

General Biology A

Test Study Guide: Unit 1 – Basics of Biology

Objective 1: Describe how chemical reactions cause change in molecules.

Students will be able to:

- 1) Explain how electrons allow an atom to bond with another atom.
- 2) Explain the difference between atoms and molecules.
- 3) Determine how many atoms and molecules are in a chemical equation.
- 4) Differentiate between the following terms: reactant, product, equilibrium, endothermic, exothermic, and chemical reaction.
- 5) Explain how and why a water molecule is formed.
- 6) Understand a chemical reaction may change the physical and/or chemical characteristics of substances.

- 1) Label the following given the chemical equation below: products, reactants, hydrogen atom, water molecule, and oxygen molecule.



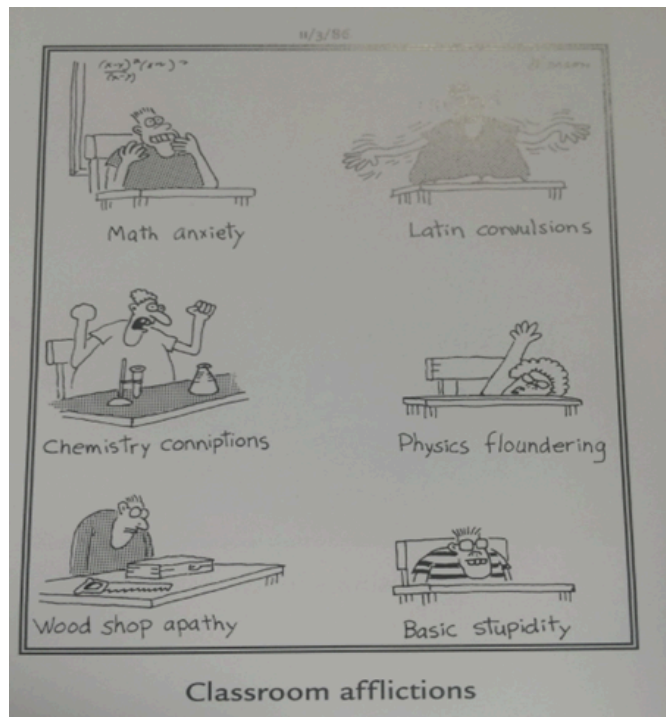
- a. How many hydrogen molecules are present?
- b. How many water molecules are present?
- c. How many oxygen ATOMS are present?

How to Study:

- a) Read Pages: 38 – 41, 42 – 45, and 52 – 55.

- b) Define the following terms:

- Atom:
- Electron:
- Molecule:
- Chemical equation:
- Chemical reaction:
- Reactant:
- Product:
- Coefficient:
- Subscript:
- Equilibrium:
- Endothermic:
- Exothermic:
- Bond:
- Ionic bond:
- Covalent bond:
- Hydrogen bond:



Objective 2: Classify the different types of macromolecules in the body.

Students will be able to:

- 1) Explain the difference between functions and structures of carbohydrates, lipids, proteins, and nucleic acids.
- 2) Know the monomers for each macromolecule and be able to recognize a simple diagram of each type of macromolecule. (You will not need to draw them for the test, but you will need to recognize the different structures, so this is good practice.)

a. Carbohydrate

b. Lipid

c. Protein

d. Nucleic Acid

- 3) Identify examples of a carbohydrate, lipid, protein, or nucleic acid.

How to Study:

- a) Read Pages: 46 – 50.
- b) Define the following terms:
 - Proteins:
 - Lipids:
 - Nucleic acids:
 - Carbohydrates:
 - Monosaccharides
 - Disaccharide:
 - Polysaccharides:
 - Glucose:
 - Starch:
 - Glycerol:
 - Fatty acid tails:
 - Amino acids:
 - Macromolecule:
 - Monomer:

- Polymer:
- Organic Molecule:

c) Know these diagrams: Figure 3.1 on Page 46, Figures 3.2 on Page 47, Figures 3.3 and 3.4 on Page 48, and Figures 3.5, 3.6, and 3.7 on Page 49.

Objective 3: Explain the role of enzymes

Students will be able to:

- 1) Explain what a catalyst is, and what its function is in chemical reactions?
- 2) Describe how an enzyme affects the speed of a reaction?
- 3) List factors that may affect an enzyme's rate of reaction and ability to function.
- 4) Describe the enzyme-substrate complex. What happens to the enzyme after the reaction is completed?
- 5) Explain how an enzyme and protein are related.

How to Study:

- a) Read Pages: 56-58.
- b) Define the following terms:
 - Catalyst:
 - Enzyme:
 - Substrate:
 - Activation energy:
 - Active site:

Objective 4: Describe the characteristics of a prokaryotic and eukaryotic cell.

Students will be able to:

- 1) Compare and contrast prokaryotic and eukaryotic cells (presence or absence of a nucleus, size, organelles, complexity).
- 2) Know which organelles may be found in each type of cell.
- 3) Identify examples of each type of cell.

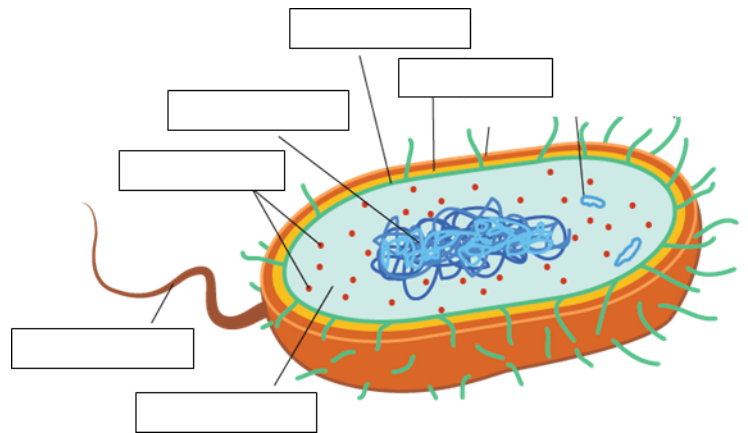
How to study:

- a) Read Pages: 72, and 73-79.

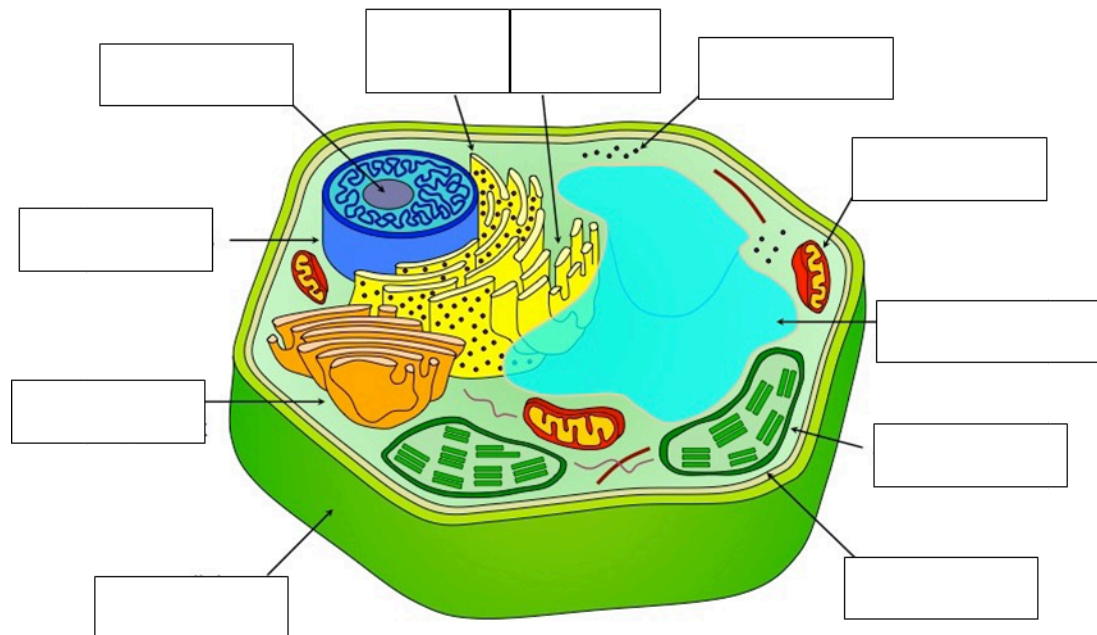
b) Define the following terms:

- Prokaryotic cell:
- Eukaryotic cell:
- DNA:
- Organelle:
- Plasma/Cell membrane:
- Cytoplasm:
- Ribosome:
- Mitochondria/Mitochondrion
- Nucleoid:
- Nucleus:
- Flagella:
- Unicellular:
- Multicellular:
- Bacteria:

Prokaryotic Cell:



Eukaryotic Cell:



Objective 5: Explain the interactions between cells, tissues, and organs of 2 body systems (Digestive and Endocrine).

Students will be able to:

- 1) Differentiate between cells, tissues, organs, and organ/body systems.
- 2) Explain how the digestive system and endocrine system work together to affect blood sugar levels.
- 3) Identify the purpose and function of the digestive system.
- 4) Identify the purpose and function of the endocrine system.

How to Study:

- a) Read Pages: 704 – 706, and 714 – 715. (Pages 800 – 802 and 810 – 811 in the online book)
- b) Define the following terms:
 - Organ/Body System: A group of organs which work together to perform a specific function
 - Organs: A structure of definite form and function composed of two or more different kinds of tissues.
 - Tissue: A group of similar cells and their intercellular substance joined together to perform a specific function.
 - Cell: The basic structural and functional unit of all organisms; the smallest structure capable of performing all the activities vital to life.
 - Digestive system: A body system made up of organs that work together to break down food, absorb nutrients, and eliminating solid waste.
 - Endocrine system: A body system made up of glands and organs which make hormones and release them directly into the blood. These hormones control many important functions in the body, including growth and development, metabolism, and reproduction.
 - Pancreas: An organ which secretes digestive enzymes and produces the hormone insulin.
 - Insulin: A hormone which regulates blood sugar levels. Insulin helps by moving glucose from the bloodstream into cells to be used for energy.
 - Blood sugar/Blood glucose level: The amount of glucose present in the blood of an organism.

Objective 6: Differentiate between positive and negative feedback mechanism to maintain homeostasis.

Students should be able to:

- 1) Define homeostasis.
- 2) Explain how positive feedback mechanisms function.
- 3) Explain how negative feedback mechanisms function.
- 4) Identify examples of positive and negative feedback functions in the body.

How to Study:

- a) Read Pages: 708 – 711. (Pages 804 – 807 in the online book)
- b) Define the following terms:
 - Homeostasis: The tendency of a cell or organism to maintain a stable internal environment.
 - Positive feedback: A feedback system which enhances the original stimulus (makes the change greater).
 - Negative feedback: A feedback system which hinders the original stimulus (makes the change less).
 - Stimulus: A thing or event that evokes a specific reaction in an organ or tissue.
 - Control organ/Control center: The organ (usually the brain) that monitors the values of a body system.
 - Effector organ: An organ that responds to stimulation by producing a physiological response.

Examples of Different Feedback Mechanisms:

-Positive Feedback: In a positive feedback system, the output enhances the original stimulus.

-A good example of a positive feedback system is childbirth. During labor, a hormone called oxytocin is released that intensifies and speeds up contractions. The increase in contractions causes more oxytocin

to be released and the cycle goes on until the baby is born. The birth ends the release of oxytocin and ends the positive feedback mechanism.

-Another good example of a positive feedback mechanism is blood clotting. Once a vessel is damaged, platelets start to cling to the injured site and release chemicals that attract more platelets. The platelets continue to pile up and release chemicals until a clot is formed.

-Negative Feedback: Almost all homeostatic control mechanisms are negative feedback mechanisms. These mechanisms change the variable back to its original state or “ideal value”.

-A good example of a negative feedback mechanism is a home thermostat (heating system). The thermostat contains the receptor (thermometer) and control center. If the heating system is set at 70 degrees Fahrenheit, the heat (effector) is turned on if the temperature drops below 70 degrees Fahrenheit. After the heater heats the house to 70 degrees Fahrenheit, it shuts off effectively maintaining the ideal temperature.

-The control of blood sugar (glucose) by insulin is another good example of a negative feedback mechanism. When blood sugar rises, receptors in the body sense a change. In turn, the control center (pancreas) secretes insulin into the blood effectively lowering blood sugar levels. Once blood sugar levels reach homeostasis, the pancreas stops releasing insulin.

-Just remember that positive feedback mechanisms enhance the original stimulus and negative feedback mechanisms inhibit it.

