AP Bio Midterm Prep Worksheet!

Unit 1: Chemistry of Life

Molecules of water are held together in what are called _____ _____, which is/are possible because of water's _____.

a. Covalent bonds; non-polarity
b. Van der Waals forces; texture
c. Hydrogen bonds; polarity
d. Loving relationships; communication skills

Water has a high specific heat. Specific heat refers to the amount of heat energy it takes to...

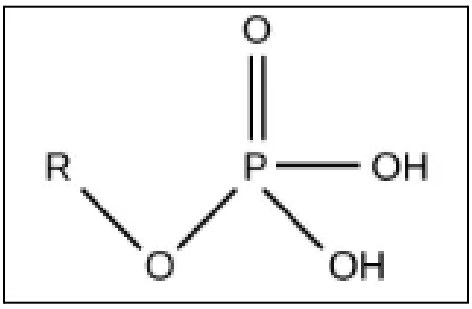
a. Raise or lower the temperature of one pound of a substance by one degree Fahrenheit
b. Raise or lower the temperature of one kilogram of a substance by ten degrees Celsius
c. Raise or lower the temperature of one milligram of a substance by one degree Kelvin
d. Raise or lower the temperature of one gram of a substance by one degree Celsius

6 elements are absolutely essential to all life. These are...

1) **Carbon**
2) **Hydrogen**
3) **Oxygen**
4) **Nitrogen**
5) **Phosphorous**

6) **Sulfur**

Draw the structure for the phosphate functional group in the space below:



You get monomers when _____ occurs.
You get polymers when _____ occurs between monomers.

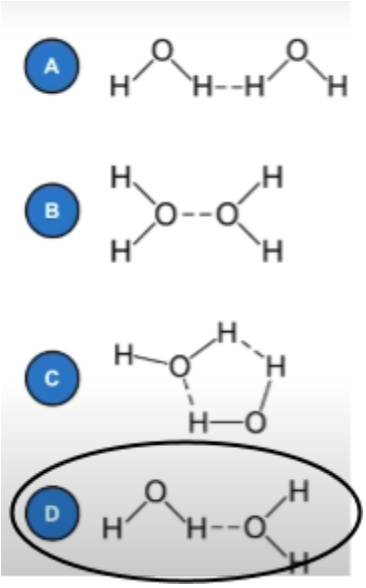
a. Dehydration synthesis; hydrolysis
b. Anabolism; catabolism
c. Hydrolysis; dehydration synthesis
d. Catabolism; anabolism

Which of the following describes unsaturated fats?

a. No double bonds between carbon atoms; solid at room temperature
b. One or more double bonds between carbon atoms; liquid at room temperature
c. Two or more double bonds between carbon atoms; plasma at room temperature
d. One or more triple bonds between carbon atoms; liquid at room temperature

Water molecules are polar covalent molecules. There is a partial negative charge near the oxygen atom and partial positive charges near the hydrogen atoms due to the uneven distribution of electrons between the atoms, resulting in hydrogen bonds between water molecules. The polarity of water molecules contributes to many properties of water that are important for biological processes.

Which of the following models best demonstrates the arrangement of hydrogen bonds between adjacent water molecules? **D**



Unit 2: Cell Structure and Function

Write down at least two differences between eukaryotic and prokaryotic cells

Prokaryotic: larger, DNA in nucleotide region, circular DNA, single chromosome, no membrane bound organelles, asexual reproduction

Eukaryotic: smaller, nucleus in nuclear envelope, linear DNA, several chromosomes, membrane-bound organelles, asexual and sexual reproduction (mitosis and meiosis)

Lysosomes are membrane-bound organelles containing **digestive enzymes** for

breaking down **waste** materials.

Fill in the blanks using the options below and then complete the related multiple-choice question:

Cell membranes are _____ _____ due to the fluid nature of the _____ _____.

a. Loosely permeable; triglyceride bilayer
b. Non-selectively permeable; phospholipid bilayer
c. Picky; embedded glycoproteins
d. Selectively permeable; phospholipid bilayer

What is the role of cholesterol in the phospholipid bilayer of cell membranes?

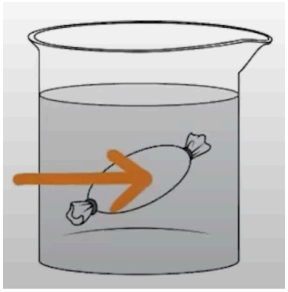
a. It causes cardiovascular health issues
b. It allows for cell-to-cell recognition and communication
c. It creates more fluidity and stability in the membrane
d. It regulates the passage of ions and other substances

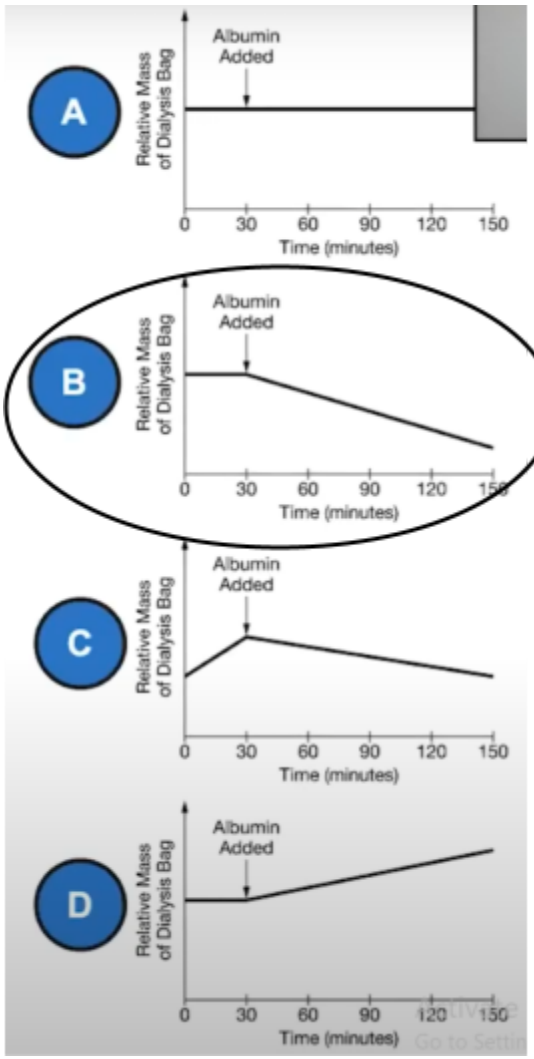
What do you think differentiates active and passive transport?

Active transport: direct use of ATP to transport molecules against concentration gradient, requires energy expenditure

Passive transport: movement of molecules along concentration gradient, no energy required, includes diffusion and osmosis

A student is using dialysis bags to model the effects of changing solute concentrations on cells. The student places one dialysis bag that contains 25 mL of distilled water into each of the two beakers that are filled with 200 mL of distilled water (Figure 1). The membrane of each dialysis bag membrane contains pores that allow small solutes such as monatomic ions to pass through but are too small for anything larger to pass. After 30 minutes, 5 mL of a concentrated solution of albumin (a medium-sized, water-soluble protein) is added to one of the two beakers. Nothing is added to the other beaker. After two more hours at room temperature, the mass of each bag is determined. There is no change in the mass of the dialysis bag in the beaker to which no albumin was added. Which of the graphs best represents the predicted change in mass over time of the dialysis bag in the beaker to which albumin was added? **B**

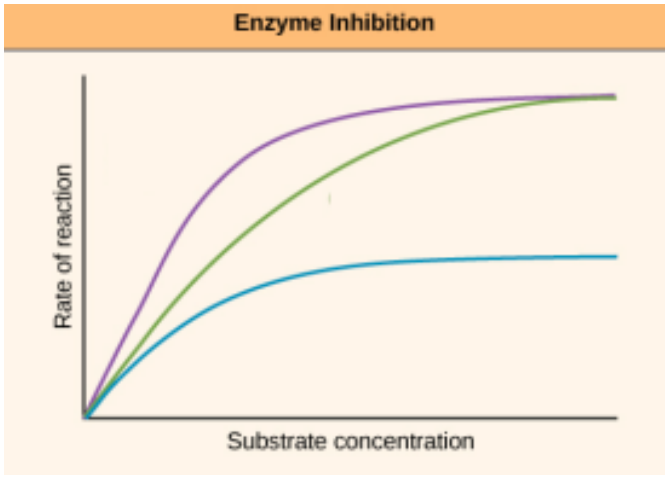




Unit 3: Cellular Energetics

Describe three forms of enzyme regulation. Provide examples if possible.

One form of enzyme regulation is competitive inhibitors, which bind to enzymes at their active site and prevent the substrate from attaching. A second form is noncompetitive inhibitors, which attach to enzymes not at the active site, but at a place where they can alter the enzyme in a way that prevents the reaction from taking place. These cannot be "outcompeted" even if there is an abundance of substrate. A third type of inhibitor are cofactors and coenzymes, which can help activate or inhibit an enzyme (examples are magnesium ions and vitamin C).



Choose the best answer based on the graph shown above.

a. The purple curve indicates the presence of no inhibitors, the green curve indicates the presence of noncompetitive inhibitors, the blue curve indicates the presence of cooperative inhibitors.
b. The purple curve indicates the presence of benign inhibitors, the green curve indicates the presence of malignant inhibitors, the blue curve indicates the presence of no inhibitors.
c. The purple curve indicates the presence of no inhibitors, the green curve indicates the presence of competitive inhibitors, the blue curve indicates the presence of noncompetitive inhibitors.
d. The purple curve indicates the presence of competitive inhibitors, the green curve indicates the presence of noncompetitive inhibitors, the blue curve indicates the presence of no inhibitors.

Which of the following is most true regarding thermodynamic systems?

a. A system can be simultaneously isolated and closed, but not open.

b. The entropy of the universe increases or stays the same for most reactions.
c. The human body can be most closely equated to an open system.
d. A system is always much larger in scale than its surroundings.

Experimental evidence shows that the process of glycolysis is present and virtually identical in organisms from all three domains, Archaea, Bacteria, and Eukarya. Which of the following hypotheses could be best supported by this evidence?

a. All organisms carry out glycolysis in mitochondria.
b. Glycolysis is a universal energy-releasing process and therefore suggests a common ancestor for all forms of life.
c. Across the three domains, all organisms depend solely on the process of anaerobic respiration for ATP production.
d. Eukaryotic organisms are more likely to utilize fermentation than oxidative phosphorylation for the synthesis of ATP.

Pectinase is a protein that catalyzes the breakdown of pectic polysaccharides in plant cell walls. A researcher designs an experiment to investigate the effect of salinity on the ability of pectinase to lower the activation energy of the reaction involved. The design of the experiment is presented in Table 1. For each test tube, the researcher will measure the amount of product formed over 20 minutes. Which of the following statements best helps justify the inclusion of test tube 5 in the experiment?

a. It will act as a control for test tube 4 by showing the effect of the presence or absence of the substrate.
b. It will act as a control for test tube 4 by showing the effect of a change in environmental temperature.
c. It will act as a control for test tube 6 by showing the effect of the presence or absence of the enzyme.
d. It will act as a control for test tube 6 by showing the effect of a change in sodium chloride concentration.

Table 1. An experiment to investigate the effect of salinity on pectinase function

Test Tube	Sodium Chloride Concentration (molar)	Temperature (degrees C)	Substrate Added	Pectinase Added
1	0	23	Yes	No
2	0	23	Yes	Yes
3	0.5	23	Yes	No
4	0.5	23	Yes	Yes
5	1.0	23	Yes	No
6	1.0	23	Yes	Yes
7	1.5	23	Yes	No
8	1.5	23	Yes	Yes

Which of the following describes the correct order of locations in which the stages of photosynthesis occur?

a. **PSII pigment molecule, P680, PSI pigment molecule, NADP+ reductase**
b. PSI pigment molecule, Cyt, PSII primary electron acceptor, NADP+ reductase
c. P680, PSI pigment molecule, NADP+ reductase, PSII pigment molecule
d. PSII pigment molecule, NADP+ reductase, PSI primary electron acceptor, P700

Fill in the blanks to the best of your abilities.
C3 plants lack adaptations to address photorespiration. **CAM** plants only open their stomata at night, storing **CO2** to enable photosynthesis to continue during the day. **C4** plants fix carbon into malate with the help of the enzyme **PEP carboxylase** and maintain specialized cells called **bundle-sheath cells**.

Unit 4: Cell Communications and Cell Cycle

What is the purpose of Direct Signaling (or direct contact signaling)?

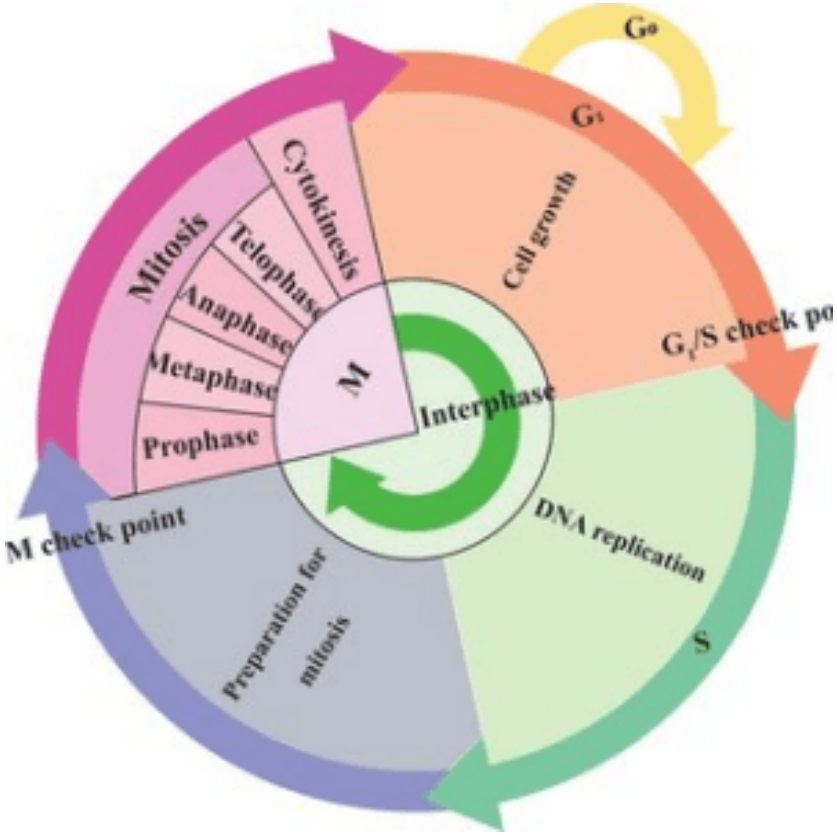
a. To communicate between 2 cells for apoptosis
b. For groups of tissue or cells to communicate as a whole
c. To communicate between cells that are far away through the bloodstream
d. To begin a cascade of reactions within the cell

What does IP3 (inositol trisphosphate) regulate?

a. The proton gradient
b. Diffusion within a cell

c. Calcium levels within a cell

d. The Electron-Transport Chain



The S Checkpoint clears cells for i. _____ by ensuring they are/have ii. _____.

a. i. Mitosis ii. Two sets of chromosomes
b. i. DNA Replication ii. Mature and fully grown
c. i. DNA Replication ii. Two sets of chromosomes
d. i. G2 ii. DNA synthesis

What are the five stages of mitosis?

a. 1. **Prophase (and prometaphase)**
b. 2. **Metaphase**
c. 3. **Anaphase**
d. 4. **Telophase**
e. 5. **Cytokinesis**

How does meiosis increase genetic variation?

a. The tips switching cause the gender to become more random as the parental chromosomes switch over more and more
b. The tips switching cause the allele representation within each parental chromosome to be more randomized within a sister chromatid

c. The sister chromatids switching around caused the parental chromosome to be moved around more, which makes it more variated
d. The tips switching cause the alleles to flip between each chromosome, which allows the chromosome set to have more space for mutations

Unit 5: Heredity

What is the best example of the representation of incomplete dominance in a homozygous dominant flower? **B**

a. 

b. 

c. 

If a female individual had hemophilia B (an x-linked disease), what is the likelihood that her son would also carry hemophilia?

a. 25%
b. 50%

c. 0%
d. 100%

If I had a dihybrid cross of RrYy x RrYy, what would be the possibility of RRyy?

a. 1/6
b. 1/16
c. 1/12
d. 1/8

What is Huntington's disease?

a. A fatal brain disease that decays nerves within the brain. It is a dominant allele
b. A fatal brain disease that decays nerves within the brain. It is a recessive allele
c. A blood disease that inhibits the clotting of blood. It is a dominant allele
d. The absence of a necessary chromosome causes developmental delays. It is a recessive allele

If I had a monohybrid cross of Rr and rr, R being pink as a dominant allele and r being white, what would be the possibility of light pink?

a. 0%
b. 25%
c. 50%
d. 75%

Identify why hemophilia B (an X-linked disease) will not be inherited by female offspring.

Because females have two X chromosomes, the X chromosome with the X-linked disease can be dominated by the X chromosomes without it. This means females will not inherit the disease. On the other hand, since males only inherit one X chromosome, if they have the chromosome carrying the gene for the disease they will express hemophilia B.