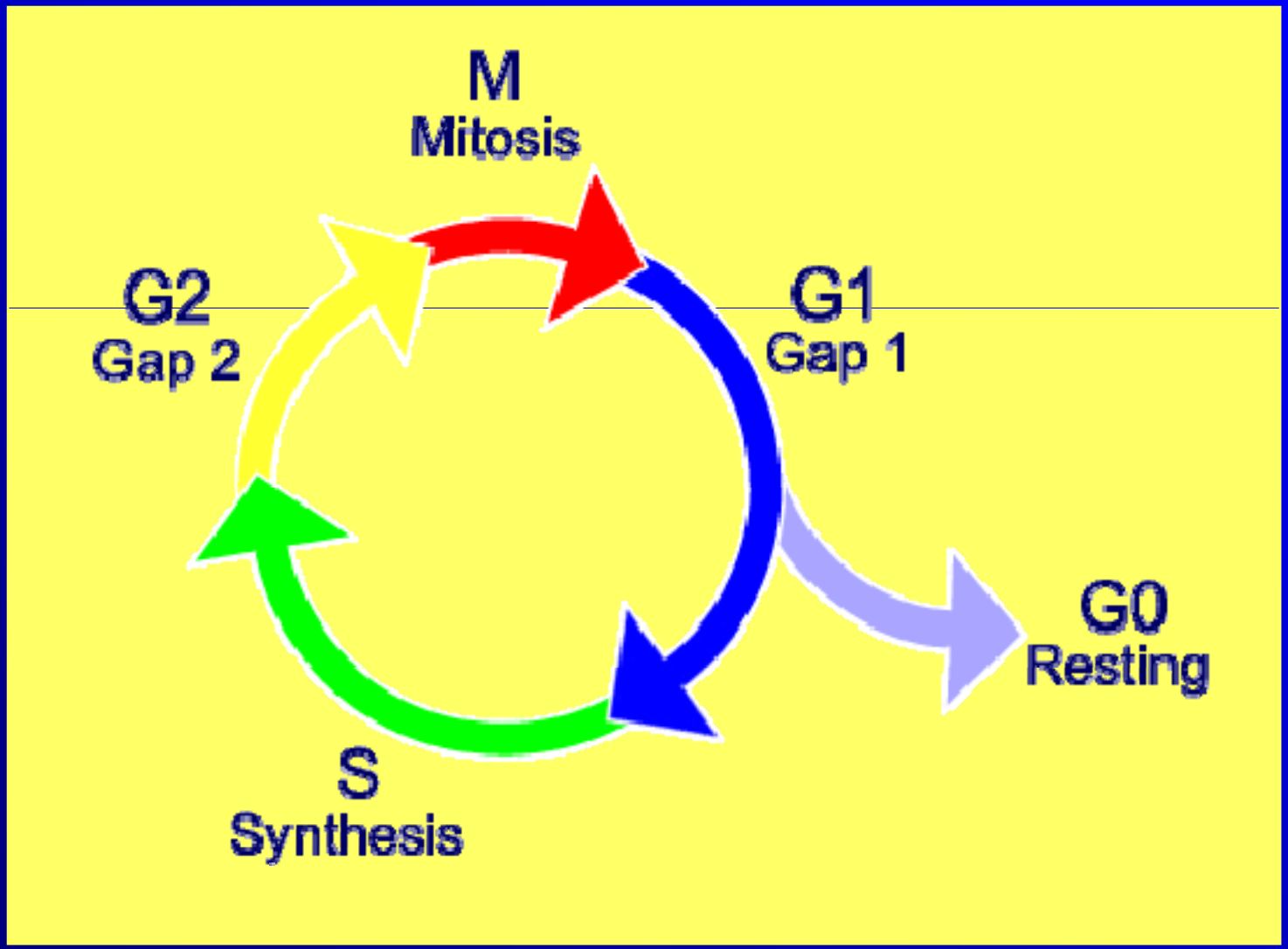
Technical Terms:

- Chromosomes
- Chromatids
- Zygote
- Gametes
- Diploid
- Haploid

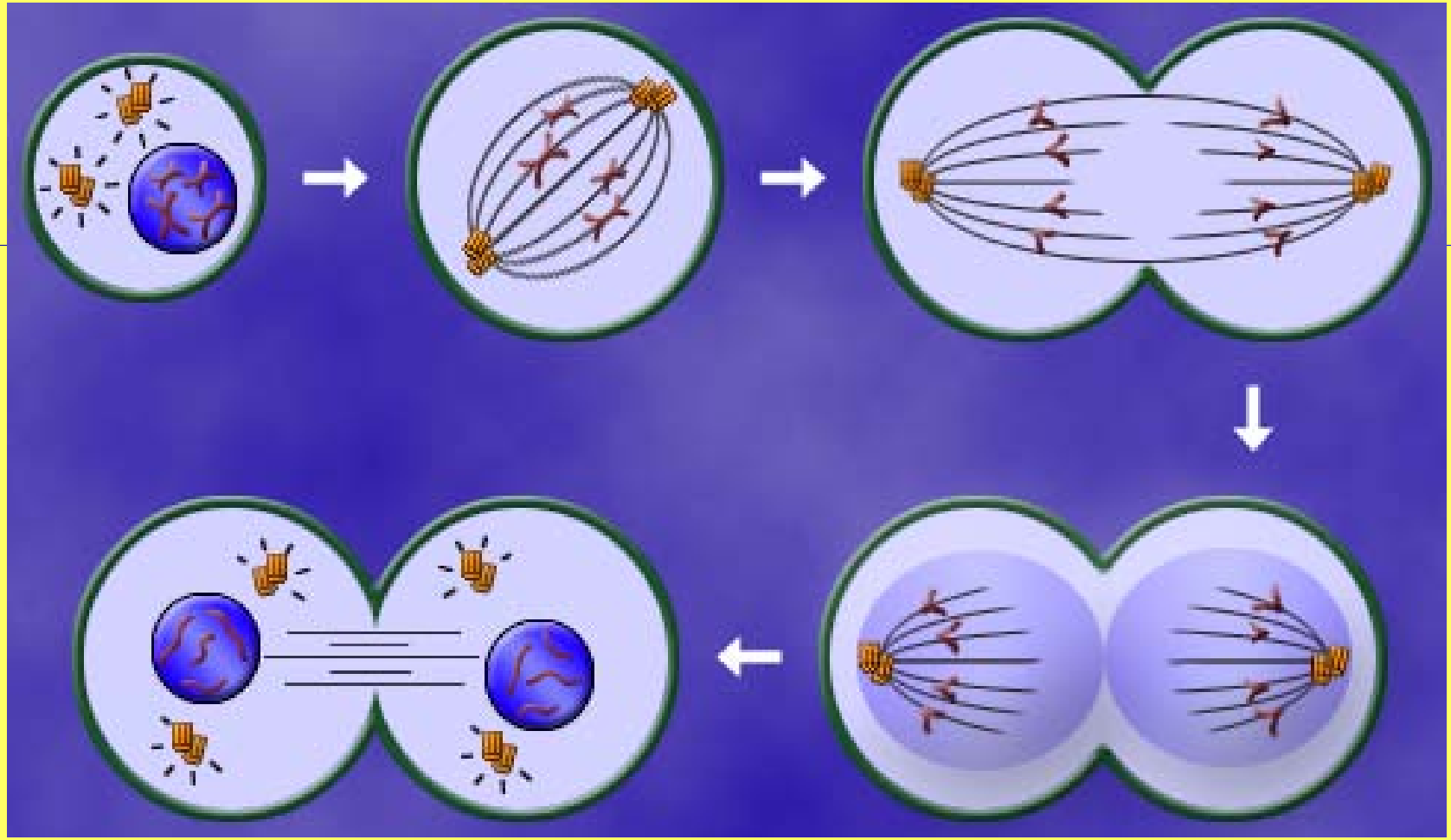
Cell Cycle



Mitosis

- The process of cell division and distribution of cell's DNA to 2 daughter cells
- Animation: http://www.cellsalive.com/mitosis.htm
- As a result, all cells have the same number of chromosomes (Humans have 46 chromosomes; 23 from ea parent) including 2 sex chromosomes (Meiosis cells have $\frac{1}{2}$ the number of chromosoomes)
- A typical somatic cell is programmed to divide 20-50Xs then die. EXCEPTION: muscle, liver, and nerve cells do not divide

Mitosis



Clinical Relevance: Why should you care…

Goal of chemotherapy (cancer therapy) is to kill cells without killing normal cells, so the focus of therapy is to target rapidly dividing cells since cancer cells divids faster than normal cells

Targets: A) inhibit DNA synthesis

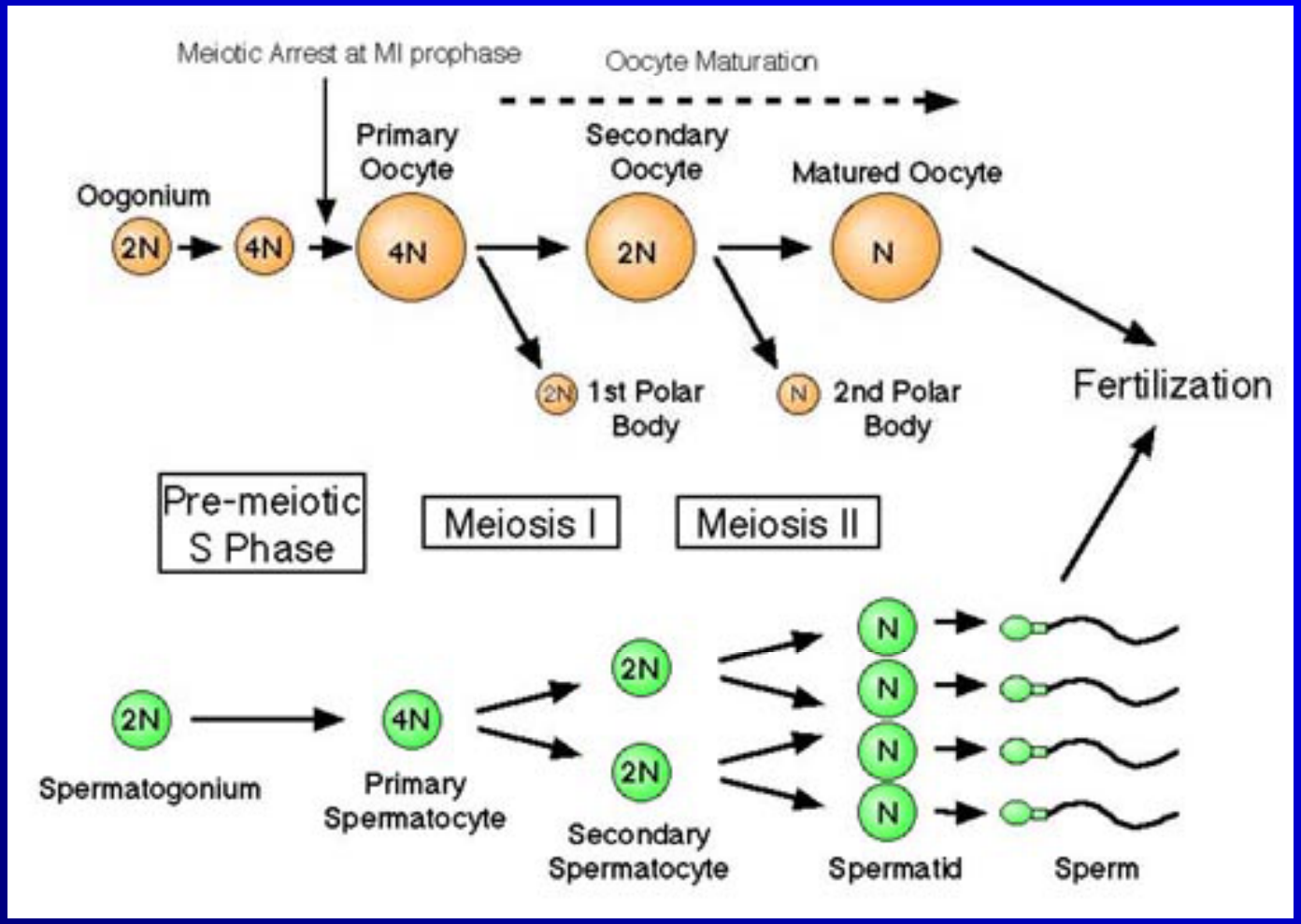
B) affect spindle formation or function

Meiosis

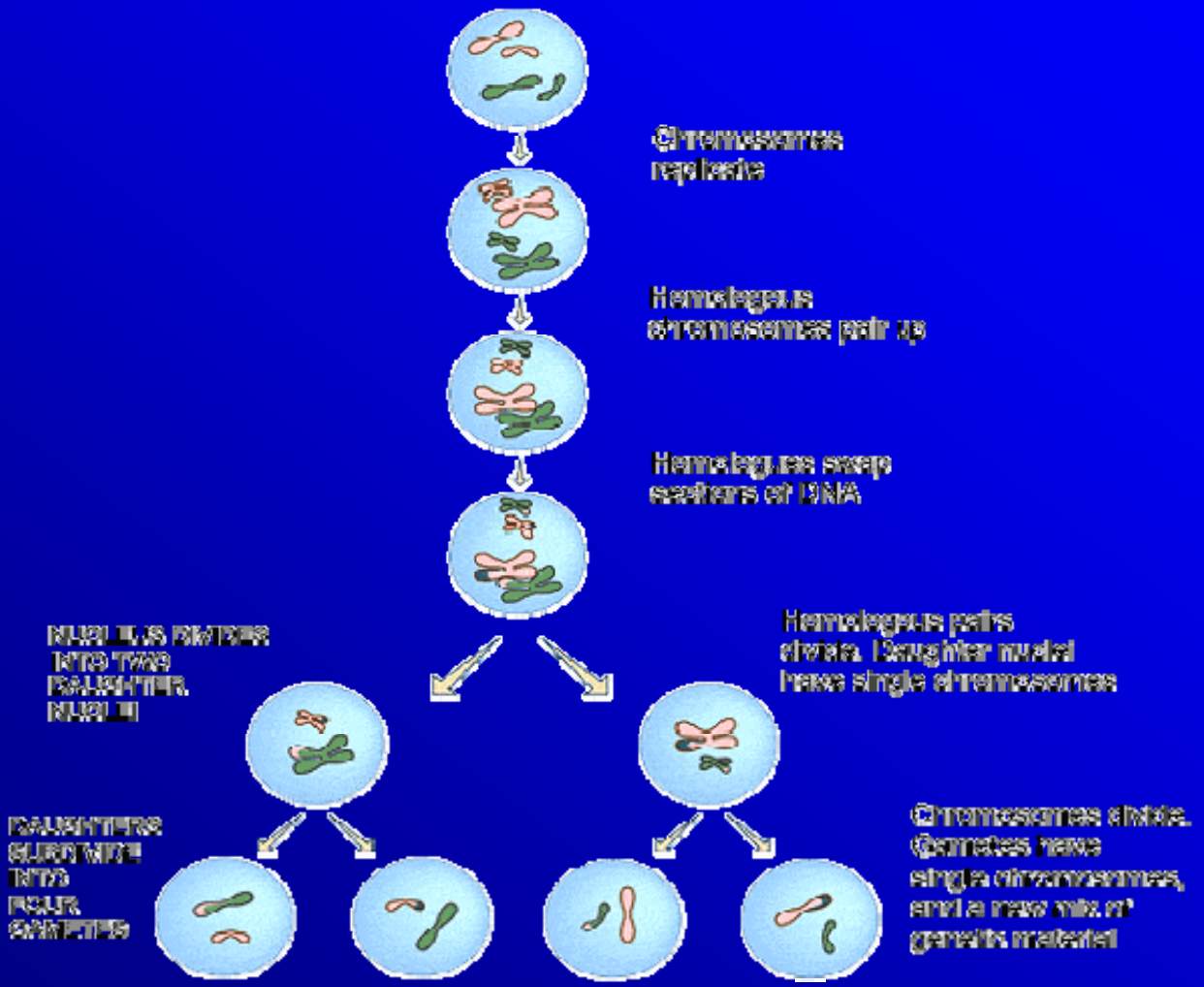
- Occurs during "S" phase
- Requires 2 step cell division:
  - 1st **Meiosis I**: produce 2 intermediate daughter cells

    Animations: http://biology.about.com/library/blmeiosisanim.htm
    http://biology.about.com/library/blmeiosisanim2.htm
    http://www.cellsalive.com/meiosis.htm
    http://www.johnkyrk.com/meiosis.html
    http://www.biology.arizona.edu/cell_bio/tutorials/meiosis/page3.html
  - 2nd **Meiosis II**: sister chromatids separate to form 4 haploid gametes

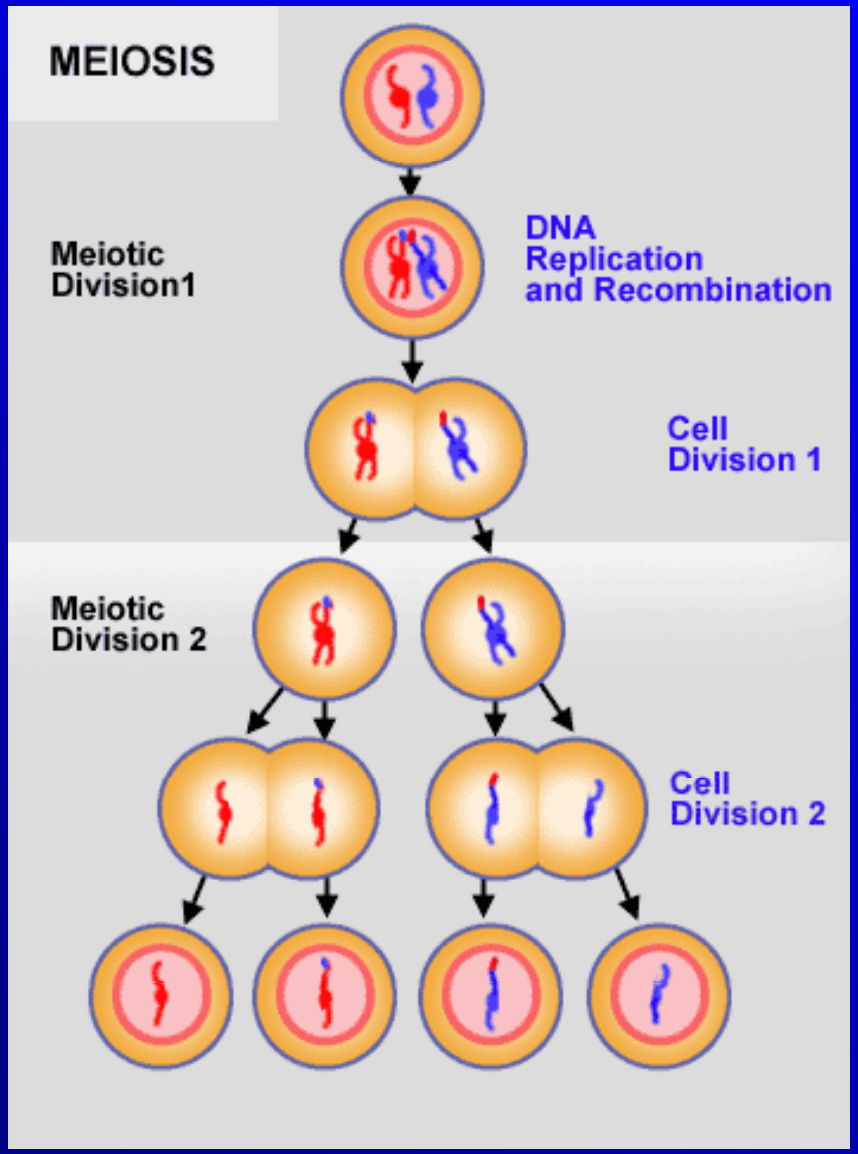
Meiosis


Meiotic Arrest at MI prophase
Oocyte Maturation
Primary Oocyte
Secondary Oocyte
Matured Oocyte
Oogonium
2N
4N
4N
2N
N
2N 1st Polar Body
N 2nd Polar Body
Fertilization
Pre-meiotic S Phase
Meiosis I
Meiosis II
2N
4N
2N
2N
N
N
N
N
Spermatogonium
Primary Spermatocyte
Secondary Spermatocyte
Spermatid
Sperm

Meiosis



Meiosis

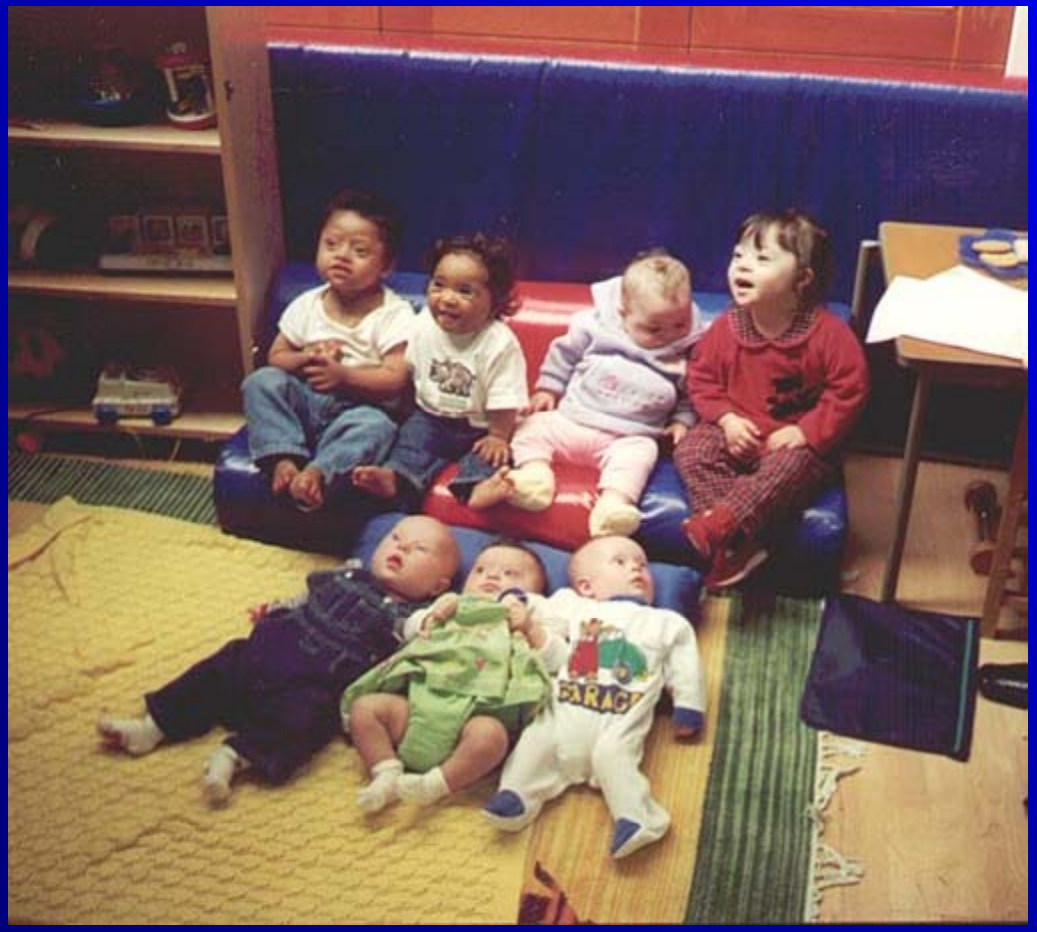

MEIOSIS
Meiotic Division1
DNA Replication and Recombination
Cell Division 1
Meiotic Division 2
Cell Division 2

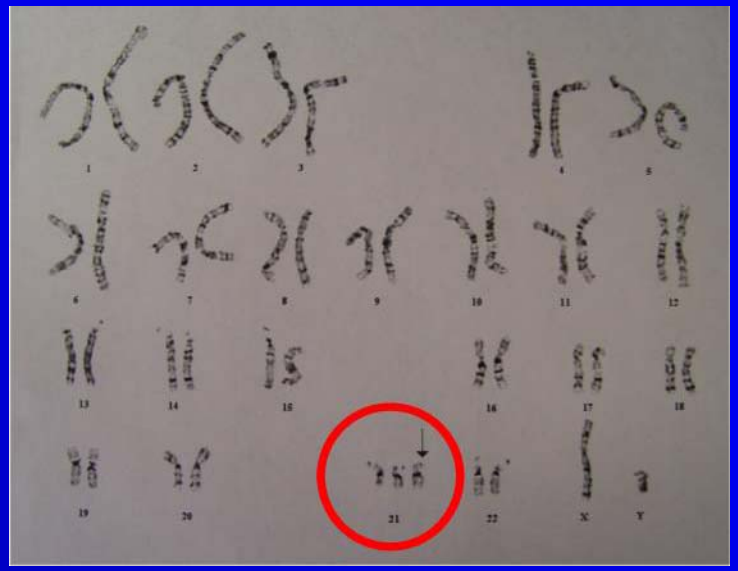
Clinical Relevance: Why should you care…

If no separation during anaphase I or II, then 1 gamete will get 2 copies on a chromosome and other gametes none

i.e. Trisomy 21; Down Syndrome; Kline Feiter's, Turner's (pictures)

Clinical Relevance: Why should you care…





1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
X
Y

Mitosis

- Diploid
- 1 division (2 diploid cells)
- Occurs in somatic cells (all cells)
- No crossing over

Meiosis

- Haploid
- 2 divisions (4 haploid gametes)
- Occurs only in sex cells (gametocytes)
- Crossing over

Different types of twins:

MONOZYGOTIC

Identical twins

1 zygote splits into 2 embryos

If zygote is not split completely, then "Siamese twins" can result

DIZYGOTIC

Fertilization occurs by 2 different sperms (2 zygotes)

What happens…2 embryos implant individually