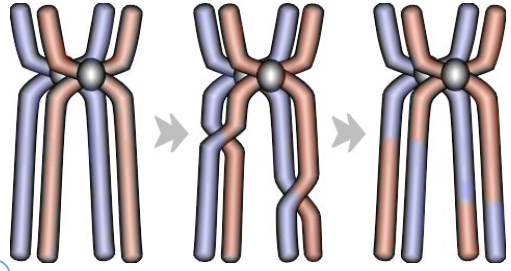
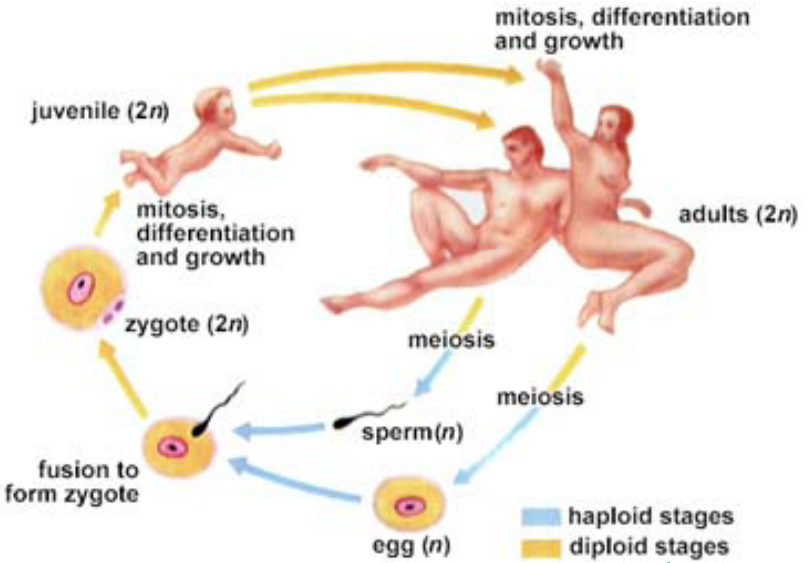
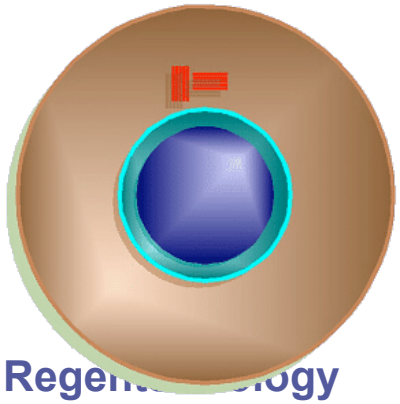
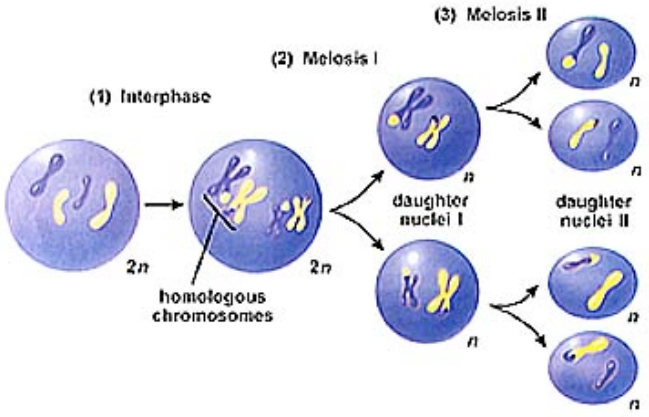




Meiosis & Sexual Reproduction

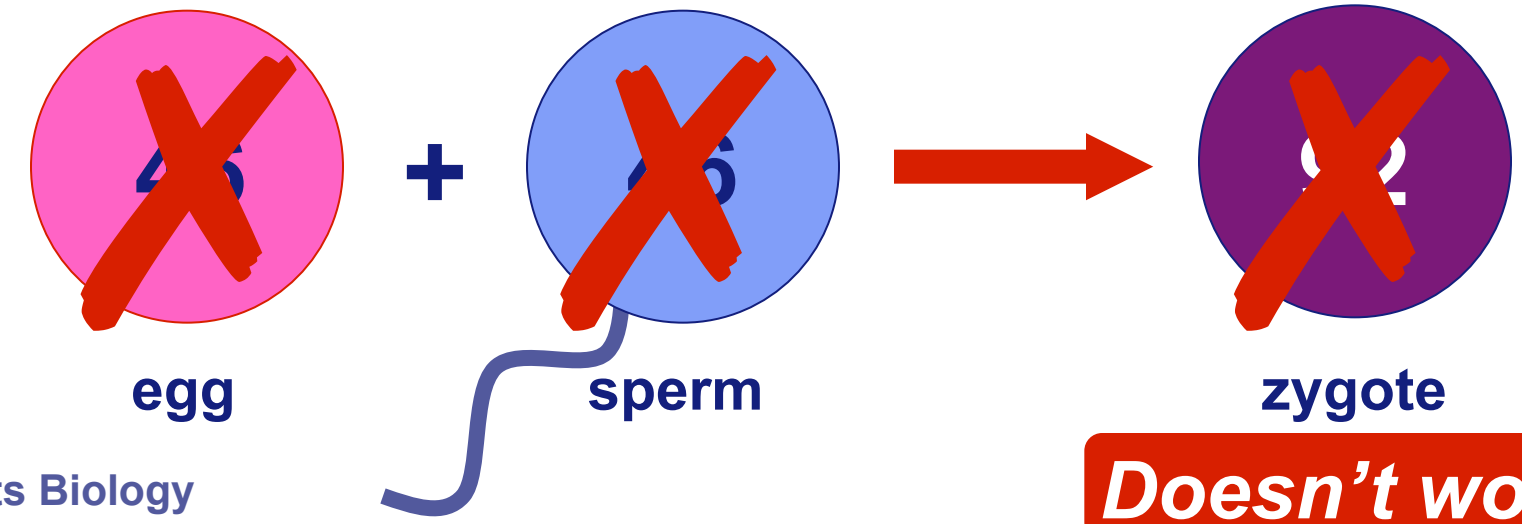




How about the rest of us?

- What if a complex multicellular organism (like us) wants to reproduce?
  - joining of egg + sperm
- Do we make egg & sperm by mitosis? **No!**

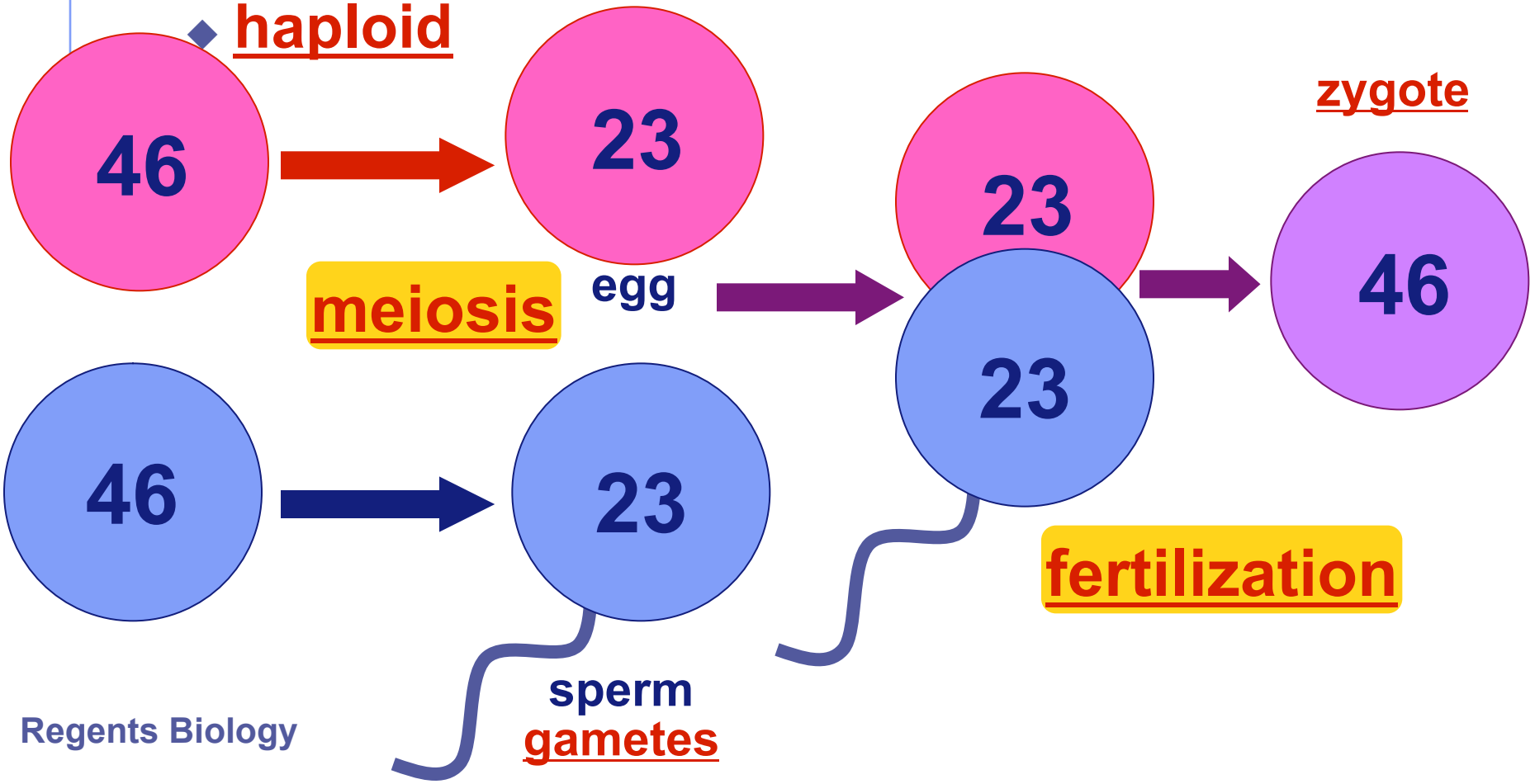
What if we did, then….



Doesn't work!

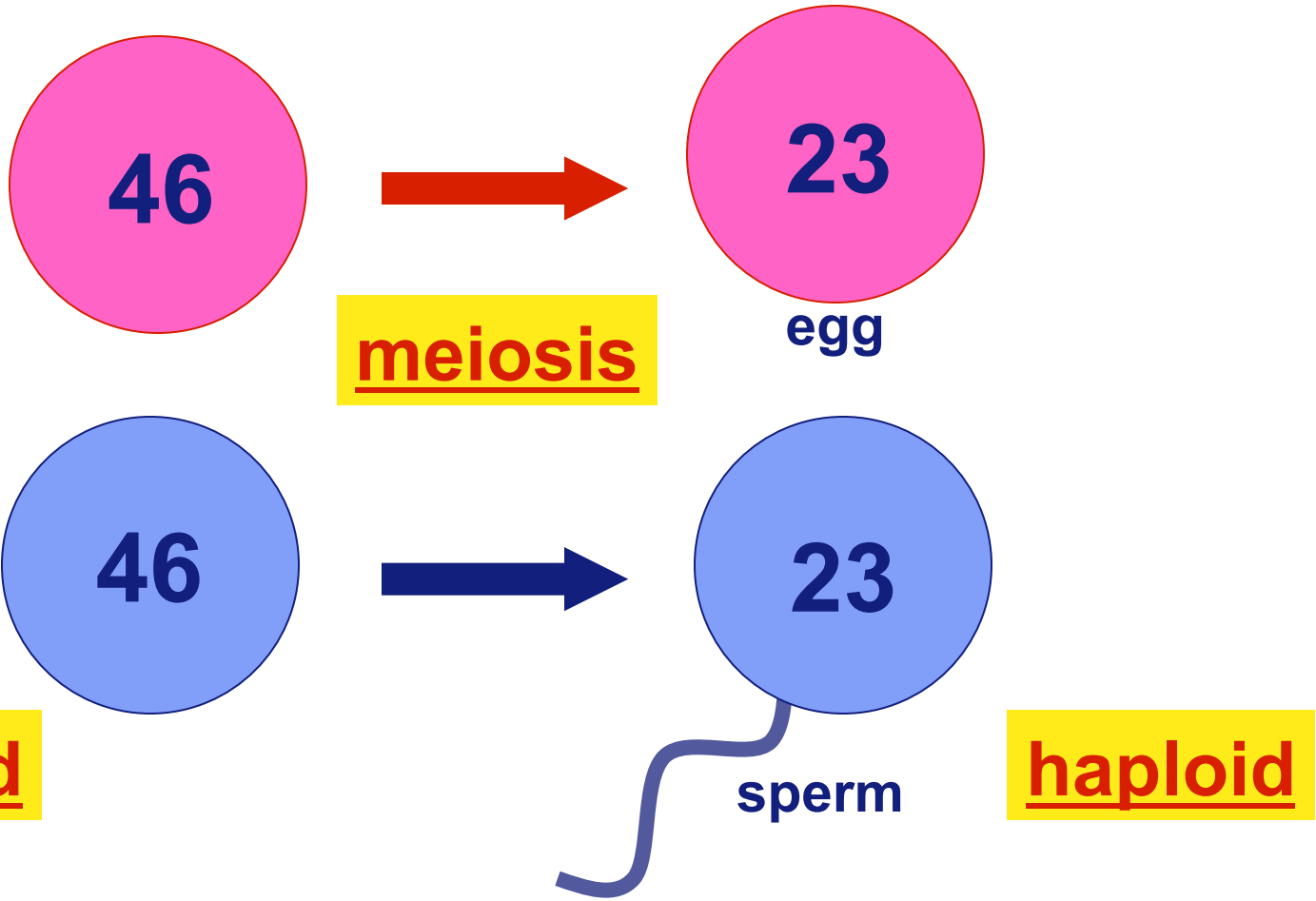
How do we make sperm & eggs?

- Must reduce 46 chromosomes → 23
  - must half the number of chromosomes
  - haploid



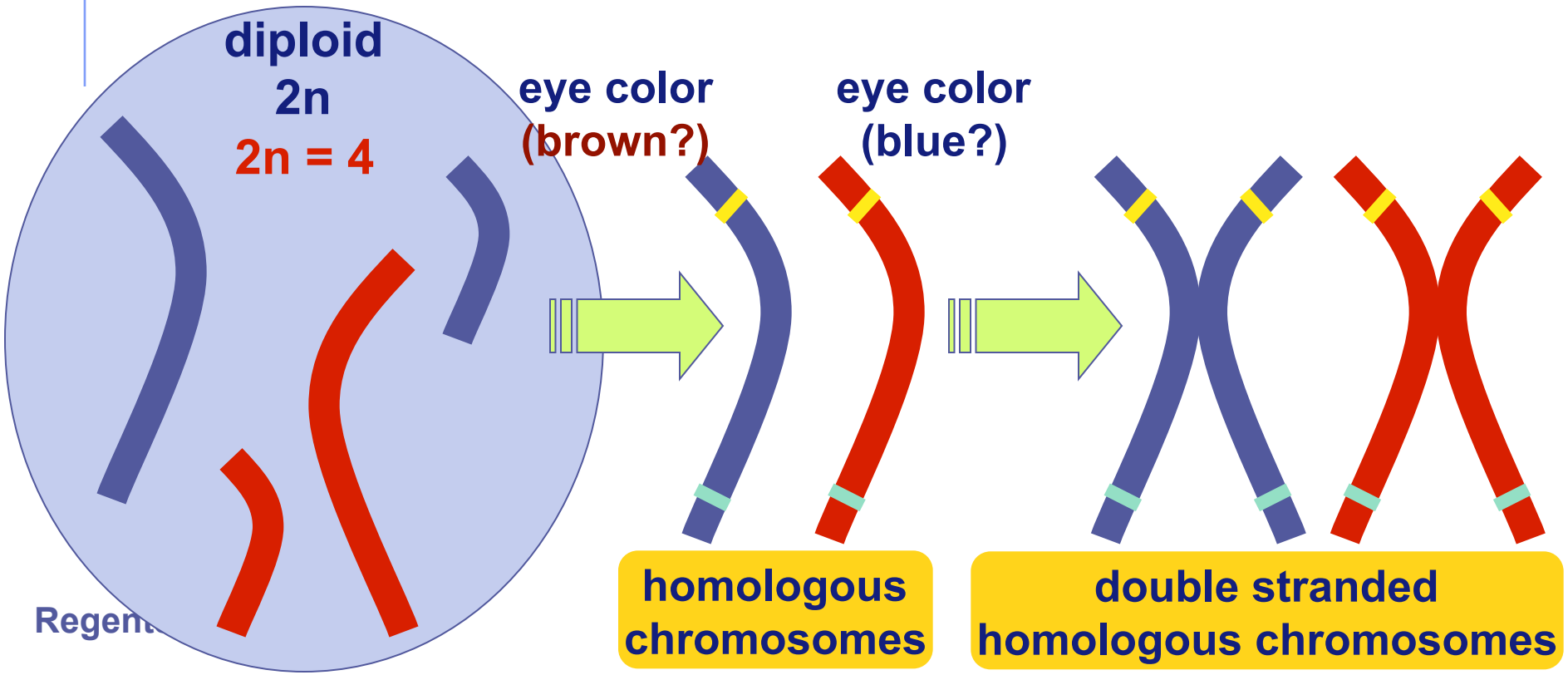
Meiosis makes sperm & eggs

- 46 chromosomes to 23 chromosomes
  - half the number of chromosomes



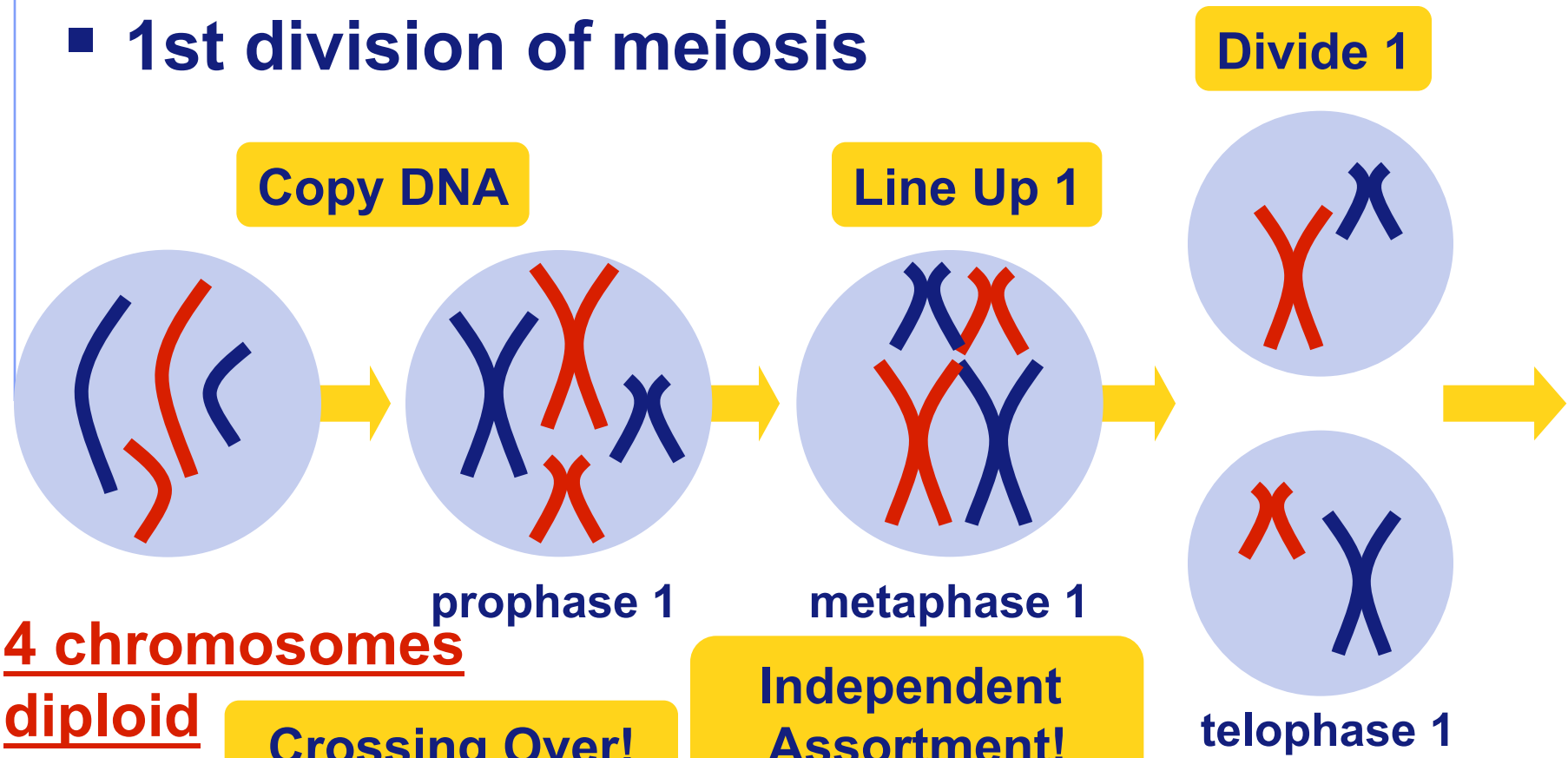
Paired chromosomes

- **Homologous chromosomes**
  - both chromosomes of a pair carry "matching" genes
    - control same inherited characters
    - homologous = same information



Meiosis 1 overview

- 1st division of meiosis



- 4 chromosomes
- diploid
- 2n

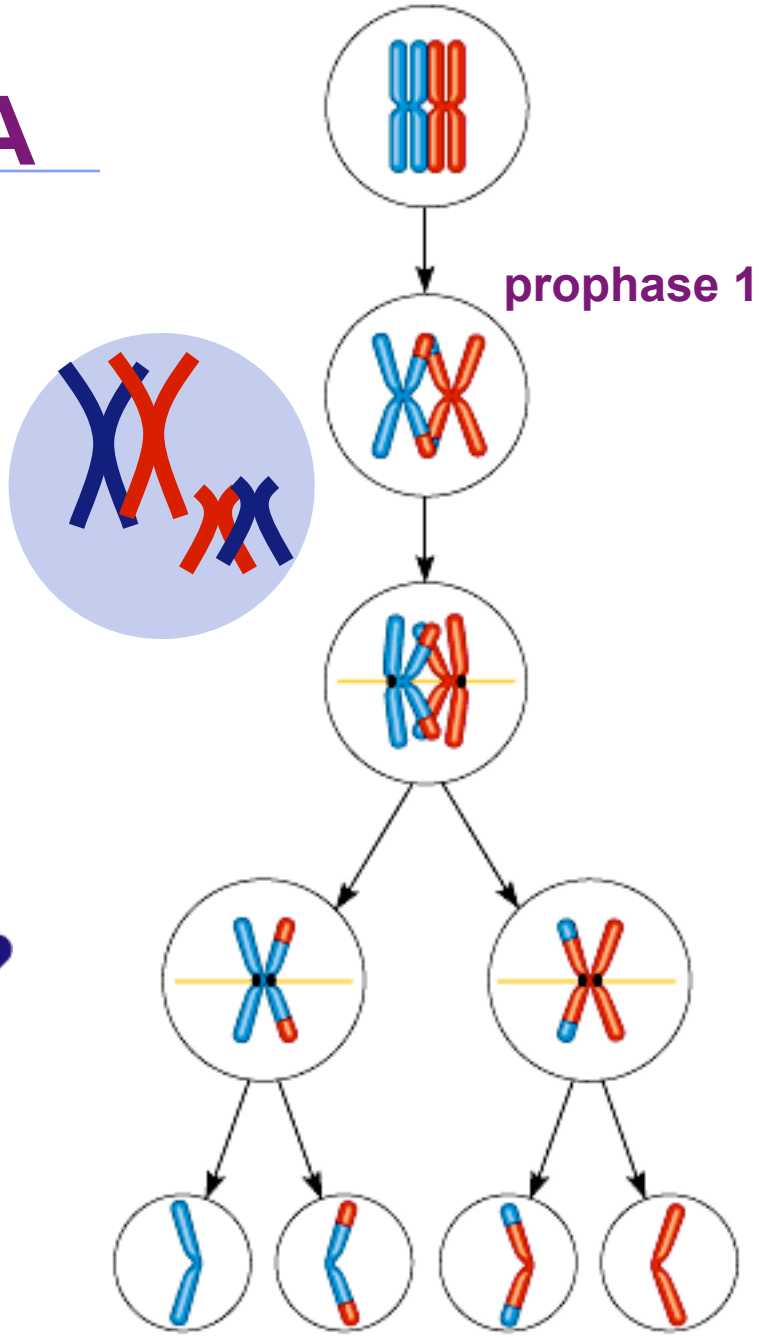
Crossing Over!

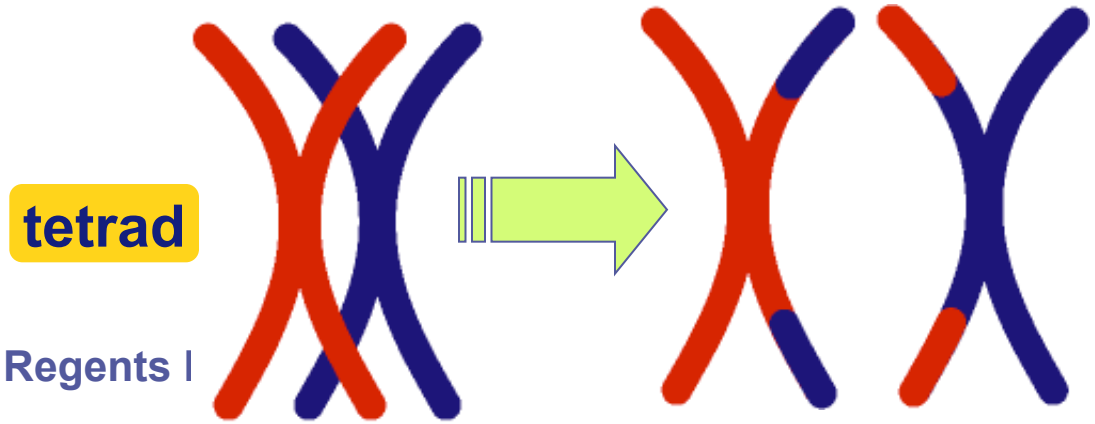
Independent Assortment!

- 2 chromosomes
- haploid
- 1n

Trading pieces of DNA

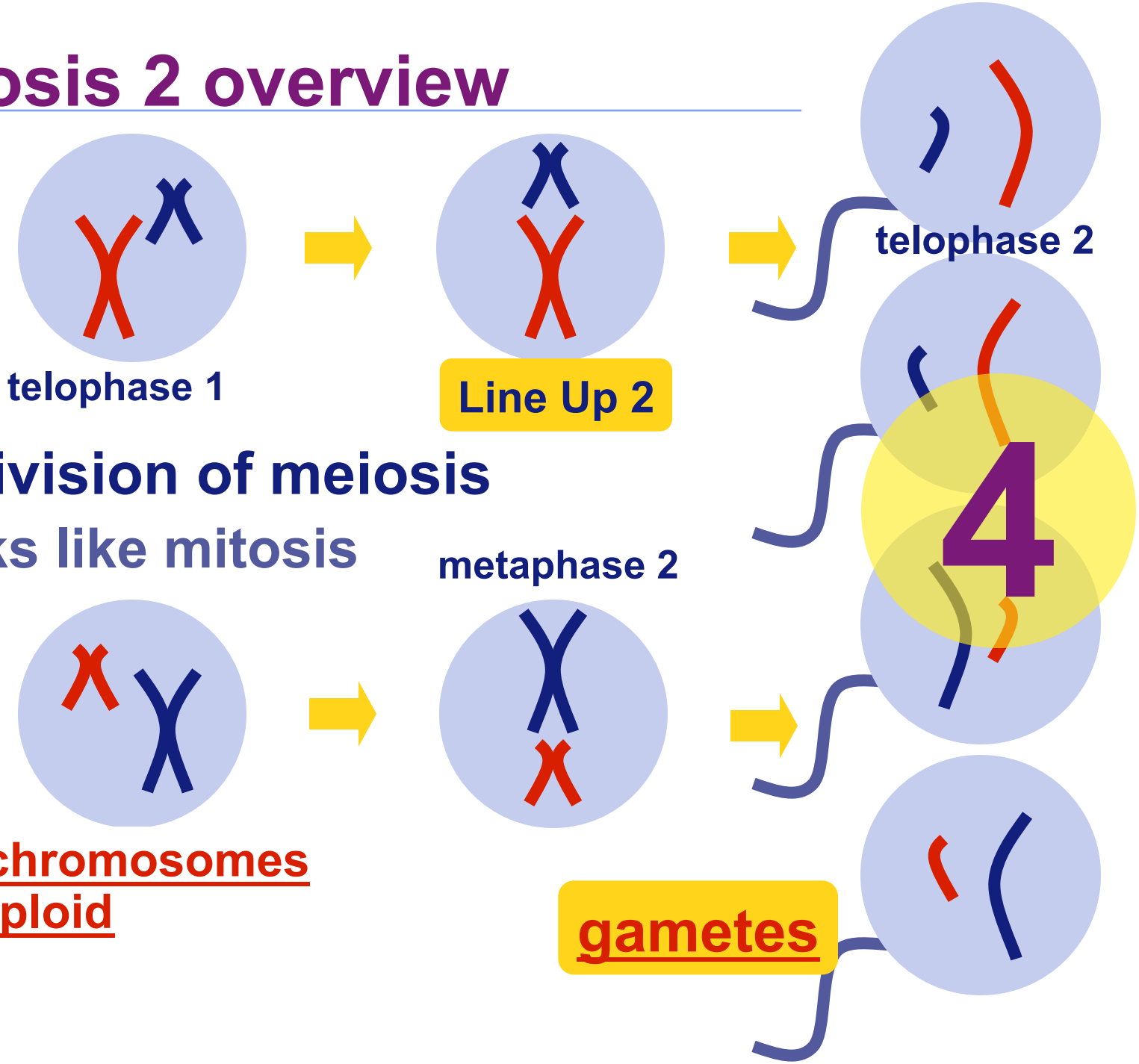
- **Crossing over**
  - during **Prophase 1**, homologous pairs swap pieces of chromosome
    - DNA breaks & re-attaches





Regents I

Meiosis 2 overview



- 2nd division of meiosis
  - looks like mitosis

- 2 chromosomes
- haploid
- 1n

Regen

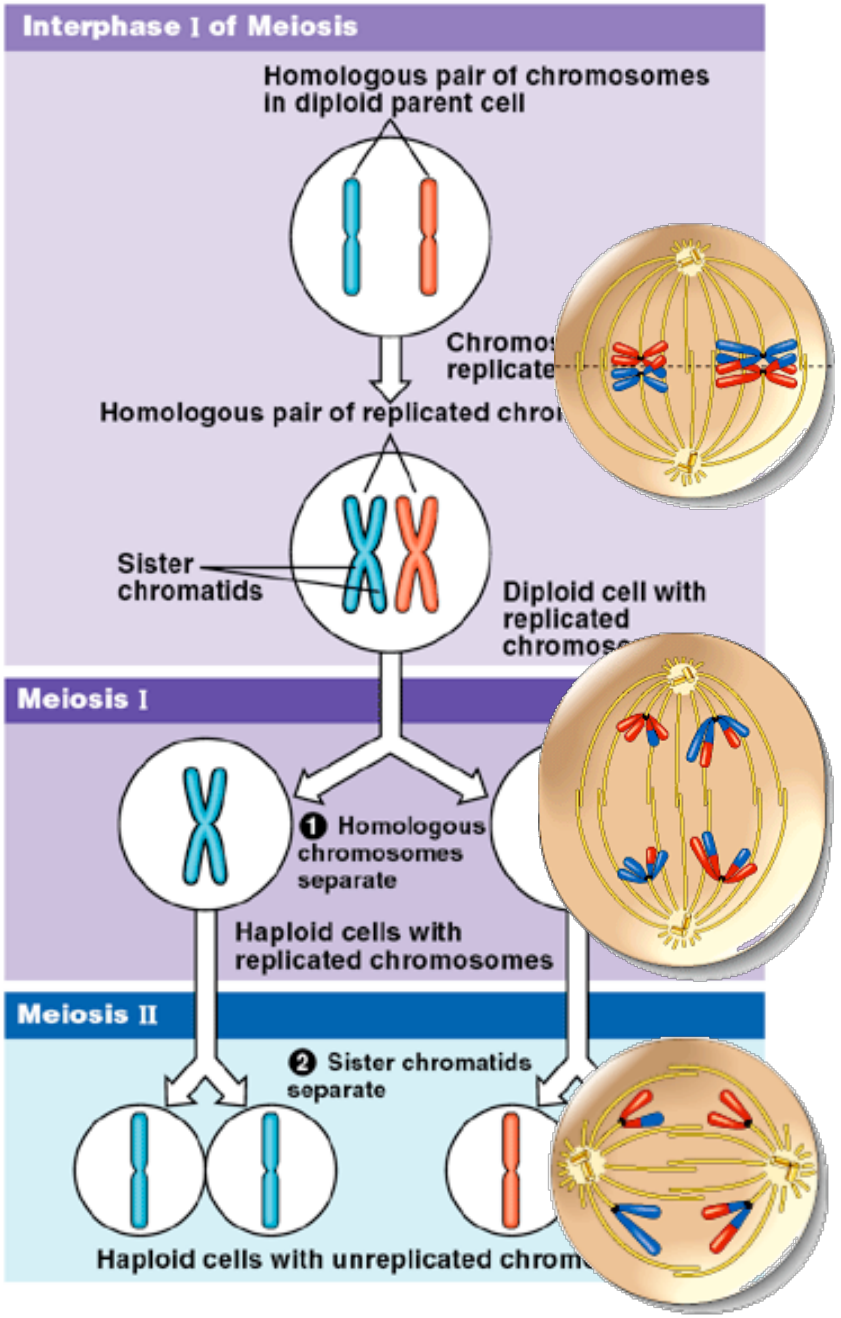
Double division of meiosis

DNA replication

Crossing over

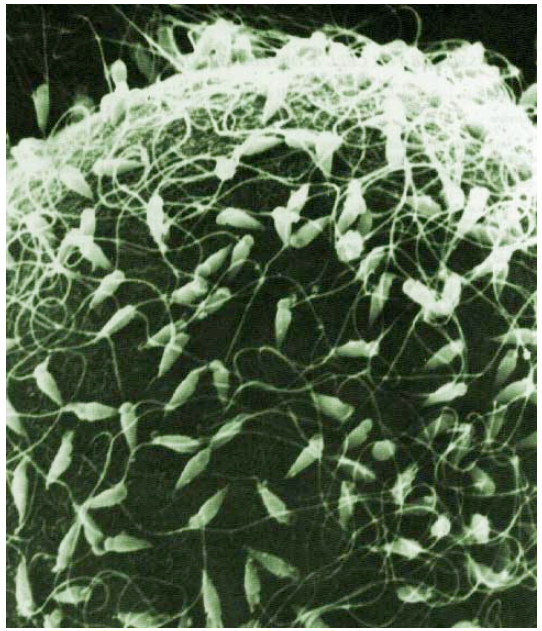
1st division of meiosis separates homologous pairs

2nd division of meiosis separates sister chromatids



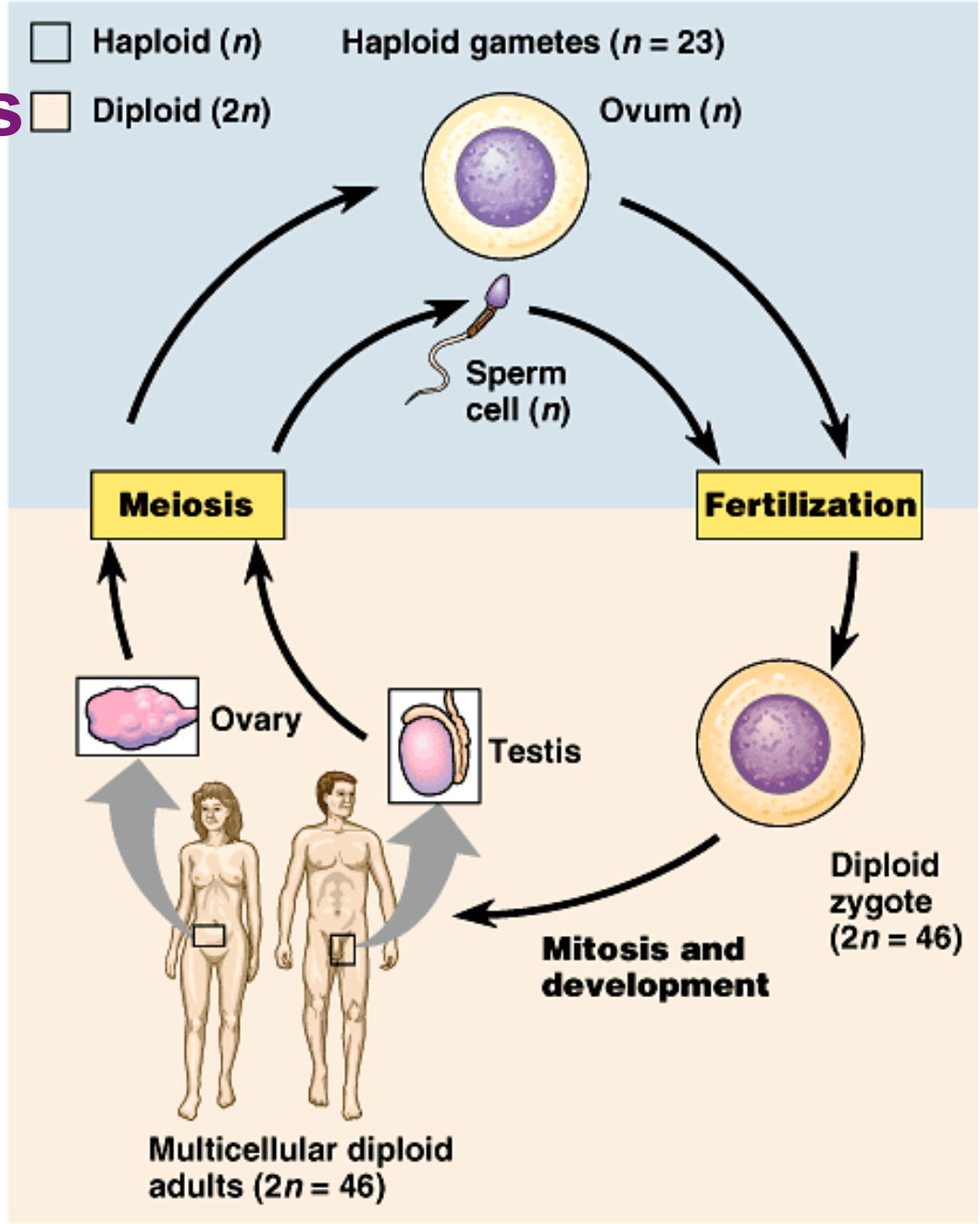
Meiosis = reduction division

- **Meiosis**
  - special cell division in sexually reproducing organisms
  - reduce number of chromosomes
    - 2n → 1n
    - diploid → haploid
      - half
  - makes gametes
    - sperm, eggs



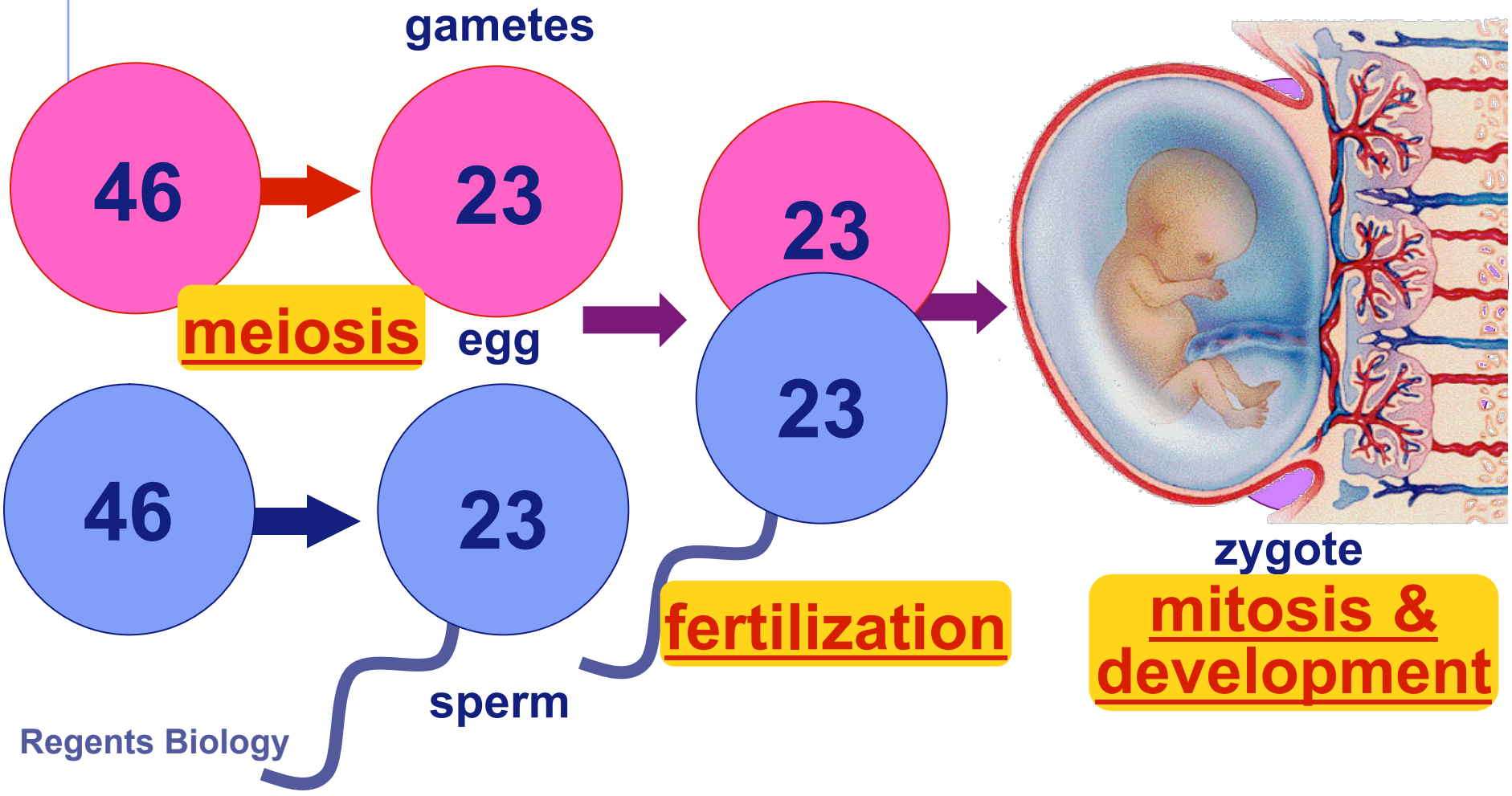
Meiosis & mitosis

- Meiosis to make gametes
  - sperm & egg
- Fertilization to fuse sperm and egg
- Mitosis to make exact copies of cells



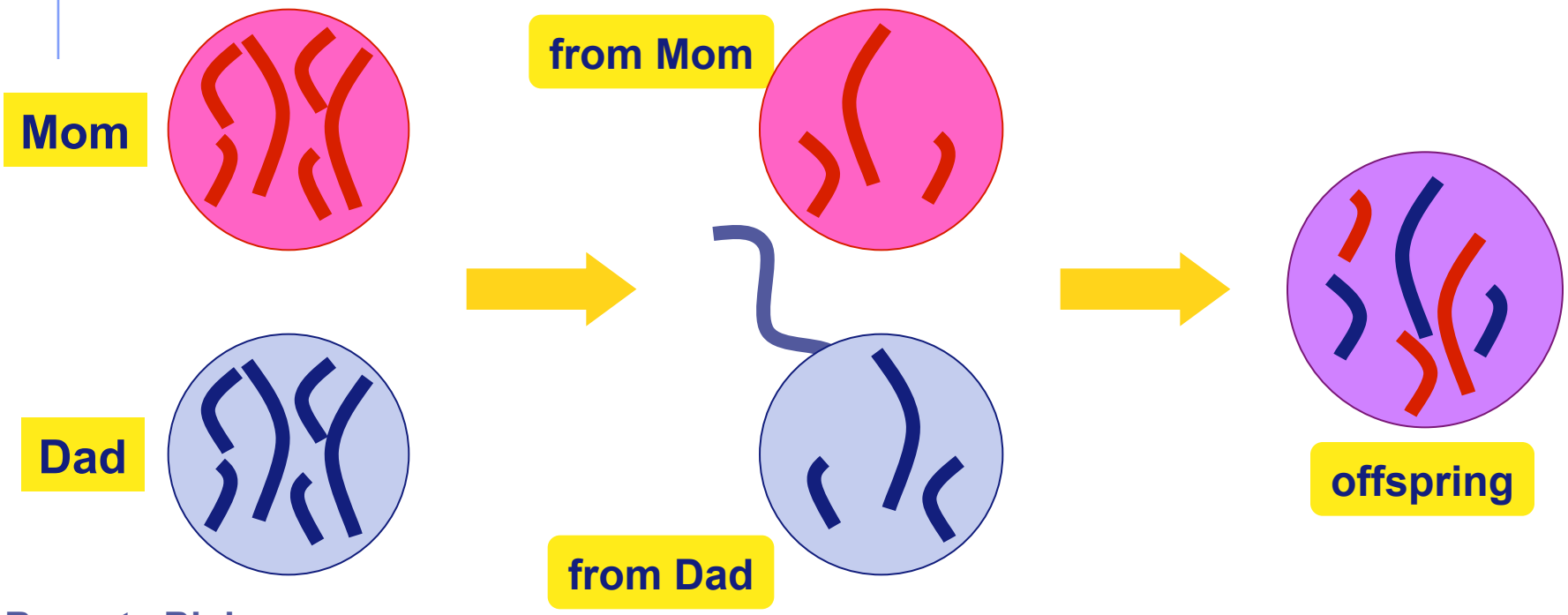
Putting it all together…

meiosis → fertilization → mitosis + development

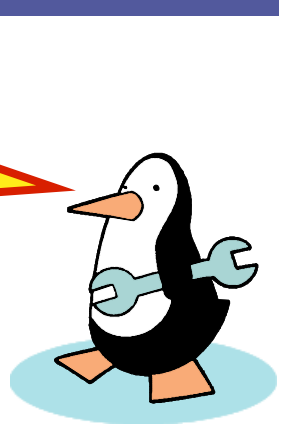


The value of meiosis 1

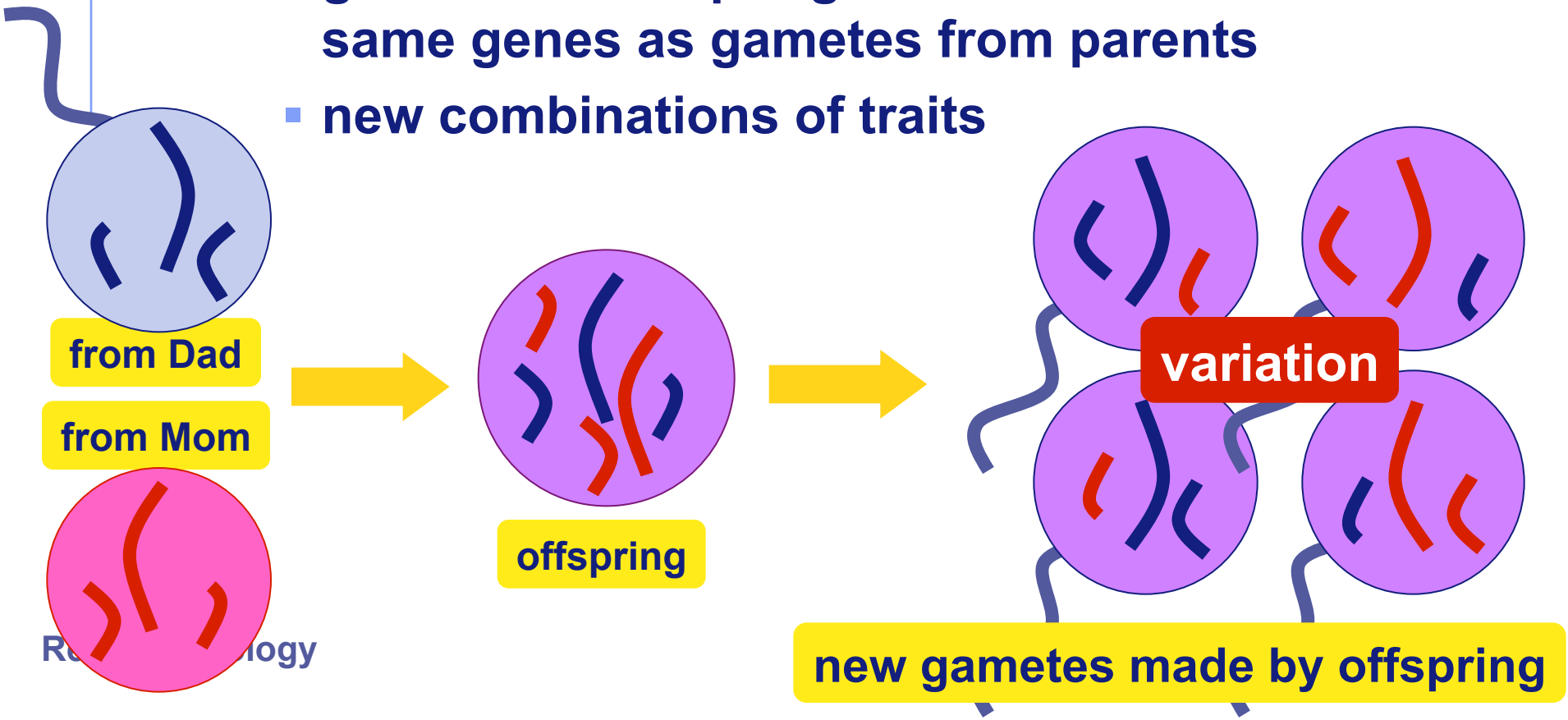
- **Consistency over time**
  - **meiosis keeps chromosome number same from generation to generation**

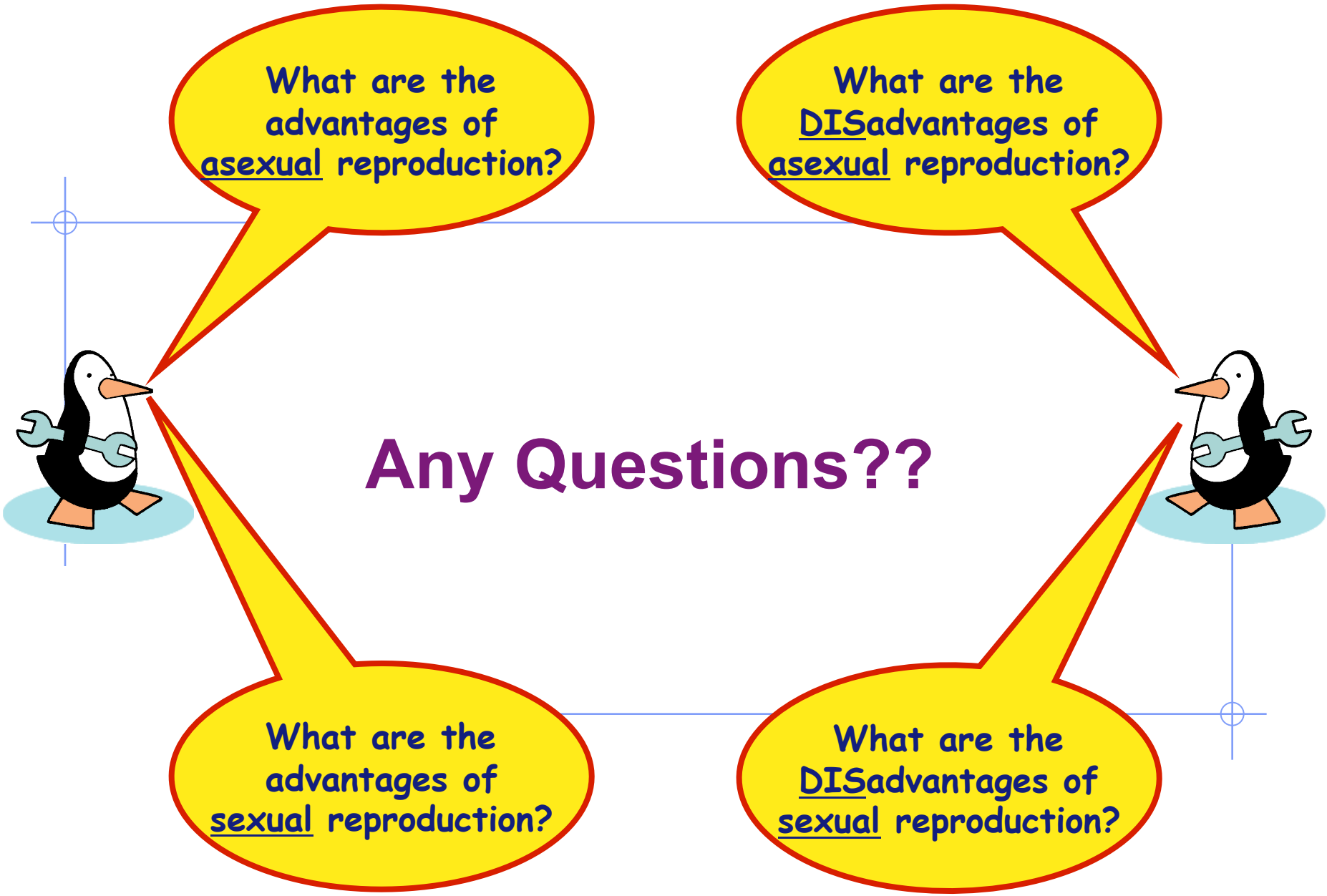


The value of meiosis 2



- **Change over time**
  - **meiosis introduces genetic variation**
    - gametes of offspring do not have same genes as gametes from parents
    - new combinations of traits




What are the advantages of asexual reproduction?
What are the DISadvantages of asexual reproduction?
Any Questions??
What are the advantages of sexual reproduction?
What are the DISadvantages of sexual reproduction?