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DNA Structure (Nucleic Acid)

- ✓ Long, thin molecule
- ✓ Nucleotide
  1. Phosphate
  2. Ribose sugar/ Deoxyribose sugar
  3. Nitrogenous Bases
     - Purines A&G
     - Pyrimidine T&C
- ✓ Base pairing/Complimentary
- ✓ Hydrogen Bonding
- ✓ Double Helix / Ladder Analogy
- ✓ Genes located on DNA and consist of a series of nucleotides
- ✓ It is the sequence of nucleotides that determine the different genes
  - ✓ Variation in the genes determines the different organisms/species
- ✓ Chromosomes

Replication

- ✓ Unzipping and unwinding
  - ✓ Helicase
- ✓ Adding new nucleotides to complimentary base pairs
  - ✓ DNA Polymerase
- ✓ Results
  - ✓ two identical DNA molecules
- ✓ semi- conservative model

BINARY FISSION

- ✓ Draw a prokaryotic cell. What does the Bacterial DNA chromosome look like in the DNA? Label all structures.
- ✓ What is binary fission?
- ✓ Explain this process.
- ✓ Draw the process of binary fission and label the process.

CELL CYCLE

- ✓ What types of cells undergo mitosis?
- ✓ Why is mitosis needed?
- ✓ What happens in Interphase during G1, S, and G2?
- ✓ Draw each phase of Cell Cycle and label accordingly. Draw neatly!!
- ✓ Discuss each phase of mitosis and explain the important events that occur in each phase.
- ✓ Explain the differences between plant and animal cells.

Mitosis

- ✓ Define Cell Cycle (purpose).
- ✓ 3 stages of the cell cycle
  - ➢ Interphase
  - ➢ Mitosis
  - ➢ cytokinesis
- ✓ 3 phases of Interphase.
- ✓ Know how to recognize each stage from another.
- ✓ Know the difference between chromosome, chromatin, chromatid.
- ✓ Differences between Binary Fission and Mitosis.
- ✓ Pick out the differences in plant cell and animal cell cytokinesis.
- ✓ Understand the differences between haploid and diploid, somatic and gamete cells.
- ✓ Organelles necessary for mitosis.
- ✓ Correct sequence of phases for mitosis.
- ✓ Match drawings with stages of mitosis.

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Meiosis. Fertilization and Development

- ✓ What is the difference between diploid and haploid and what the cell is in each stage of Meiosis?
- ✓ Gamete and a somatic cell
- ✓ Recognize what specific feature Meiosis does that Mitosis does not.
- ✓ What are male and female sex cells are called in animals and plants?
- ✓ Be able to distinguish each stage of Meiosis from another.
- ✓ Fertilization
- ✓ Development
- ✓ Differentiation
- ✓ Homologous chromosomes
- ✓ What event(s) in Meiosis is responsible for genetic variation?
- ✓ Independent Assortment
- ✓ Correct terms for each stage of development and their order.

Karyotypes

- ✓ Know what a normal karyotype should like.
- ✓ Be able to tell if the individual is a boy or girl from a karyotype.
- ✓ Non-Disjunction
- ✓ Trisomy and monosomy
- ✓ Define and recognize Turner, Klinefelter, and Downs syndrome.
- ✓ How do you obtain a karyotype?

Genetics

- ✓ genotypes and phenotypes.
- ✓ alleles
- ✓ patterns dominant and recessive traits.
- ✓ Heterozygous vs homozygous
- ✓ punnett squares—monohybrid and dihybrid crosses
- ✓ Know how an allele relates to a gene and a chromosome.

Protein Synthesis

- ✓ The sequence of protein production from DNA to protein.
  - ➢ Genes
- ✓ Central Dogma
  - ➢ Transcription, translation , protein
  - ➢ mRNA, tRNA, rRNA
  - ➢ Ribosomes
  - ➢ Codons and codon chart for amino acid sequence
  - ➢ Amino acids join via polypeptide bonds to make a complete protein (gene expression)
- ✓ Mutations: Missense, Nonsense and Silent

Enzymes:

- ✓ Activation Energy
- ✓ Activation Site
- ✓ Substrate and Product
- ✓ Metabolism

Biotechnology

Electrophoresis

- ✓ Charge of DNA and movement
- ✓ MicroPipette use (procedures)
- ✓ Amount of movement (fragment size)
- ✓ Reading a DNA fingerprint/Gel
- ✓ Balancing of Centrifuge
- ✓ Adjusting pipette (100 – 1000ul) and (5 – 50ul)

CANCER

- ✓ Definition
- ✓ Discuss the causes of cancer.
- ✓ Explain the difference between benign and malignant cancer. Draw each.
- ✓ Explain cancer's rate of cell division.
- ✓ What are Carcinogens/ Mutagens?
- ✓ What is Metastasis

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Evolution

- ✓ Definition
- ✓ Populations
- ✓ Evidence for evolution
- ✓ Common Ancestry/Genetic Code
- ✓ Three tenets of evolution proposed by Darwin/Populations
- ✓ Speciation and examples of speciation
- ✓ Lamark, Darwin, & Wallace
- ✓ Natural selection vs Artificial Selection
- ✓ Definition of evolution/Theory
- ✓ Homologous and vestigial structures
- ✓ Darwin's study of finches
- ✓ Endosymbiosis
- ✓ Cladistics

Classification

Prokaryote

- ✓ Eubacteria
- ✓ Archaebacteria

Eukaryote

- ✓ Protista
- ✓ Fungi
- ✓ Plantae
- ✓ Animalia
- ✓ Taxonomy
  - ➢ Kingdom
  - ➢ Phylum
  - ➢ Class
  - ➢ Order
  - ➢ Family
  - ➢ Genus
  - ➢ Species
    - ➢ Define Species

Binomial Nomenclature—eg. *Homo sapien*