

### Category 1 – Cell Structure and Function

#### CELLS

**cell:** smallest unit of living things

- simple cells are **prokaryotic**
- complex cells containing organelles with specific functions are **eukaryotic**

**Example:** eukaryotic cell (animal cell with organelles)



Characteristic	Prokaryotic	Eukaryotic
cell membrane	yes	yes
cytoplasm	yes	yes
ribosomes	smaller	larger
nucleus	no	yes
organelles	no	yes

Cell Part or Organelle	Description
cell membrane	surrounds cell; controls what enters/leaves cell; recognizes other cells; maintains homeostasis
cytoplasm	suspends organelles in a eukaryotic cell; enclosed within the cell membrane
nucleus	controls the cell's activities; contains chromosomes made of DNA
mitochondria	breaks down food to release energy
endoplasmic reticulum	can move and change proteins (rough ER); produce lipids (smooth ER); pipe-like
smooth or rough	
ribosome	makes proteins; round structures
	rough endoplasmic reticulum
golgi body/complex	changes and packages cell products
lysosome	breaks down materials in the cell using enzymes
	and enzymes that speed up digestion
vacuole	holds materials like water in a plant cell

The following organelles are found only in plant cells:

**cell wall:** surrounds cell membrane; supports cell

**chloroplast:** contains chlorophyll (green pigment) for photosynthesis

#### CELLULAR PROCESSES

**homeostasis:** regulation of conditions (pH or temperature) within a cell which allows for stable, balanced internal environment

**energy conversion:** during photosynthesis, plants convert energy from the sun to make a sugar called glucose

**respiration:** mitochondria release energy from glucose molecules

**molecule transportation:** molecules move in and out of cells across the cell membrane by various means; active transport (requires proteins) requires energy

**synthesis of new molecules:** create new molecules from amino acids

**simplex molecules:** move from amino acids

**proteins:** made of amino acids

**lipids:** made of carbon, hydrogen, and oxygen

**carbohydrates:** made of carbon, hydrogen, and oxygen

**nucleic acids:** made of carbon, hydrogen, oxygen, and nitrogen

#### VIRUSES

**virus:** tiny non-living particles that can only reproduce inside a host cell

- no metabolism (depend on host cell)
- cause diseases like influenza

**structure:** nucleic acids, cell membrane, capsid

**reproduction:** attach to host cell and release new viruses

**survival:** can survive outside host cell for short periods

**size:** much smaller than cells

**movement:** can move through air and water

**harm:** can be harmful to humans and animals

**prevention:** vaccines and antibiotics

#### SPECIALIZED CELLS

**DNA:** holds genetic information

**cell division:** process by which a cell divides into two daughter cells

**specialized cells:** cells that have specific functions

**plant cells:** have cell walls and chloroplasts

**animal cells:** lack cell walls and chloroplasts

**muscle cells:** contract to produce movement

**nerve cells:** transmit electrical signals

**blood cells:** transport oxygen and nutrients

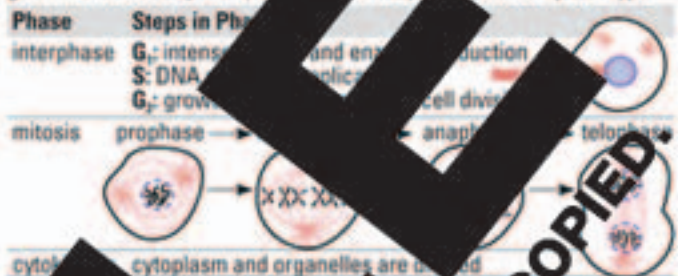
**skin cells:** protect the body from the environment

**root cells:** absorb water and minerals

**leaf cells:** perform photosynthesis

#### CELL CYCLE

**cell cycle:** sequence of phases of cell growth and division; timing and rate of cell cycle are related to an organism's normal growth and development; cell cycle frequency varies by cell type



**cytoplasm:** cytoplasm and organelles are divided during the cell cycle, which the nucleus is divided, resulting in two daughter cells with the same genetic information found in the parent nucleus; prokaryotic cell division is binary fission

**mitosis:** process by which a cell divides into two identical daughter cells

**meiosis:** process by which a cell divides into four genetically diverse daughter cells

**DNA replication:** process by which a DNA molecule is copied to produce two identical DNA molecules

**transcription:** process by which DNA is transcribed into RNA

**translation:** process by which RNA is translated into a protein

**cellular respiration:** process by which cells convert glucose into energy

**photosynthesis:** process by which plants convert light energy into glucose

**cellular transport:** movement of molecules in and out of cells

**homeostasis:** regulation of internal conditions

**energy conversion:** conversion of energy from one form to another

**molecule transportation:** movement of molecules across membranes

**synthesis of new molecules:** creation of new molecules from raw materials

**simplex molecules:** simple molecules like water and oxygen

**proteins:** complex molecules made of amino acids

**lipids:** complex molecules made of carbon, hydrogen, and oxygen

**carbohydrates:** complex molecules made of carbon, hydrogen, and oxygen

**nucleic acids:** complex molecules made of carbon, hydrogen, oxygen, and nitrogen

**enzymes:** proteins that speed up chemical reactions

**hormones:** chemical messengers that regulate cell activities

**antibodies:** proteins that fight off pathogens

**antigens:** substances that trigger an immune response

**antigen-antibody complex:** complex formed by an antigen and an antibody

**cellular communication:** process by which cells interact with each other

**cellular signaling:** process by which cells send and receive signals

**cellular growth:** process by which cells increase in size and number

**cellular differentiation:** process by which cells become specialized

**cellular death:** process by which cells die and are removed from the body

**apoptosis:** programmed cell death

**necrosis:** unprogrammed cell death

**cellular repair:** process by which cells replace damaged or dead cells

**cellular regeneration:** process by which cells are replaced by new cells

**cellular homeostasis:** process by which cells maintain a stable internal environment

**cellular adaptation:** process by which cells change in response to their environment

**cellular evolution:** process by which cells change over time

**cellular speciation:** process by which new species are formed

**cellular extinction:** process by which a species disappears

**cellular diversity:** variety of different cell types

**cellular complexity:** degree of organization and specialization

**cellular organization:** arrangement of cells in a tissue or organ

**cellular structure:** physical form and shape of a cell

**cellular function:** specific tasks performed by a cell

**cellular interaction:** communication between cells

**cellular cooperation:** cells working together to perform a task

**cellular competition:** cells vying for resources

**cellular conflict:** cells fighting over resources

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