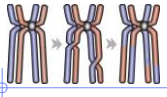
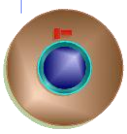
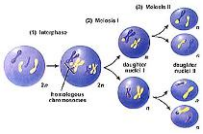


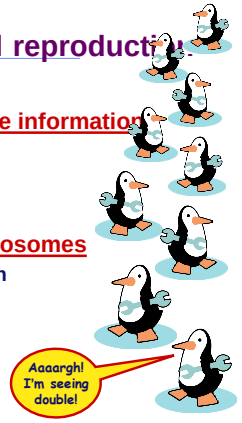
Meiosis & Sexual Reproduction





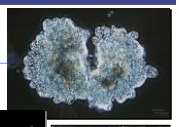
Cell division / Asexual reproduction

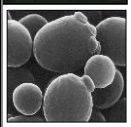
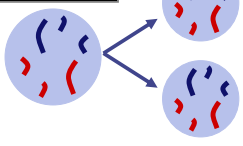
- Mitosis
  - produce cells with same information
    - identical daughter cells
  - exact copies
    - clones
  - same number of chromosomes
    - same genetic information



Asexual reproduction

- Single-celled eukaryotes
  - yeast
  - *Paramecium*
  - *Amoeba*
- Simple multicellular eukaryotes
  - *Hydra*
    - budding

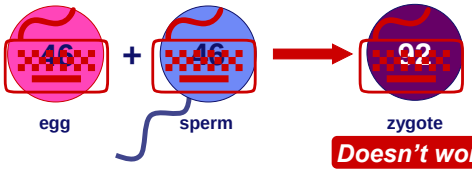


How about the rest of us?

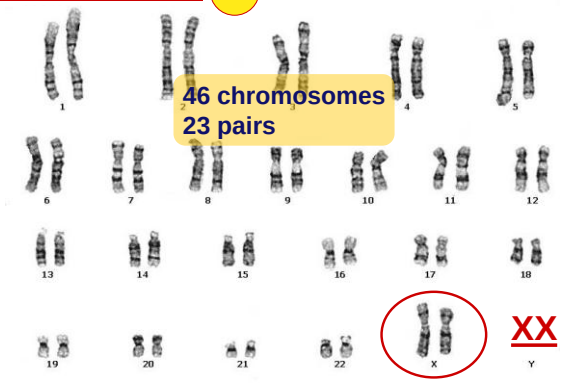
- What if a complex multicellular organism (like us) wants to reproduce?
  - joining of egg + sperm
- Do we make egg & sperm by mitosis? **No!**

What if we did, then….

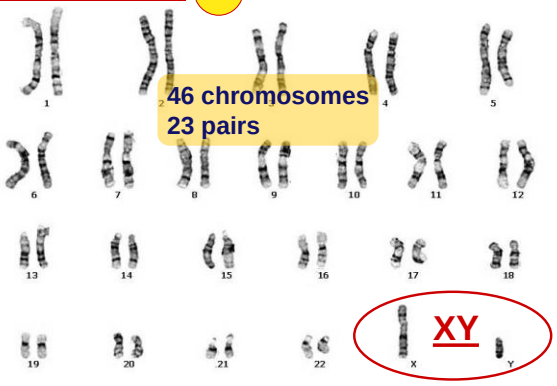


Doesn't work!

diploid = 2 copies 2n Human female karyotype

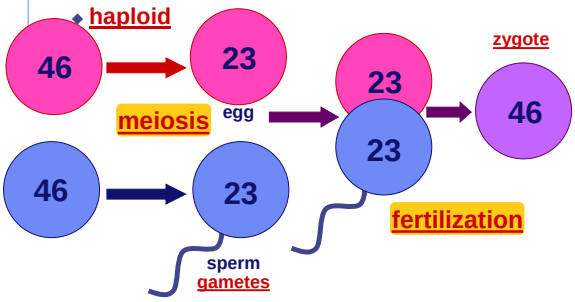


diploid = 2 copies 2n Human male karyotype



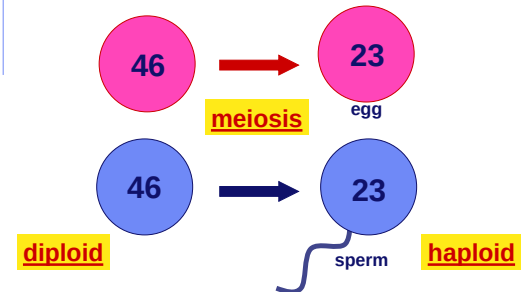
How do we make sperm & eggs?

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



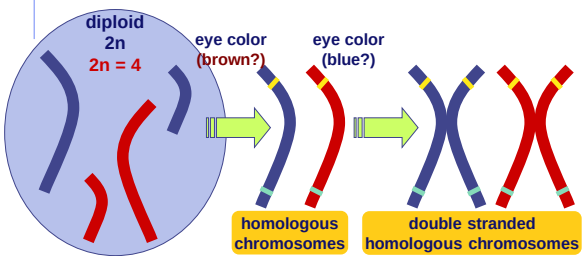
Meiosis makes sperm & eggs

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

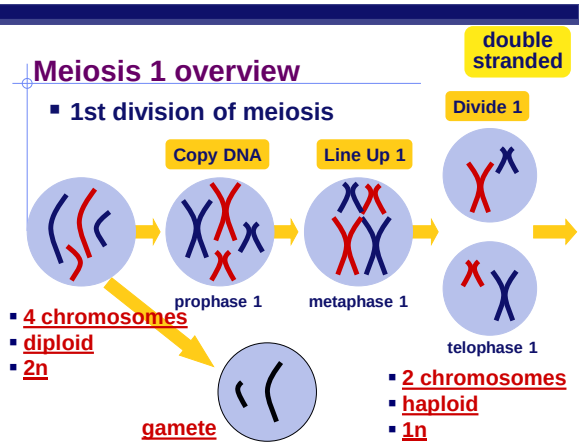


Paired chromosomes

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

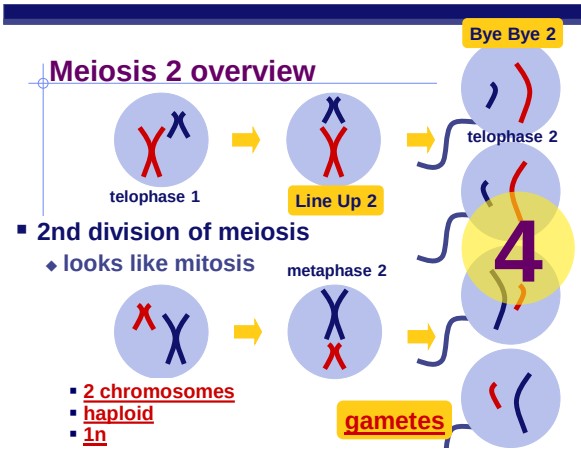


Meiosis 1 overview



- 1st division of meiosis

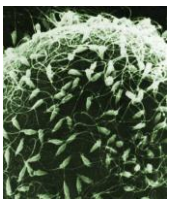
Meiosis 2 overview



- 2nd division of meiosis
  - looks like mitosis

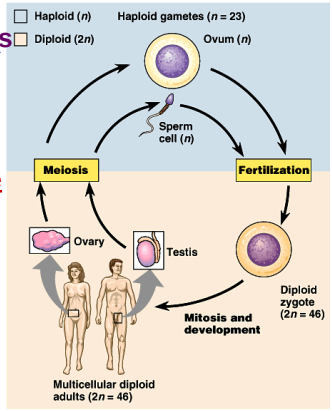
Meiosis = reduction division

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

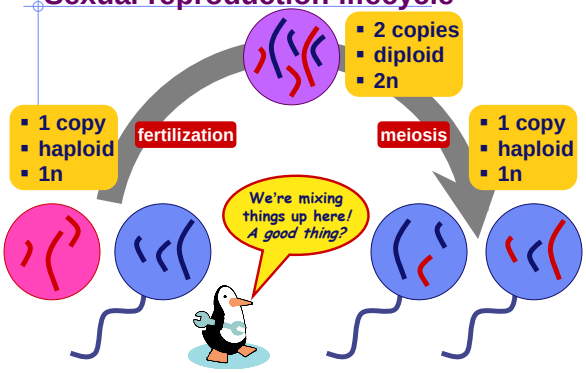


Meiosis & mitosis

- Meiosis to make gametes
  - sperm & egg
- Mitosis to make copies of cells
  - growth
  - repair
  - development

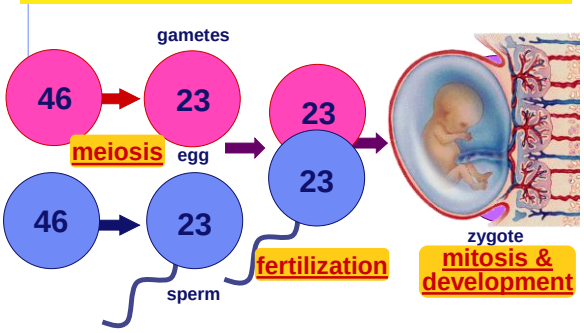


Sexual reproduction lifecycle



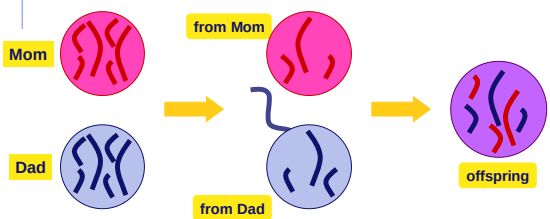
Putting it all together…

meiosis → fertilization → mitosis + development



The value of meiosis 1

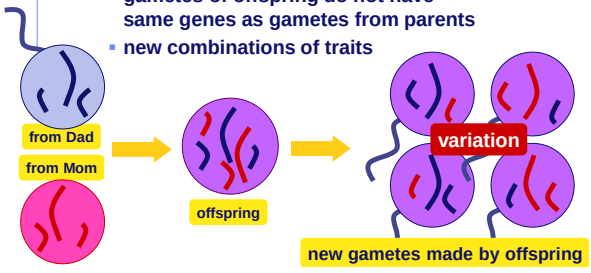
- Consistency over time
  - meiosis keeps chromosome number same from generation to generation



The value of meiosis 2

We're mixing things up here!

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



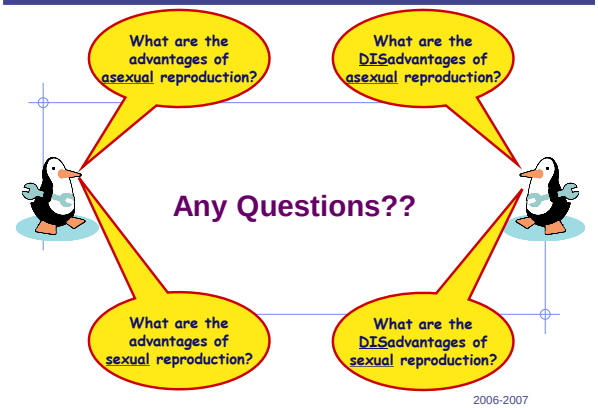
How does this explain: family resemblance & differences!

Why are the kids so similar to the parents but not exact?

Baldwin brothers

Michael & Kirk Douglas

Martin & Charlie Sheen, Emilio Estevez



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