Unit 2 Guided Notes AP Daily Videos

2.1 Cell Structure- _____Componenets

- Subcellular components _____ to all cells
    - All living cells contain a _____, reflecting the common ancestry of all known life
    - Ribosomes synthesize _____ according to mRNA sequence and the instructions that are encoded in the _____ sequence originates from the genome of the cell

Draw the difference between Prokaryotic Cell and Eukaryotic Cell

- Structure and Function : Ribosomes
    - Ribosomes consist of _____that are NOT membrane-enclosed
    - Ribosomes are made of _____ RNA (rRNA) and proteins
    - Ribosomes _____ according to mRNA sequences
- Structure and Function: _____ (ER)
    - The endoplasmic reticulum is a network of _____within the cytoplasm of the eukaryotic cell
        - _____of the ER
            - _____ ER
                - Has _____ attached to its membrane
                - _____ the cell
                - Rough ER is associated with _____ the newly synthesized _____ made by attached ribosomes for possible export from the cell
            - _____ ER
                - Does _____have ribosomes attached
                - Functions include _____and lipid synthesis
        - _____ differences between rough ER and smooth ER leads ot functional differences
- Structure and Function: _____Complex
    - Series of _____sacs found in eukaryotic cells
    - Involved in _____ and chemical modification of newly synthesized proteins and packaging for protein trafficking

Describe what is happening in the stop motion video:

- Structure and Function: Mitochondria
    - Has a _____ membrane

    - _____is smooth and the inner membrane is highly convoluted, forming _____ called cristae
    - Function in _____ energy that eukaryotic cells can use for cell work
- Structure and Function: Lysossomes
    - _____ found in some eukaryotic cells that contain hydrolytic enzymes
    - _____ can be used to digest a variety of materials such as damaged cell parts or macromolecules
- Structure and Function: Vacuoles
    - _____found in eukaryotic cells
    - Play a variety of roles ranging from _____and other macromolecules to release of waste from a cell

Describe the view of the plant cell and vacuoles:

- Structure and Function: Chloroplasts
    - Found in eukaryotic cells such, as _____ and plants
    - _____membrane
    - Specialized for _____from the sun and producing sugar for the organism
- Let's Practice!!! This is good to follow along with!!!

2.2 Cell Structure and Function

- Strucutre and Function: Chloroplasts
    - Specialized for _____and capturing energy from the sun to produce sugar
    - Within chloroplasts are _____:
        - Thylakoid
            - _____ compartments that are organized in stacks called grana
            - Membranes contain _____ that comprise the photosystems and _____ can be found between the photosystems, embedded in the thylakoid membrane
            - _____reactions occur here
            - Folding of these internal membranes _____the efficiency of these reactions
        - Stroma
            - _____ the inner chloroplast membrane and outside thylakoids
            - The _____ (Calvin- Censon cycle) reactions occur here
- Structure and Function: Mitochondria

    - _____ provides compartments for different metabolic reactions
    - Mitochondria _____ from macromolecules
    - The _____ (citric acid cycle) reactions occur in the matriz of the mitochondria
    - _____ and ATP synthesis occur in the inner mitochondrial membrane
    - Folding of the inner membrane i _____, which allows for more ATP to be made
- Structure and Function: Vacuoles
    - Vacuoles play a _____, including storage and release ofo water, macromolecules, and cellular waste products
    - In _____, vacuoles aid in retention of water for turgor pressure
    - _____is an internal cellular force, usually caused by water pushing up against the plasma membrane and cell wall
- Structure and Function: Lysosomes
    - Contains _____ and can contribute to cell function in the following ways:
        - _____design
        - _____of organic materials
        - Programmed cell death (_____)
- Strucutre and Function: _____ (ER)
    - The ER performs the following functions for the cell:
        - Provide _____support
        - Plays a role in _____ transport
        - Rough ER carries out _____on ribosomes that are bound to its membrane

Describe what is happening in the stop motion video:

Describe what is happening in the stop motion video:

- Let's Practice- Skill Practice- Argumentation!!!! Follow along and make notes!!

2.3 Cell Size

- Cells are _____small
    - Moving _____(such as nutrients and waste) in and out of cells gets more difficult that _____a cell is
    - The 3 blocks below are cut from beets, a root vegetable, and can represent hypothetical _____sizes

Describe what happened in the mini-experiment:

- Since there was a _____of bleach outside the cubes, bleach was able to move _____ of each cube
- The results show a different amount of bleach _____ after 30 min. The smaller cube was _____ at allowing bleach to enter as shown by a _____ of its total volume containing bleach

- Surface Area-to- Volume Ratio- Equations
  -

Length of sides (cm)	0.5	1	2
SA (cm^2)			
V (cm^3)			
SA:V ratio			

Put your math here to fil in the chart:

- Effect of _____ Ratios on the Exchange of Materials
  - Smaller cells typically have a _____surface area to volume ratio and more _____exchange of materials with the environment
  - As cells _____, the relative surface area making it difficult for larger cells to meet the demand for internal resources and remove wate sufficiently
  - Thes limitations can _____ cell size and shape
- Let's Practice- Visual Represnetations- Follow Along and make notes!!

Daily Video 2.3 Video 2 - Cell Size

- _____ on the Exchange of Materials
  - The _____of the plasma membrane must be large enough to adequately exchange materials
  - Smaller cells typically have _____ surface area- to-volume ratio and more _____exchange of materials with the environment
  - As cells _____ in volume, the relative surface area _____ and the demand for internal recourses increases
  - More _____ structures are necessary to adequately exchange materials with the environment
- Use of _____and Strategies

    - Membrane folding _____ surface area
        - Root hairs on the surface of plant roots _____increase the surace area of the root allowing for _____ absorption of water and nutrients
    - Membrane folding _____surface area
        - The outer lining of the _____ is highly folding containing finger-like projections called villi
        - The _____ of each villi has additional microscopic projections called microvilli which further _____ the surface area available for absorption of nutrients
        - If conditions arise that lead to the loss of this folding, these cells would not be as _____ in absorbing nutrients for the organism
    - As organisms _____ in size, their surface area-to-volume ratio decreases, affecting properties like _____ with the environment
        - _____ of ear allows the elephant to dissipate more thermal energy as _____closer to the surface
    - Organisms have evolved _____efficient strategies to obtain nutrients and eliminate wastes
        - Cells and organisms use _____surfaces, such as stomatal openings of leaves, to obtain molecules from and release molecules into the _____ environment
        - When stomata are _____ CO2 can enter the lead and O2 and H2O can be _____into the atmosphere
- Let's Practice- Follow along and make notes about_____ tests and data analysis

2.4 Plasma Membranes

- Cells have membranes that allow them to establish an_____ environment
    - Cell membranes provide a _____between the interior of the cell and the outside environment
    - Cell membranes control the_____of materials in and out of the cell
- _____ have both hydrophilic and hydrophobic regions
    - Phospholipids are _____.
        - Hydrophilic _____ head is polar
        - Hydrophobic _____ tail is nonpolar
    - Phospholipids spontaneously form a_____ in an aqueous environment
        - Tails are located _____ the bilayer
        - Heads are _____ to the aqueous outside and aqueous inside environments
- Embedded _____ can be hydrophilic or hydrophobic
    - _____ proteins
        - Loosely bound to the_____ of the membranes
        - Hydrophilic with _____and polar side groups

    - I_____proteins
        - _____ the membrane
        - Hydrophilic with charged and _____side groups
        - Hydrophobic with _____ side groups penetrate the hydrophobic interior of the bilayer
- Embedded proteins play various roles in maintaining the _____ environment of the cell
    - Membrane _____functions
        - Transport
        - _____ recognition
        - Enzymatic acitivity
        - Signal Transduction
        - _____ joining
        - Attachment for _____ or cytoskeleton
- The framework of the cell membranes is described as the _____ model
    - Strucutred as a mosaic of_____ in a fluid bilayer of phospholipids
    - The structure is not_____and is held together primarily by hydrophobic interactions which are _____han covalent bonds
    - Most _____ and some proteins can shift and flow along the surface of the membrane or across the bilayer
- Fluid mosaic model components includes _____.
    - _____, a types of steroid, is randomly sdistributed and wedged between phospholipids in the cell membrane of eukaryotic cells
    - Cholesterol regulates bilayer _____under different environmental conditions
- Fluid mosaic model components include_____.
    - _____ of the (molecules) carbohydrates and lipids enable them to function as markers
        - _____- one or more carbohydrate attached to a membrane protein
        - _____- lipid with one or more carbohydrate attached
- Let's Practice- Follow along and take nates about visual representations!!

2.5 Membrane Permeability

- The structures of the cell membrane
    - _____ are amphipathic
        - _____phosphate head is polar
        - _____ fatty acid tail is nonpolar
    - Phospholipids spontaneously form a _____in an aquesous environment
    - _____- a moving phospholipid bilayer composed of varying types fo molecules (proteins, steroids, carbohydrates)
    - _____ is a deirect consequence of membrane structure

- The cell membrane is selectively permeable
    - _____molecules pass freely
        - N2
        - O2
        - CO2
- The cell membrane is selectively permeability
    - _____ substances such as large polar molecules and ions can NOT freely moce across the membrane
    - Hydrophilic substances move through_____.
        - _____- A hydrophilic tunnel spanning the membrane that allow specific target molecules to pass through
        - _____- Spans the membrane and change shape to move a target molecule from one side of the membrane to the other
    - _____, like H2O, can pass directly through the membrane in minimal amounds
- The cell wall is a structural _____and permeable barrier
    - As a structural boundary:
        - _____ and maintains the shape of the cell
        - _____ against cellular rupture when internal water pressure is high
        - Helps_____stand up against the force of gravity
    - As a permeable barrier
        - _____ small holes between plant cells that allow the transfer of nutrients, waste, and ions
    - Animal cells_____have cell walls
- The cell walls are composed of_____ carbohydrates
    - Cell walls comprised of complex carbohydrates
        - _____- cellulose
            - Polysaccharide
        - _____- Chitin
            - Polysaccharide
        - _____- peptidoglycan
            - Polymer consisting of _____ and amino acids
- Let's Practice- Follow Along and make notes about statistical tests and data analysis!!

2.6 Membrane Transport

- Selectivly permeable membranes allow for the formation of _____ gradients
    - Concentration gradient
        - A concentration gradient is when a_____is more concentrated in one area than another
        - A _____separates two different concentrations of molecules
- _____ is the net movement of molecules from high to low concentration

    - Net movement of molecules from high concentration to low_____ metabolic energy, such as, ATP needed
    - Plays a_____ in the import of materials and the export of wastes
- Passive transport is the net movement of molecules from_____concentration
    - _____- movement of molecules from high concentration to low concentration
        - Small nonpolar molecules _____ (N2, O2, CO2)
    - _____- movement of molecules from high concentration to low concentration through_____proteins
        - Allows from _____ molecules and ions to pass through membranes

Descirbe the experiment performed:

- _____requires energy
    - Active transport requires the_____(suach as ATP) to move molecules from regions of low concentration to regions of high concentration
- _____requires energy to move large molecules into the cells
    - In ednocytosis, the cell uses energy to take in macromolecules and particulate matter by forming_____derived from the plasma membrane
        - _____- cell takes in large particles
        - _____- cell takes in extracellular fluid containing dissolved substances
        - _____- Mediated endocytosis- receptor proteins on the cell membrane are used to capture specific target molecules
- _____ requires energy to move large molecules out of the cell
    - In exocytosis, _____ use energy to fuse the plasma membrane and secrete larg emacromolecules out of the cell
        - Proteins such as_____ proteins
        - Hormones
        - Waste
- Let's Practice- Follow along and take notes about Questions and Methods!!!

2.7 Facilitated Diffusion

- _____ are necessary for facilitated diffusion
    - Facilitated diffusion- movement of molecules from_____ concentration to low concentration through transport proteins
        - _____ molecules
        - Large _____can pass through aquaporins
        - _____, including Na+ and K+, require channel proteins
- _____ establishes and maintains concentration gradients
    - Active transport moves molecules and/or ions _____their concentration gradient from low concentration to high concentration

        - _____called pumps
        - Requires metabolic energy (such as _____)
        - Establishes and_____ concentration gradients
- _____ are necessary for active transport
    - _____- secondary active transport that uses the energy from an electrochemical gradient to transport_____across the membrane through a protein
        - _____- two different ions are transported in the same direction
        - _____ two different ions are transported in opposite directions
- Membranes may become _____ by movement of ions
    - The _____ allows for the formation of gradients
        - _____l gradient
            - Type of _____ gradient
            - _____- electral potential difference (voltage) acorss a membrane
        - Membranes may become_____by movement of ions acrosee the membrane

Describe the example:

- Let's Practice! Follow along and make notes about argumentation!!

2.8 Tonicity and Osmoregulation

- _____moves by osmosis
    - Osmosis is the _____of free water across a selectively permeable membrane
        - _____ of water move via aquaporins
    - _____ is the total solute concentration in a solution
        - Water has high _____ abilities
        - _____ is the substance being dissolved
        - _____ is a substance that dissolves a solute
        - _____ is a uniformed mixture of one or more solutes dissolved in a solvent
            - Solvent+ solute= solution
- Tonicity_____ a cell's physiology
    - _____is the measurement of the relative concentration of solute between two solutions (_____ of the cell)
    - Internal cellular environments can be _____to external environments
        - Hypertonic
            - _____ solute and _____ solvent

        - Isotonic
            - _____ concentrations of solute and solvent
        - Hypotonic
            - _____ solute and _____solvent
    - Water moves by osmosis into the area with a_____ concentration
        - Water concentrations and solute concentrations are _____related
        - Water would diffuse _____ of a hypotonic environment to a hypertonic environment
        - Solutes diffuse along their_____ concentration gradients, from the_____ environment into the _____ environment
    - When a cell is in an _____ environment, a dynamic equilibrium exists with equal amounts of water moving in and out of the cell at equal rates
        - _____of water takes place

What is the environment?

- _____ contribute to survival
    - In plant cells, osmoregulation maintains _____ and allows control of internal _____composition/water potential
        - Environment Hypertonicity
            - _____ and more cellular water
            - Plasmolysis
        - Isotonic Solution
            - Equal Solute and water
            - _____.
        - Environmental Hypotonicity
            - More cellular solute and less cellular water
            - _____.
    - The _____helps maintain homeostasis for the plant in environmental hypotonicity
        - Osmotic pressure is high _____ of the plant cell due to environmental hypotonicity
        - Water flows _____the plant vacuoles via osmosis causing the vacuoles to_____ and press against the cell wall
        - The cell wall expands until it begins to exert_____ on the cell, this pressure is called_____ pressure
        - Turgidity is the _____state for plant cells
    - In animal cells, osmoregulation_____and allows control of internal solute composition/ water potential
        - Environmental Hypertonicity
            - Less cellular solute and more cellular water
            - _____.
        - Isostonic Solution
            - Equal solute and water

        - _____.
    - Environmental Hypotonicity
        - More cellular solute and less cellular water
        - _____.

Explain the example given:

- Let's practice!! Follow Along and take notes about questions and methods!!

2.8 Video 2- Tonicity and Osmoregulation

- The components of an effective graph
    - Title
        - Experiment _____ and what is being_____.
    - Labeled _____with units
        - Independent variable
            - _____ (Horizontal)
        - Dependent variable
            - _____ (Vertical)
    - Scaling- uniform intervals
        - Scale is _____ to analyze data
        - Scale _____on the grid lines
    - Identifiable lines or bars
        - _____or level each line or bar
    - Trend line
        - _____ that shows the general pattern or overall direction of the data
- Types of graphs
    - Line graph
        - Reveals_____for multiple groups or treatments
        - Track changes over time, concentrations, etc.
    - XY Graph
        - Scatterplot.
        - To determine _____ things
        - Compare_____ that may or may not have linear relationships
    - Histogram
        - Show how values in a data set are _____spaced or equal intervals
        - Explore the relationship between _____ variables
    - Bar graph
        - Compare _____ or treatments to each other
    - Box and whisker plots

        - Show the_____ in a sample
        - Ideal for comparing_____ the mean
    - Dual Y
        - Illustrate the relationship between_____variables
- Let's Practice!! Follow along and take notes about representing and describing data

2.8 Video 3 Tonicity and Osmoregulation

- Water moves by osmosis
    - _____ measures the tendency of water to move by osmosis
        - Calculated from_____ and solute potential

What is the equation?

- Water moves by Osmosis
    - Water moves from an _____ to an area of low water potential
    - The values of water potential can be_____ or negative
    - The _____ the water potential, the more likely water will move into the area
- Water potential of _____water
    - Water potential of pure water has a value of_____ in an open container
- Osmoregulation allows _____ composition and water potential
    - _____the amount of solute in water will cause
        - An _____ potential
        - A _____ potential
    - _____ water potential will cause
        - An _____ in pressure potential
    - _____ pressure potential will cause
        - A _____ in water potential
- _____of a solution
    - In an open system, the pressure potential is zero, so_____is equal to the solute potential
        - i= _____constant
        - C= _____concentration
        - R= _____ constant
        - T= _____ in Kelvin
            - The addition of solutes is _____solute potential

Describe/ Follow along with the example:

- Let's Practice!! Follow along and make notes about statistical tests and data analysis!!

2.9 Mechanisms of Transport

- _____ is the end movement of molecules down their concentration gradient
    - _____- the movement of molecules from high concentration to low concentration
        - _____ pass freely (N2, O2, CO2) across a cell membrane
        - Small amounts of _____ like water, can diffuse across a cell membrane
    - _____- the movement of molecules from high concentration to low concentration through transport proteins
        - _____molecules
        - _____ including Na+ and K+, require channel proteins
- _____ is the diffusion of water across a selectively permeable membrane
    - _____ of water move via aquaporins
    - Differences in _____concentrations can facilitate osmosis
- _____ is the movement of molecules _____ their concentration gradient
    - Active transport moves molecules and/or ions _____ their concentration gradient, from low concentration to high concentration
        - _____ are carrier proteins used in active transport
        - Requires _____ (such as ATP)
        - Establishes and maintains _____gradients
- Movement of _____ into and out of cells requires energy
    - In _____the cell uses energy to take in macromolecules and particulate matter by forming new vesicles and derived from the plasma membrane
        - The_____ of endocytosis are phagocytosis, pinocytosis, and receptor-mediated endocytosis
    - In _____, internal vesicles use energy to fuse with the plasma membrane and secrete large macromolecules out of the cell
- Let's Practice!!! Follow along and take notes about the concept explanation!!!

2.10 Compartmentalization

- _____ in Eukaryotic cells
    - Cells have a plasma membrane that allow them to _____ internal environments that are_____from their external environment
    - _____ have additional internal membranes and membrane-bound organelles that compartmentalize the cell
    - Cellular compartments allow for various_____and specific enzymatic reactions to occur simultaneously, increasing the efficiency of the cell
- Cellular Compartments: _____.
    - Membrane _____ interactions
    - The hydrolytic enzymes of the lysosome function at an_____environment

    - By having the compartmentalization, the inside of the lysosome can maintain a more acidic pH and allow for_____to occur, while the rest of the cytoplasm can remain a more neutral environment
- Cellular Compartments: _____.
    - Membrane folding _____ for metabolic reactions to occur
    - _____and ATP synthesis occur in the inner mitochondrial membrane
    - Folding of the inner membrane increases the surface area, which allows for more A_____ to be made
- Cellular Compartments: _____.
    - Membrane folding maximizes surface area for metabolic reactions to occur
    - The _____ are highly folded membrane compartments that increase the efficiency of the _____reactions
- Let's practice. Follow along and take notes about the argumentation

2.11 Origins of Cell Compartmentalization

- Comparison of _____ in Prokaryotic and Eukaryotic Cells
    - _____ have a plasma membrane that separates their internal environment from their surrounding environment
    - Prokaryotic cells have an internal region, _____, that contains its genetic material
    - Eukaryotic cells have_____ internal membranes and membrane-bound organelles that compartmentalize the cell
        - _____ is contained within a membrane-bound nucleus
- The evolution of membrane-bound organelles
    - The nucleus and other internal membranes (e.g. ER) are theorized to have formed from the _____of the plasma membrane
    - _____evolved from previously free-living prokaryotic cells via endosymbiosis
        - A_____was engulfed by an anaerobic cell through endocytosis
        - The engulfed prokaryotic cell_____ by the engulfing cell; this arrangement became_____ beneficial
        - Over time, the engulfed cell lost some of its independent functionality and became the _____ of the eukaryotic cell
    - _____evolved from previously free-living prokaryotic cells via endosymbiosis
        - A_____ was engulfed by another cell through endocytosis
        - The engulfed prokaryotic cell _____ by the engulfing cell; but rather each benefitted from the arrangement
        - Over time, the engulfed cell lost some of its independent functionality and became the_____ of the eukaryotic cell
- Relationship between the functions of_____ & their ancestors

    - Both mitochondria and chloroplasts have _____, which function to regulate the_____ into and out of the cell and to maintain a stable internal environment
    - Like prokaryotic cells; mitochondria and chloroplasts
        - Both have their _____encoding genetic information and can reproduce by a similar process used by prokaryotes
        - Both contain their_____that synthesize proteins
- Let's practice!!! Follow along and take notes about argumentation!!!