The Cellular Foundation of Life (Part 2)

BIOLOGY 2ND GRADE

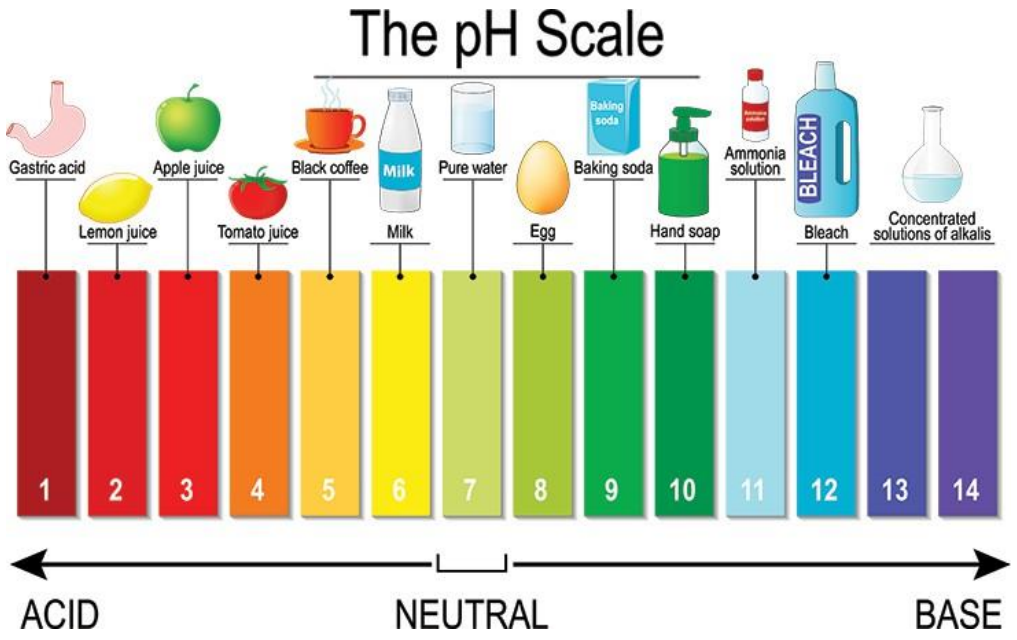
TECHNICAL ENGLISH

2024-2025

pH: A measure of the concentration of hydrogen ions in the solution.

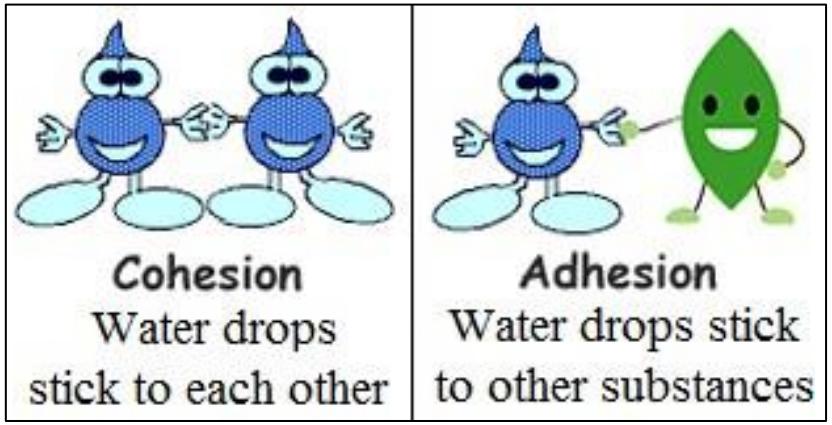
Acid: A substance that donates hydrogen ions and therefore lowers pH

Base: A substance that absorbs hydrogen ions and therefore raises pH



Adhesion: The attraction between different molecules

Cohesion: The attraction between the same molecules



Evaporation: The process where molecules change from the liquid state to the gas state (Vapor)

Hydrophilic: Describes a substance that dissolves in water; water-loving

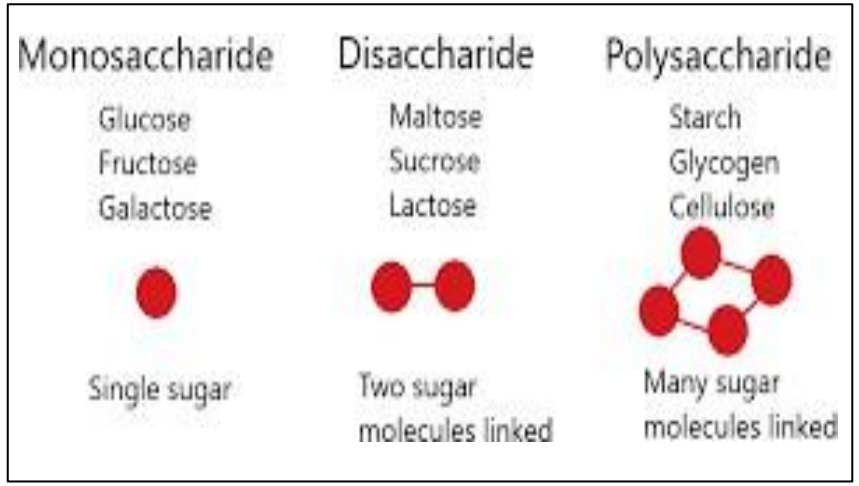
Hydrophobic: Describes a substance that does not dissolve in water; water-fearing

Denaturation: The loss of shape in a protein as a result of changes in temperature, pH, or exposure to chemicals

Amino acid: Molecules that combine to form proteins.

Polypeptide: A long chain of amino acids linked by peptide bonds

Monosaccharide: A single unit of carbohydrates



Disaccharide: A substance that is composed of two molecules of simple sugars linked to each other

Polysaccharide: A long chain of monosaccharides.

Nucleotide: The basic building block of nucleic acids that contain a pentose sugar, a phosphate group, and a nitrogenous base

Nucleic acid: Macromolecules that are made up of nucleotides and carries the genetic information of a cell and instructions for the functioning of the cell

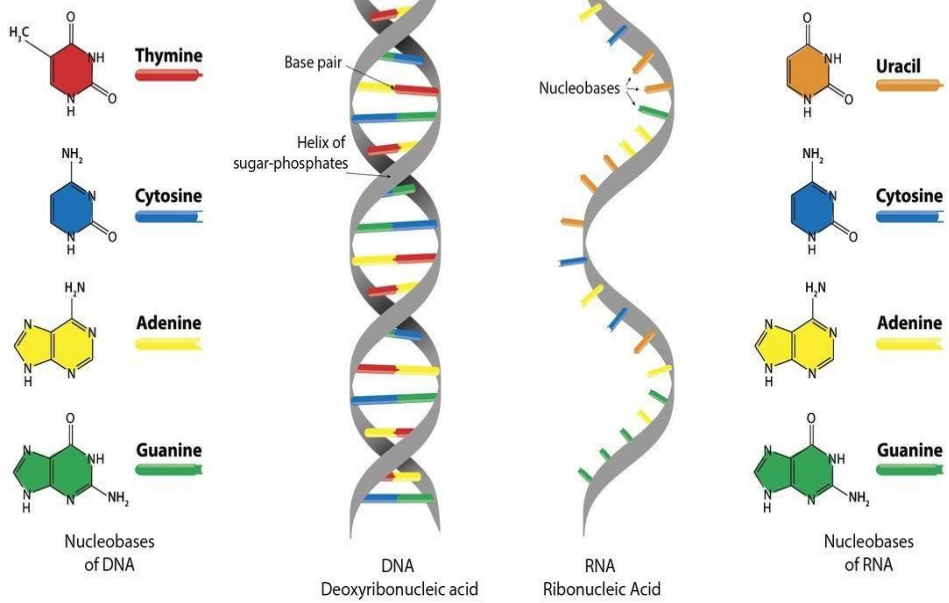
Deoxyribonucleic acid (DNA): A double-stranded polymer of nucleotides that carries the hereditary information of the cell

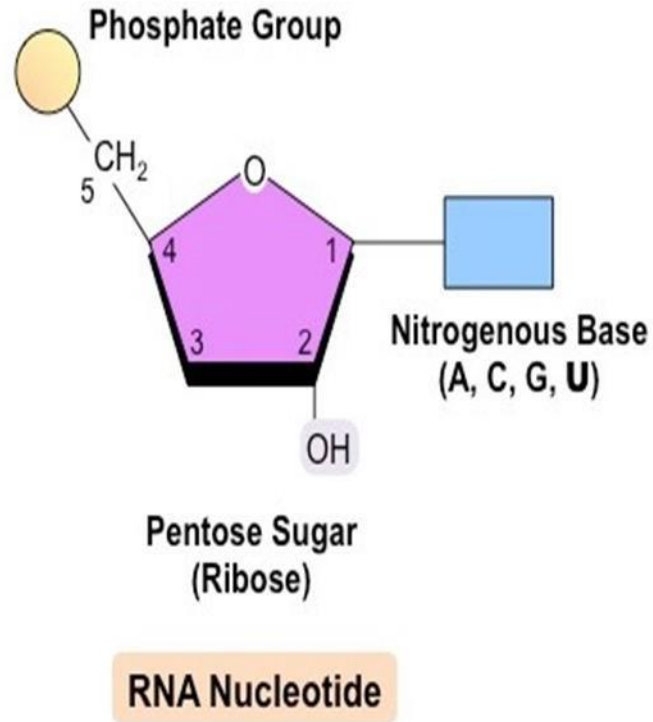
Ribonucleic acid (RNA): A single-stranded polymer of nucleotides that is involved in protein synthesis

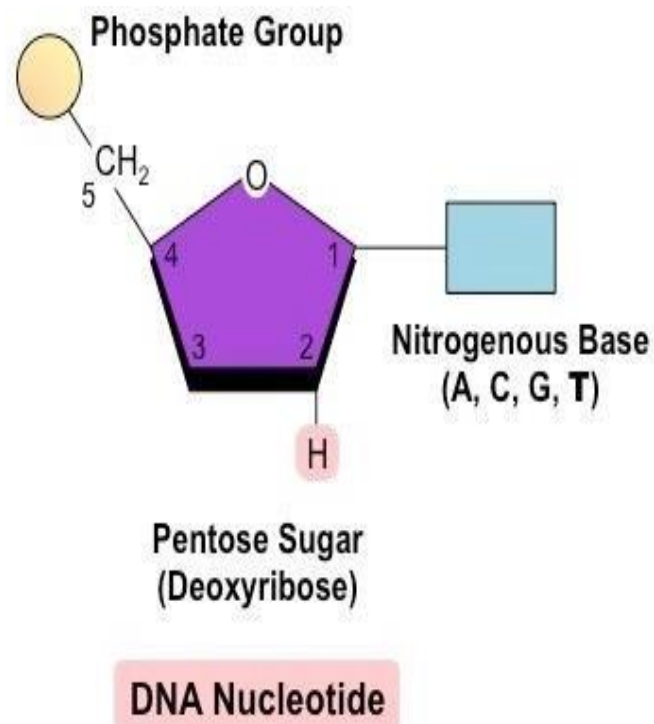
Protein: Large molecules composed of one or more chains of amino acids

Carbohydrate: Sugar molecules that serve as energy sources.

Cellulose: A polysaccharide that makes up the cell walls of plants and provides structural support to the cell


Thymine
Cytosine
Adenine
Guanine
Nucleobases of DNA
Base pair
Helix of sugar-phosphates
DNA
Deoxyribonucleic acid
Nucleobases
RNA
Ribonucleic Acid
Uracil
Cytosine
Adenine
Guanine
Nucleobases of RNA


Phosphate Group
Nitrogenous Base
(A, C, G, U)
OH
Pentose Sugar
(Ribose)
RNA Nucleotide


Phosphate Group
Nitrogenous Base
(A, C, G, T)
H
Pentose Sugar
(Deoxyribose)
DNA Nucleotide

Chitin: A modified polysaccharide that forms the outer skeleton of arthropods and the cell walls of fungi

Enzyme: Proteins that help speed up metabolism, or the chemical reactions in our bodies.

Hormone: Chemical messengers produced by glands sending signals into the bloodstream to various tissues in the body.

Glycogen: The storage form of carbohydrates in animals.

Starch: The storage form of carbohydrates in plants.

Lipids: Substance that is nonpolar and insoluble in water (fats, oils, etc)

Saturated fatty acid: Fatty acids made up of hydrocarbon chains with single bonds

Unsaturated fatty acid: Fatty acids that have one or more double bonds in the hydrocarbon chain

Phospholipid: A type of lipid molecule that is the main component of the cell membrane.

Atomic number: The number of protons in an atom

Mass number: The number of protons plus neutrons in an atom

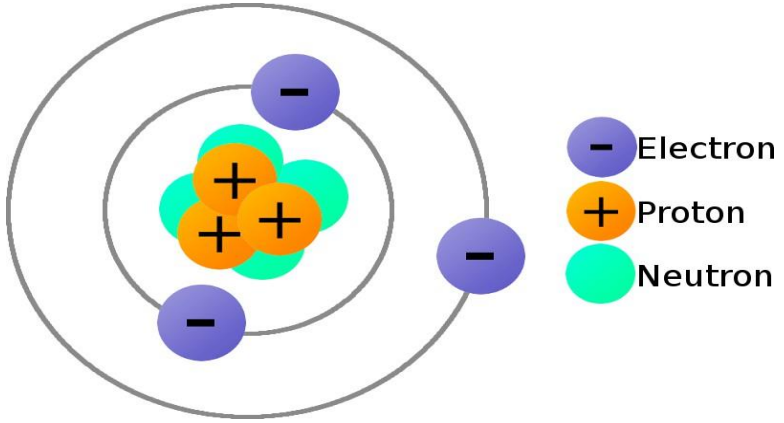
Element: One of 118 unique substances that cannot be broken down into smaller substances and have a specified number of protons

Isotope: One or more forms of an element that have different numbers of neutrons

Electron: Negatively charged particles of atoms

Neutron: Uncharged (No charge) particles of atoms

Proton: Positively charged particles of atoms



Electron Transfer: the movement of electrons from one element to another

Ion: An atom or group of atoms that carries a positive or negative electric charge as a result of having lost or gained one or more electrons

Anion: A negative ion formed by gaining electrons

Cation: A positive ion formed by losing electrons

Assessment

1. Explain pH, Acid, and Base to your partner.

2. Write the difference between the following:

- Adhesion and Cohesion
- Hydrophilic and Hydrophobic
- DNA and RNA
- Anion and Cation

ATP: (Adenosine Triphosphate) the cell's energy

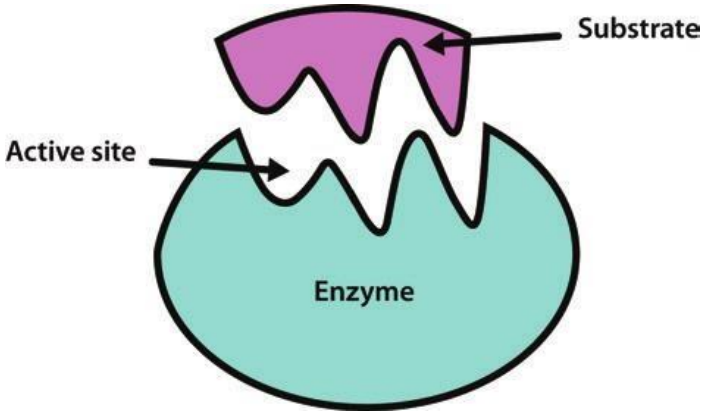
Metabolism: All chemical reactions involved in maintaining the living state of the cells and the organism.

Fermentation: Chemical process by which molecules such as glucose are broken down anaerobically. (Occurs in the cytoplasm)

Glycolysis: The process of breaking down glucose for energy. (Occurs in the mitochondria)

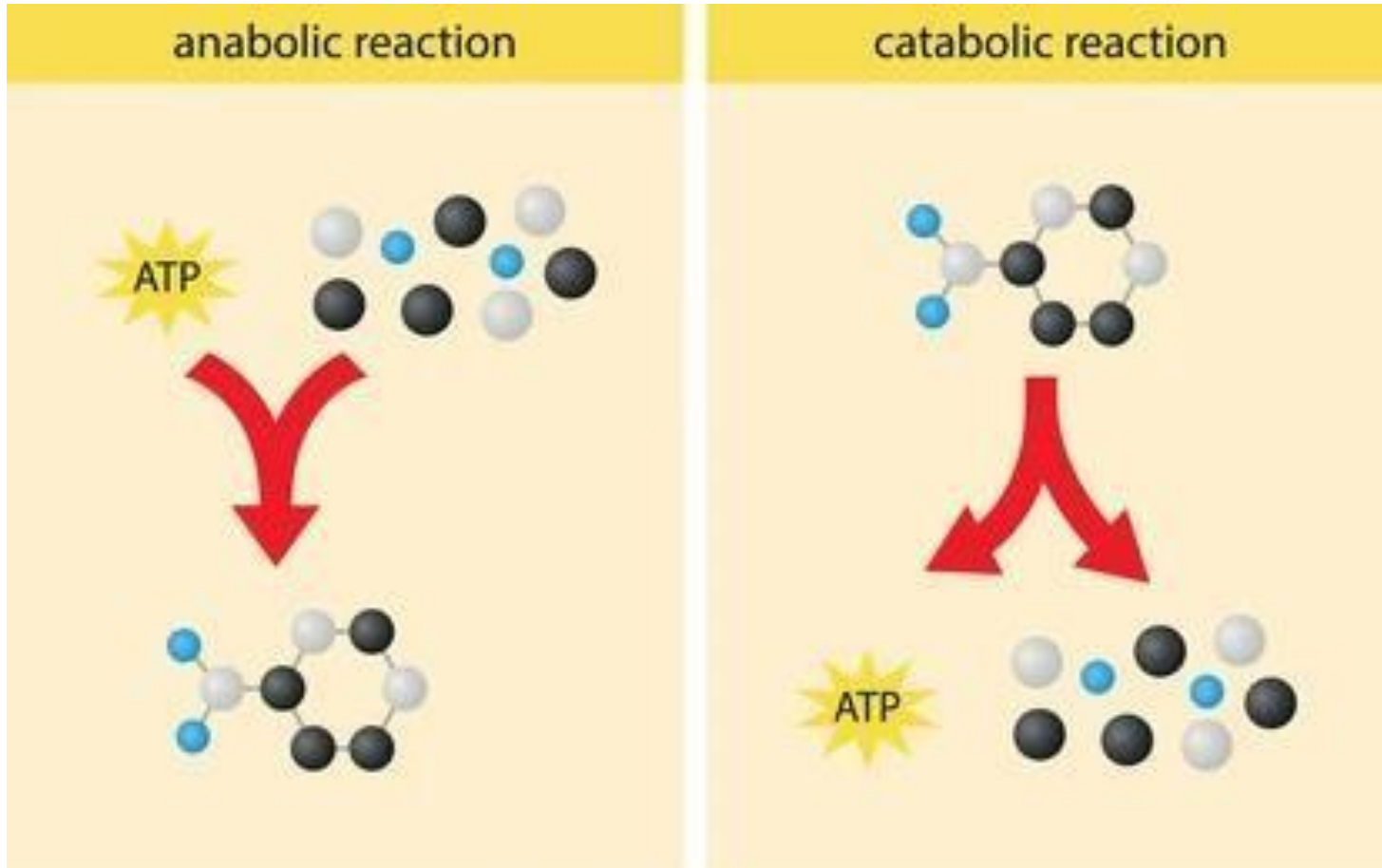
Active site: A specific region on the enzyme where the substrate binds

Substrate: A molecule on which the enzyme acts



Anabolic: Anabolic processes involve the building of larger, complex molecules from smaller, simpler ones.

Catabolic: Catabolic processes break large, biological molecules down into smaller, simpler molecules.


anabolic reaction
ATP
catabolic reaction
ATP

Assessment

True or False. Correct the false statements.

- A specific region on the enzyme where the substrate binds is metabolism.
- Catabolic processes involve the building of larger, complex molecules from smaller, simpler ones.
- Active site is a molecule on which the enzyme acts.
- The process of breaking down glucose for energy in the mitochondria is glycolysis.

Autotroph: An organism capable of producing its own food

Heterotroph: An organism that consumes other organisms for food

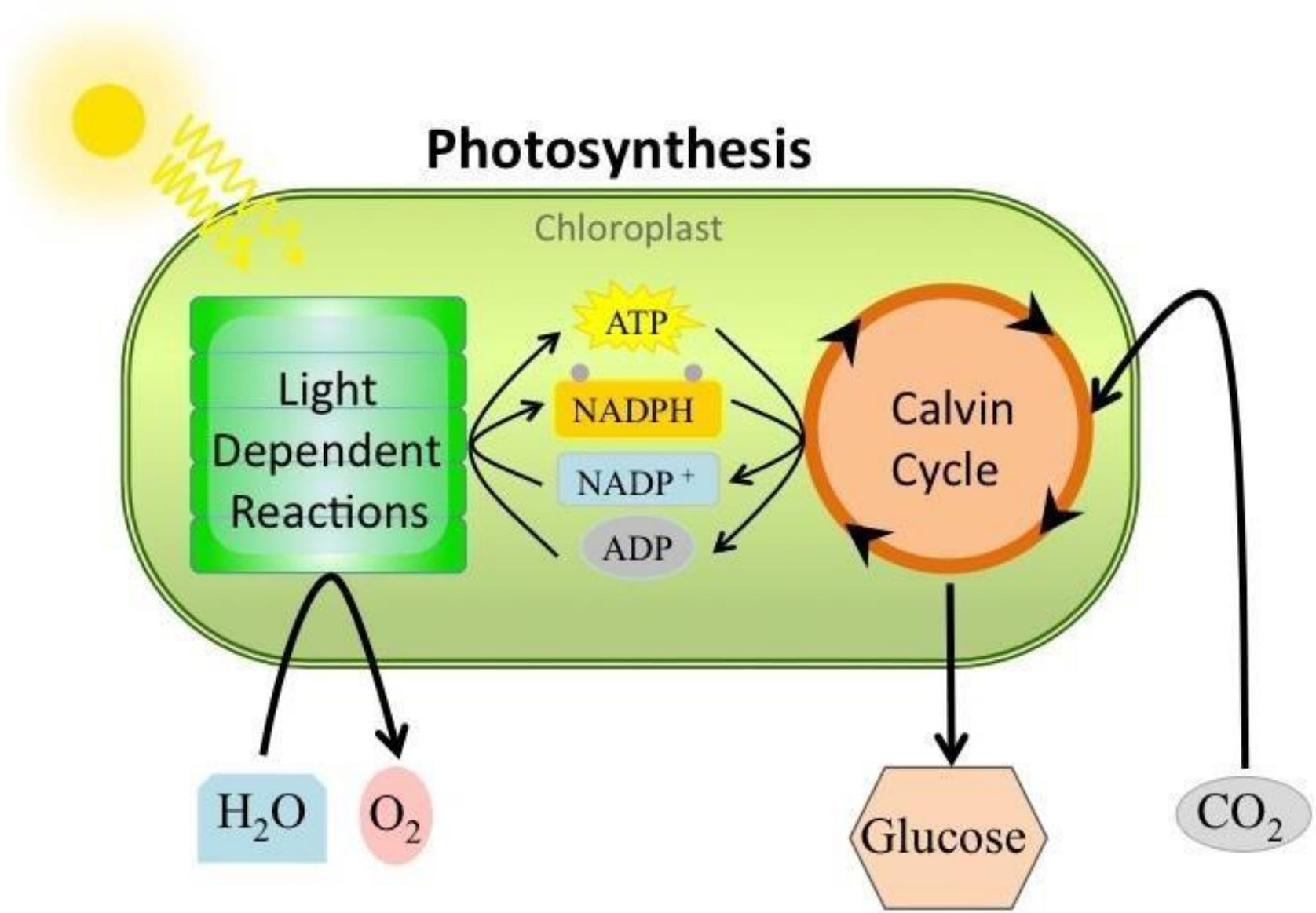
Photoautotroph: An organism capable of synthesizing its own food molecules, using the energy of light.

Light-dependent reaction: The first stage of photosynthesis where visible light is absorbed to form two energy-carrying molecules (ATP and NADPH)

Photosystem: a group of proteins, chlorophyll, and other pigments that are used in the light-dependent reactions of photosynthesis to absorb light energy and convert it into chemical energy

Calvin cycle: The reactions of photosynthesis that use the energy stored by the light-dependent reactions to form glucose and other carbohydrate molecules

Carbon fixation: The process of converting inorganic CO_2 gas into organic compounds


Photosynthesis
Chloroplast
Light Dependent Reactions
ATP
NADPH
NADP+
ADP
Calvin Cycle
H2O
O2
Glucose
CO2

Chlorophyll: The green pigment that captures the light energy that drives the reactions of photosynthesis

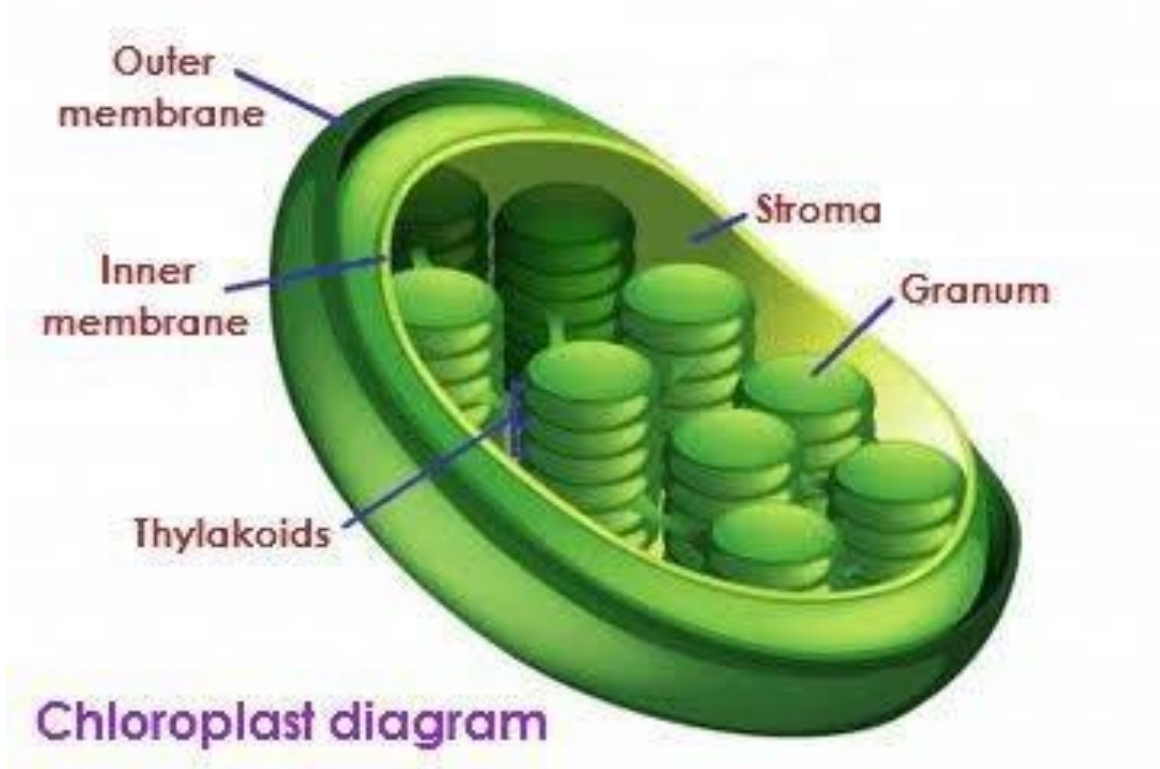
Mesophyll: The middle layer of cells in a leaf

Stoma: The opening that regulates gas exchange and water regulation between leaves and the environment. (plural: stomata)

Stroma: The fluid-filled space surrounding the grana inside a chloroplast where the Calvin cycle reactions of photosynthesis take place

Granum: A stack of thylakoids located inside a chloroplast

Thylakoid: A disc-shaped membranous structure inside a chloroplast where the light-dependent reactions of photosynthesis take place using chlorophyll embedded in the membranes


Outer membrane
Inner membrane
Thylakoids
Stroma
Granum
Chloroplast diagram

Assessment

Circle the correct answer.

1. A stack of thylakoids located inside a chloroplast *stroma / granum.*

2. The middle layer of cells in a leaf is *mesophyll / chlorophyll*

3. An organism capable of producing its own food is *heterotroph / autotroph*