

Name: _____

Biology Keystone Review Document Module A

Eligible Content & Information

The Biology Keystone Exam will include both multiple choice and open ended questions that are divided into two modules.

Module A covers cells and cell processes. It will include 32 multiple choice questions and 4 constructed response questions. The constructed response questions are all scored on a scale of 0 – 3 using a rubric.

It is estimated that each module will take approximately one hour and fifteen minutes, but it is not a timed test and you will be given whatever amount of time that you need.

This review packet includes the eligible content at the top of each page for Module A and a series of open-ended, matching, or labeling questions to help review that particular content area. The questions are not keystone-style questions, but are meant to be a means to review the material.

BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.

QUESTION: Name/describe the 8 characteristics of life shared by all living things.

1.

2.

3.

4.

5.

6.

7.

8.

QUESTION: Define prokaryotic and eukaryotic

Prokaryotic - _____

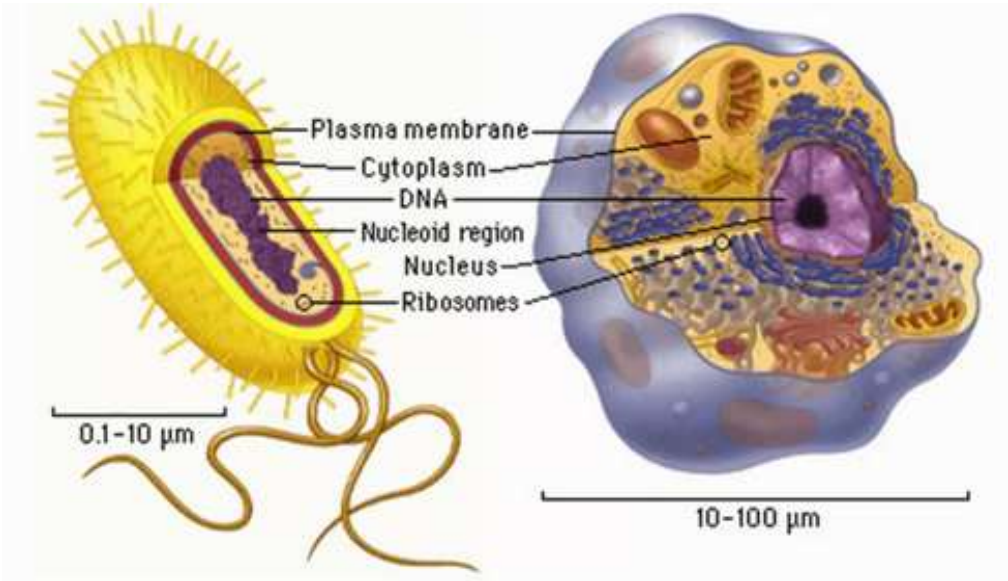
Eukaryotic - _____

BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.

QUESTION: Complete the chart below (with a yes or no) comparing structures found within prokaryotes and eukaryotes.

	Nucleus?	DNA?	Cell Wall?	Cell Membrane?	Organelles?	Ribosomes	Cytoplasm?
Prokaryotes							
Eukaryotes							

QUESTION: Label which picture is prokaryotic and which is eukaryotic.



QUESTION: Match the cell parts with its function.

- | | |
|-----------------------------|---|
| _____ mitochondria | A. control center of the cell holding the DNA |
| _____ Golgi apparatus | B. storage of materials like water or food |
| _____ endoplasmic reticulum | C. contain digestive enzymes to break down wastes |
| _____ vacuole | D. network of proteins to help maintain the cell's shape |
| _____ chloroplast | E. transport of proteins in the cell |
| _____ lysosome | F. where proteins are assembled or made |
| _____ nucleus | G. where chemical energy is converted to a useable form - ATP |
| _____ ribosomes | H. modifies, sorts, and packages proteins into vessicles |
| _____ cytoskeleton | I. captures light energy and converts it into chemical energy |

QUESTION: What are the five differences between plant and animal cells?

Animal Cells	Plant Cells
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).

QUESTION: Put the following terms in order from the largest/most complex to the smallest/simplest. 1 = largest, 6 = smallest.

_____ tissues _____ organ systems _____ organisms
_____ organelles _____ cells _____ organs

QUESTION: Starting with organelle, give a specific example of each level mentioned in the question above, ending with organism.

QUESTION: Match the term with its description.

_____ organ	A. an individual living thing
_____ organelle	B. a group of tissues that all work together doing the same job
_____ cell	C. a group of organs that all work together doing the same job
_____ organ system	D. the simplest unit of life
_____ tissue	E. a group of cells that all work together doing the same job
_____ organism	F. a small part found within a cell that has a specific job

QUESTION: Two cells are observed and compared and it is found that one of them (Cell A) has only 45 mitochondria, while the other one (Cell B) has 500 mitochondria.

a. Why would two different cells have a different amount of mitochondria?

b. If you were told that one of the cells was a heart cell and one was a skin cell, which would be Cell A (with 45 mitochondria) and which would be Cell B (with 500 mitochondria)?

Cell A: _____ Cell B: _____

BIO.A.2.1.1 Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion).

QUESTION: Water is a polar molecule. Draw a diagram of a molecule of water, labeling all of its atoms and showing what is meant by the word polar.

QUESTION: Show how hydrogen bonds form between water molecules.

QUESTION: The polarity of water gives it many special characteristics. Match the characteristics below with the correct description.

- | | |
|------------------------------|--|
| _____ Adhesion | A. a “skin” on top of the water due to stronger bonds formed on top |
| _____ Cohesion | B. water molecules bond to other water molecules easily |
| _____ High Specific Heat | C. the Hydrogen bonds are more spread out in ice so it floats |
| _____ Universal solvent | D. the charged regions allow it to dissolve other polar molecules, ionic molecules, and other hydrogen bonding molecules |
| _____ Lower density as solid | E. it takes a large amount of energy to raise or lower the temp. of water |
| _____ Surface tension | F. the movement of water up a narrow tube due to cohesion, adhesion, and surface tension |
| _____ Capillary action | G. water molecules bond to other kinds of molecules |

QUESTION: Write the characteristic from the list above that is being described in the examples below using living organisms.

- _____ allows plants to bring water up into their roots up to the tips of the stems.
- _____ allows organisms to cool off due to sweating and/or panting.
- _____ allows bugs to land and walk on a body of water like a lake or pond.
- _____ allows aquatic organisms to survive when temperatures drop very low.
- _____ allows materials to be carried by blood and moved throughout our body.

BIO.A.2.2.1 Explain how carbon is uniquely suited to form biological macromolecules.

QUESTION: Fill in the blanks, which describe the characteristics of carbon that allow it to form large, complex molecules.

Carbon atoms contain _____ valence electrons, which are found in the _____ energy level. This means that each carbon atom can form _____ strong _____ bonds with other elements or with other carbons. Since it can easily bond with other carbons, many different structures, such as _____ and long _____ can be formed. Since it is a _____ atom, it is very stable, and so the molecules formed are _____ as well. Carbon has the ability to form _____, _____, or triple bonds, so a great variety of large and complex molecules can be formed.

QUESTION: Another term for biological macromolecule is organic compound.

a.) Which six elements are the most often ones found in organic compounds?

b.) Name the four major groups/types of organic compounds.

BIO.A.2.2.2 Describe how biological macromolecules form from monomers.

QUESTION: Define the terms monomer & polymer and state how they are related to one another.

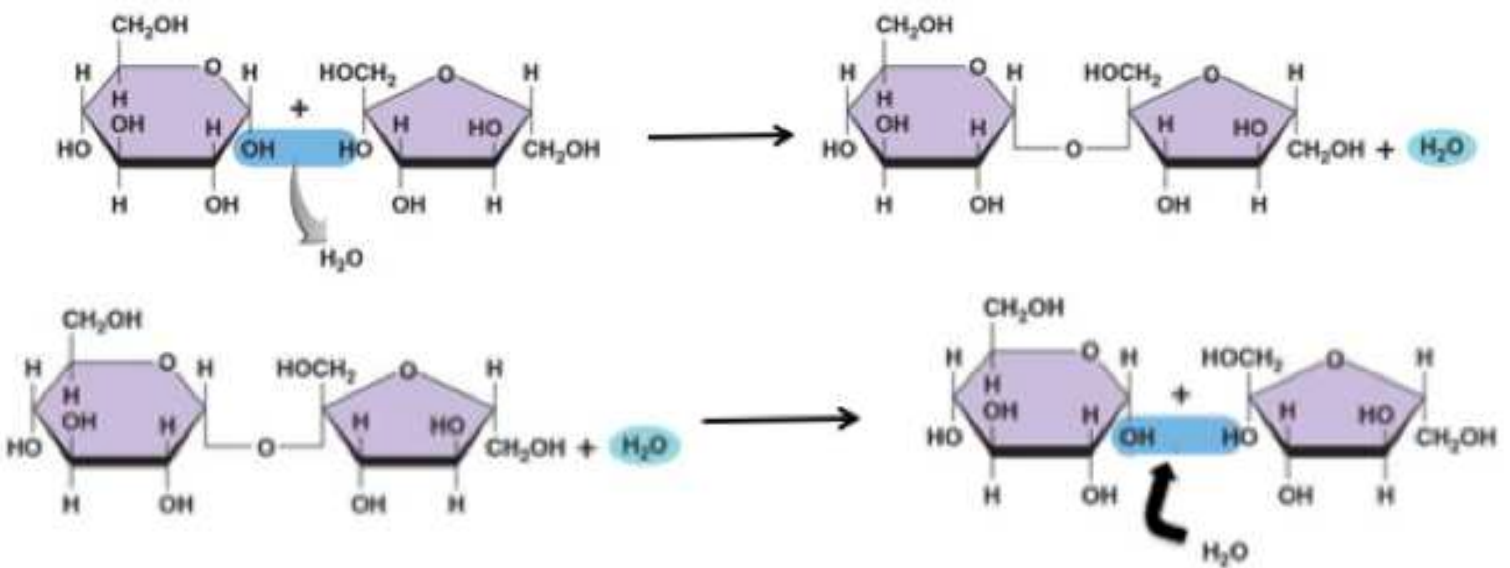
Monomer:

Polymer:

QUESTION: Name and describe the process that bonds monomers into polymers.

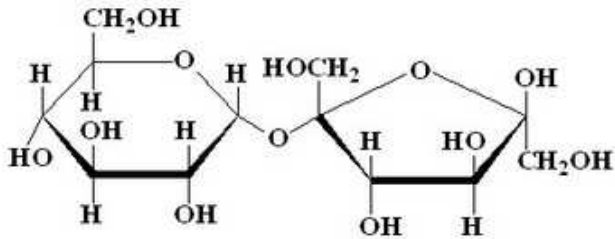
QUESTION: Name and describe the process that breaks polymers into monomers.

QUESTION: Identify which picture represents dehydration synthesis and which is hydrolysis.



BIO.A.2.2.3 Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.

QUESTION: The picture below represent one of the organic compounds or a building block of the organic compound. Label which group the picture belongs to (*carbohydrates, amino acid/proteins, lipids, nucleotide/nucleic acid*) and then complete the information asked underneath each picture.



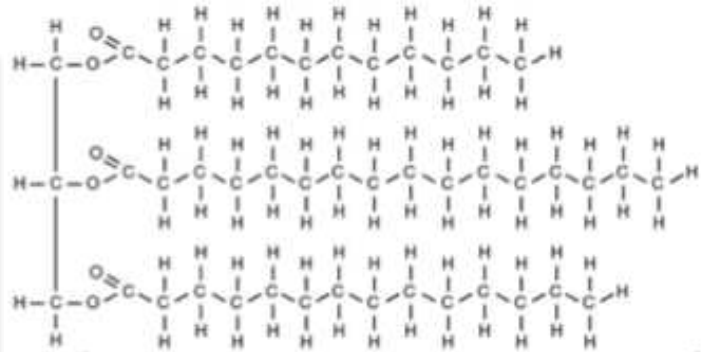
Name: _____

Examples: _____

Monomer: _____

General structure: _____

Function(s): _____

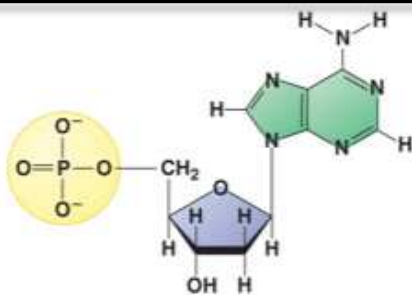


Name: _____

Examples: _____

General structure: _____

Function(s): _____



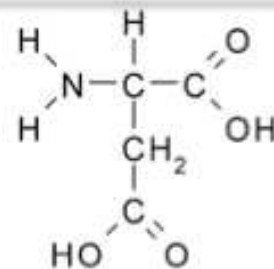
Name: _____

Examples: _____

Monomer: _____

General structure: _____

Function(s): _____



Name: _____

Examples: _____

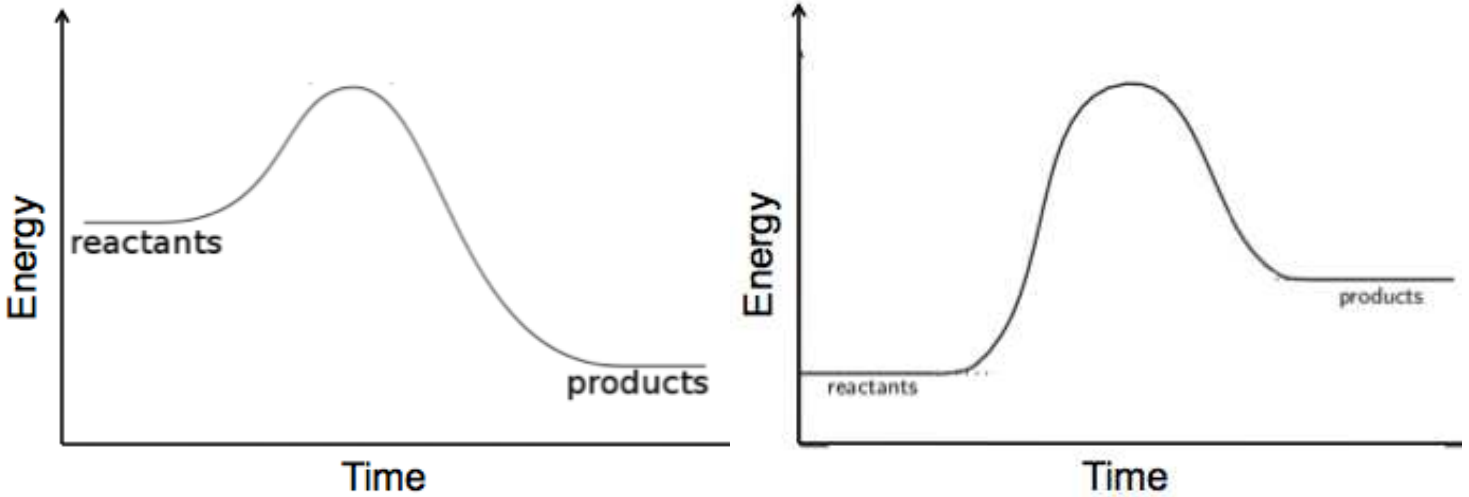
Monomer: _____

General structure: _____

Function(s): _____

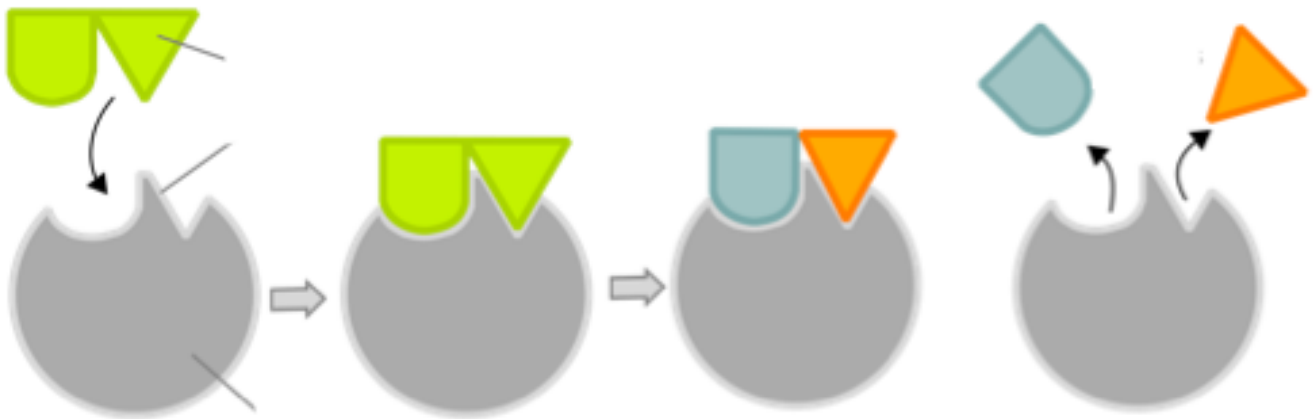
BIO.A.2.3.1 Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction.

QUESTION: Reactions that absorb energy are called _____, while reactions that release energy are called _____. A.) Label the graphs below as either endothermic or exothermic.



b.) In the graphs above, draw in a dotted line on each showing how an enzyme would change the graph.

QUESTION: In the picture below label the following structures: *enzyme*, *substrates*, *active site*, *enzyme-substrate complex*, and *product*. Then under the picture explain how an enzyme catalyzed reaction progresses using the words you labeled in the picture.



BIO.A.2.3.2 Explain how factors such as pH, temperature, and concentration levels can affect enzyme function.

QUESTION: What is the result if the temperature of an enzyme-catalyzed reaction is raised *SLIGHTLY*?

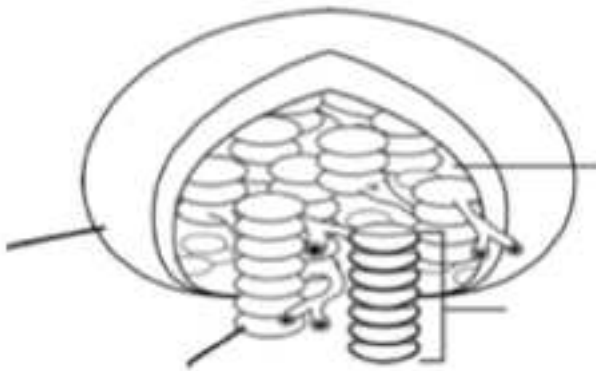
QUESTION: What is the result if the temperature of an enzyme-catalyzed reaction is raised *DRAMATICALLY*?

QUESTION: Enzymes work within a narrow range of pH values. What happens if the pH changes?

QUESTION: If the enzyme concentration stays the same, adding more substrates will (*INCREASE* *DECREASE* *or* *NOT CHANGE*) the rate of the reaction. If the substrate level is constant, adding more enzymes will (*INCREASE* *DECREASE* *or* *NOT CHANGE*) the rate of the reaction.

BIO.A.3.1.1 Describe the fundamental role of plastids (e.g., chloroplasts) and mitochondria in energy transformations.

QUESTION: Label which picture below is the mitochondrion and which is the chloroplast. In the mitochondrion, label the: *cristae*, *matrix*, *inner membrane*, *inter-membrane space* and *outer membrane*. In the chloroplast, label the: *stroma*, *thylakoid*, and *granum*.



QUESTION: Name and describe the process that occurs in chloroplasts.

QUESTION: Name and describe the process that occurs in mitochondria.

BIO.A.3.2.1 Compare the basic transformation of energy during photosynthesis and cellular respiration.

QUESTION: Write the balanced chemical equation for photosynthesis. *Be sure to include the term LIGHT in the right place.*

QUESTION: Write the balanced equation for cellular respiration. *Be sure to include the term ENERGY in the right place.*

QUESTION: What is the relationship between cellular respiration and photosynthesis that can be seen in the equations above?

QUESTION: Complete the graphic organizer below showing the energy conversions that occur during photosynthesis and cellular respiration using the phrases given.

CHEMICAL ENERGY (ATP)

CHEMICAL ENERGY (SUGARS)

SOLAR ENERGY

CHEMICAL ENERGY (FOOD)

CHEMICAL ENERGY (ATP)

Photosynthesis energy transformations:

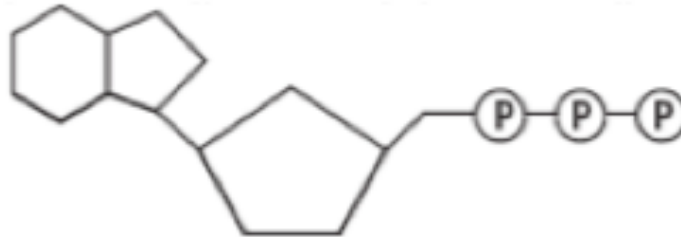
_____ ⇒ _____ ⇒ _____

Cellular Respiration energy transformations:

_____ ⇒ _____

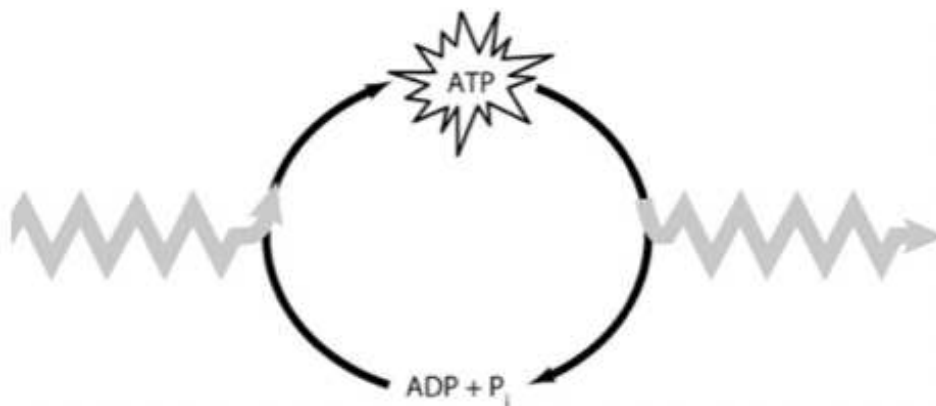
BIO.A.3.2.2 Describe the role of ATP in biochemical reactions.

QUESTION: Label the three parts of an ATP molecule – *adenine*, *5-carbon sugar (ribose)*, and *three phosphate groups*.



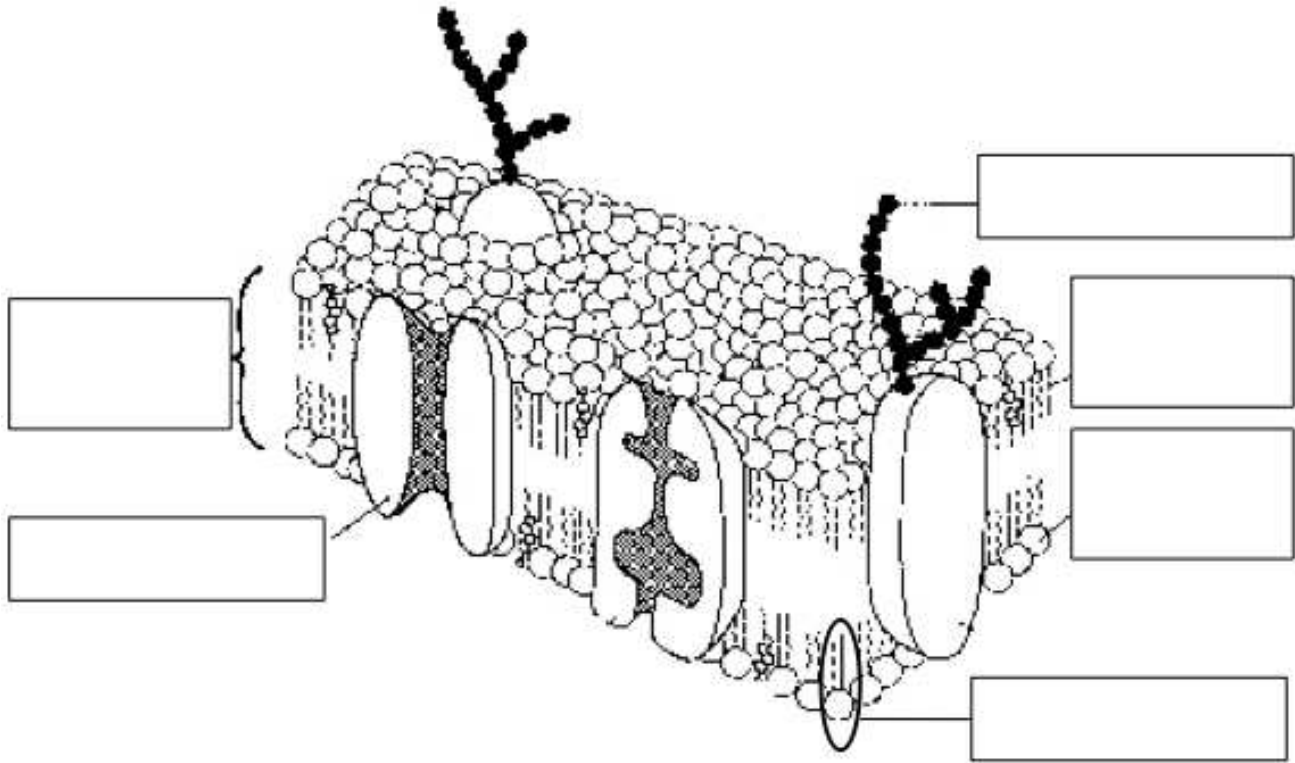
QUESTION: What happens to a molecule of ATP in order for it to release free energy that can be used by cells? What is the name of the resulting molecule?

QUESTION: In the diagram of the ATP cycle below, add in the phrases: *ENERGY FOR CELLULAR WORK* and *ENERGY FROM FOOD* in the correct places. Then name a few examples of “cellular work.”



BIO.A.4.1.1 Describe how the structure of the plasma membrane allows it to function as a regulatory structure and/or protective barrier for a cell.

QUESTION: Label the main parts of the cell membrane in the picture below.



QUESTION: The cell membrane is considered to be _____ because it only allows certain things in and out. This is because the phosphate heads are _____, while the fatty acid tails are _____. This allows small polar and non-polar molecules to pass through freely, but larger molecules and ions must use _____ to enter and leave the cell. The carbohydrates found attached to some membranes act as _____ which receive and respond to chemical messages.

BIO.A.4.1.2 Compare the mechanisms that transport materials across the plasma membrane (i.e., passive transport – diffusion, osmosis, facilitated diffusion; and active transport – pumps, endocytosis, exocytosis).

QUESTION: Match the vocabulary term with the correct definition.

- | | |
|-----------------------------|--|
| _____ Osmosis | A. The movement of substances from high to low concentration |
| _____ Endocytosis | B. Exporting large molecules out of the cell using vesicles |
| _____ Diffusion | C. The diffusion of water across a semi-permeable membrane |
| _____ Facilitated Diffusion | D. Using protein pumps to move materials against a concentration gradient |
| _____ Exocytosis | E. Bringing large molecules into a cell when the membrane forms a vesicle |
| _____ Active transport | F. Using channel proteins for molecules to move down a concentration gradient. |

QUESTION: The diagrams below show a cell that is placed into beakers that contain solutions with different concentrations. Under each diagram label whether **THE CELL** is *HYPOTONIC*, *HYPERTONIC*, or *ISOTONIC*; and then write how water will move in each case.

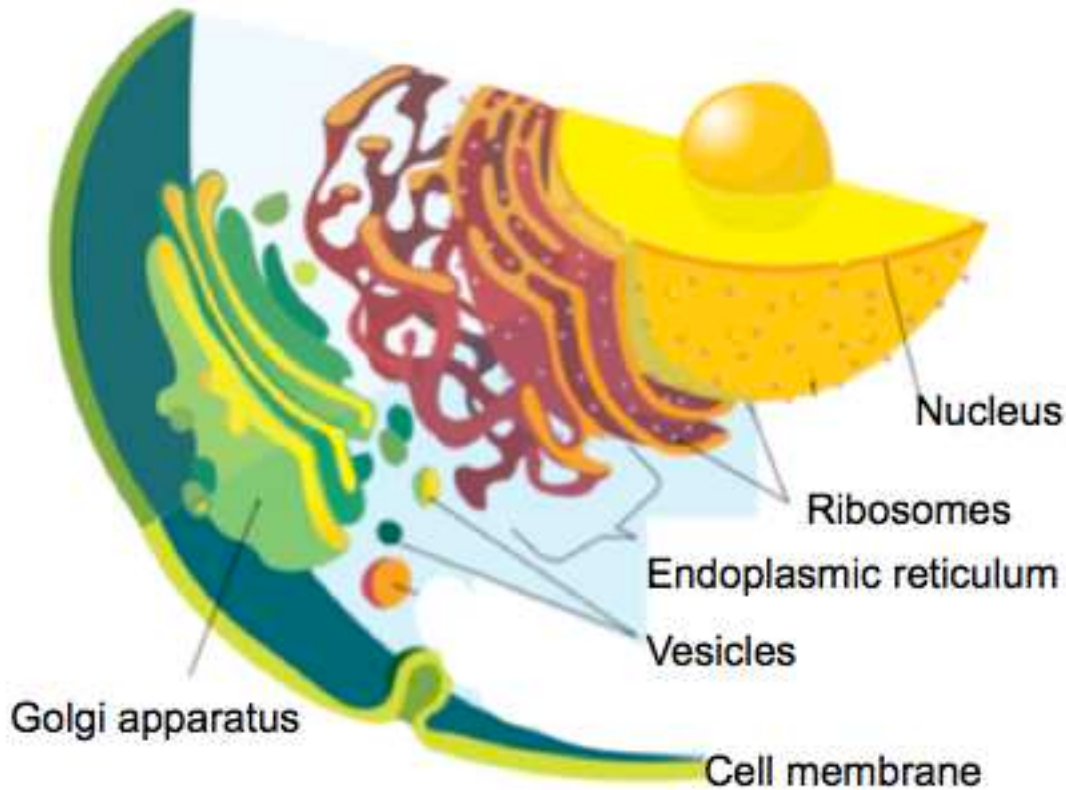


QUESTION: In [*HYPOTONIC* *HYPERTONIC* or *ISOTONIC*] environments, an animal cell might undergo [*CYTOLYSIS* or *PLASMOLYSIS*] because water will rush into the cell.

In [*HYPOTONIC* *HYPERTONIC* or *ISOTONIC*] environments, cells can undergo [*CYTOLYSIS* or *PLASMOLYSIS*] because water will rush out of the cell.

BIO.A.4.1.3 Describe how membrane-bound organelles (e.g., endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials within a cell.

QUESTION: The diagram below shows the endomembrane system, which plays a role in the synthesis and export of proteins within a cell. Put the organelles seen in the diagram in the correct order based on the role that they play in that process by numbering them from 1 - 6.



QUESTION: Match the cell part with the role that it plays in the process of making and exporting a protein.

- | | |
|-----------------------------|---|
| _____ Golgi apparatus | A. membrane-bound sacs that bring the protein to the membrane |
| _____ Endoplasmic reticulum | B. sites where the proteins are actually built |
| _____ Nucleus | C. structure that fuses with a vesicle to allow the protein to leave the cell |
| _____ Vesicles | D. organelle that finishes protein production and transports it to the Golgi |
| _____ Cell membrane | E. contains DNA, which are the instructions on how proteins are built |
| _____ Ribosomes | F. organelle that modifies, processes, and packages proteins into vesicles |

BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

QUESTION: Define the term homeostasis.

QUESTION: Thermoregulation refers mechanisms used to regulate an organism's body temperature.

A.) Ectotherms (cold-blooded organisms) can only regulate their body temperature using behavioral responses. Name some examples of behavioral responses used by ectotherms.

B.) Endotherms (warm-blooded organisms) can regulate their body temperature using both behavioral and physiological responses. Name some examples of physiological responses that occur in endotherms in BOTH hot and cold environments.

Hot environment:

Cold environment:

QUESTION: Single-celled organisms do not have complex systems to help them maintain homeostasis. What process helps them obtain oxygen and get rid of carbon dioxide?

QUESTION: To maintain homeostasis, all organisms must be able to sense _____, or changes in the organism and/or the environment, and _____ to those changes.