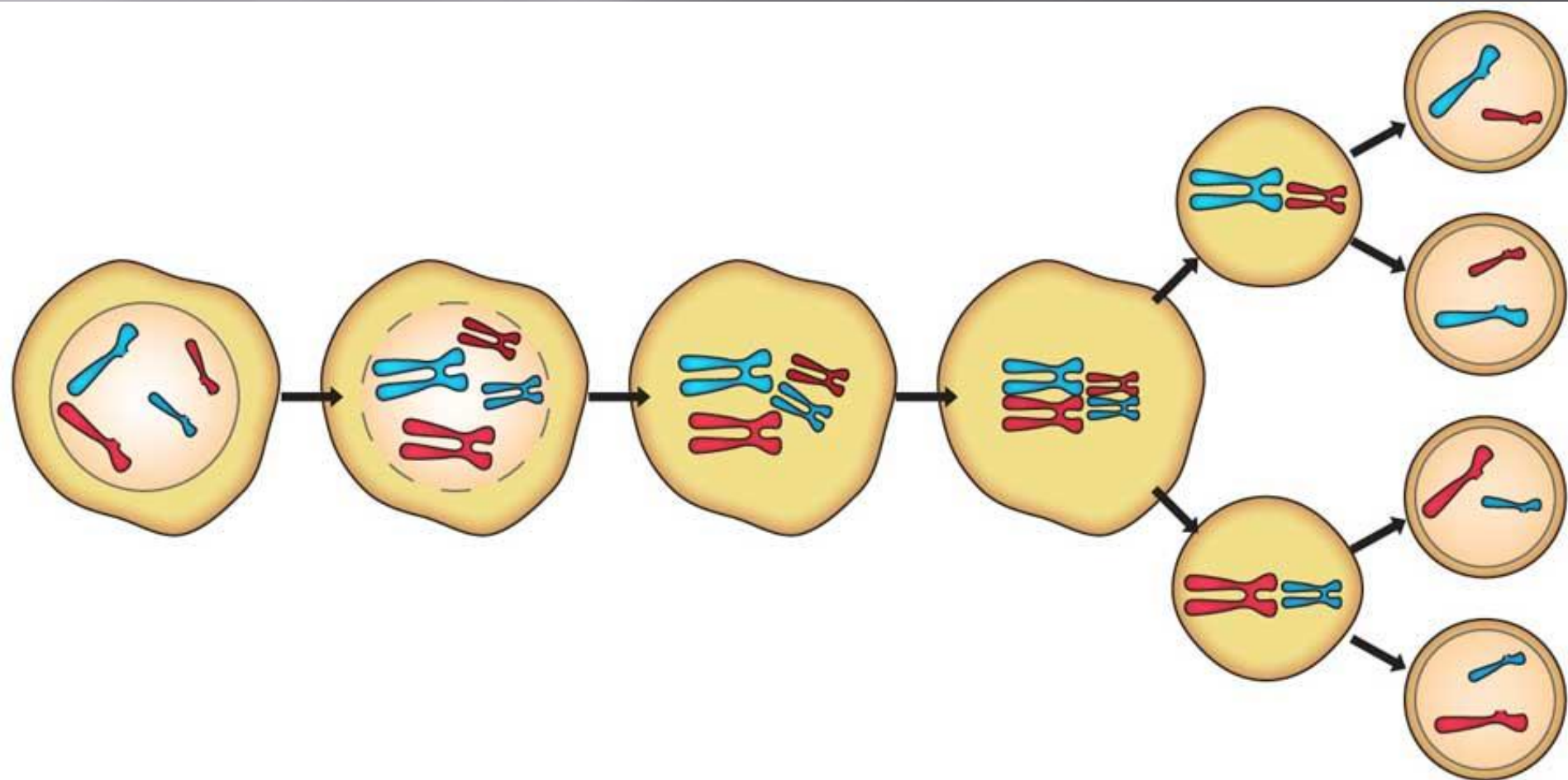
Sexual Reproduction

- ▣ Involves the union (fertilization) of two sex cells (called gametes).
- ▣ The female gamete (egg in humans) and the male gamete (sperm in humans) unite to form a zygote (a fertilized egg).



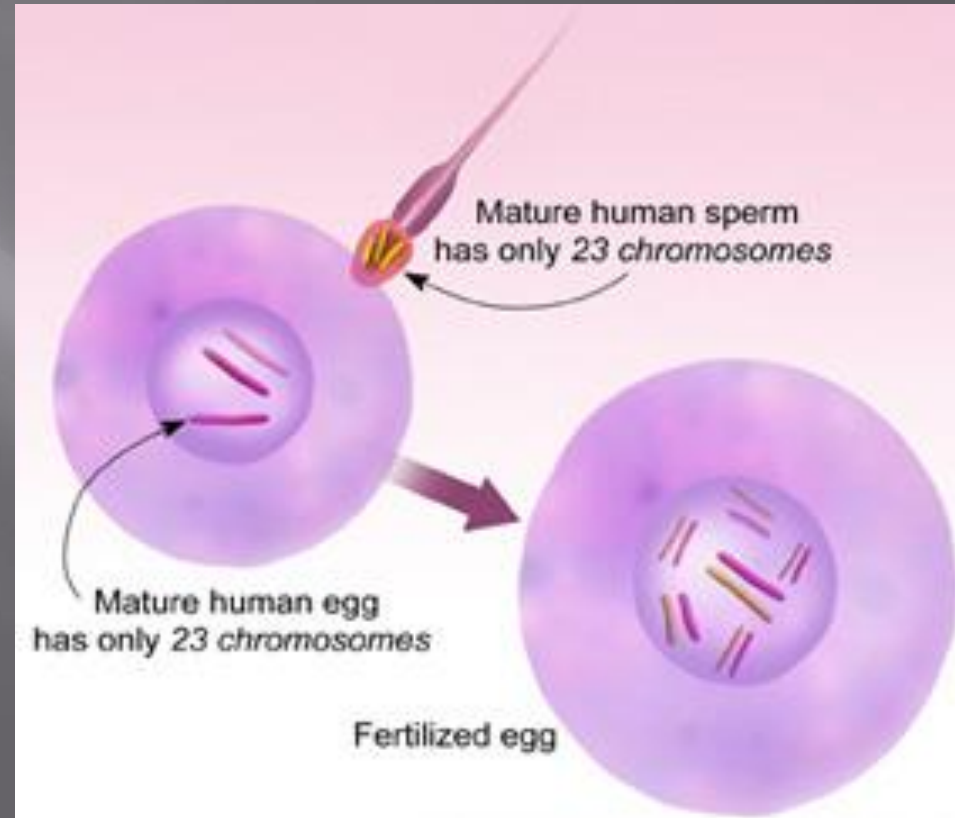
Meiosis

- ▣ A special type of cell division necessary for sexually reproducing organisms.



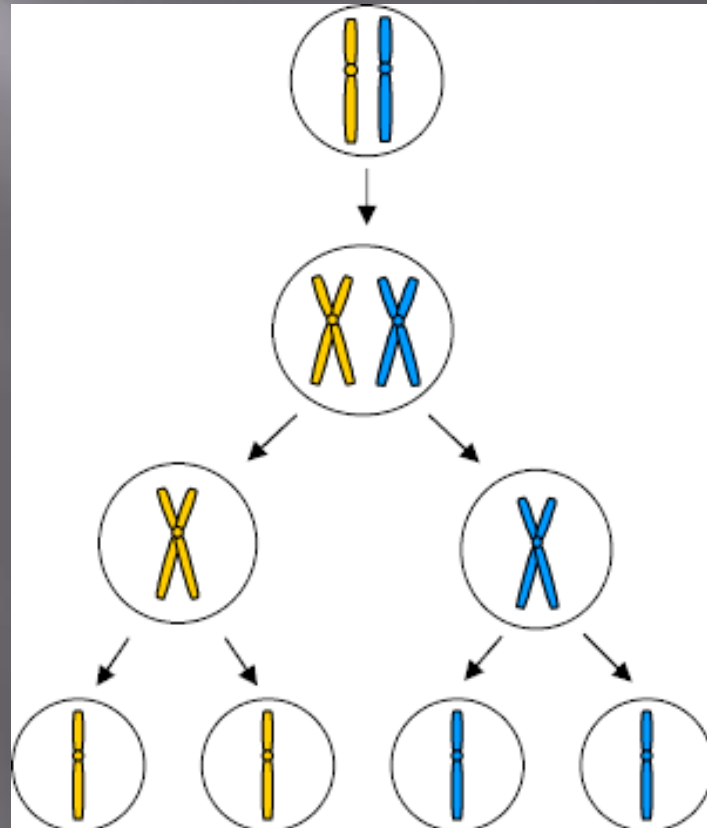
Meiosis

- Cells (gametes) produced via meiosis contain half the number of chromosomes as the parent cell and are therefore referred to as haploid cells (in humans $n=23$).
- Cells that have the full set of chromosomes are said to be diploid (in humans $2n=46$).

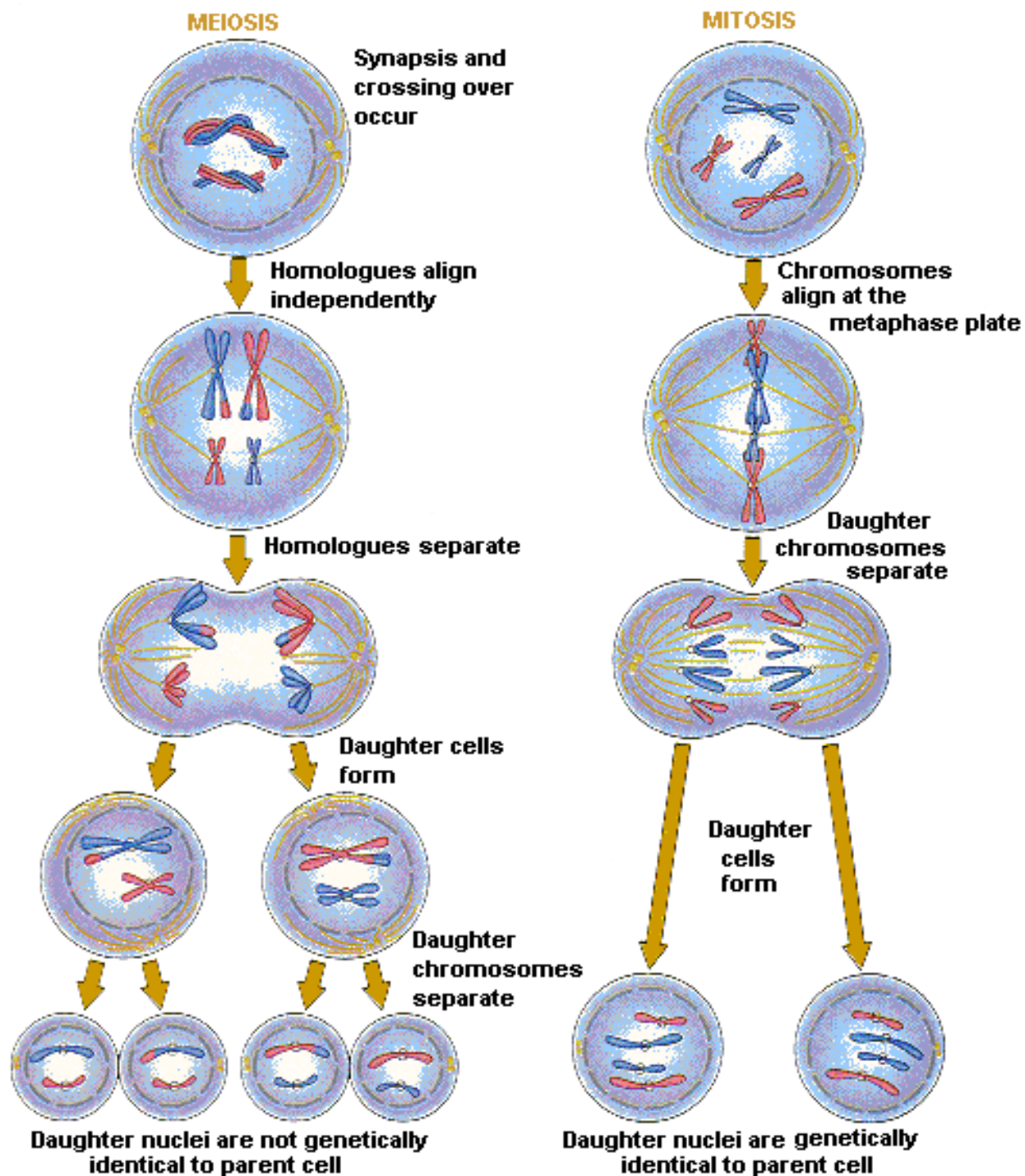


Meiosis

- ▣ Cells that have the full set of chromosomes are said to be diploid (in humans $2n=46$).
- ▣ So we can define Meiosis as a special type of cell division which produces haploid cells called gametes.



Comparing Mitosis to Meiosis



Meiosis I

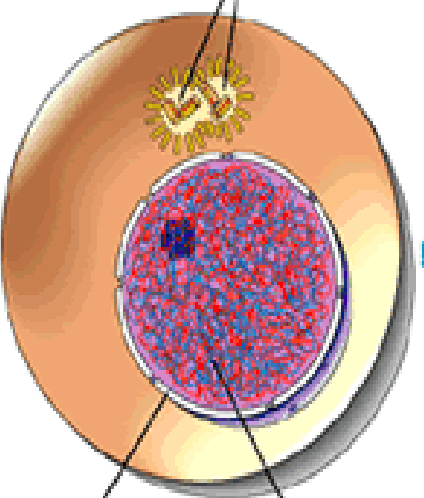
interphase I

prophase I

metaphase I

anaphase I

Centrosomes (with centriole pairs)

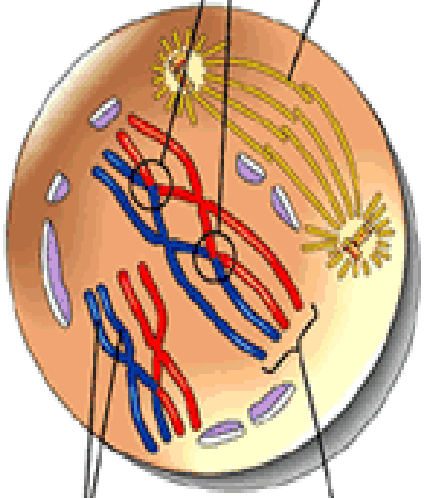


Nuclear envelope
Chromatin

Chromosomes duplicate



Chiasmata
Spindle



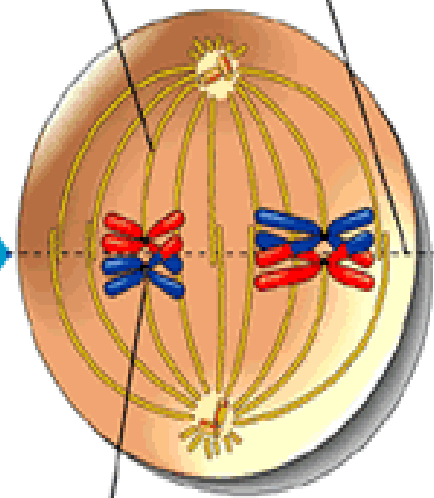
Sister chromatids
Tetrad

Homologous chromosomes pair and exchange segments

Synapsis - pairing of homologs to form tetrad



Microtubule attached to kinetochore
Metaphase plate

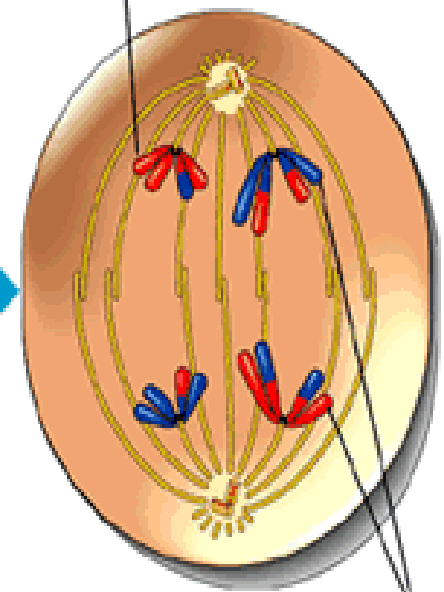


Centromere (with kinetochore)

Tetrads line up



Sister chromatids remain attached



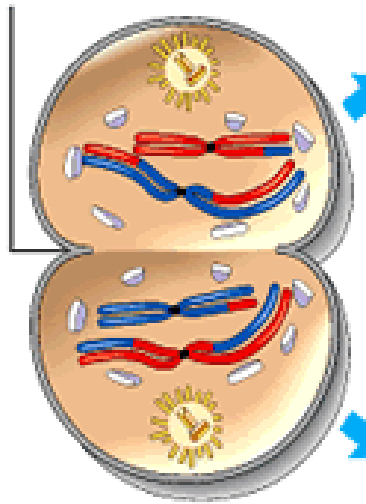
Homologous chromosomes separate

Pairs of homologous chromosomes split up

Meiosis I

telophase & cytokinesis

Cleavage furrow



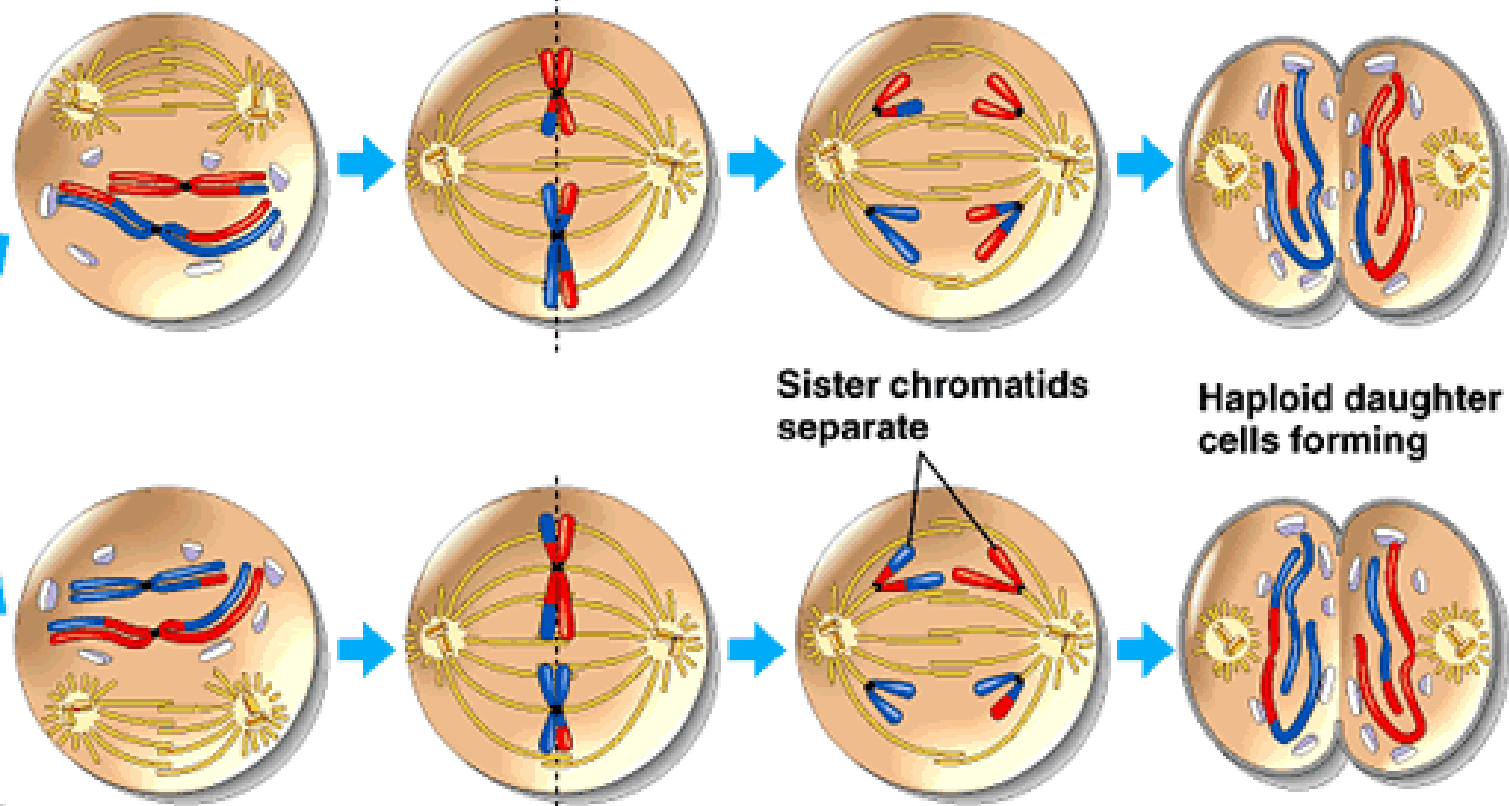
Meiosis II

prophase II

metaphase II

anaphase II

telophase II



Sister chromatids separate

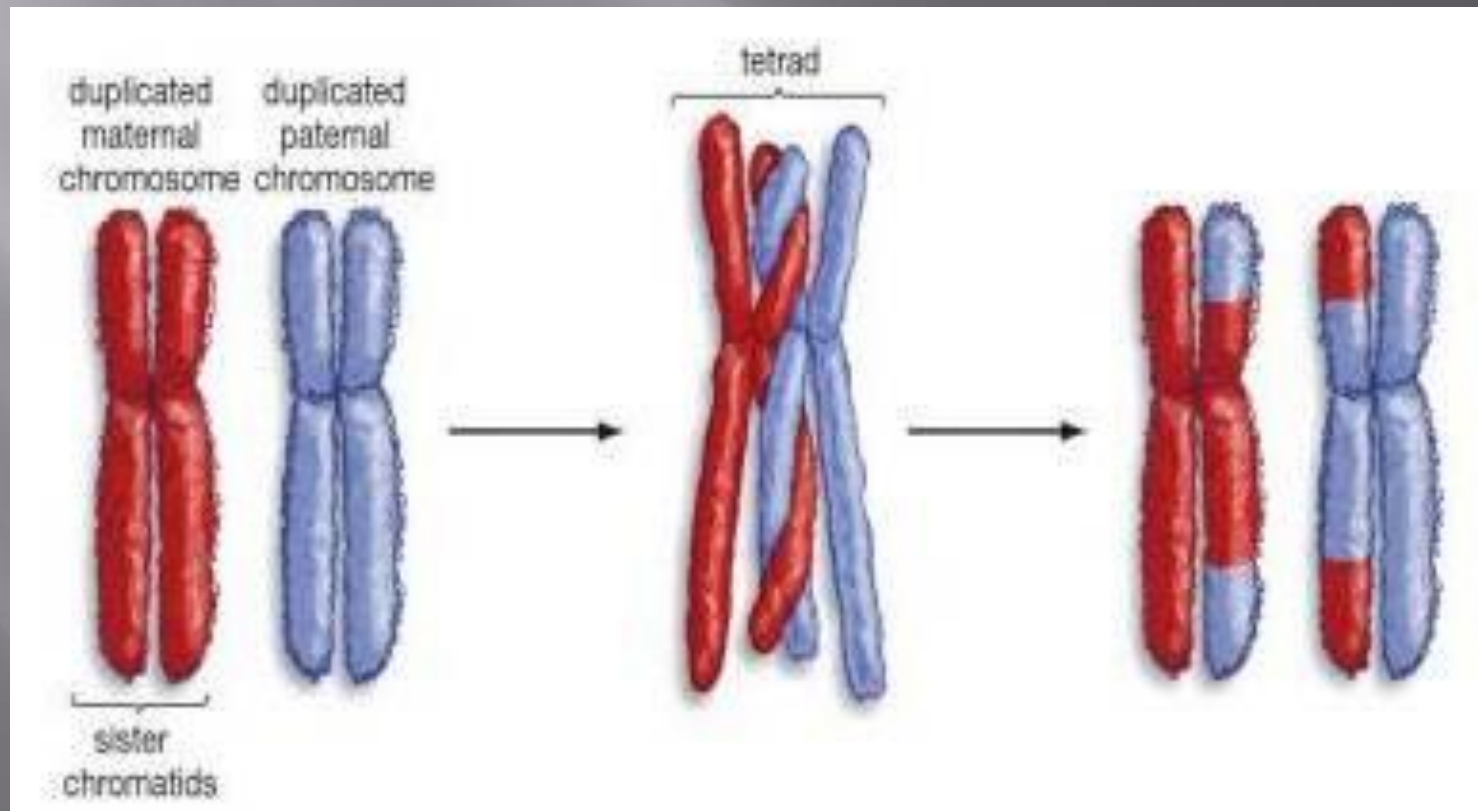
Haploid daughter cells forming

Two haploid cells form; chromosomes are still double

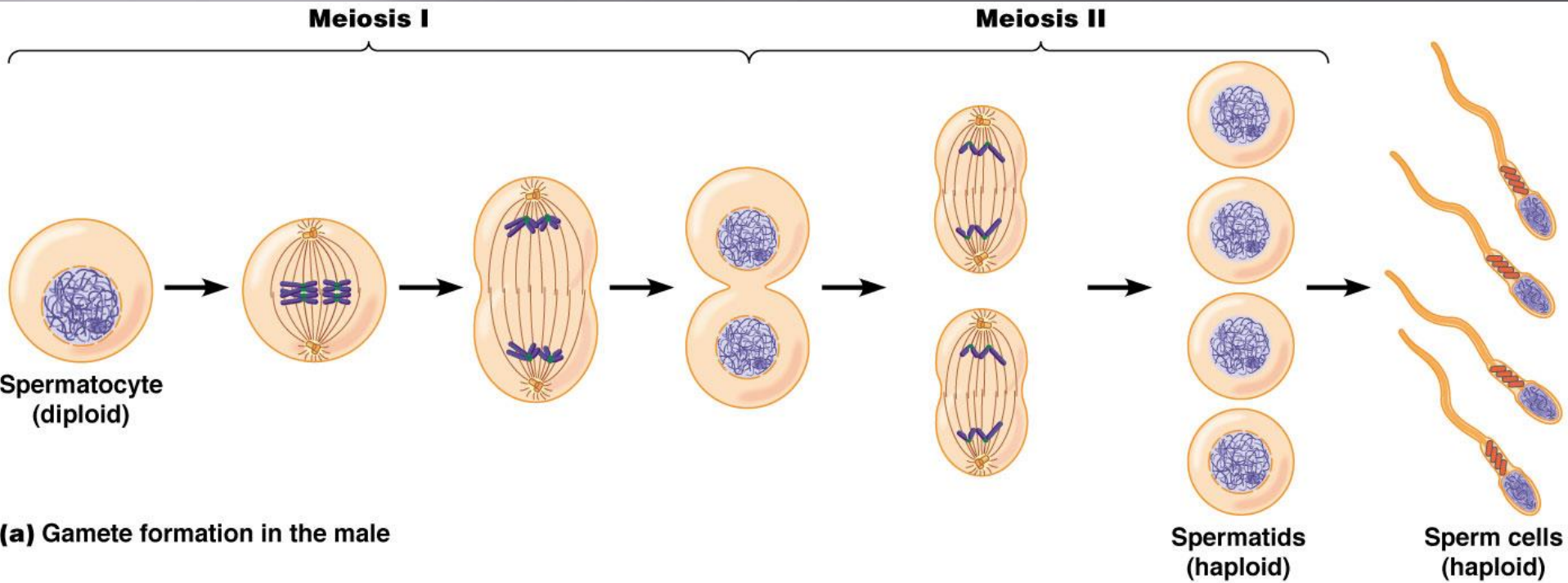
During another round of cell division, the sister chromatids finally separate; four haploid daughter cells result, containing single chromosomes

Crossing Over

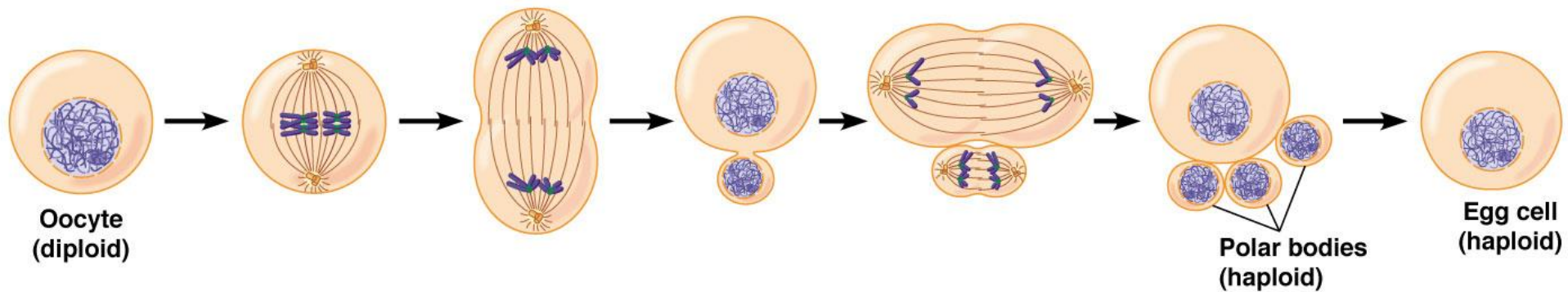
- ▣ The process of homologous chromosomes exchanging sections of DNA during Prophase I of Meiosis.
- ▣ This dramatically increases the variability of the gametes produced by any given individual.



Spermatogenesis and Oogenesis



(a) Gamete formation in the male



(b) Gamete formation in the female

Human Genome

Normal Human Karyotype

