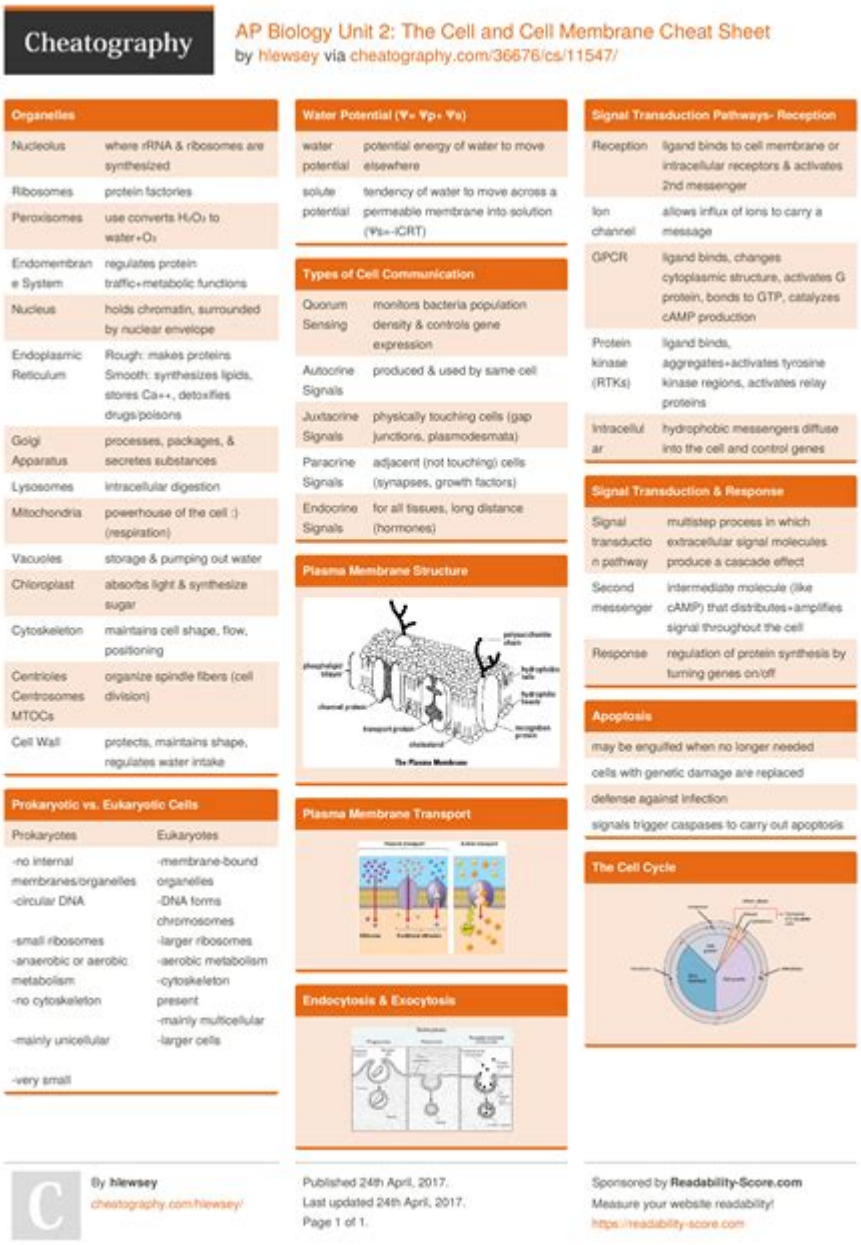
Ap Biology Unit 2 Cheat Sheet



Cheatography

AP Biology Unit 2: The Cell and Cell Membrane Cheat Sheet
by hlewsey via cheatography.com/36676/cs/11547/

Organelles

Nucleolus	where rRNA & ribosomes are synthesized
Ribosomes	protein factories
Peroxisomes	use converts H_2O_2 to water+O_2
Endomembrane System	regulates protein traffic+metabolic functions
Nucleus	holds chromatin, surrounded by nuclear envelope
Endoplasmic Reticulum	Rough: makes proteins Smooth: synthesizes lipids, stores Ca++, detoxifies drugs/poisons
Golgi Apparatus	processes, packages, & secretes substances
Lysosomes	intracellular digestion
Mitochondria	powerhouse of the cell :) (respiration)
Vacuoles	storage & pumping out water
Chloroplast	absorbs light & synthesize sugar
Cytoskeleton	maintains cell shape, flow, positioning
Centrioles Centrosomes MTOCs	organize spindle fibers (cell division)
Cell Wall	protects, maintains shape, regulates water intake

Prokaryotic vs. Eukaryotic Cells

Prokaryotes	Eukaryotes
-no internal membranes/organelles	-membrane-bound organelles
-circular DNA	-DNA forms chromosomes
-small ribosomes	-larger ribosomes
-anaerobic or aerobic metabolism	-aerobic metabolism
-no cytoskeleton	-cytoskeleton present
-mainly unicellular	-mainly multicellular
-very small	-larger cells

Water Potential (Ψ= Ψp+ Ψs)

water potential	potential energy of water to move elsewhere
solute potential	tendency of water to move across a permeable membrane into solution (Ψs=-iCRT)

Types of Cell Communication

Quorum Sensing	monitors bacteria population density & controls gene expression
Autocrine Signals	produced & used by same cell
Juxtacrine Signals	physically touching cells (gap junctions, plasmodesmata)
Paracrine Signals	adjacent (not touching) cells (synapses, growth factors)
Endocrine Signals	for all tissues, long distance (hormones)

Plasma Membrane Structure

Plasma Membrane Transport

Endocytosis & Exocytosis

Signal Transduction Pathways- Reception

Reception	ligand binds to cell membrane or intracellular receptors & activates 2nd messenger
Ion channel	allows influx of ions to carry a message
GPCR	ligand binds, changes cytoplasmic structure, activates G protein, bonds to GTP, catalyzes cAMP production
Protein kinase (RTKs)	ligand binds, aggregates+activates tyrosine kinase regions, activates relay proteins
Intracellular	hydrophobic messengers diffuse into the cell and control genes

Signal Transduction & Response

Signal transduction pathway	multistep process in which extracellular signal molecules produce a cascade effect
Second messenger	intermediate molecule (like cAMP) that distributes+amplifies signal throughout the cell
Response	regulation of protein synthesis by turning genes on/off

Apoptosis

- may be engulfed when no longer needed
- cells with genetic damage are replaced
- defense against infection
- signals trigger caspases to carry out apoptosis

The Cell Cycle

By hlewsey
cheatography.com/hlewsey/

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AP Biology Unit 2 Cheat Sheet is an essential resource for students preparing for the Advanced Placement Biology exam. Unit 2 typically focuses on the cell structure and function, cellular metabolism, and the molecular basis of heredity. Understanding these concepts is crucial for both the exam and for a comprehensive grasp of biological sciences. This article provides a detailed overview of the key topics included in AP Biology Unit 2, accompanied by a cheat sheet that encompasses vital information, concepts, and terms that students should master.

Key Concepts of AP Biology Unit 2

Unit 2 of the AP Biology curriculum is foundational in understanding cellular processes and the molecular mechanisms that govern life. The main categories of focus include:

1. Cell Structure and Function
2. Membrane Structure and Function
3. Metabolic Pathways
4. Cell Communication
5. Cell Division and the Cell Cycle

Cell Structure and Function

Cells are the basic unit of life, and a thorough understanding of their structure is essential. Key components of cell structure include:

- Prokaryotic Cells: Simple, unicellular organisms without a nucleus. Key features include:
- Plasma membrane
- Cytoplasm
- Ribosomes
- DNA (circular chromosome)

- Eukaryotic Cells: More complex cells that can be unicellular or multicellular. Key organelles include:
- Nucleus
- Endoplasmic reticulum (smooth and rough)
- Golgi apparatus
- Mitochondria
- Chloroplasts (in plants)
- Lysosomes

Each organelle has specific functions that contribute to cellular processes, such as protein synthesis, energy production, and waste management.

Membrane Structure and Function

The plasma membrane is a vital component of all cells, serving as a barrier and facilitator of communication. Important topics include:

- Fluid Mosaic Model: Describes the structure of the plasma membrane, which is composed of a

phospholipid bilayer with embedded proteins.
- Transport Mechanisms:
- Passive Transport: Movement of molecules across the membrane without energy input. Includes diffusion and osmosis.
- Active Transport: Requires energy (ATP) to move substances against their concentration gradient.
- Endocytosis and Exocytosis: Processes for bulk transport of molecules into and out of the cell.

Metabolic Pathways

Metabolism encompasses all chemical reactions that occur within a cell. Students should familiarize themselves with the following concepts:

- Anabolic vs. Catabolic Pathways:
- Anabolic: Build larger molecules from smaller ones (e.g., protein synthesis).
- Catabolic: Break down larger molecules into smaller ones (e.g., cellular respiration).

- Enzymes: Biological catalysts that speed up chemical reactions. Key points include:
- Activation energy
- Enzyme-substrate complex
- Factors affecting enzyme activity (temperature, pH, substrate concentration)

Metabolic pathways often involve a series of enzymatic reactions, each catalyzed by specific enzymes.

Cell Communication

Cells communicate with one another to coordinate functions and respond to environmental changes. Important mechanisms include:

- Signal Transduction Pathways: Series of molecular events initiated by a signal (ligand) binding to a receptor on the cell surface, leading to a cellular response.
- Types of Signaling:
- Autocrine: Signals act on the same cell that produces them.
- Paracrine: Signals affect nearby cells.
- Endocrine: Hormones are released into the bloodstream to affect distant cells.

Understanding how cells communicate is essential for grasping concepts related to development, immune responses, and homeostasis.

Cell Division and the Cell Cycle

Cell division is crucial for growth, repair, and reproduction. The cell cycle consists of several phases:

1. Interphase: The cell prepares for division, consisting of three sub-phases:
- G1 (Gap 1): Cell growth and normal functions.
- S (Synthesis): DNA replication.
- G2 (Gap 2): Further growth and preparation for mitosis.

2. Mitosis: Division of the nucleus, which includes:
- Prophase
- Metaphase
- Anaphase
- Telophase

3. Cytokinesis: Division of the cytoplasm, resulting in two daughter cells.

Understanding the regulation of the cell cycle and the role of checkpoints is crucial for comprehending cancer biology and genetic disorders.

Cheat Sheet Summary

To help consolidate your understanding of AP Biology Unit 2, here is a concise cheat sheet summarizing the essential points:

Cell Structure

- Prokaryotic Cells: No nucleus, simpler structure.
- Eukaryotic Cells: Complex organelles, nucleus present.

Membrane Function

- Fluid Mosaic Model: Phospholipid bilayer with proteins.
- Transport Types:
- Passive (no energy): Diffusion, osmosis.
- Active (requires energy): Pumps, endocytosis, exocytosis.

Metabolism

- Anabolic Pathways: Build molecules.
- Catabolic Pathways: Break down molecules.
- Enzymes: Catalysts, affected by temperature, pH, and concentration.

Cell Communication

- Signal Transduction: Reception and response to signals.
- Types of Signaling: Autocrine, paracrine, endocrine.

Cell Division

- Phases of Cell Cycle:
- Interphase (G1, S, G2)
- Mitosis (Prophase, Metaphase, Anaphase, Telophase)
- Cytokinesis

Study Tips for AP Biology Unit 2

1. Create Flashcards: Use flashcards for key terms and definitions to reinforce memory.
2. Practice Diagrams: Draw and label cell structures and metabolic pathways to visualize concepts.
3. Utilize Practice Questions: Engage with AP-style questions to familiarize yourself with exam formats.
4. Group Study: Collaborate with peers to discuss and quiz each other on key topics.

By mastering the content outlined in this cheat sheet, students will be better prepared for the AP Biology exam and will gain a clearer understanding of the intricate processes that govern life at the cellular level. Understanding these fundamental concepts will serve as a strong foundation for more advanced biological studies.

Frequently Asked Questions

What topics are typically covered in AP Biology Unit 2?

AP Biology Unit 2 generally covers the structure and function of cells, including cellular processes like cell communication, energy transformation, and the role of organelles.

What is the significance of the cell membrane in AP Biology Unit 2?

The cell membrane is crucial for maintaining homeostasis, regulating the movement of substances in and out of the cell, and facilitating communication between cells.

What are the main types of cellular transport discussed in Unit 2?

Unit 2 discusses passive transport (like diffusion and osmosis) and active transport, which require energy to move substances against their concentration gradient.

How does the concept of energy transformation relate to cellular respiration?

Cellular respiration is a key topic in Unit 2, showcasing how cells convert glucose into usable energy (ATP) through processes like glycolysis, the Krebs cycle, and oxidative phosphorylation.

What role do enzymes play in cellular processes according to Unit 2?

Enzymes act as catalysts to speed up biochemical reactions in cells, lowering activation energy and thus facilitating essential metabolic processes.

What is the importance of cell signaling in AP Biology Unit 2?

Cell signaling is vital for coordinating cellular activities, allowing cells to respond to their environment, communicate with each other, and maintain homeostasis.

What are the differences between prokaryotic and eukaryotic cells that AP Biology students should know?

Prokaryotic cells are generally smaller, lack a nucleus, and have no membrane-bound organelles, while eukaryotic cells are larger, contain a nucleus, and have various organelles.

How can a 'cheat sheet' help students prepare for Unit 2 exams?

A cheat sheet can summarize key concepts, diagrams, and processes, helping students quickly recall important information and make connections during their studies.

What study strategies can be effective for mastering the content in AP Biology Unit 2?

Effective study strategies include creating visual aids like flashcards, diagrams, and flowcharts, engaging in group discussions, and practicing with past exam questions.

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