

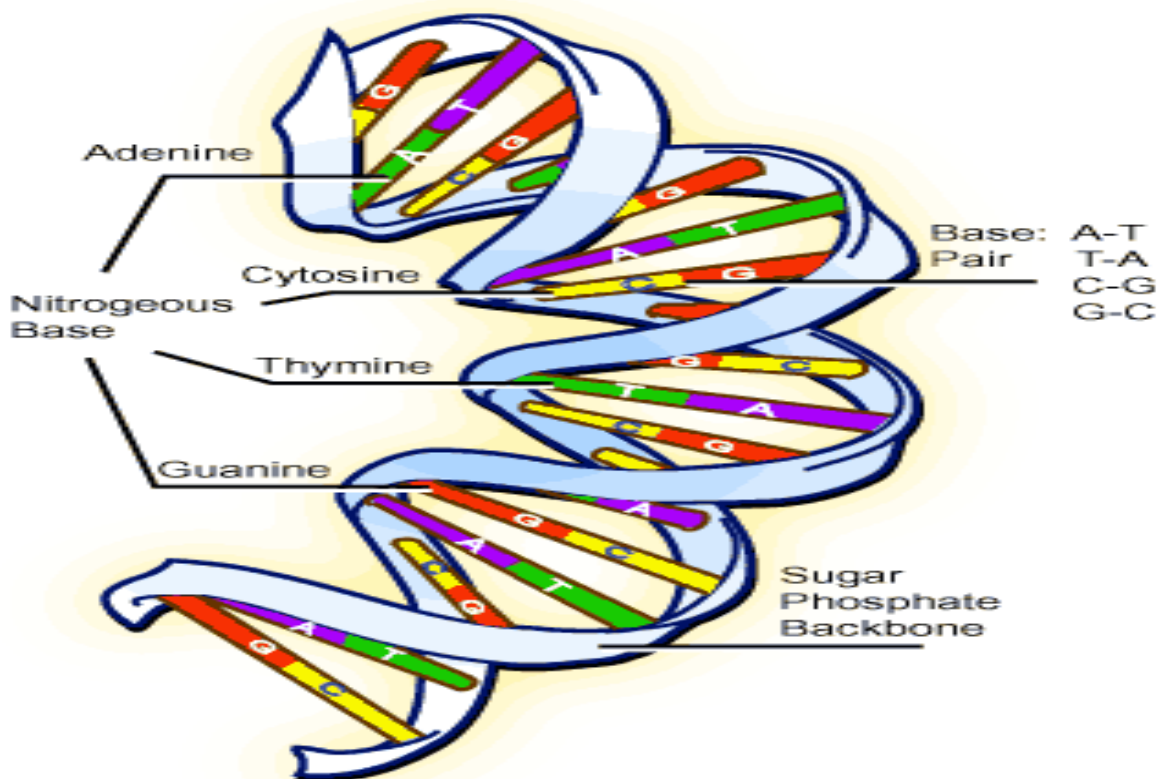
DNA and GENETICS UNIT NOTES

NAME: _____

DO NOT LOSE!

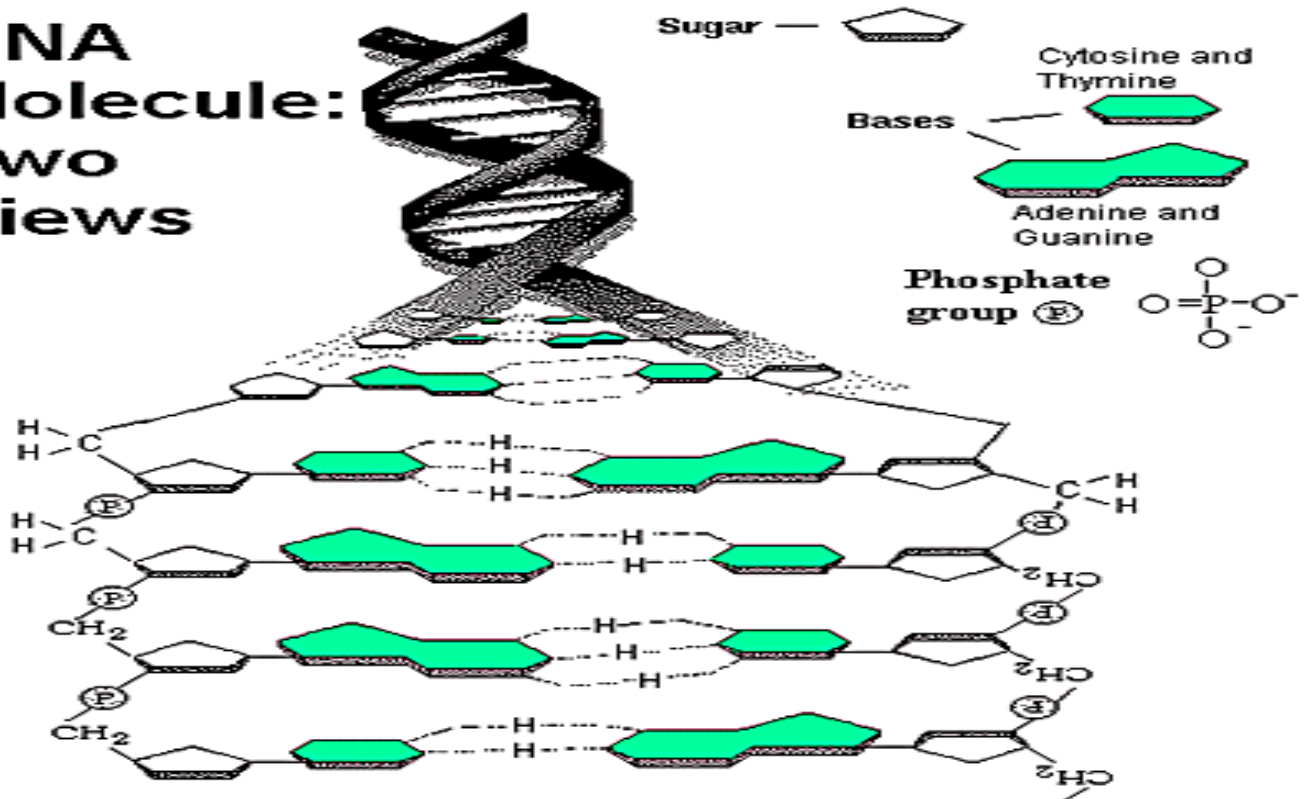
DNA

- DNA - Deoxyribose Nucleic Acid
- Shape is called double helix
- DNA has the information for our cells to make proteins.
- DNA through transcription makes mRNA
- mRNA through translation makes proteins (ribosomes)



- Watson and Crick (1953) Discovered structure of DNA.
- Rosalind Franklin? Who is she?
 - Watson and Crick used her photograph to create the double helix but never gave her credit. She died just before they won the Nobel Prize.
- Each unit of DNA called a nucleotide of DNA consists of 3 parts.
 - Phosphate backbone
 - A 5-carbon sugar (deoxyribose)
 - A nitrogen base attached to the sugar

DNA Molecule: Two Views



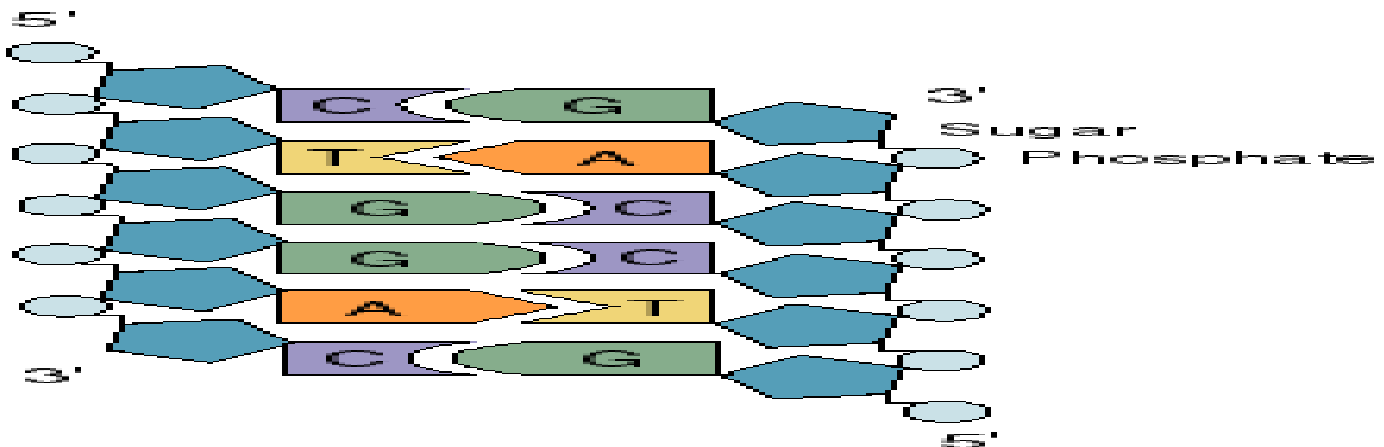
■ There are four different types of nucleotides found in DNA

- A is for adenine
- G is for guanine
- C is for cytosine
- T is for thymine

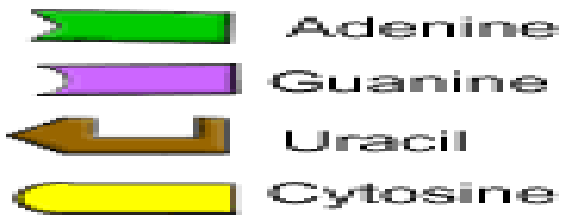
● A goes with T

● C goes with G

● WRONG! T – C or G - A

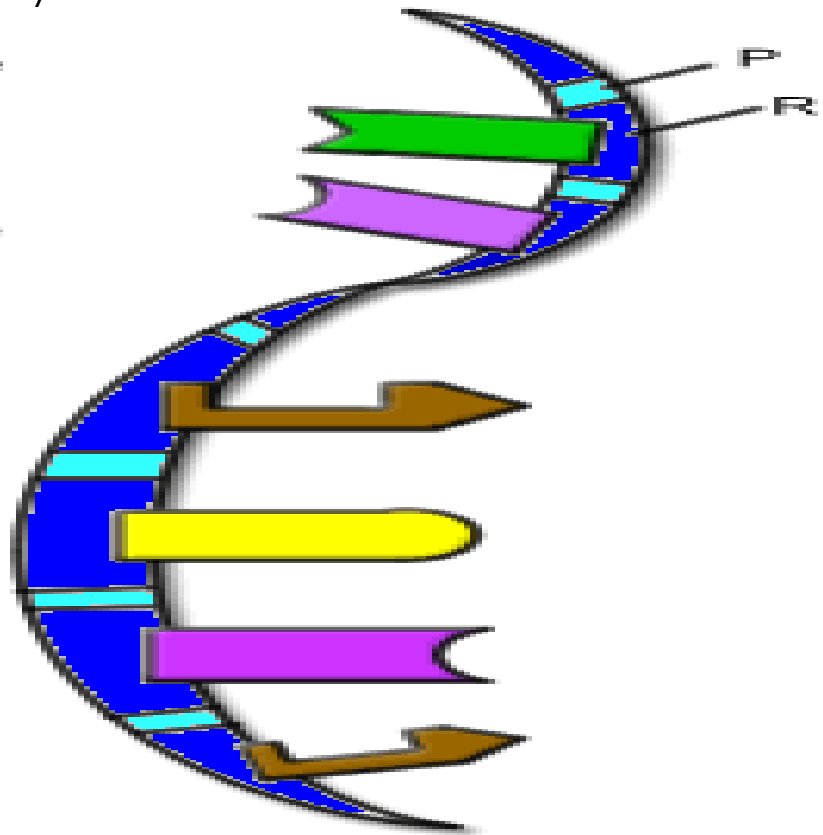


- RNA
 - - Single strand
 - - Uracil replaces Thymine



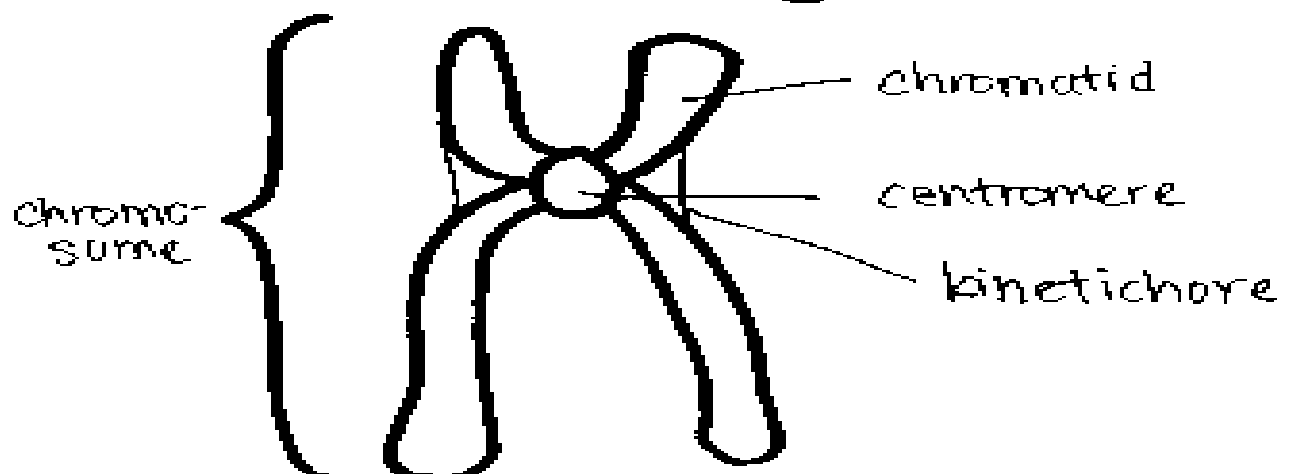
P= phosphate

R= Ribose



NEW AREA OF FOCUS: CELL DIVISION

STRUCTURE OF A CHROMOSOME

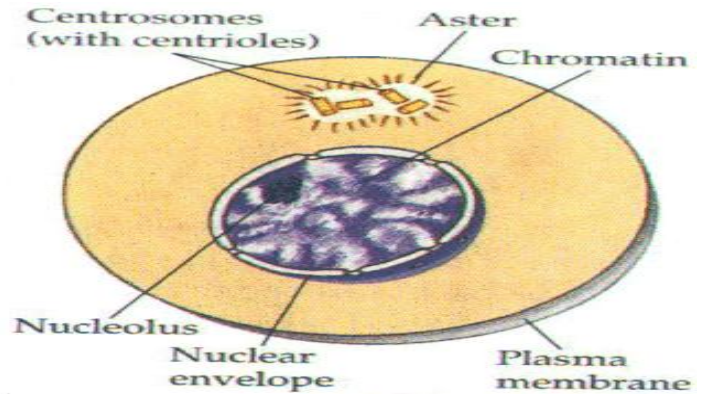


Mitosis – Cellular Division

- When one cell divides into two
- Exact copy of the cells genetic material is made.

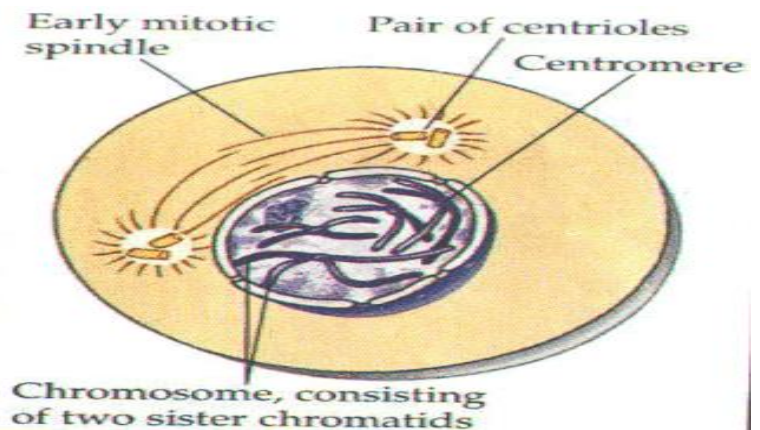
Interphase

- Most of cell cycle (90%)
- Cell grows and develops (gets bigger)
- Chromosomes not visible
- Nucleus intact
- DNA is copied



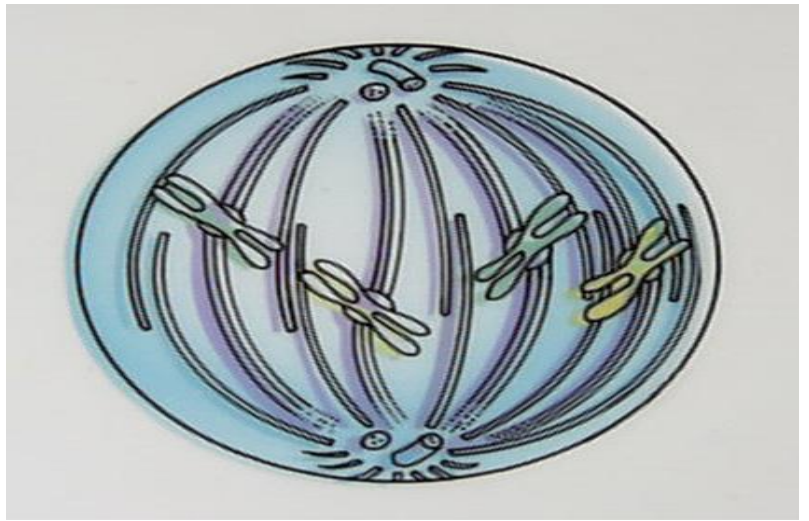
● Prophase

- Chromatin draws together to create chromosomes.
- Spindle fibers form.

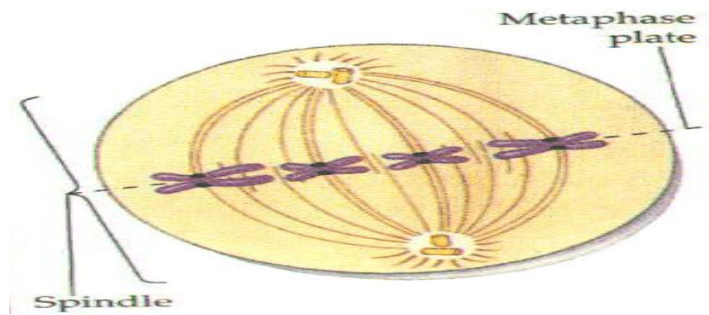


Prometaphase

- Prometaphase
 - Nuclear envelope breaks down.
 - Centrosomes are positioned at opposite poles of the cell.
 - Spindle fibers attach to chromosome at the kinetochore.

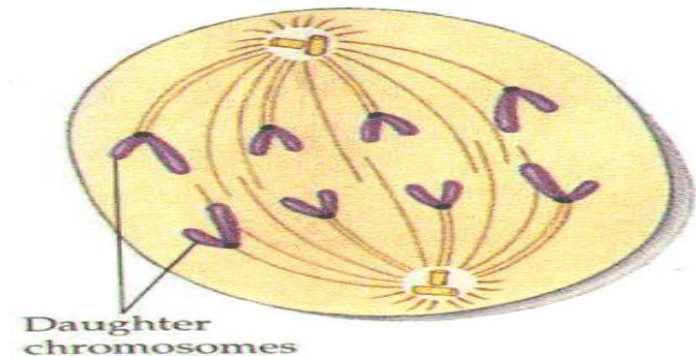


Metaphase - Chromosomes line up on equator



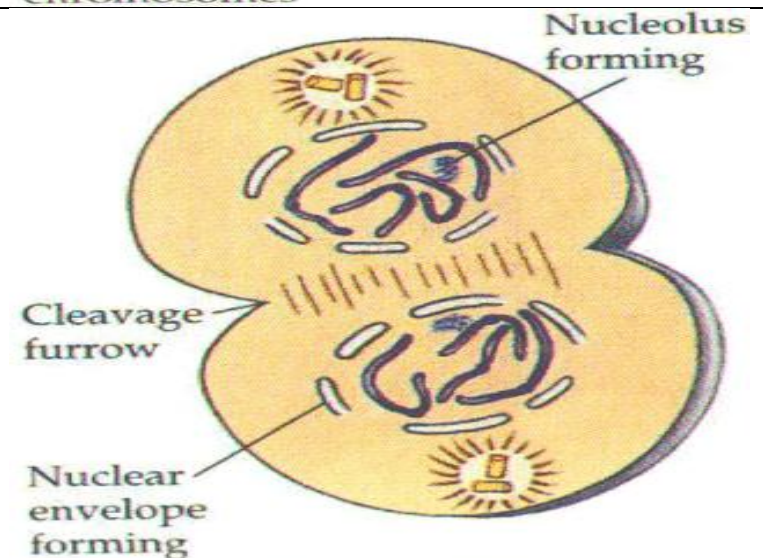
Anaphase

- Chromosomes get split at centromere
- The two identical copies get pulled apart

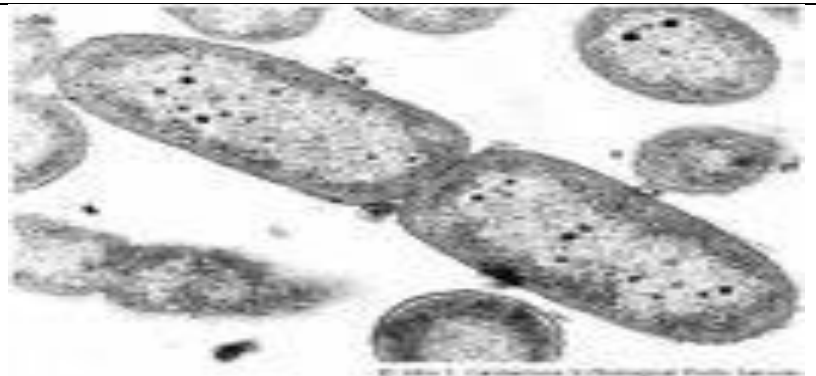


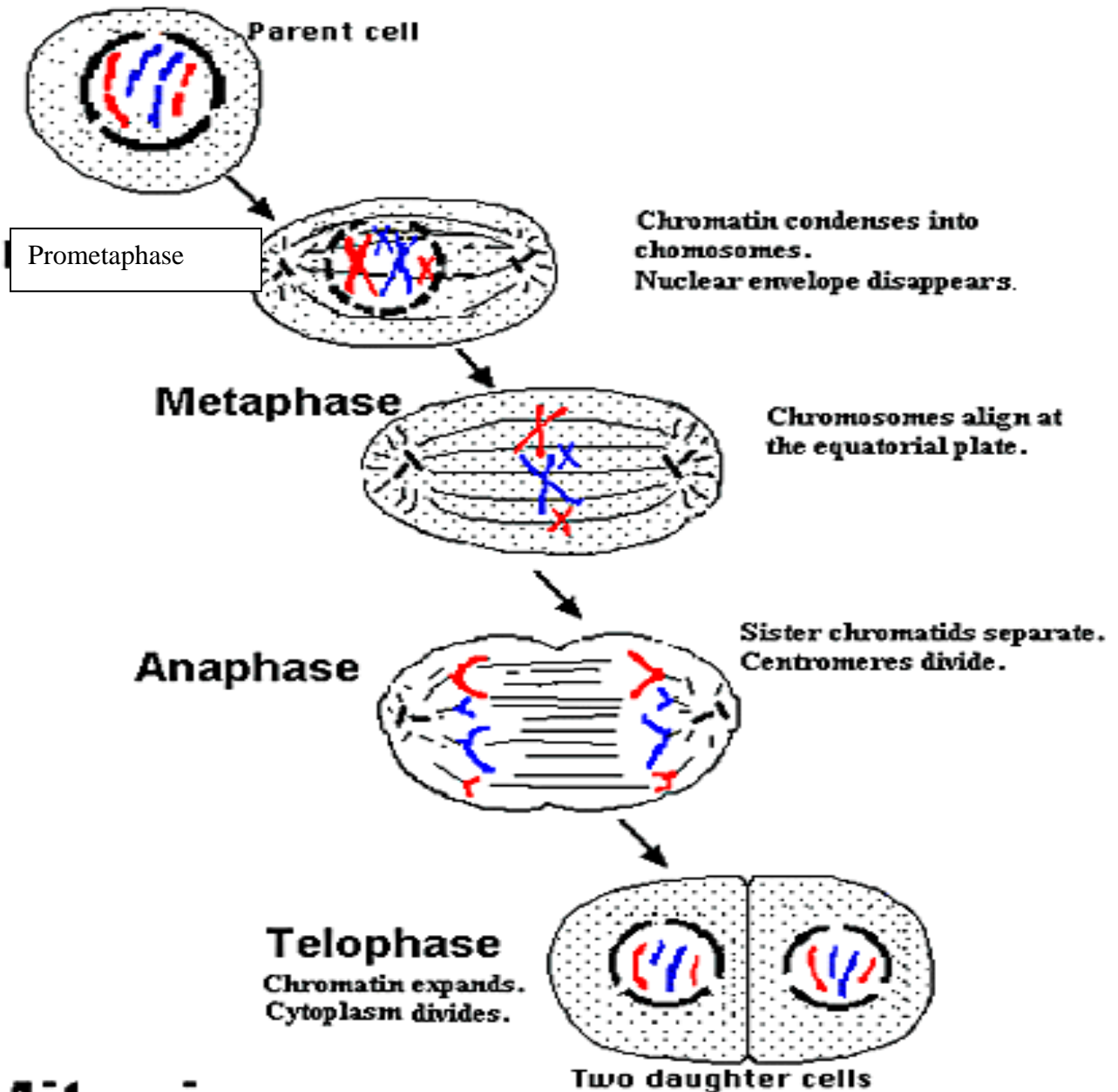
Telophase

- Chromosomes reach poles.
- Nuclear membrane begins to form.
- Cleavage furrow forms pinching cell into two.
- Chromosomes begin to unwrap.



- Cytokinesis: Cell breaks into two (Cell Plate Visible in plants)





Mitosis

Cancer is: Uncontrolled, unregulated cell growth and reproduction. Mitosis out of control.

A few things that may help you avoid cancer.

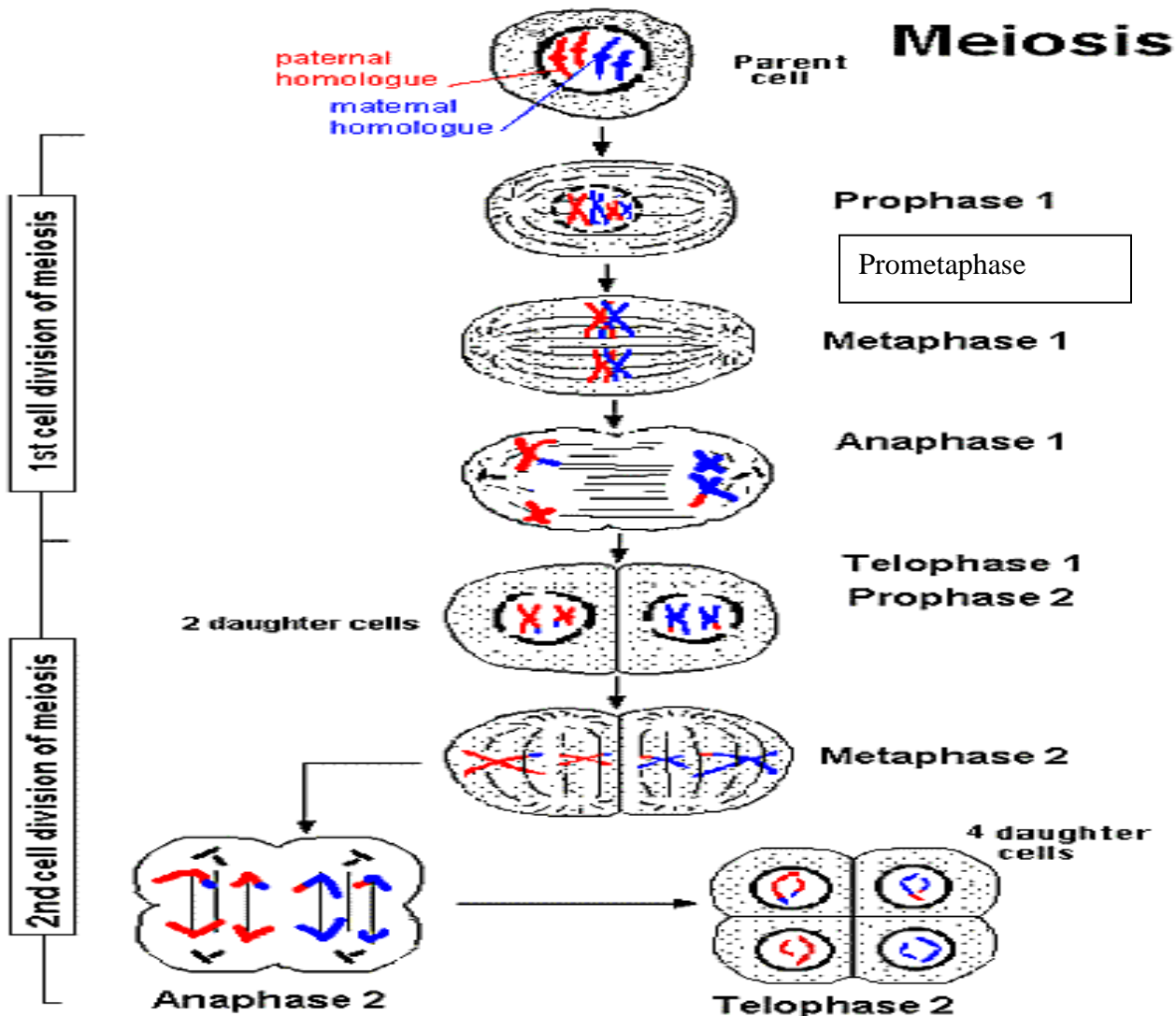
- Don't smoke or chew
- Avoid UV exposure (skin cancer)
- Exercise daily
- Eat healthy
- Don't drink excessive alcohol

- Avoid radiation / energy exposure
- Avoid unprotected sex (HPV virus)
- Get regular checks up with your doctor

What's in a cigarette?

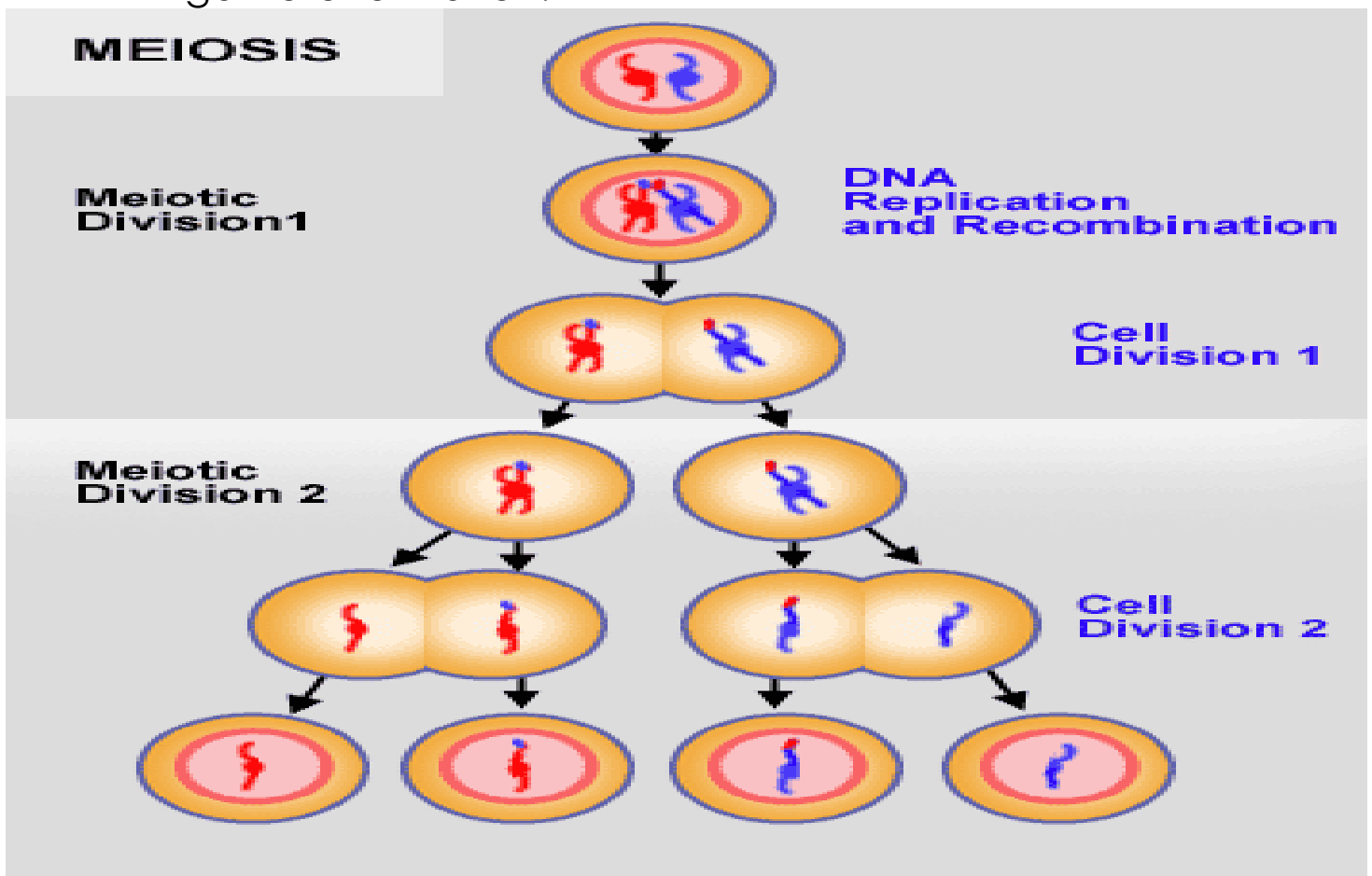


Meiosis: Cell division that produces reproductive cells.



Meiosis involves

- Has two cell divisions in meiosis,
- A reduction in the amount of genetic material
 - Results in half the number of chromosomes
 - Crossing-Over
- Law of segregation (Heredity), states that allele pairs separate or segregate during gamete formation, and randomly unite at fertilization.
 - A gene can exist in more than one form.
 - Organisms inherit two alleles for each trait.
 - When gametes are produced (by meiosis), allele pairs separate leaving each cell with a single allele for each trait.
- Independent Assortment: Genes assort independently because they are located on different chromosomes in gamete formation.

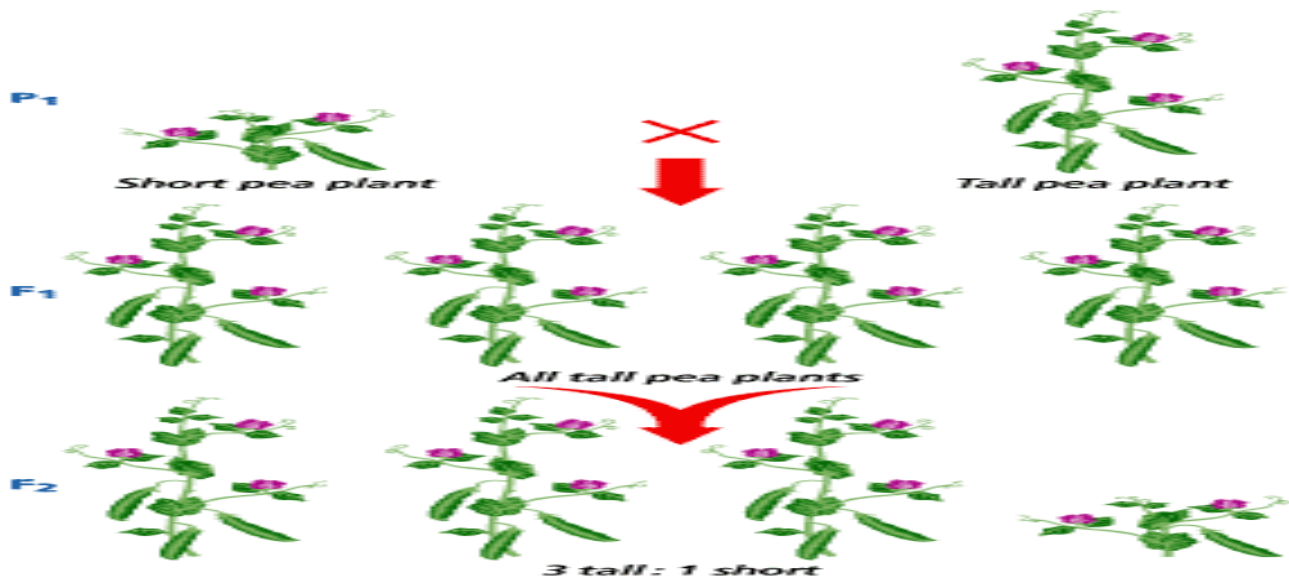


Meiosis involves.

- Sperm has 23 chromosomes (haploid)
- Egg has 23 chromosomes (haploid)
- When they meet you have 46 (diploid)
- Crossing Over : Genetic segments of information are swapped when the chromosomes are next to each other (random and creates millions of possibilities)
- Reduction of genetic information
- Produces four different germ (reproductive cells)

Genetics Large Paragraph (Has all of the key terms)

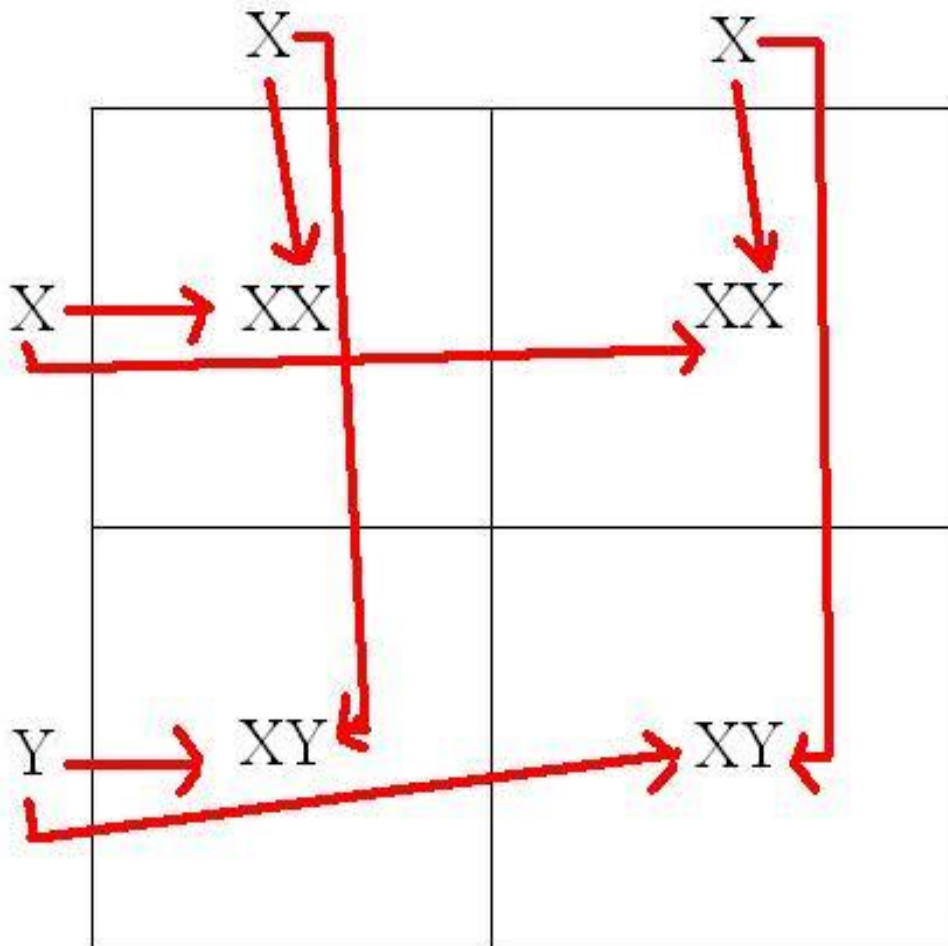
- Gregor Mendel: The father of modern genetics. He counted his results and kept statistical notes, much like your science journal. The year was 1851, a young priest from Vienna studied mathematics and science at the university. Upon finishing, he went back to priesthood and tended a garden outside of the monastery. He worked with pea plants and became curious as to why some pea plants had different characteristics or **traits**. Mendel seemed to notice that pea plants tended to pass traits from parents to offspring, which is called **heredity**. Mendel started doing experiments with purebred plants, or plants that always produce offspring with the same trait as the parent. For example, short pea plants always produce short offspring. Mendel then decided to cross short pea plants with tall pea plants.



- An organism's **phenotype** is its physical appearance or its visible traits. An organism's **genotype** is its genetic makeup, or allele combinations. From all of Mendel's' results, he reasoned that individual factors must control the inheritance of traits in peas. Mendel knew that the female contributes one factor, while the male contributes the other factor in **sexual reproduction**. Today's scientists call the factors that control traits **genes**. Scientists call the different forms of gene alleles. A dominant allele is one whose trait always shows up in the organism when the allele is present. A **recessive allele** is covered up when the dominant allele is with it. A **hybrid** has two different alleles.
- Law of segregation (Heredity), states that allele pairs separate or segregate during gamete formation, and randomly unite at fertilization.
 - A gene can exist in more than one form.
 - Organisms inherit two alleles for each trait.
 - When gametes are produced (by meiosis), allele pairs separate leaving each cell with a single allele for each trait.
- T = Dominant
- t = Recessive
- TT = Two dominant

- tt = Two recessive
- Tt = One dominant, one recessive

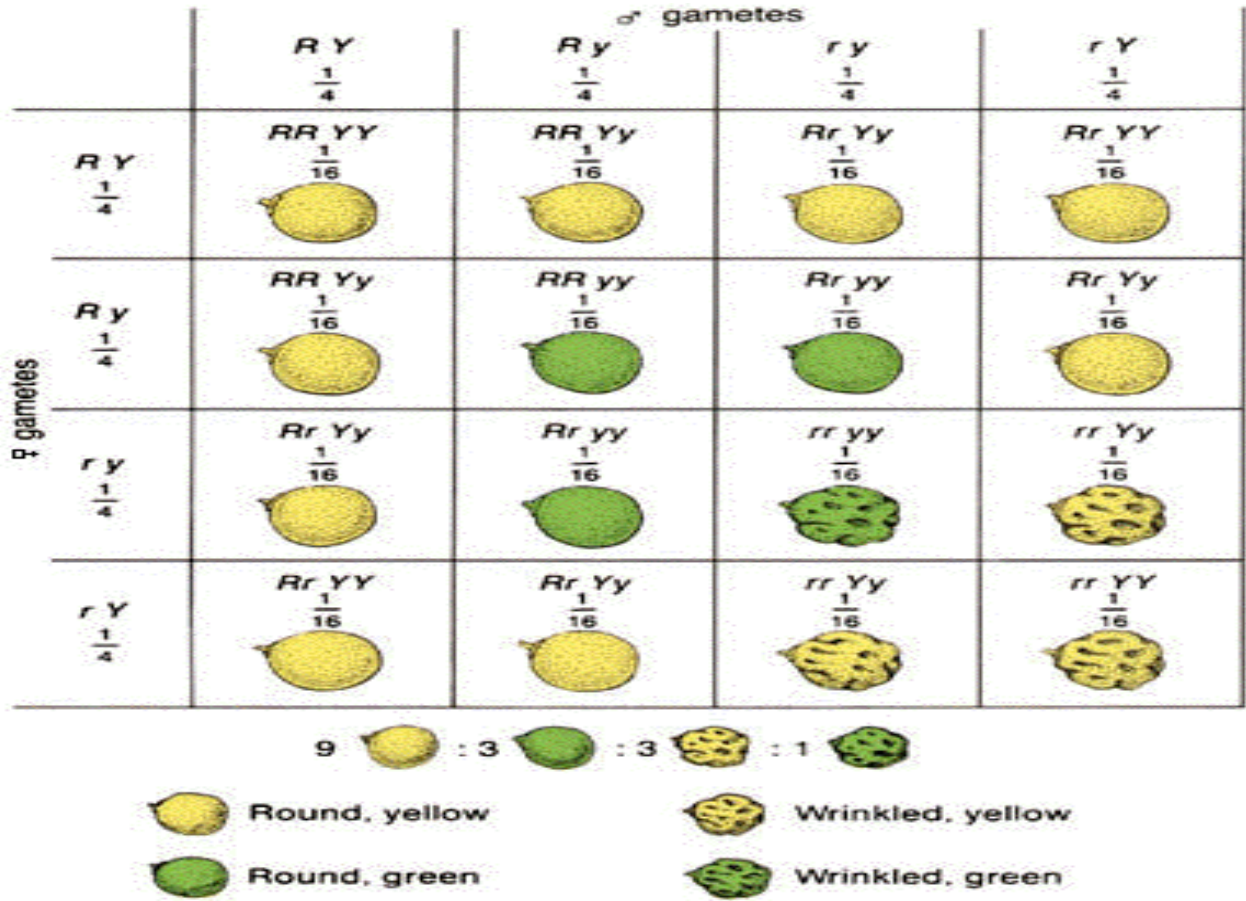
Punnett Square: A diagram that is used to predict the outcome of a particular cross



Genetics deals heavily with probability, or the likelihood that a particular event will occur.

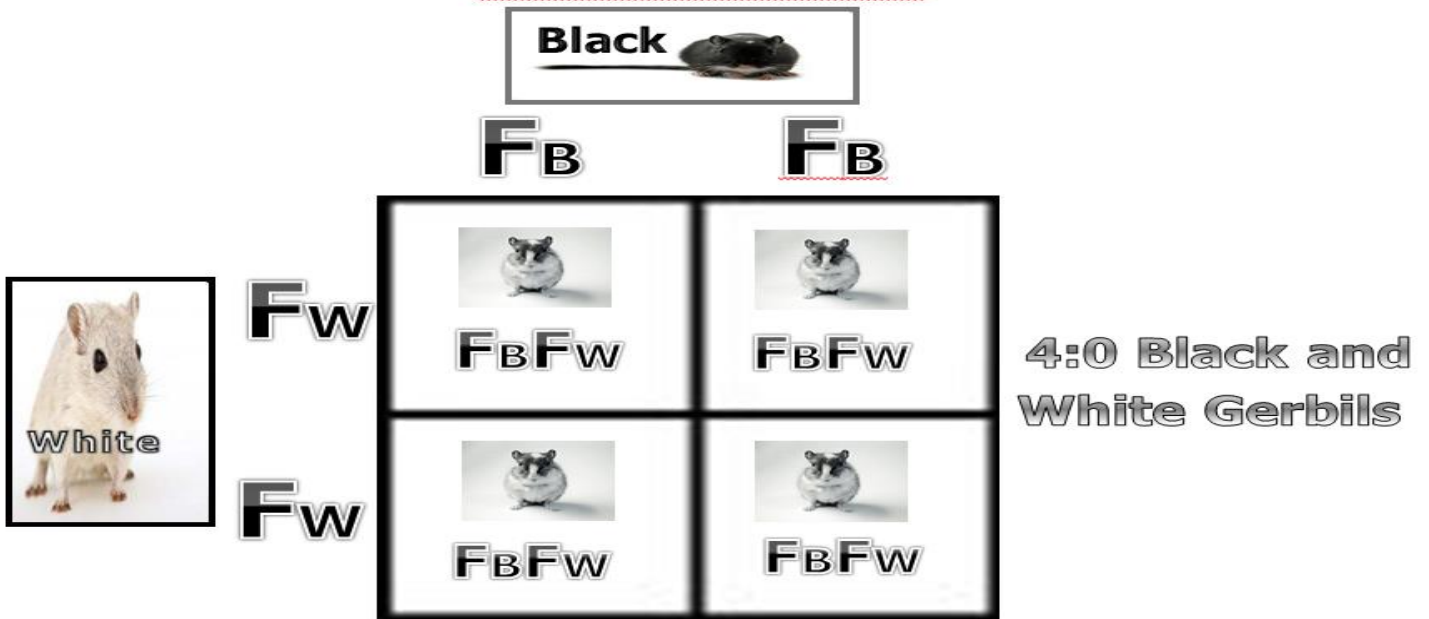
- **Homozygous**-Has two identical alleles TT or tt
- **Homozygous Dominant**: All dominant
- **Heterozygous**- Has two different alleles Tt

Dihybrid Cross

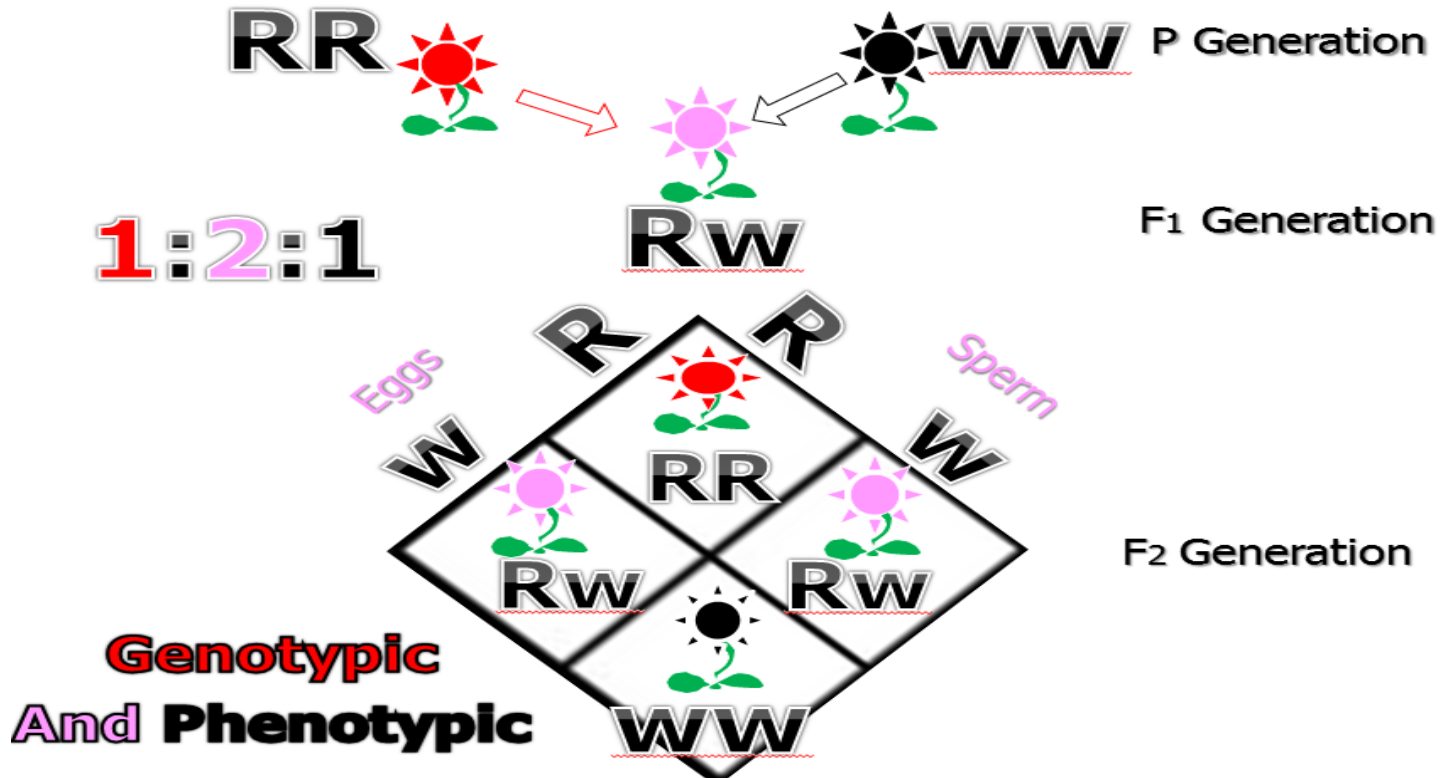


Codominance or a relationship among alleles where both alleles contribute to the phenotype of the heterozygote.

Codominance



- Incomplete Dominance: One allele for a specific trait is not completely dominant over the other.



New Area of Focus: BIO-ETHICS

- Bio-Ethics: The study of ethical issues raised by the developments in life science technologies.
- Stem cells: Cells that have the remarkable potential to develop into many different cell types in the body.
- Cloning: A method of reproduction used to copy a cell or an individual (producing a clone) from their DNA.

