AP Biology
Unit 5- Heredity

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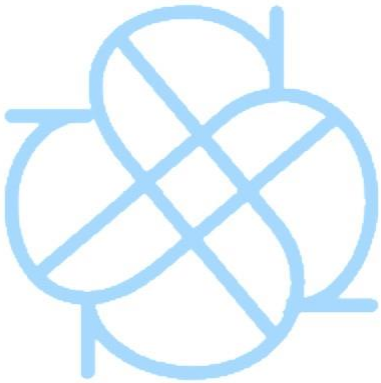
1. Meiosis:

- Crossing over: homologous chromosomes exchange parts of their chromatids with each other
- Gene: unit of DNA that codes for RNA, proteins, and polypeptides
- Synapsis: the pairing of homologous chromosomes
    - Line up gene by gene
- X chromosome: sex xhromosome; occurs twice in females, and once inmales.
- Y chromosome: sex chromosome present only in males
- Genetic recombination: the resulting regrouping of genes in an offspring that results from meiosis
- Haploid: cell containing only one set of chromosome (*n*)
- Diploid: cell containing two set of chromosomes (*2n*)
- Karyotype: display of a cell's chromosomes, with homologues paired up and in order
- Genome: all of the cell's DNA
- somatic cell: diploid cells that undergo mitosis; also referred to as bodily cells
- Gamete: haploid cells that have already undergone meiosis; also referred to as sex cells
- Homologous chromosomes: chromosomes with the same length, shape, and genes (can have different alleles however in the same genes)
- Fertilization: when two haploid gametes contain to form a diploid cell
    - Ex: the union between egg and sperm
- Zygote: result of fertilization; diploid cell
  produces somatic cells by mitosis
- Prophase I: occupies more than 90% of the time required for meiosis
  -chromosomes condense

-synapse and crossing over

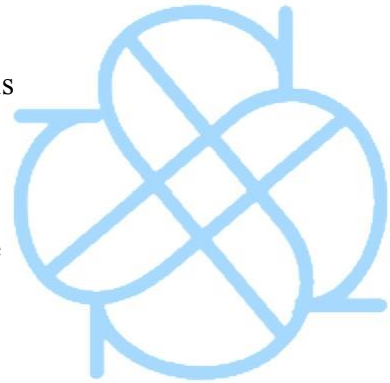
-tetrads and chiasmata

- Sexual reproduction: the fusion of gametes
- Asexual reproduction: not involving the fusion of gametes.
- Chiasmata: point of crossover in homologous chromosomes
- Variation: difference of expressed alleles in gene pool
- Random fertilization: cause of genetic variation; refers to random process of fertilization between a random egg and random sperm



2. Meiosis and Genetic Diversity:

- Purpose
    - Produce gametes for sexual reproduction
    - Women: happens in ovaries
    - Men: happens in tests
- Nuclear division splits the amount of chromosomes in the parent cell into half
    - 2n → n
- Cellular division (Meiosis):
- Meiosis 1
    - prophase
    - Metaphase
    - Anaphase
    - Telophase
    - Cytokinesis
- Meiosis11
    - prophase
    - Metaphase
    - Anaphase
    - Telophase
    - Cytokines



- Meiosis ends with four gametes each containing half the genetic complement of the parent
- Comparing Mitosis and Meiosis: MITOSIS: results in the production of 2 daughter cells IDENTICAL to the parent cell to make somatic cells(2n)
  -growth and repair of cell organisms
  -23 pairs of chromosomes in identical daughter cells
  -DNA replicated 1 time
  -creates 2 diploid cells
  -1 nuclear division
  MEIOSIS: results in the reproduction of chromosomes number by half in the 4 new cells(used only in fertilization)

-To make sex cells(n)

-Production of sex cells for sexual reproduction

-23 chromosomes in each 4 genetically different daughter cells

-DNA replicates 1 time

-Creates 4 haploid cells

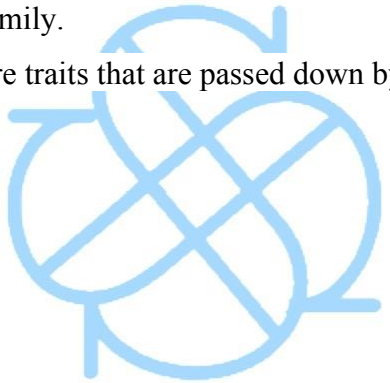
-2 nuclear division

Mitosis	Meiosis
● results in the production of 2 daughter cells IDENTICAL to the parent cell to make somatic cells(2n) ● growth and repair of cell organisms ● DNA replicated 1 time ● creates 2 diploid cells ● 1 nuclear division	● results in the reproduction of chromosomes number by half in the 4 new cells(used only in fertilization) ● To make sex cells(n) ● Production of sex cells for sexual reproduction ● DNA replicates 1 time ● Creates 4 haploid cells ● 2 nuclear division

- Genetic Diversity:
    - Crossing Over
    - Randomization

3. Mendelian Genetics:

- Allele: Different forms of a gene
- Dominant: dominating allele
- Recessive: inferior allele; masked in the presence of a dominant allele
- Homozygous: two identical alleles for a trait
- Heterozygous: two different alleles for a trait
- Genotype: genetic makeup
- Phenotype: An organism's physical appearance
- Sex-linked: genes locatd on sec chromsomes
- Carrier: A person who has one recessive allele for a trait but does not have the trait.
- Pedigree: A diagram that shows the occurrence of a genetic trait in several generations of a family.
- Mendelian traits are traits that are passed down by dominant and recessive alleles of one gene.



4. Non-Mendelian Genetics:

- Not determined by the simplicity of dominant versus recessive
- Recombination Frequency: average amount of crossovers
- X Inactivation: Condensation of X chromosomes into Barr bodies
- Codominance: where both dominant, differing alleles are equally expressed in the phenotype
- Epistasis: when a gene also control the expression of other, independent genes
- Incomplete Dominance: where both dominate, differing alleles are blended; neither are expressed fully
- Linkage: Occurs when different traits are inherited together more often that they would have been by chance along
- Mitochondrial Inheritance: genes passed through the mother's side
- Pleiotropy: The ability of a single gene to have an effect on multiple expressions in the phenotype
- Polygenic Traits: Characteristics that are influenced by more than one pair of genes
- Multiple Alleles: A gene that has more than two alleles

5. Chromosomal inheritance:

- Chromosome theory of inheritance:chromosomes contain genes, and the behavior of those genes during the process of meiosis affects the phenotype of the resulting offspring
- Genes close enough to each other on the chromosome that result in their constant inheritance as a pair
- Recombinant: new combination of inherited gene
- Linkage map: a map of genes on a chromosome depending on the genes' recombination frequency
    - Map units: a unit of measurement of the distance between genes. one map unit is equivalent to a 1% recombination frequency
- Nondisjunction: error that occurs in cell division in which homologous chromosomes do not detach from each other
    - Aneuploidy: cell genome is missing a chromosome
    - Polyploidy: cell genome contains an extra chromosome
- Genetic Mutations
    - Deletion: one or more nucleotides are deleted or lost
    - Duplication: portion of a chromosome is duplicated
    - Inversion: fragment during crossover is moved in a reverse orientation to the chromosome
    - Translocation: a chromosomal fragment is removed from a chromosome and attached to a different chromosome
- Disorders that result from GeneAbnormalities
    - klinefelter syndrome: XXY
    - turner syndrome: XO
    - SRY gene: Y linked gene that triggers the male sexual development pathway in animals.
        - A disorder occurs if this gene is deleted from the Y chromosome of a male; THe individual is genetically male, but has female reproductive organs
    - Trisomy X Syndrome: female has an extra X, resulting in XXX