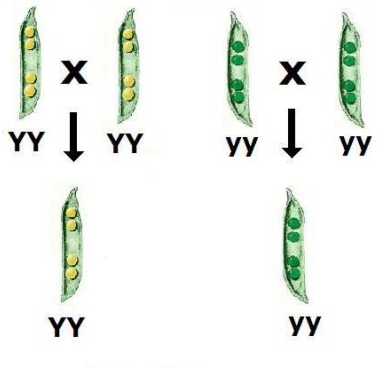
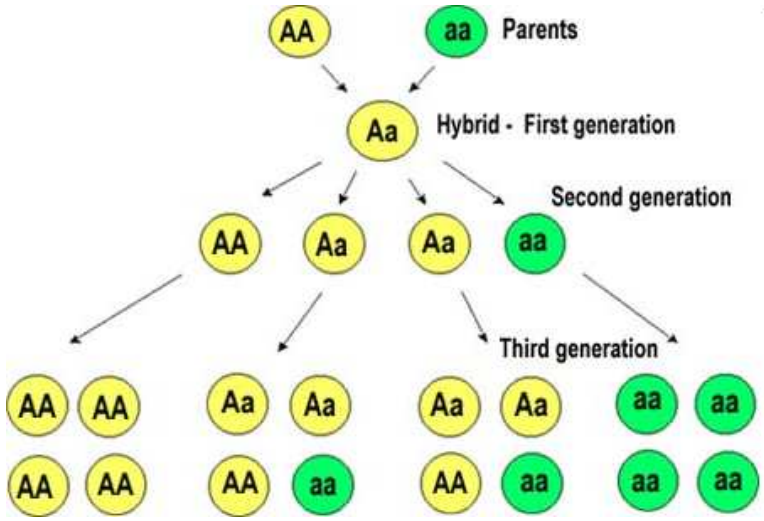
Life Science

Chapters 3 & 4 Genetics

Gregor Mendel

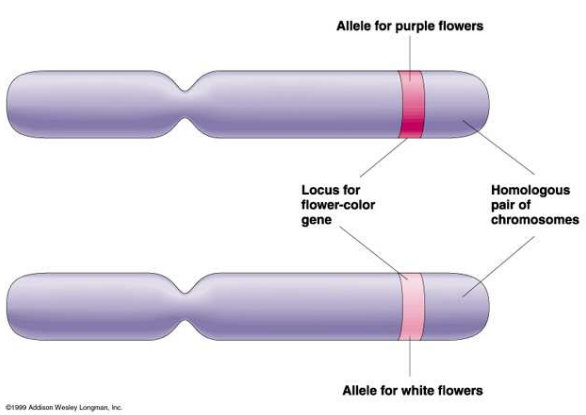
- "father of genetics"
- experiments using pea plant traits
- a. Tall or short plants
- b. Round or wrinkled peas
- c. Yellow or green peas
- d. Smooth or pinched pods
- e. Green or yellow pod color





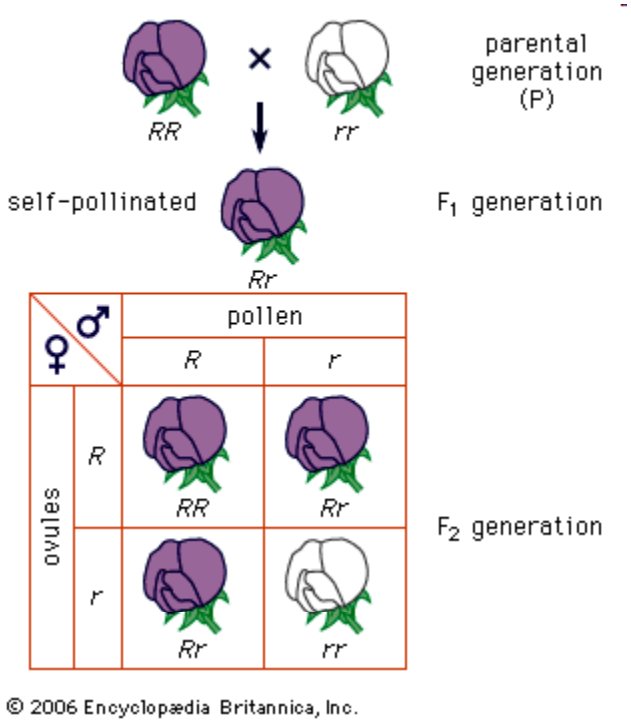
New Terms

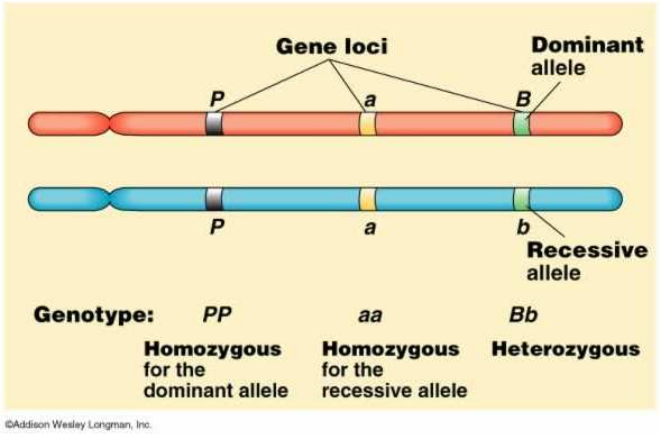
- **Gene**: factor that controls a trait
- **Allele**: the different forms of a gene
- **Purebred**: always produces the same trait
- **Hybrid**: an organism w/ two different alleles for a trait – it is heterozygous



More Terms.

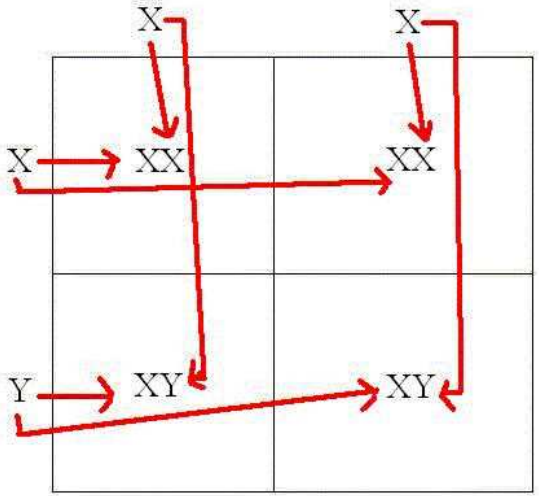
- **Dominant** allele: trait shows up in the organism when the allele is present represented by a Capital letter ie “T” for tall
- **Recessive** allele: trait is masked or covered up unless homozygous represented by a small case letter ie “t” for short
- **Phenotype**: The outward visible trait being shown
- **Genotype**: The genetic makeup of the trait
  - **Homozygous**: both alleles are the same for the trait in question
  - **Heterozygous**: Alleles are different for the trait in questions

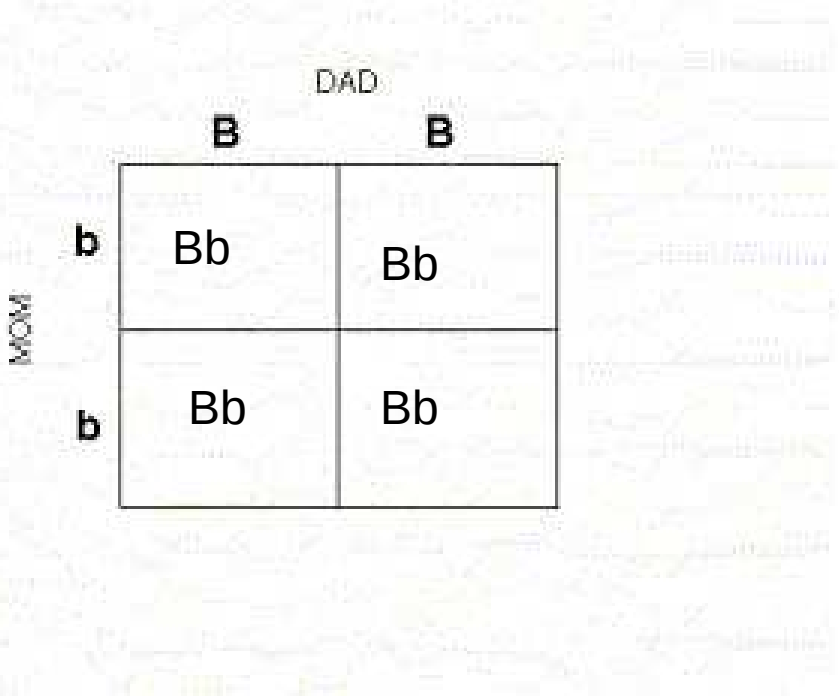




Punnett Square

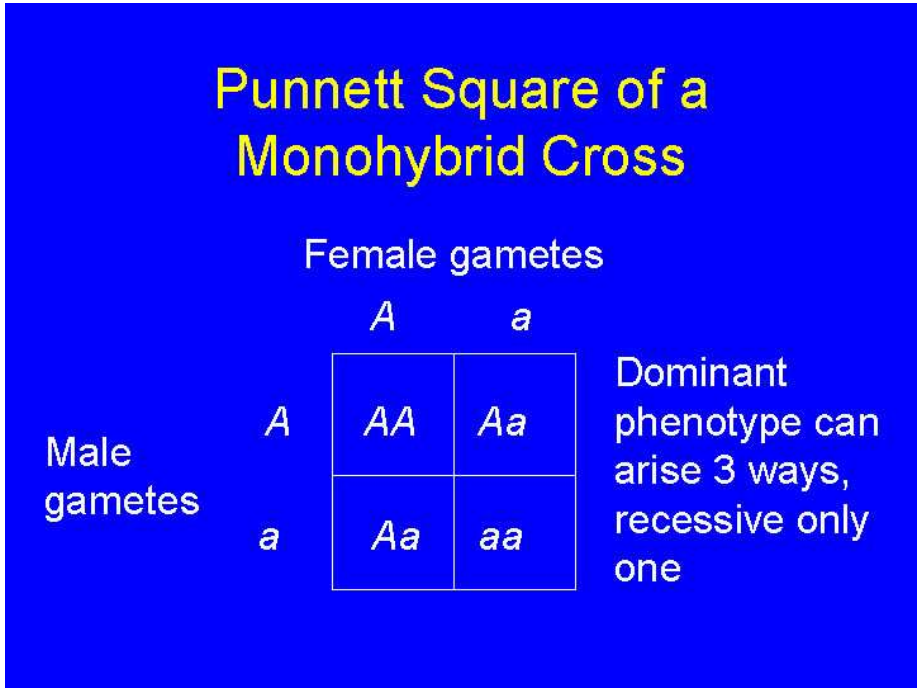
- Way of predicting the possible phenotype & genotype outcomes when parents are crossed
- Must be able to determine the genotypes of the parents





Punnett Square

- Way of predicting the possible phenotype & genotype outcomes when parents are crossed
- Must be able to determine the genotypes of the parents



In this case, when two hybrids are crossed, the possible outcomes are:

the phenotype ratio is 3:1

3 dominant

1 Recessive

genotype ratio is 1:2:1

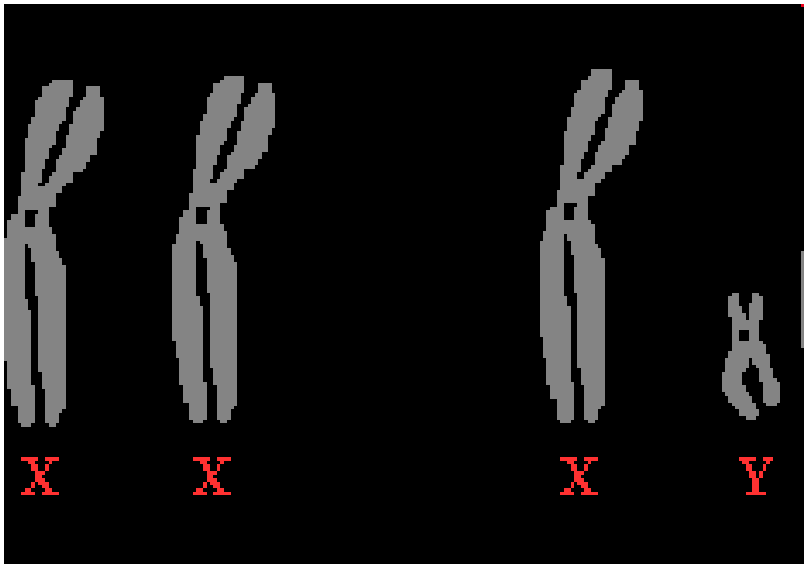
1 Homozygus dominant

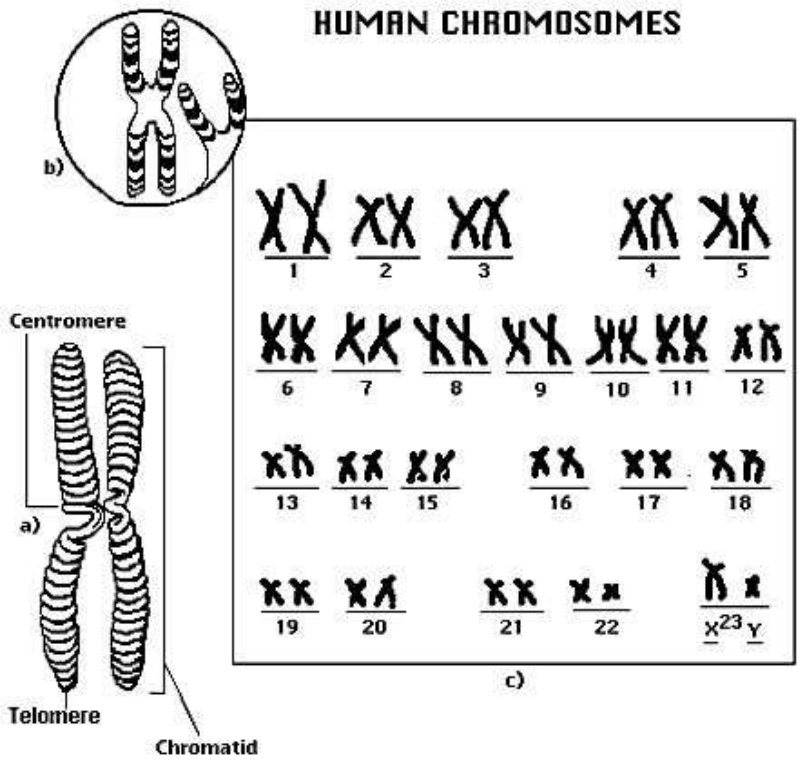
2 Heterozygus

1 Homozygus recessive

Human Genetics

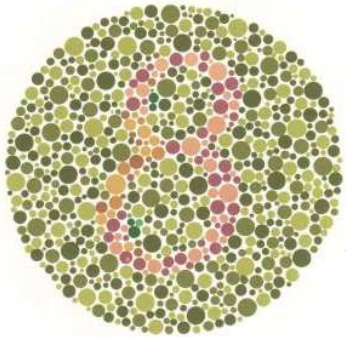
- 23 pairs of homologus chromosomes in the human cell: 46 total chromosomes
- small sections of each chromosome, genes, are responsible for inheritance
- Chromosomes named as numbered pairs
- Pair 23 determines sex of individual
- Long chromosome X, short chromosome Y
- XX is Female, XY is Male

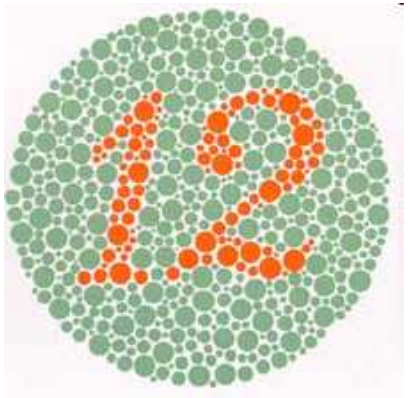


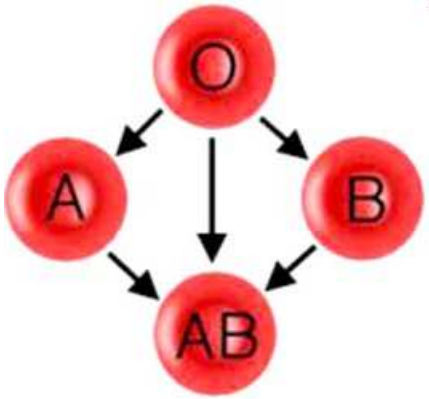


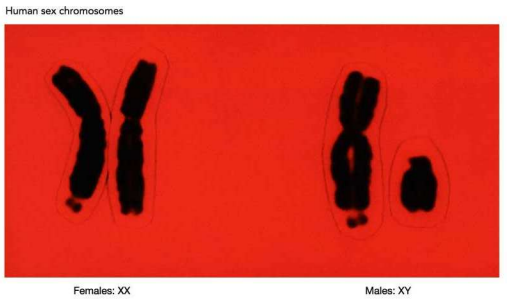
Human Genetics

- Sex-Linked Traits
  - Because males have only 1 X chromosome, they do not have another X chromosome to hide any recessive traits that might show up.
    - 1. Color Blindness, male pattern baldness
- Genetic diseases and disorders
  - i. Problems during mitosis or meiosis and or genetic mutations
  - ii. Cystic Fibrosis, Sickle Cell Anemia, Hemophillia, Downs Syndrome
  - iii. Dr.s can test for genetic disorders by testing “sloughed” off cells from the fetus found in the amniotic fluid during pregnancies.
- Blood Type 3 alleles
  - 1. A allele and B allele are codominant
  - 2. O allele is recessive



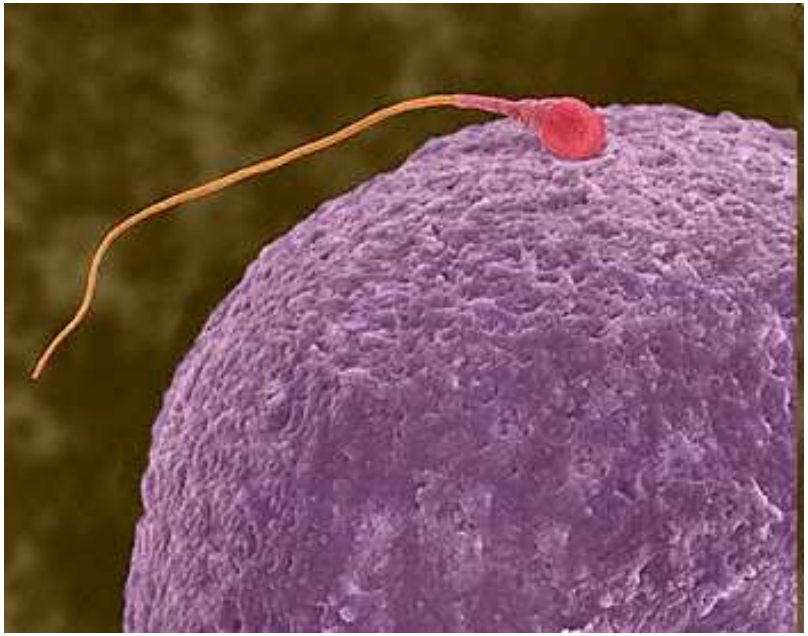






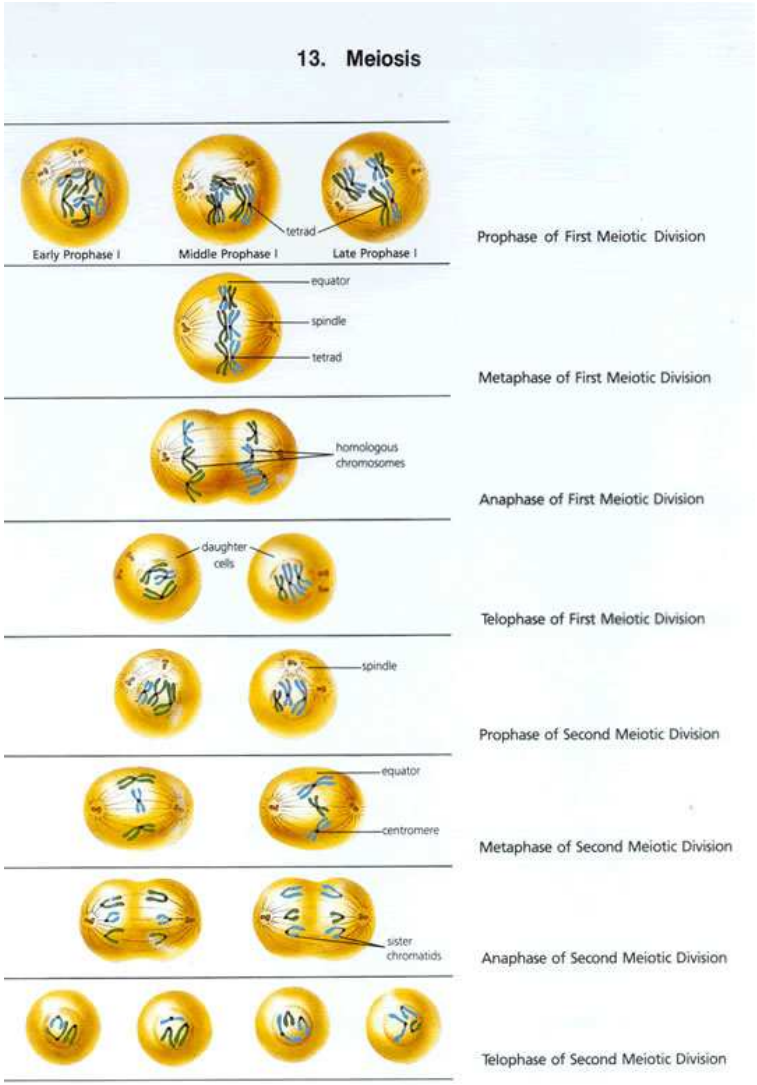
Gamete Formation

- Normal chromosome # 23 pairs = 46 total
- **Diploid** – a cell that has both homologus chromosomes (one from each parent) –2N
- **Haploid** – 1N - has only one of the homologus chromosomes (one from the father or the one from the mother)
  - Egg & Sperm cells are haploid so when they combine during fertilization the zygote is once again diploid.



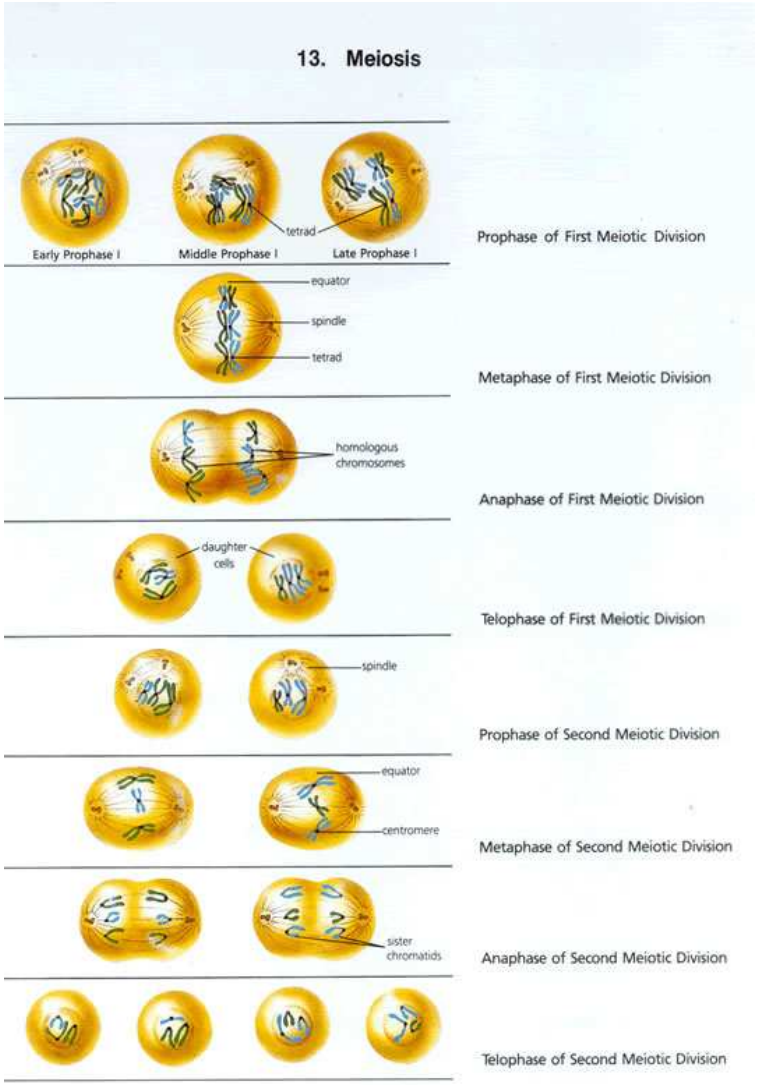
Meiosis – gamete formation

- Two phases: Meiosis I and Meiosis II
- Meiosis I
- i. Prophase I:
  - 1. Chromatin has duplicated, chromosomes condense and coil.
  - 2. The pairs of chromosomes stay next to each other forming a “Tetrad”
- ii. Metaphase I
  - 1. Tetrads line up along equator
- iii. Anaphase I
  - 1. Tetrad separates so that each one of the duplicated homologus chromosomes separate to the poles
- iv. Telophase I
  - 1. New nuclear membrane forms around the new nuclei
    - a. Chromosomes uncoil becoming chromatin again
    - b. Each new cell has only half of theoriginal number of chromosomes



Meiosis – gamete formation

- Meiosis II – The two new cells divide
- 1. Prophase II
  - a. Chromatin condenses and forms the chromosome (has two Chromotids and a centromere)
- 2. Metaphase II
  - a. Chromosomes line up on the equator
- 3. Anaphase II
  - a. Centromere dissolves pulling each separated chromatid to the poles
  - b. Chromotids pulled to the poles
- 4. Telophase II
  - a. New cells formed- 4 gametes- from the original 1 mother cell.
  - b. These 4 gametes have only one of the two homologus chromosomes from the original cell



Mitosis vs Meiosis