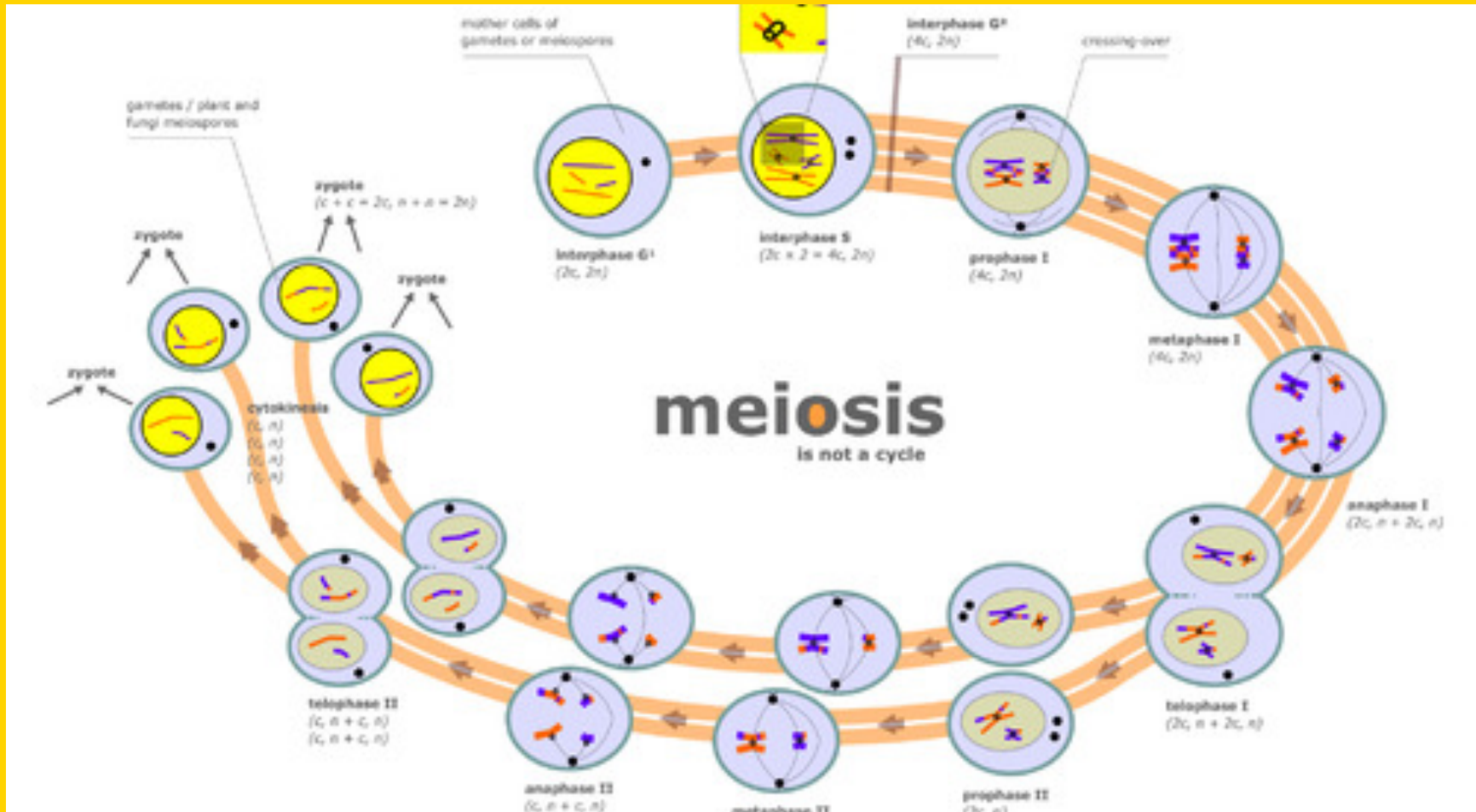
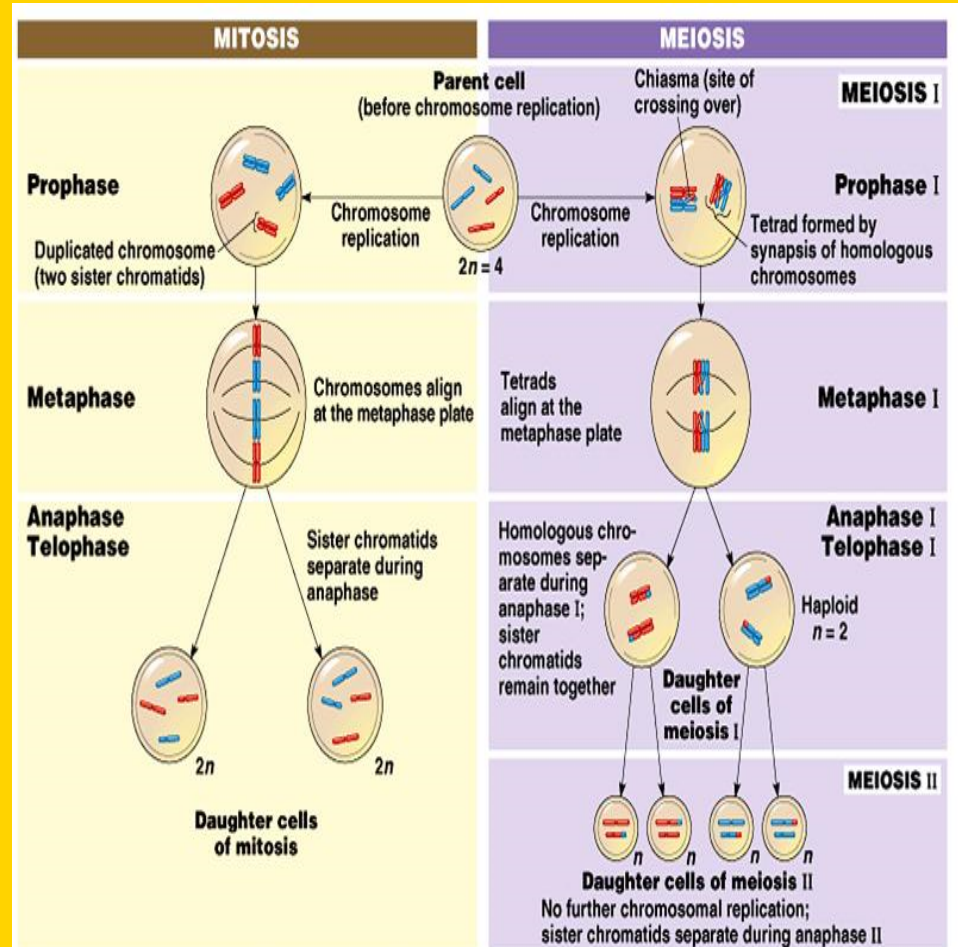


# Meiosis



# I. What?

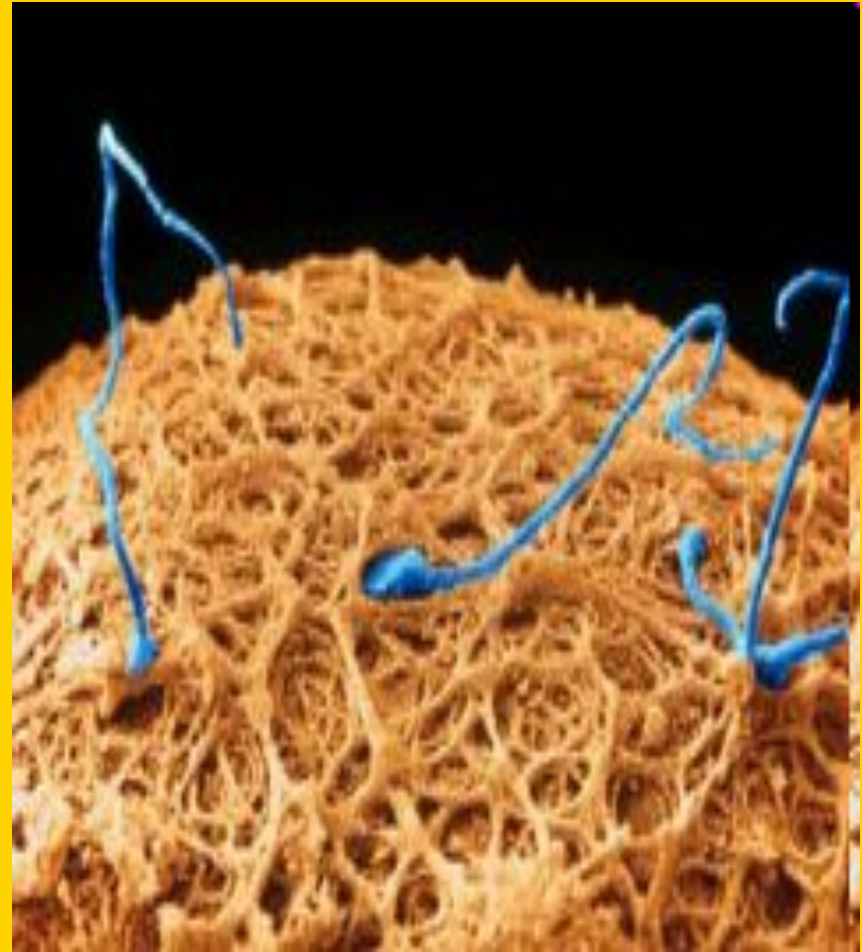
- A. The process by which *sex cells* are produced.
- B. The steps are *similar* to mitosis.



## II. Sex cells

### A. In animals:

1. Sperm  
(male sex cell)
2. Egg  
(female sex cell)



B. In plants:

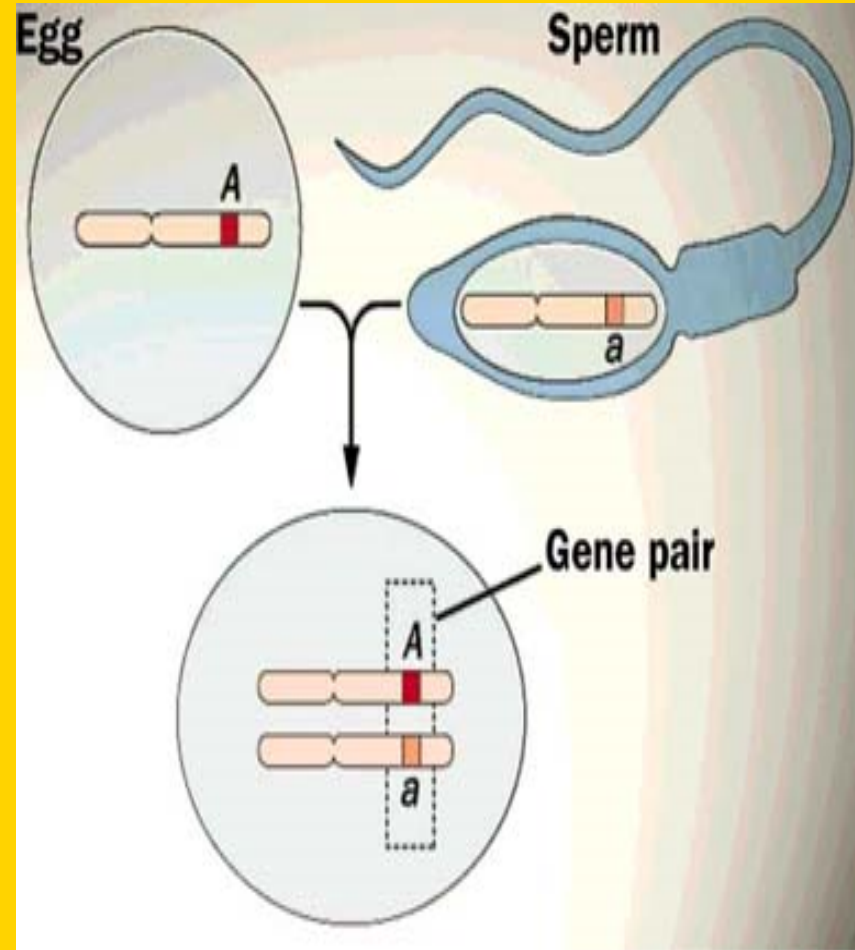
1. Pollen  
(male sex cell)
2. Ovum  
(female sex cell)





# III. Chromosome number

- A. Sex cells (gametes) are *haploid* ( $n$ ):  
*one set of chromosomes*
- B. Body (somatic) cells are *diploid* ( $2n$ ):  
*two sets of chromosomes*



# IV. Fertilization

## A. Animals

*Sperm and egg unite to form the first body cell of an organism, a zygote.*

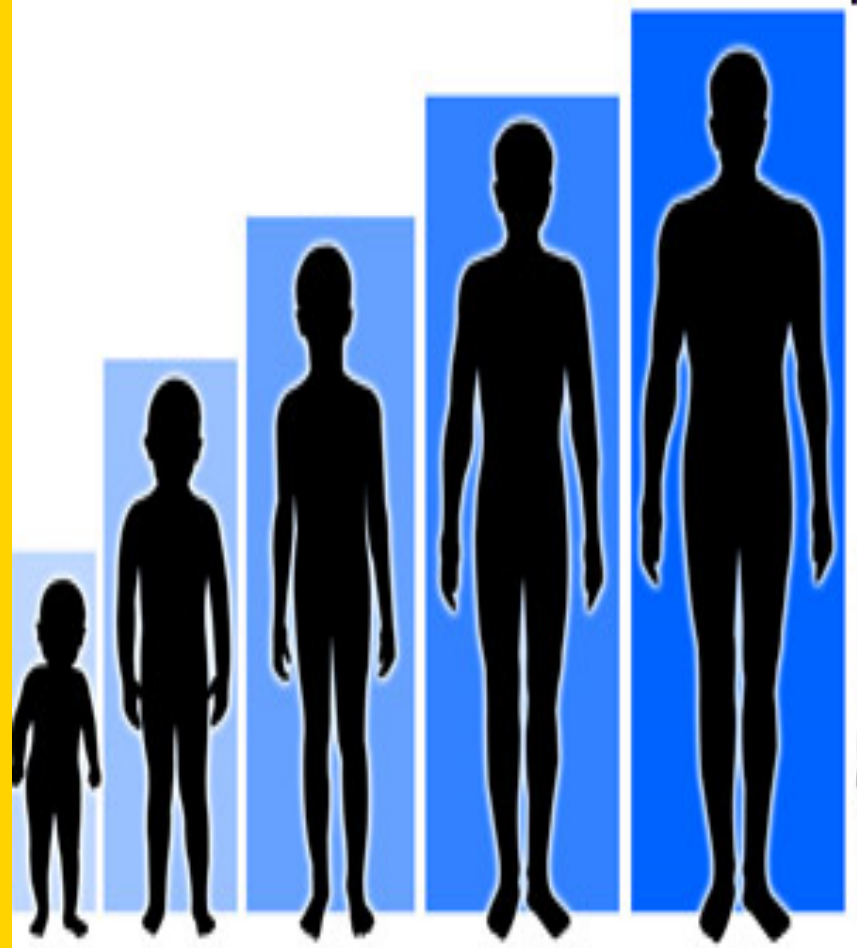
## B. Plants

*Sperm (in pollen) and egg (in ovule) unite to form a zygote.*

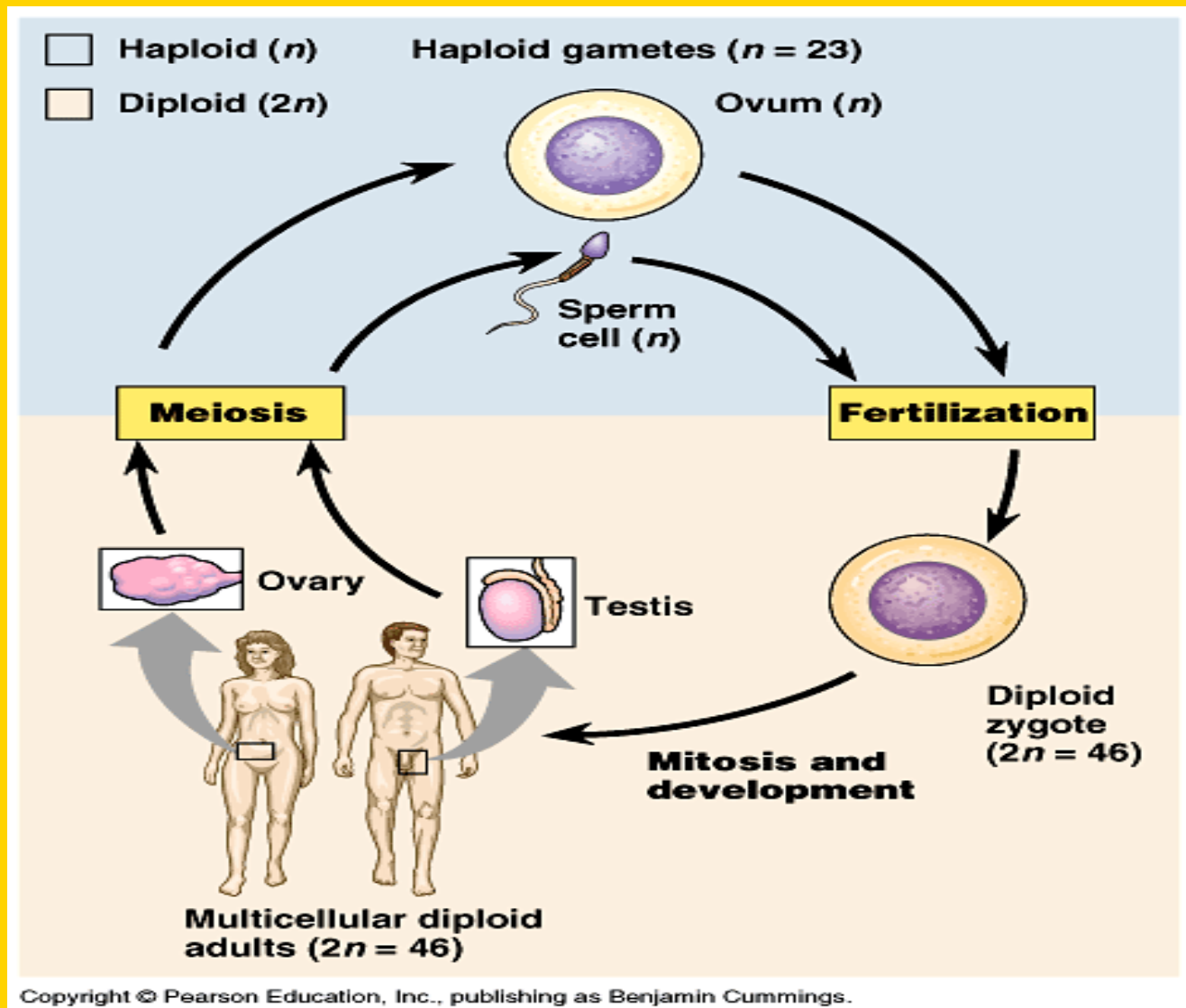


# V. Growth

- A. Once the zygote has formed, it begins to divide through the process of mitosis.



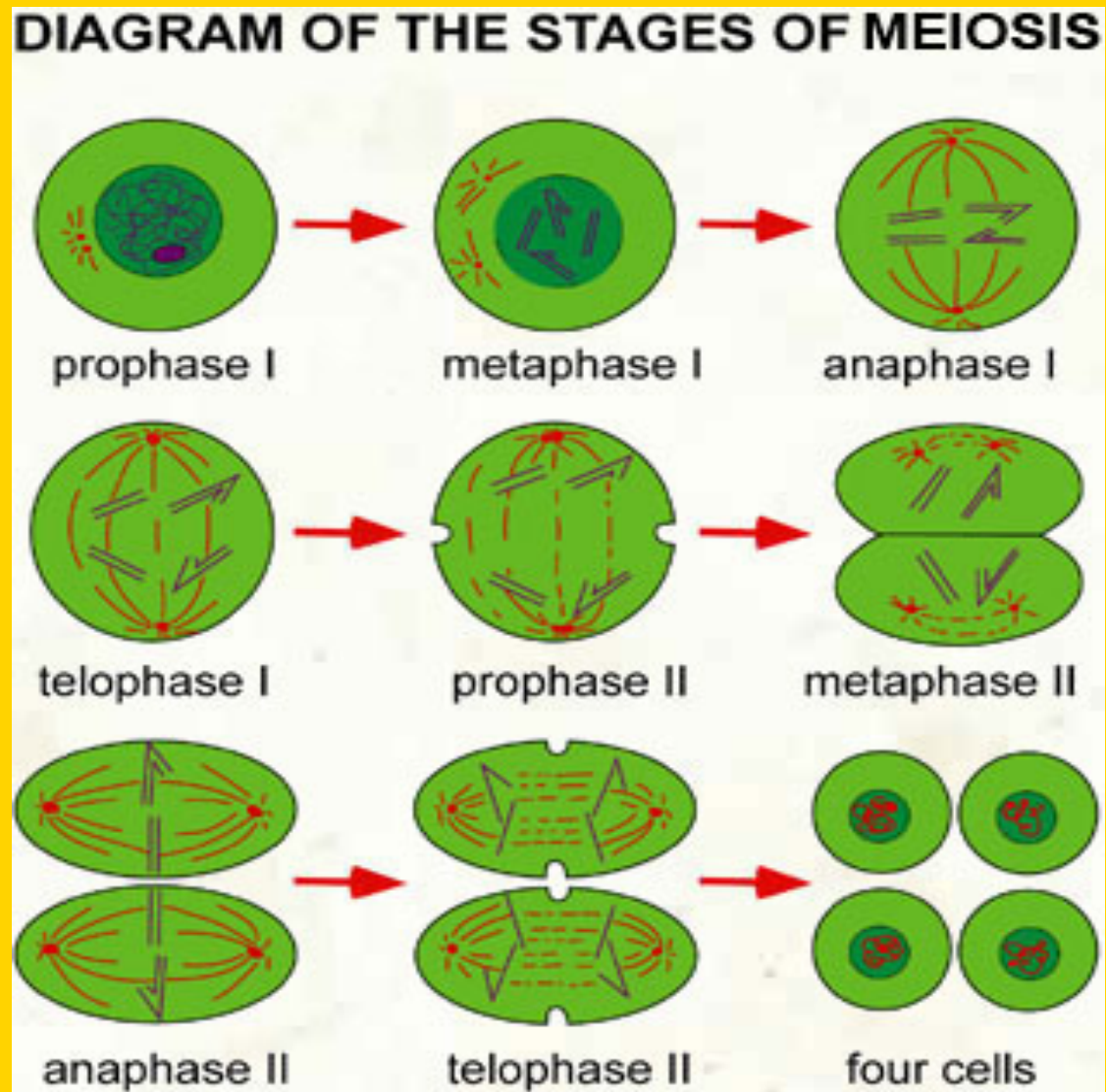
# Meiosis, Fertilization, and Mitosis







# The Steps of Meiosis



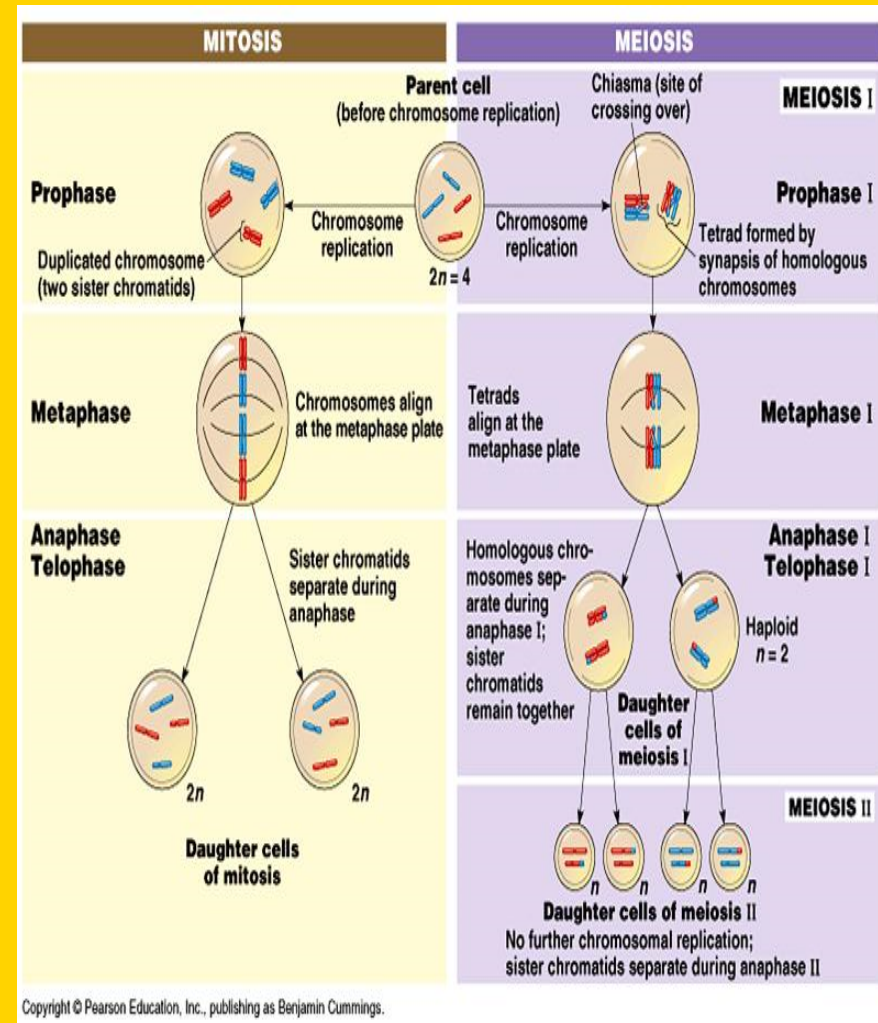
# I. Overview

## A. Similar to mitosis:

1. Cell division
2. PMAT are similar

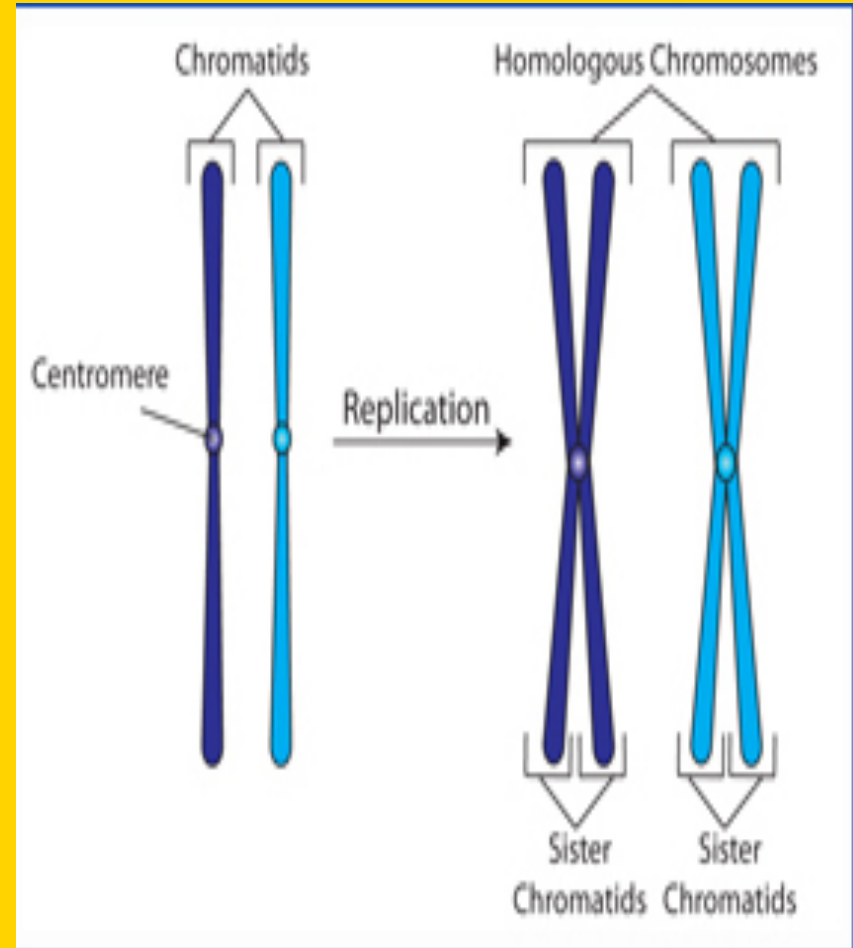
## B. Unlike mitosis:

1. Two cell divisions
2. Four cells form from one



## II. Before Meiosis during Interphase

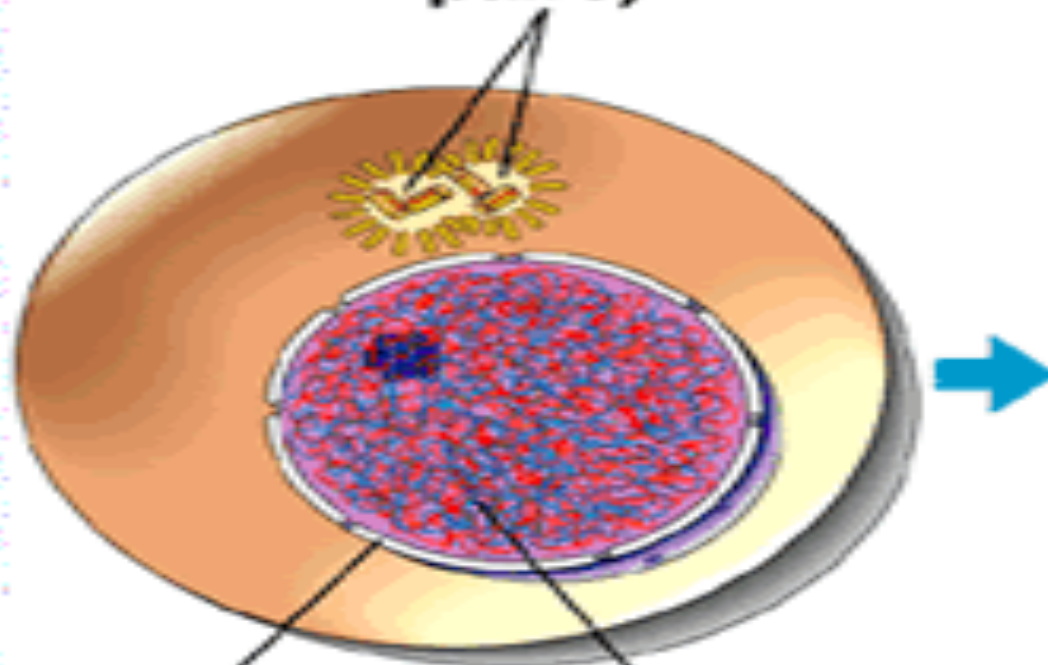
- A. Chromosomes are replicated (DNA)
- B. Meiosis begins with a  $4n$  number of chromosomes (four sets)





## interphase I

Centrosomes  
(with centriole  
pairs)

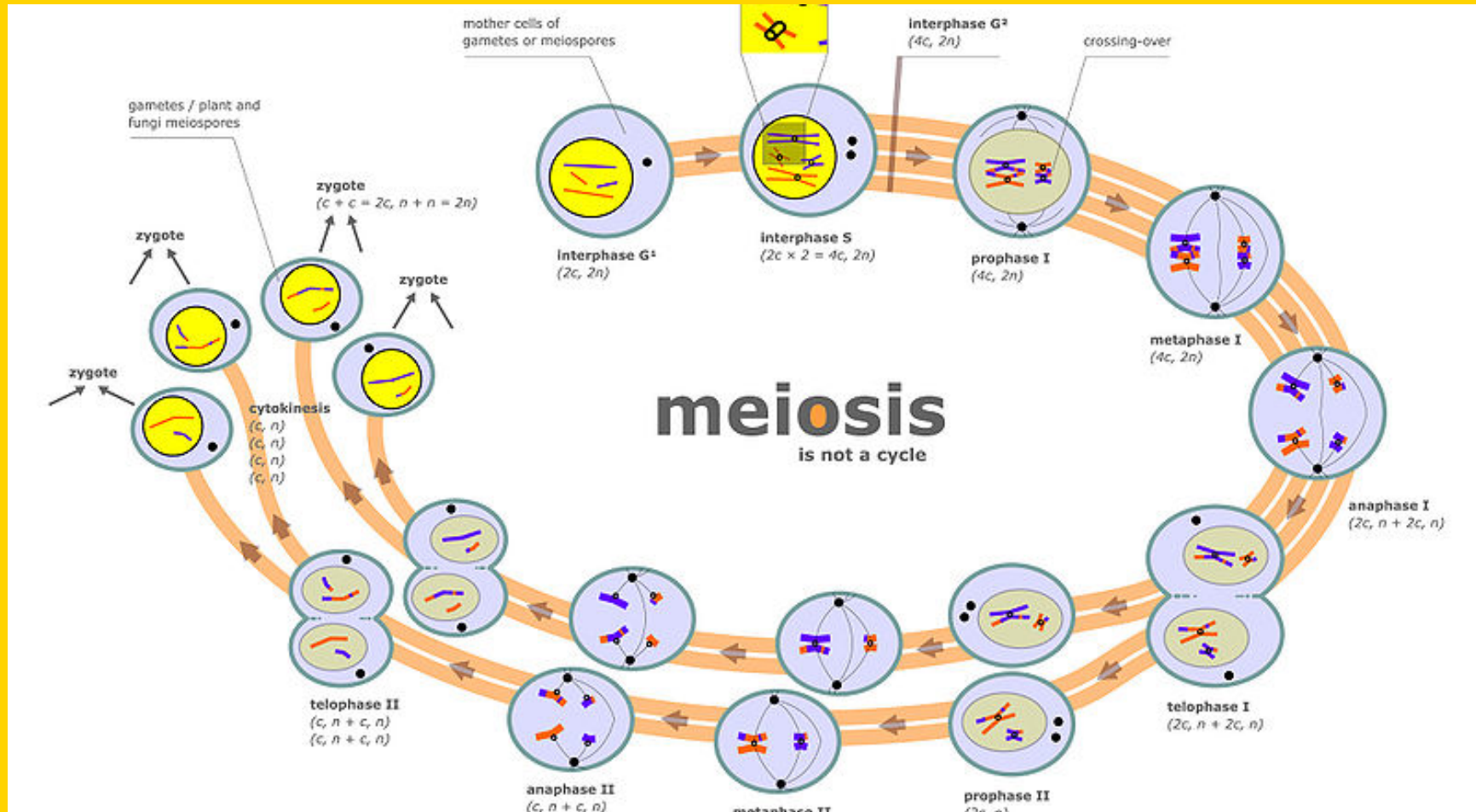


Nuclear  
envelope

Chromatin

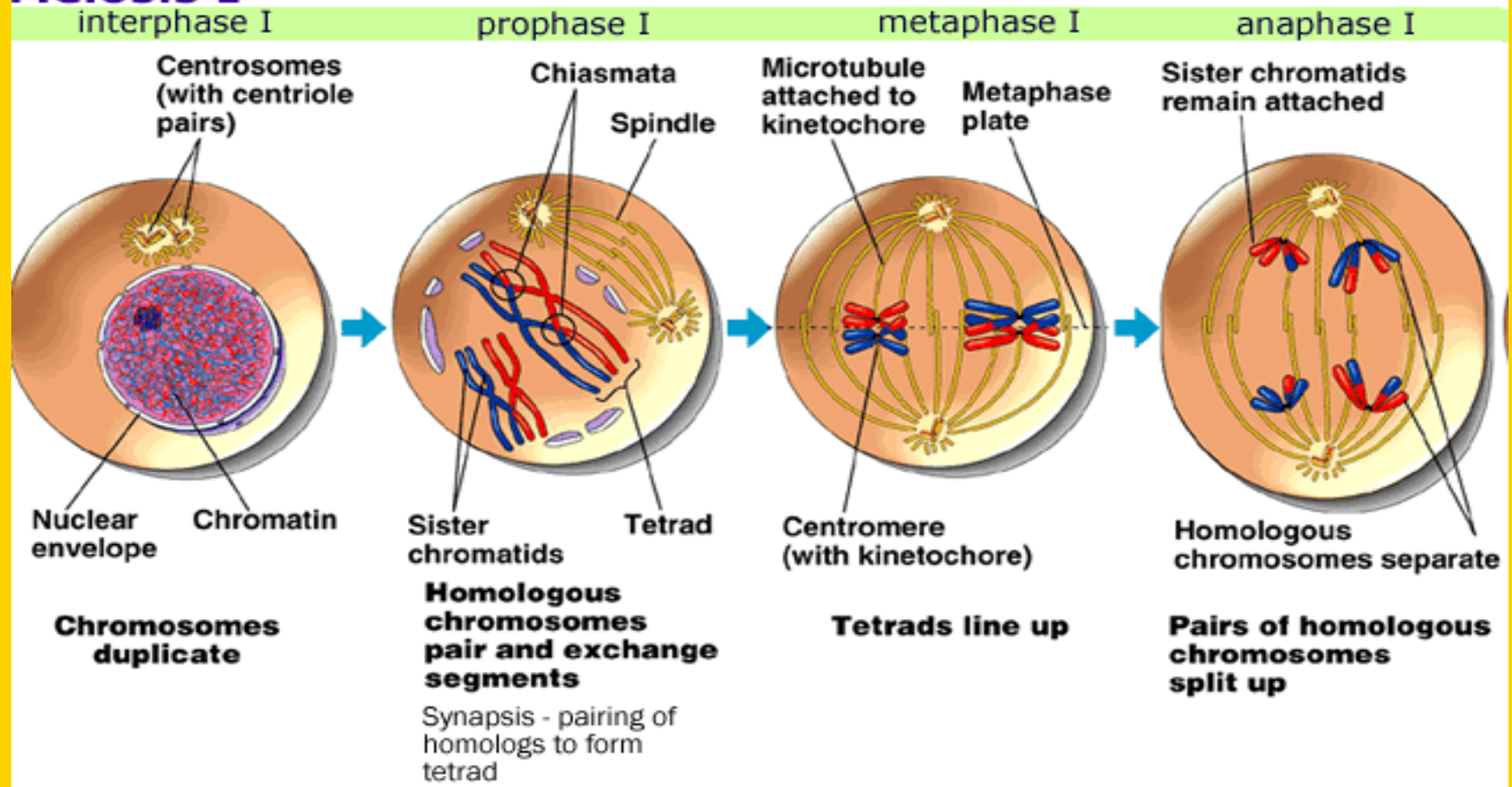
**Chromosomes  
duplicate**

# III. The Details:



# A. Meiosis I

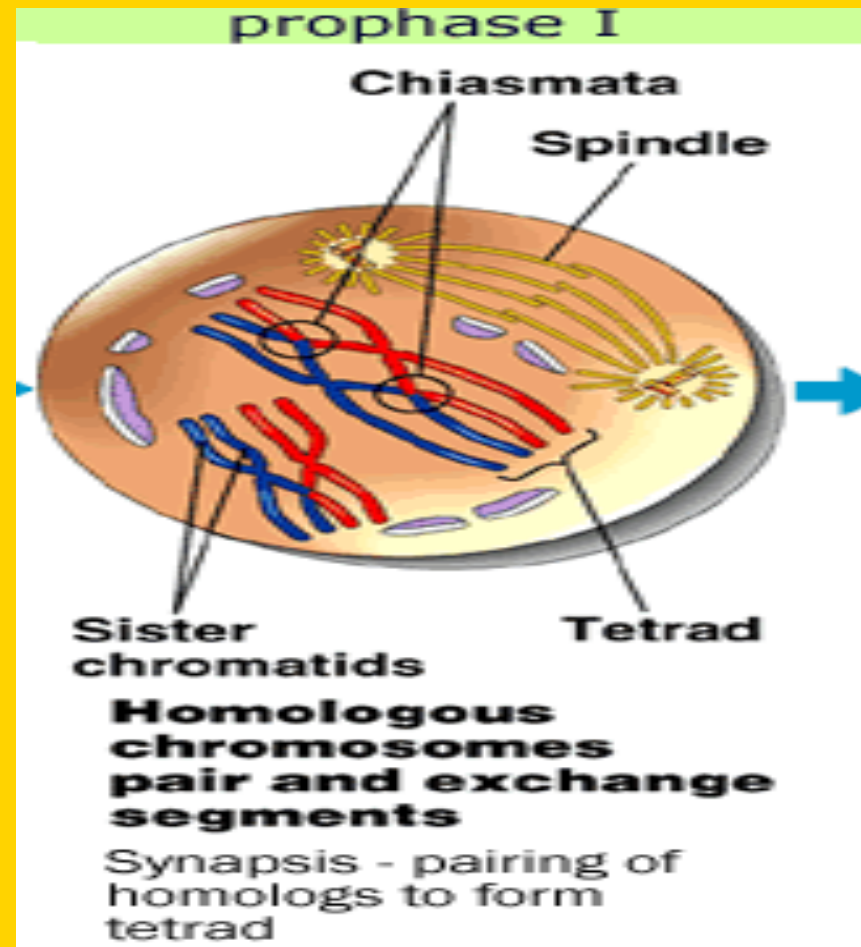
## Meiosis I



# A. Meiosis I

## 1. Prophase I (preparing)

- a. Nuclear membrane dissolves
- b. Spindle fibers form
- c. Chromosomes condense
- d. *Crossing over* occurs between homologous chromosomes

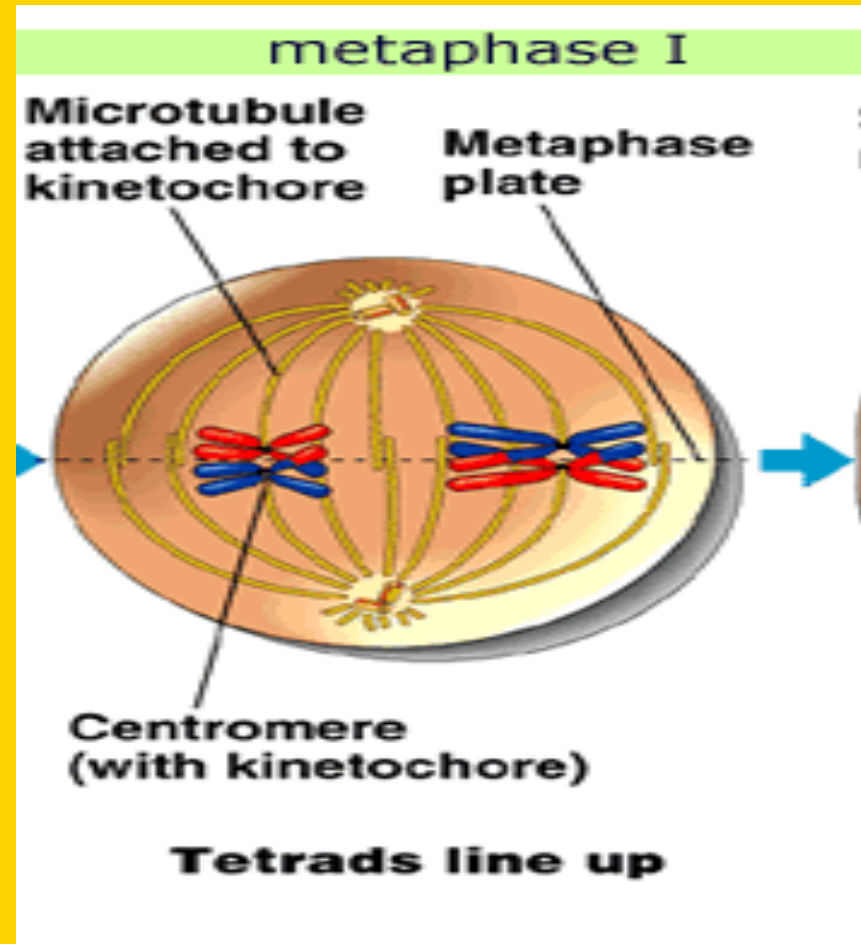




# A. Meiosis I

## 2. Metaphase I (middle)

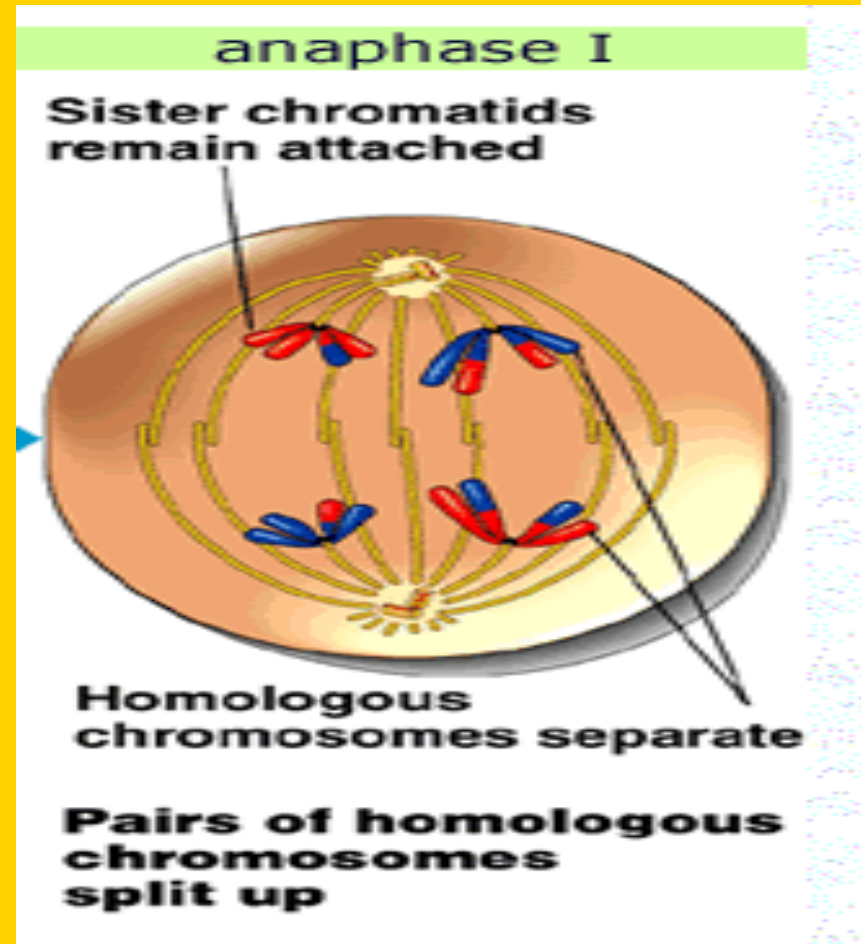
- a. Homologous chromosomes line up in the middle of the cell



# A. Meiosis I

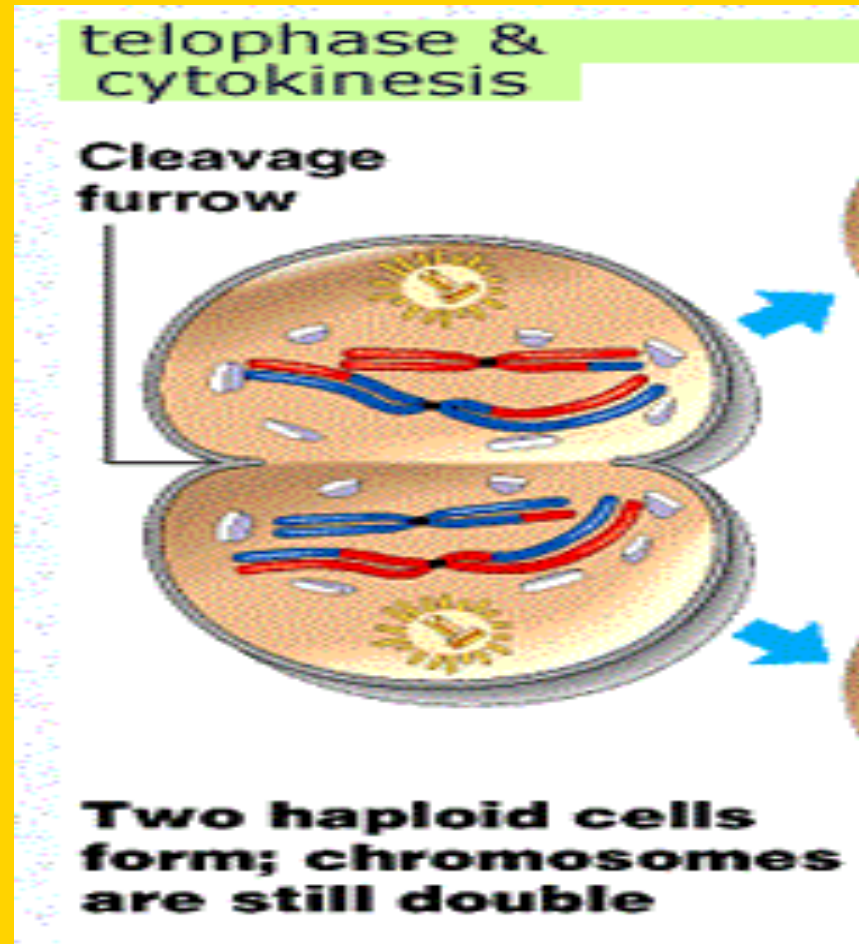
## 3. Anaphase I (apart)

- a. Homologous chromosomes are pulled apart by the spindle fibers

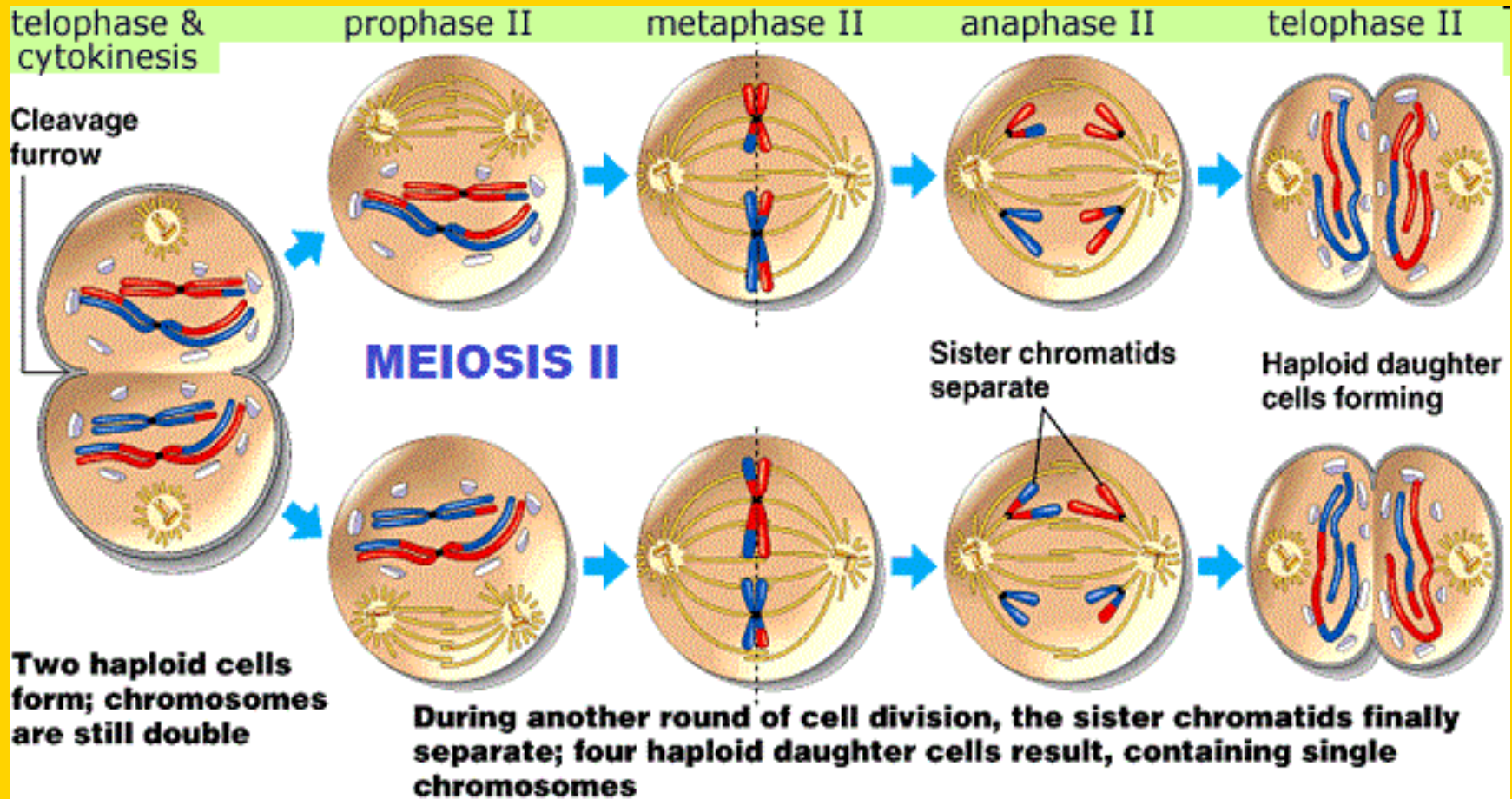


# A. Meiosis I

4. Telophase I  
(two cells form)
  - a. Chromosomes uncondense (uncoil)
  - b. Nuclear membrane briefly reappears



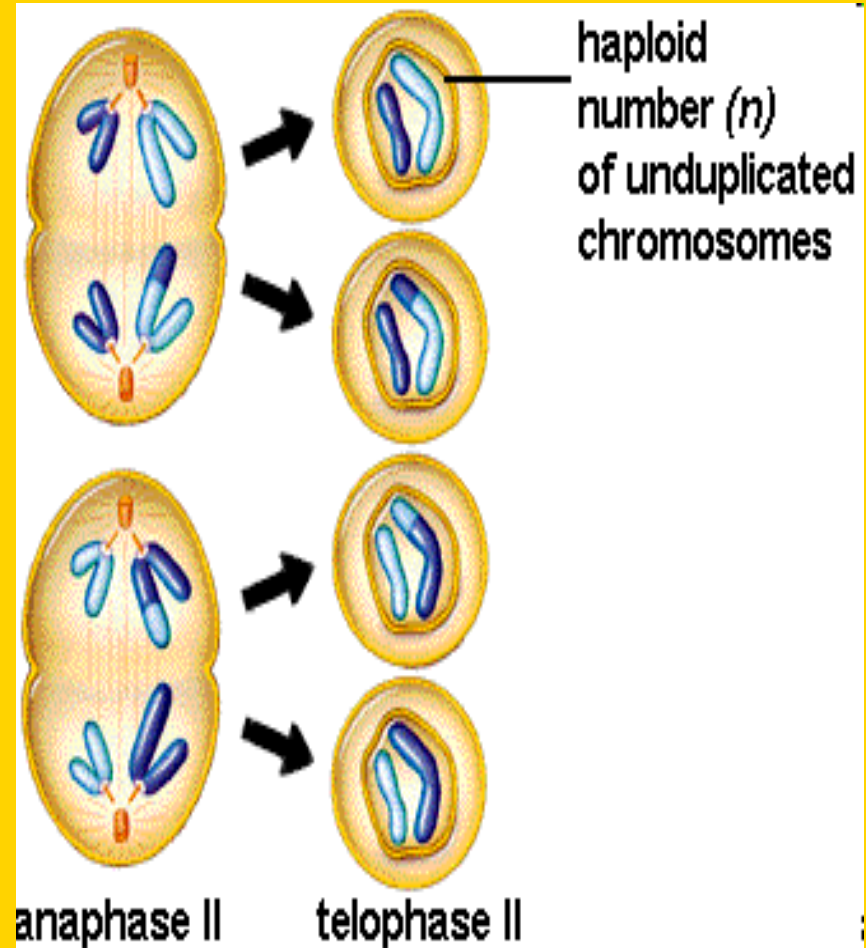
# Meiosis II





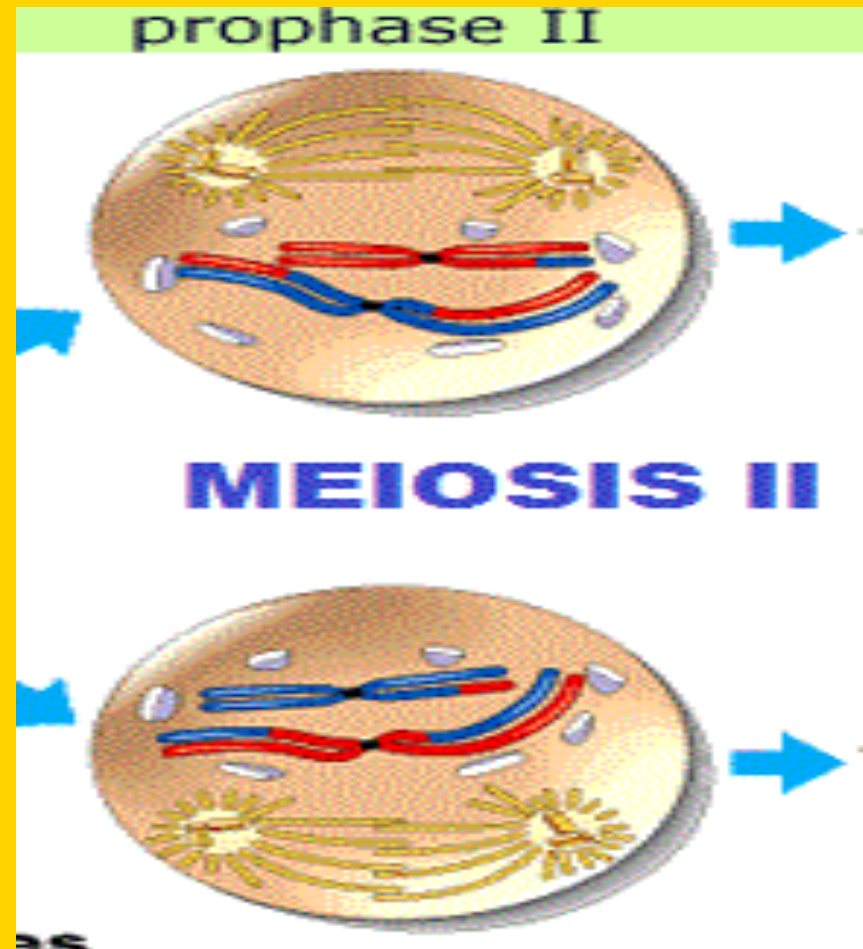
## B. Meiosis II

1. Identical to mitosis
2. No interphase before meiosis II
3. The Steps:



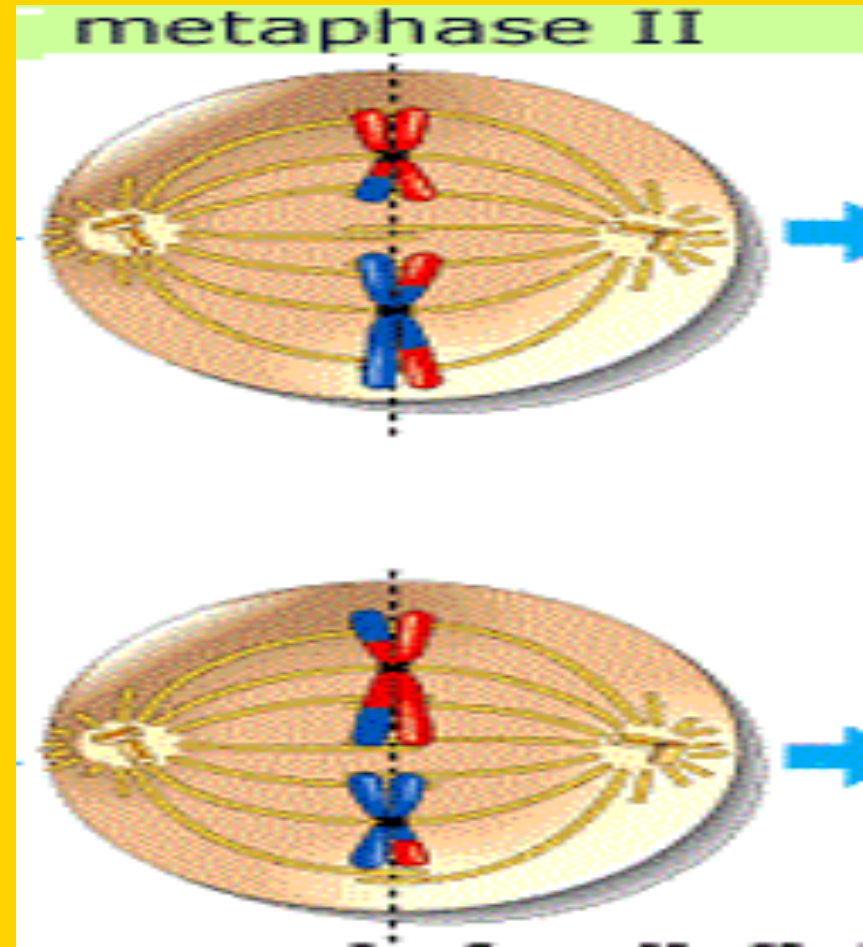
## B. Meiosis II

### a. Prophase II



# B. Meiosis II

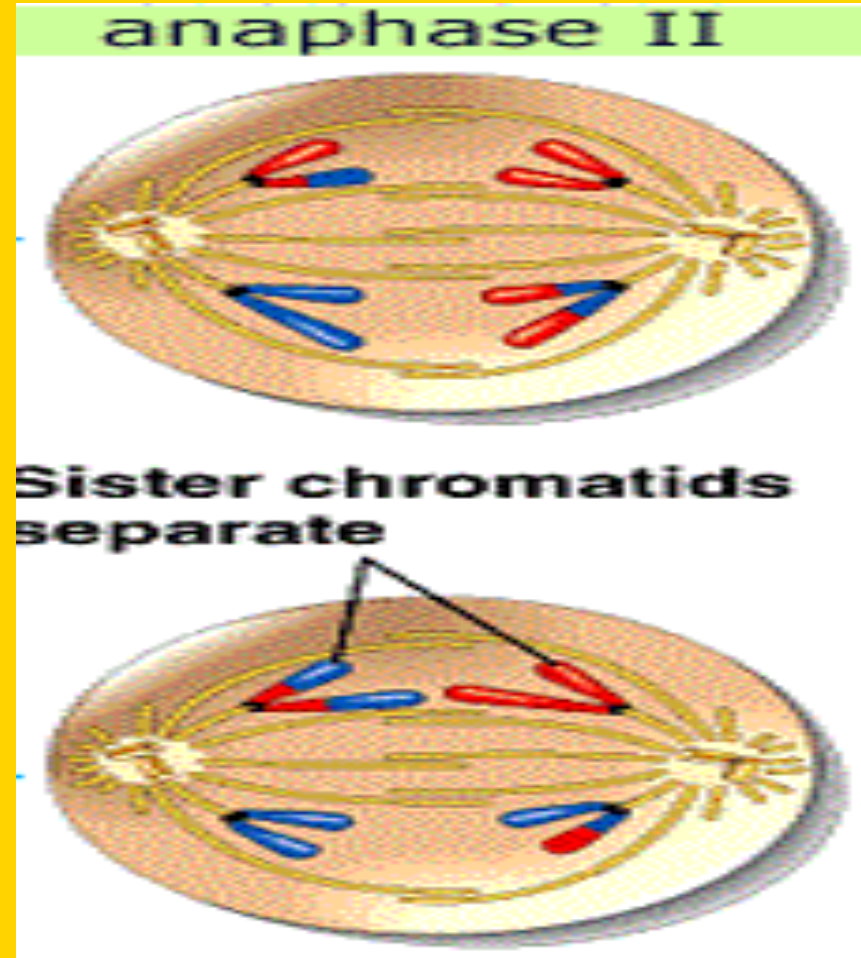
## b. Metaphase II



## B. Meiosis II

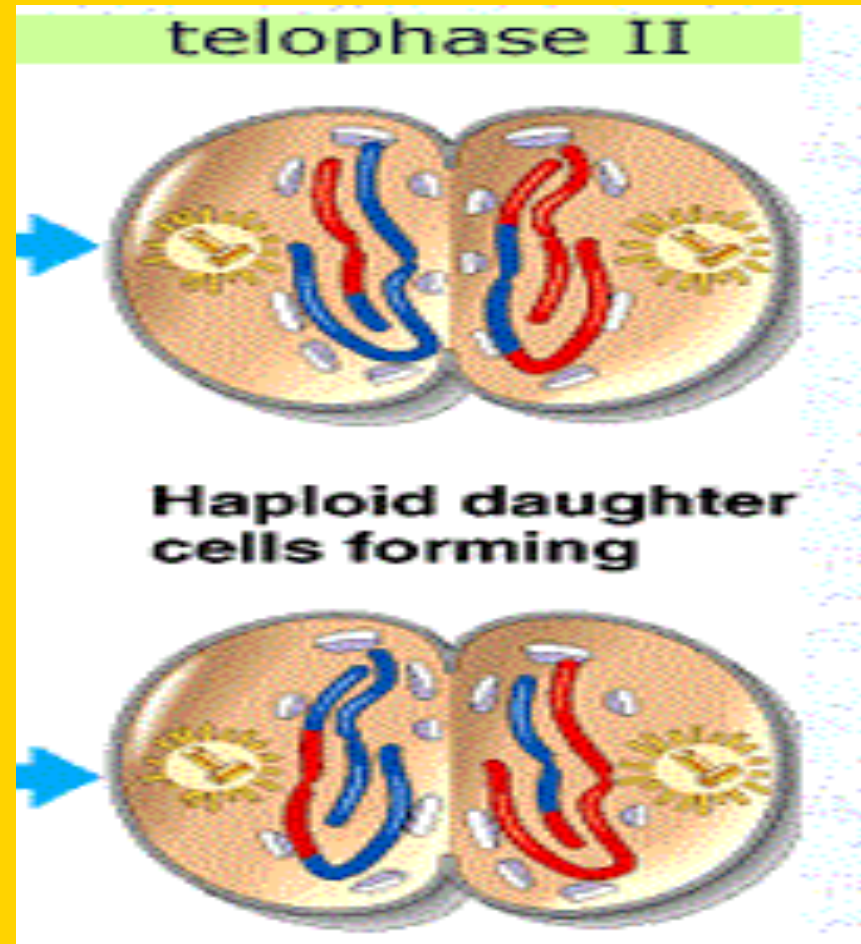
### c. Anaphase II

- i. The sister chromatids pull apart during anaphase II just like mitosis



## B. Meiosis II

### d. Telophase II





# IV. The End Result

- A. Four haploid cells form from one diploid cell
- B. Each cell is unique because of:
  1. Crossing over
  2. Different possible chromosome alignments

