

Biology exam question list



**ASSIGN
BUSTER**

1. Understand what is the same about all life, and what makes life diverse A. List the five characteristics all organisms on Earth share * The five characteristics all organisms share is: information, replication, evolution, cells, and energy (serie) B.

Explain why the first four are required for life * Cells allow things to go in and out of the organism (allows diffusion to happen so good things go in and bad things go out) * Energy is required because it allows most functions and reactions to happen in the organism * Information: so your cells know what to do next(aka the things happening in your brain need information to learn) * Replication: everything an organism does revolves around trying to replicate itself(meiosis) C. Differentiate heterotrophs and autotrophs 1. Heterotrophs: need to obtain energy from an outside source 2.

Autotrophs: create energy and food for themselves Some reactions are exothermic because their $PE_{\text{reactants}}$ is Higher than PE_{products} 2. Understand that energy to sustain life is derived from chemical potential energy * LOCS D. Relate the distance of electrons from their protons to the concept of chemical potential energy * The further electrons are from their protons, the more PE they have (PE is stored energy, so the distance is increased and is further meaning it'll have more want to go closer to the oppositely attracted nucleus) E.

Define exergonic and endergonic chemical reactions * Exergonic reactions: happen spontaneously (don't need any source of energy to happen) Endergonic need energy from the outside to create the reaction heat has been released to the environment > $PE_{\text{reactants}} > PE_{\text{products}}$ (PE dropped so Exergoinic) The hydrolysis of ATP provides the energy needed for

an endergonic reaction. Acquire Energy = Endergonic Rxn... Pi is transferred to a phosphate group F.

Classify the hydrolysis of ATP as either endergonic or exergonic * Hydrolysis of ATP is exergonic (energy is released) the ATP outermost phosphate groups is broken... energy is created G. Classify the phosphorylation of a substrate by ATP as either endergonic or exergonic.. phosphorylation is exergonic because the electrons in ADP and the Pi have so much less PE than they did in the ATP.. phosphorylation is the addition of a phosphate group to a substrate... it adds negative charge to a protein the electrons in the protein change configuration (the molecule's overall shape) H.

Use the First Law of Thermodynamics to explain how chemical reactions transfer energy from one molecule to another... first law states that energy is neither created nor destroyed... it just means that PE will change from KE and KE will turn into thermal, sound, or light energy, the energies are just changing * HOCS A. Predict whether reactions are exergonic or endergonic given information on the potential energy of reactants and products PE of reactants higher: PE drops: Exergonic... PE of products higher, then PE increases, and it's endergonic B.

Use the concepts of exergonic and endergonic reactions to explain how ATP does work in the cell via phosphorylation. 1. The addition of a phosphate group to a substrate: exergonic: electrons in ADP and phosphate group has much less PE than in ATP (meaning the ADP Pi are the products.. products will have less PE than the reactants.. PE drops).. When phosphorylated, the Energy is a product... The phosphorylation by ATP means that the exergonic because there was a drop in PE, ΔG (or free energy thing) is negative 1.

Understand the importance of cellular respiration to (almost all) life on Earth

* LOCS A. List (separately) the inputs and outputs of cellular respiration.

Inputs of Cell Respiration: Outputs of CR: B. Recall that nearly all life on Earth

conducts cellular respiration C. Differentiate and relate the roles of glucose

and ATP in cellular respiration D. Describe the role of cellular respiration in

the transfer of energy from glucose to work done in the cell E. Differentiate

aerobic and anaerobic cellular respiration Anaerobic doesn't require O₂,

Aerobic requires O₂ * HOCS A.

Justify why some organisms would use aerobic cellular respiration and others

would use anaerobic cellular respiration Some organisms find it difficult to

acquire O₂: at the bottom of the ocean, etc B. Justify why most life on Earth

uses aerobic cellular respiration, instead of anaerobic cellular respiration

Most life is near oxygen, they can acquire it mostly a lot of the time 1.

Understand the importance of photosynthesis to (almost all) life on Earth *

LOCS A. *** changed 8/28 *** List (separately) the inputs and outputs of the

light-capturing reactions of photosynthesis Inputs of LCR:

Outputs of LCR: B. *** changed 8/28 *** List (separately) the inputs and

outputs of the Calvin Cycle of photosynthesis Inputs Calvin Cycle: Outputs

CC: C. Relate the inputs and outputs of photosynthesis to those of cellular

respiration The inputs of photosyn are the outputs of CR D. Define, identify

on a diagram, and relate chloroplasts, thylakoids, and stroma Thylakoids are

fluid filled sacs where the photosynthesis occurs in cells Stroma: is the

surrounding membrane of the chloroplasts

Chloroplasts are found in plants in which they absorb the light rays E. ***

changed 8/28 *** Associate the light-capturing reactions and Calvin Cycle of

photosynthesis with these structures F. Compare, contrast, and relate the functions of chlorophyll and carotenoids G. Use the concept of chemical potential energy to summarize why chlorophyll absorbs the wavelengths of light it does. Chem PE. H. Define carbon fixation I. Generalize the influence of photosynthesis on oxygen levels in Earth's atmosphere.. Increased O₂ levels J.

Generalize the influence of carbon fixation on carbon dioxide levels in Earth's atmosphere K. Paraphrase the three potential fates of the excited electron produced when a photon meets a chlorophyll molecule L. Relate the functions of the antenna complex and the reaction center in a chloroplast * HOCS A. *** changed 8/28 *** For each input of photosynthesis, predict the effect on both the light-capturing reactions and Calvin Cycle if that one input is limited. B. Illustrate the flow of energy from solar energy, to glucose, to ATP, to work done in the cell. . Understand the importance of diffusion to cellular metabolism and the how it constraints the evolution of cell/body size and shape * LOCS A. Define diffusion B. Predict (in a general sense) the net direction in which dissolved molecules will move given information about their concentration C. Define each of the terms of Fick's Law of Diffusion D. Calculate the surface area to volume ratio for simple shapes, when presented with equations to calculate surface area and volume E.

Assess the surface area to volume ratios of different shapes relative to one another, given information about their volume or mass F. Predict (in a general sense) changes in the rate of diffusion given changes in the various parameters of Fick's Law of Diffusion G. When provided with equations for the surface area and volume of a shape, use them to explain why the SA: V

of a small shape is greater than that of the same shape at a larger size. *
HOCS A.

Justify why the net movement of a group of molecules along a concentration gradient due to diffusion can be caused by the random movement of individual molecules B. *** added 9/2 *** Use the concepts of surface area and volume to relate 1) the ability to acquire reactants for cellular respiration and 2) the amount of those reactants required to a single celled organism's size
Photosynthesis: $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ (O₂ is a by product)
along with sugar