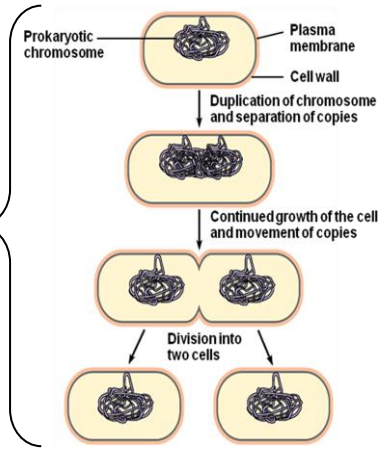
Cell Division: Mitosis Notes

Organisms can reproduce sexually or asexually

- Asexual Reproduction
  - _____
  - _____
  - Entire population of species is _____
  - Common in unicellular organisms
- Sexual Reproduction
  - _____

    _____
  - Combination of parental genes and traits
  - _____
  - Common in multicellular organisms



PROKARYOTIC CELLS (e.g., Bacteria) DIVIDE ASEXUALLY

- These cells possess a _____
- The chromosome is _____
- The cell then divides into two cells, a process called _____

THE EUKARYOTIC CELL CYCLE AND MITOSIS

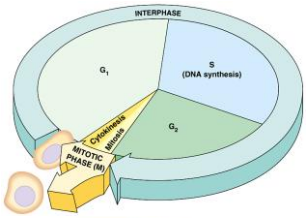
- A eukaryotic cell has many more genes than a prokaryotic cell
  - The genes are grouped into _____
- Chromosomes contain a very long DNA molecule with thousands of _____
  - Individual chromosomes are ONLY VISIBLE_____(Mitosis)
- Before a cell starts dividing, the "single" chromosomes are_____
  - This process produces "double" chromosomes containing 2 sister _____

What IS Mitosis?

- A way for a cell to make an _____
- Each daughter cell has _____
- In humans, the original cell starts with _____chromosomes, and ends with _____chromosomes.

Why are more cells needed by Mitosis?

- _____
- _____
- _____
- _____

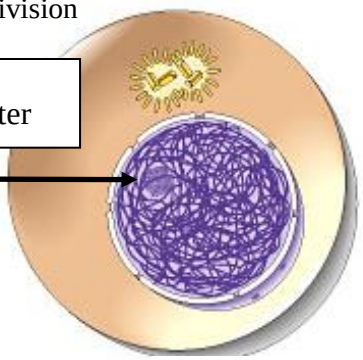


The **Cell Cycle** consists of two major parts:

- _____ where DNA makes a copy of itself and new organelles are made.
- _____: when chromosomes "DANCE" and separate into 2 groups = nuclear division

Interphase = ~ 90% of the Cell Cycle time

Inter



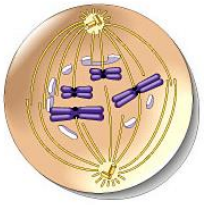
- DNA exists as chromatin "spaghetti" protected by a _____ membrane
- The _____ is visible
- Growth and DNA _____occur

Mitosis = "_____" = PMAT

- ~ _____% of Cell Cycle time

Prophase

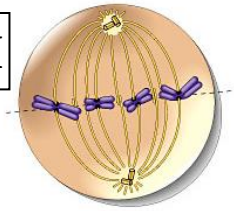
P



- Chromatin _____into visible "double" chromosomes
- Nucleolus and nuclear membrane _____
- 2 _____separate to opposite poles of the cell and build a football-shaped _____

Metaphase

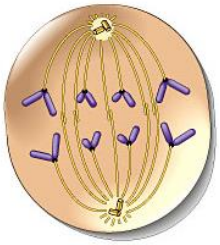
M



- Chromosomes line up _____in the middle of the cell along the _____
- Chromosomes attach to the spindle fibers at their _____

Anaphase

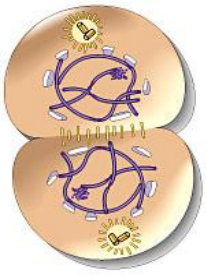
A



- Spindle fibers retract toward the poles, _____the "double" chromosomes in half at the centromere
- _____split apart forming 2 identical "_____" chromosomes that are pulled to the poles at each side of the cell

Telophase

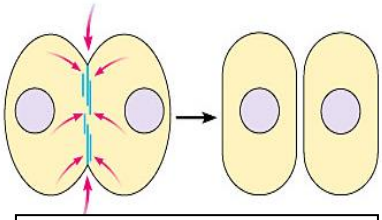
T



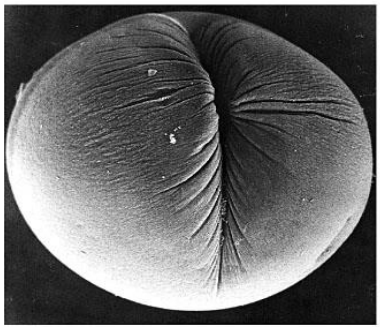
- Chromosomes uncoil back into _____
- Spindle _____ while the nuclear membrane and nucleolus _____

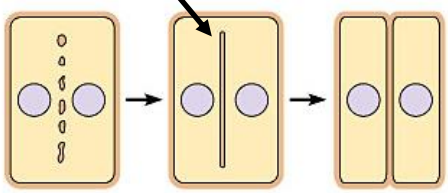
Cytokinesis pinches the cell apart

- In animals, a protein "_____" pinches the cell in half
- In plants, a cell plate forms and splits the cell in two as a new _____is built



Animal Cell



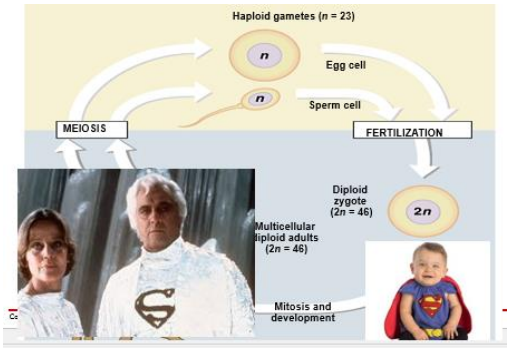


Plant Cell

Cell Division: Meiosis Notes

You were created from a combination of two _____ (or sex cells)

- Body cells (_____) with two sets of chromosomes are said to be _____ (2n)
- Gametes are _____, with only one set of chromosomes (n)



At fertilization, a sperm fuses with an egg, forming a _____

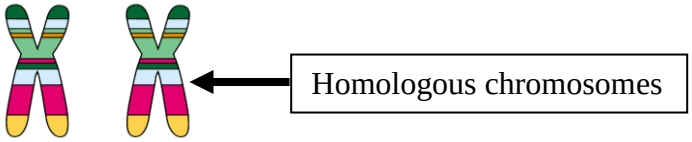
- Repeated _____ cell division leads to the development of a mature adult
- The adult makes haploid gametes by _____ cell division

So…What is MEIOSIS?

- The creation of _____

After Fertilization, the _____ (fertilized egg) has 23 pairs of _____

- Most traits are determined by genes that are located on the _____ = (chromosomes 1-22)
- Homologous chromosomes have the SAME size, shape, and gene locations, but may have DIFFERENT _____



Meiosis acts like a genetic "_____" by creating new combinations of genes for each chromosome

- As the chromosomes "dance" through Meiosis, _____ mixes up the DNA in new ways

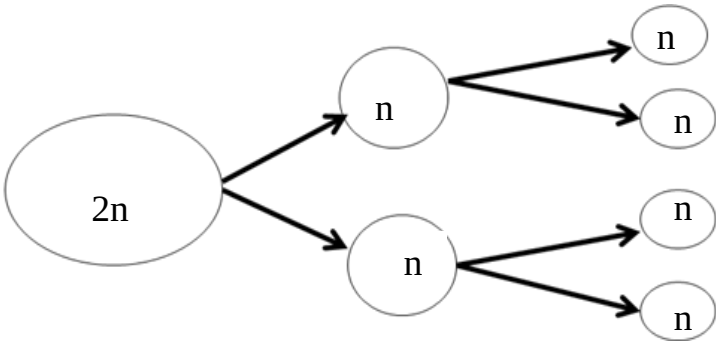
- The chance of any two eggs or sperm receiving the same DNA is extremely _____ …. Thus the offspring for any two parents have a _____

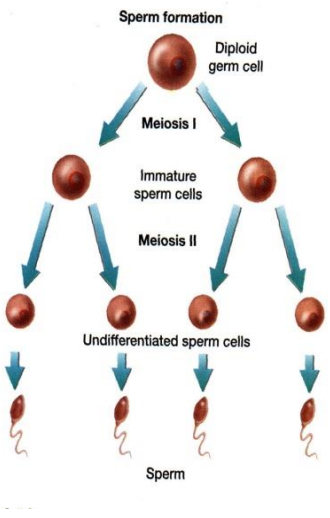
Meiosis reduces the chromosome number from _____

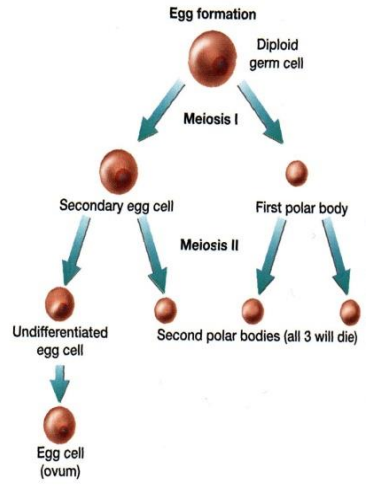
- Meiosis, like mitosis, is preceded in Interphase by chromosome _____
- However, in meiosis the cell divides _____

MEIOSIS is different in BOYS and GIRLS

- Spermatogenesis in the _____ = ___ sperm
- Oogenesis in the _____ = ___ egg





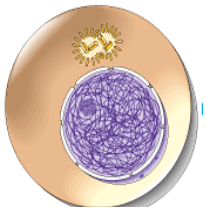


The Steps of Meiosis:

Interphase I

- _____ and DNA replication occur
- DNA exists as chromatin and the nucleolus is visible
- Most of the cell's life cycle is in this stage

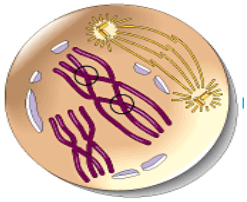
Interphase 1



Prophase I (AKA _____)

- Spindle fibers begin to form
- Chromatin coils tightly into visible "double" chromosomes
- The nuclear membrane and nucleolus disappear from this diploid cell
- Homologous chromosomes, composed of sister chromatids, come together as pairs forming a tetrad
- _____ may "blend" the DNA into new gene combinations

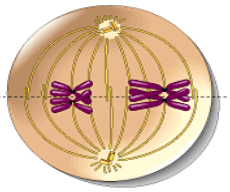
Prophase 1



Metaphase I (AKA _____)

- The chromosome pairs line up _____ straddling the cell's equator
- Each chromosome attaches to the spindle fiber at its centromere

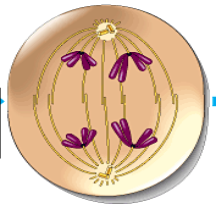
Metaphase 1



Anaphase I (AKA _____)

- Chromosome pairs separate and "_____" chromosomes move to opposite poles as spindle fibers retract

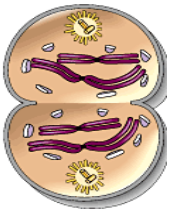
Anaphase 1



Telophase I

- "Double" chromosomes uncoil back into chromatin
- The spindle disappears as the nucleolus and nuclear membrane reappear
- A cleavage furrow develops (animal cell) and eventually the cell splits into two _____ daughter cells

Telophase 1



Interphase II

- Some growth occurs but NO _____
- DNA exists as chromatin and the nucleolus is visible

Prophase II

- Chromatin coils tightly into visible "double" chromosomes (composed of sister chromatids)
- Spindle fibers form as the nucleolus and nuclear membrane disappear from this _____ cell

Metaphase II

- "Double chromosomes line up _____along the equator of this haploid cell
- Spindle fibers are attached at the centromere

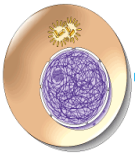
Anaphase II

- Spindle fibers retract, ripping the "_____" chromosomes in half at the centromere
- "_____" chromosomes are pulled to the poles at each side of the cell

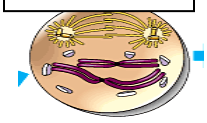
Telophase II

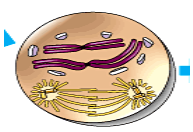
- "Single" chromosomes uncoil back into chromatin
- The spindle disappears as the nucleolus and nuclear membrane reappear
- A cleavage furrow develops (animal cell) in both cells and eventually splits forming 4 _____ gametes (egg or sperm)

Interphase 2

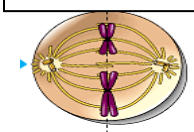


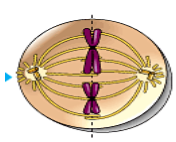
Prophase 2



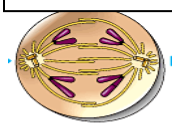


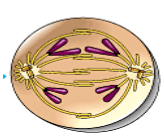
Metaphase 2





Anaphase 2





Telophase 2