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Chemical energy and atp worksheet answers

Name: Key

Distributive Property: Make it Simple!

Rewrite each of the following equations using the distributive property. Write the correct answer for each problem. Remember to show your work.

Example: 7 x 32 = 224

(7x30) + (7x2)
210 + 14
224

Actual student answers may vary. Examples of correct answers.

A) 6 x 55 = 330
(6x50) + (6x5)
300 + 30
330

B) 9 x 74 = 666
(9x70) + (9x4)
630 + 36
666

C) 12 x 140 = 1680
(12x100) + (12x40)
1200 + 480
1680

D) 8 x 112 = 896
(8x110) + (8x2)
880 + 16
896

E) 30 x 156 = 530
(30x150) + (30x6)
450 + 180
530

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6. The chemical equation for the synthesis of ATP is: ADP + Pi ←→ ATP + H_2O. $\Delta G^{\circ\prime} = +7.3$ kcal/mol.
   A) Write the chemical equation for the hydrolysis of ATP and note the value of the standard free energy change for this reaction.

B) The actual concentrations of ATP, ADP and Pi differ by tissue/cell type (see table).

Tissue/Cell Type	ATP (mM)	ADP (mM)	Pi (mM)
Liver	3.5	1.8	5.0
Skeletal Muscle	8.0	0.9	8.0
Brain	2.6	0.7	2.7

Calculate $\Delta G'$ for ATP hydrolysis in liver, muscle, and brain (NOTE: assume 25°C and omit the concentration of water in your calculations). In which cell/tissue type does the free energy of hydrolysis provide the most energy to do work?

Name _____ Date _____ Class _____

Study Guide

CHAPTER 8
Section 1: How Organisms Obtain Energy

In your textbook, read about how organisms obtain energy.

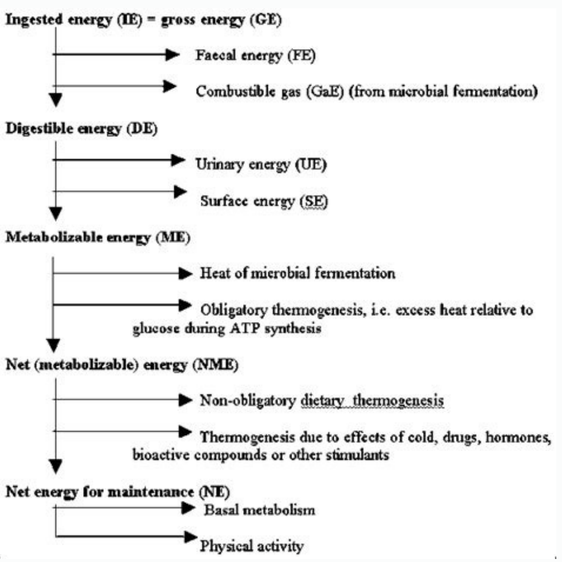
Match the definition in Column A with the term in Column B.

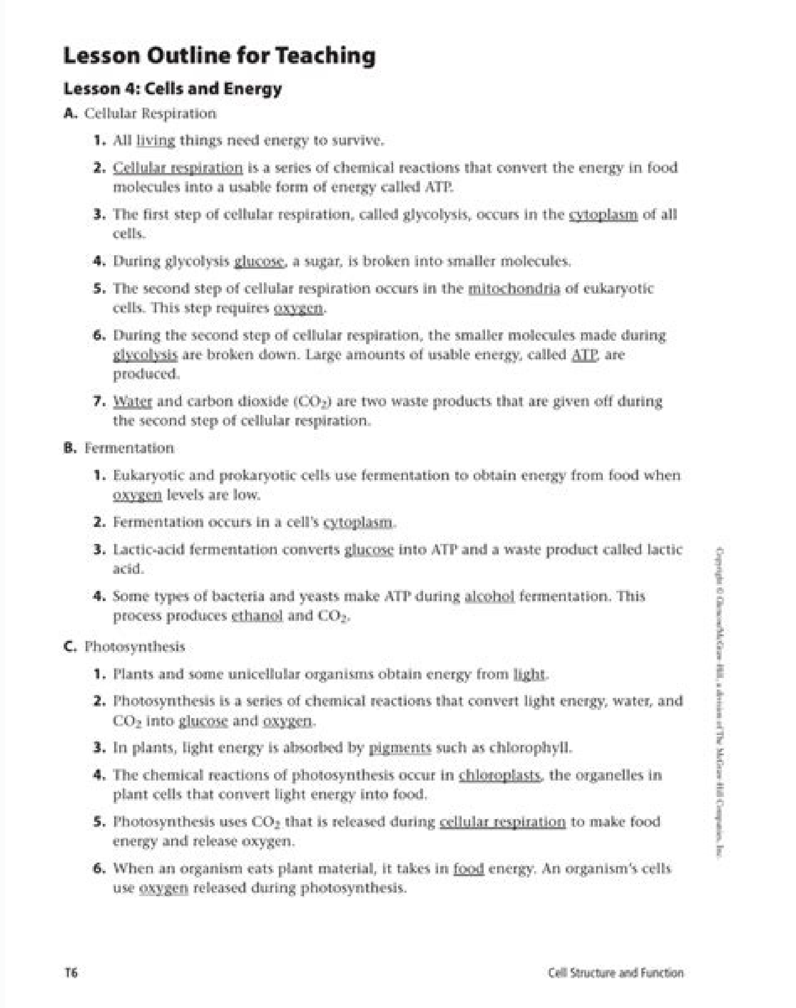
Column A		Column B
C	1. the idea that energy cannot be created or destroyed	A. energy
E	2. all the chemical reactions in a cell	B. thermodynamics
F	3. anabolic pathway that converts energy from the Sun to chemical energy for use by cells	C. first law of thermodynamics
A	4. ability to do work	D. second law of thermodynamics
H	5. series of chemical reactions in which the product of one reaction is the substrate for the next reaction	E. metabolism
I	6. biological molecule that provides chemical energy	F. photosynthesis
B	7. study of the flow and transformation of energy	G. cellular respiration
J	8. source of nearly all energy for life	H. metabolic pathway
G	9. catabolic pathway that breaks down organic molecules	I. adenosine triphosphate (ATP)
D	10. spontaneous increase in disorder, or entropy	J. sunlight

Use each of the terms below only once to complete the passage.

aerobic **anaerobic** **ATP** **cellular respiration** **cytoplasm** **energy** **glucose** **glycolysis** **mitochondria** **NADH** **oxygen**

Organisms obtain energy in a process called (1) cellular respiration. This process harvests electrons from carbon compounds, such as (2) glucose, and uses that energy to make (3) ATP. ATP is used to provide (4) energy for cells to do work. In (5) Glycolysis, glucose is broken down into pyruvate. Glycolysis is a(n) (6) anaerobic process because it does not require oxygen. Glycolysis takes place in the (7) cytoplasm. Two molecules of ATP and two molecules of (8) NADH are formed for every glucose molecule that is broken down. (9) aerobic respiration takes place in the (10) mitochondria. It is aerobic because the process requires (11) oxygen.





Lesson Outline for Teaching

Lesson 4: Cells and Energy

A. Cellular Respiration

1. All living things need energy to survive.
2. Cellular respiration is a series of chemical reactions that convert the energy in food molecules into a usable form of energy called ATP.
3. The first step of cellular respiration, called glycolysis, occurs in the cytoplasm of all cells.
4. During glycolysis glucose, a sugar, is broken into smaller molecules.
5. The second step of cellular respiration occurs in the mitochondria of eukaryotic cells. This step requires oxygen.
6. During the second step of cellular respiration, the smaller molecules made during glycolysis are broken down. Large amounts of usable energy, called ATP, are produced.
7. Water and carbon dioxide (CO_2) are two waste products that are given off during the second step of cellular respiration.

B. Fermentation

1. Eukaryotic and prokaryotic cells use fermentation to obtain energy from food when oxygen levels are low.
2. Fermentation occurs in a cell's cytoplasm.
3. Lactic-acid fermentation converts glucose into ATP and a waste product called lactic acid.
4. Some types of bacteria and yeasts make ATP during alcohol fermentation. This process produces ethanol and CO_2.

C. Photosynthesis

1. Plants and some unicellular organisms obtain energy from light.
2. Photosynthesis is a series of chemical reactions that convert light energy, water, and CO_2 into glucose and oxygen.
3. In plants, light energy is absorbed by pigments such as chlorophyll.
4. The chemical reactions of photosynthesis occur in chloroplasts, the organelles in plant cells that convert light energy into food.
5. Photosynthesis uses CO_2 that is released during cellular respiration to make food energy and release oxygen.
6. When an organism eats plant material, it takes in food energy. An organism's cells use oxygen released during photosynthesis.

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During the rest periods, the phosphocreaine shop is regenerated by the ATP. The exhaustion of the metabolic effort of the substrates required such as ATP or glycogen within a muscle causes fatigue as the muscle is unable to generate energy for power supply. The contraction of ionic imbalance of a muscle requires the Ca+ions to interact with troponin, exposing the binding site of the actin at the head of the myosin. The accumulation of metabolites from these reactions other than lactic acid, such as mg2+ ions or reactive oxygen species, can also induce fatigue by interfering with the release of ca+ ions from the sarcoplasmic reticulum or through the reduction of the sensitivity of troponin to ca+. The action potential released by depolarization and calcium ion from a motorway triggers the release of acetylcholine in the motor -coty -cytolcoline extremmity the depolarization within the sarcolemma begins, which spreads through muscle fiber through tubuli t causes the depolarization of the sarcoplasma ca2+) Calcium ions Play a Pivotal Role in Initiating Muscular ContractionSmuscle Innervation 2.ãacy Actin and Myosin Cross-Bridge Formationon Actin, The Binding Site for the Myosin Heads Are Covered by A Blocking Complex (Troponin and Tropomyosin) Calcium Ions Bind to Troponin and reconfigure the complex, exposing the bond sites for the myosin heads the myosin heads, then form a crossed bridge with the filaments of Actin the role of calcium in understanding the formation of the cross bridge: ã ¢ âvelop For the Filamen, ATP hydrolysis and formation of crossed bridges of actin and myosine TS are needed to slide ã ¢ ã ¢ ã ¢ ¢ ã ¢ ã ¢ è ¢ ã ¢ Ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ã ¢ ã ¢ ¢ ã ¢ ã ¢ ã ¢ \ ã ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ Ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ã ¢ ã ¢ ¢ ã ¢ ã ¢ ã ¢ \ ã ã ¢ ã ¢ ã ¢ ¢ ã ¢ ã ¢ Ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ olution ,, ,, ,, ,, ,olution sliding mechanism of actin and myosinatp is linked to the head of the myosin, breaking the Between the actin and the hydrolysis of Miosinatp it makes the heads of myosin change position and wheel, moving them towards the subsequent myosin heads of binding sites, the actin bind to the new Actin sites and return to their original conformation that the Reorientation drags the actin along the myosin in a sliding mechanism of the myosin. Moving Actin filaments in a similar way to the way a remote pushes a mechanism of striped navigation filaments 4. The glucose for glycolysis can be provided by the flow of blood, but it is more often converted by glycogen into muscle fibersLactic acid key terms: a by -product of anaerobic breathing that strongly contributes to muscle effort. Muscle fatigue refers to the decline of muscle force generated in periods of prolonged activities or due to pathological issues. With insufficient oxygen, the pyruvate cannot enter the Krebs cycle and instead accumulates in muscle fiber. Cellular respiration plays a key role in returning the muscles to normal after exercise, converting the excess pyruvate to ATP and regenerating the reserves of ATP, phosphocreatine and glycogen in the muscles necessary for faster contractions. However, the swimming pool is very small and after some muscle contractions they will be exhausted. With the accumulation of pyruvate, the production of lactic acid has also increased. Phosphocreatine provides phosphates to ADP molecules, producing high energy ATP molecules. It further inhibits anaerobic breathing, inducing fatigue. With the accumulation of pyruvate, the quantity of lactic acid produced has also increased. ATP: the molecule containing high energy bonds used to transfer energy between systems inside a cell. With a large exercise, osmotically active molecules outside the muscle are lost through sweating. The process involved in muscle metabolism during aerobic exercise takeaways key to ATP points is necessary for muscle contraction. Glycolisi converts glucose into pyruvate, pyruvate, and Nadh, producing two ATP molecules. Four potential sources of ATP muscle contractions. ATP free levels of ATPs exist inside muscle fibers and can immediately provide energy for contraction. Muscle fatigue has a series of possible causes including compromised blood flow, ionic imbalance within the muscle, nervous fatigue, the loss of desire to continue and, above all, the accumulation of lactic acid in the muscle. The pyruvate is continually elaborated in lactic acid. It is present at low levels in the muscle. Exercise and aging with sufficient training, the metabolic ability of a muscle can change, delaying the onset of muscle effort. The accumulation of lactic acid, long -term muscle use requires the release of oxygen and glucose to muscle fiber to allow aerobic breathing, producing the ATP required for muscle contraction. However, the loss of the desire to exercise in the face of the increase in muscle pain, breathing and heart rate can have a strong negative impact on muscle activity. Muscle fatigue occurs after a prolonged activity period. In extreme cases, there can lead to a painful and extensive maintenance of muscle contraction or cramps. It is sarcomere by shortening the repeated reorientation of the myosin heads drags the actin filaments along the length of the miosinas actin filaments are anchored to the Z lines, the drag of the actin brings closer the lines Z more shortening, shortening the sarcomaeree the individual sarcomers become More short, the muscle fibers as a whole contracts with sarcomere prisons that shorten the synthesis of the muscle contraction potential in a motorway triggers the release of CA2+ ions from the READOLOMCALCIUM SARCOPLASTICS ions are linked to the (on the Actin) and cause tropomyosin to move, exposing binding sites for the myososine of myosin the filaments and heads of the myosine form a cross bridge that is broken by the hydrolysis Atpatp makes the heads of the myosin run and change change Myosin Heads Bind to the Actin Filament Before Returning To Their Original Conformation (Releasing Adp + Pi) The Repositioning of the Myosin Heads Move The Actin Filaments Towards The Center of the Sarcomerethe Sliding of Actin Along Myosin Therefore Shortens the Sarcomere, Causing Muscle ContractionMary Contraction Summary. Note: In this animation the head of the myosin is attached to the actina when the hydrolysis ATP does it that the reality turnt, the head of the myosin turns when not connected and then returns to its original conformation after the binding actin for Continue to enjoy the â € œ â € ‹Our site, we ask you for your identity as a human. Cellular respiration while the pyruvate generated through glycolysis can accumulate to form lactic acid, can also be used to generate further ATP molecules. Cellular respiration is not as quick as the above mechanisms; However, it is necessary for periods of training more than 30 seconds. It is also necessary to turn back the glycogen from lactic acid and restore the lists of phosphocreatine and ATP in the muscle. Several factors contribute to muscle effort, the most important is the accumulation of lactic acid. Cellular respiration produces further ATP molecules from the pyruvate in the mitochondria. With aging, the levels of ATP, CTP and myoglobin begin to decrease, reducing the ability to work. With sufficient exercise, the beginning of muscle fatigue can be delayed. This accumulation of lactic acid in muscle tissue reduces the pH, making it more acidic and producing the pungent sensation in the muscles during exercise. Most of the movements require a force very below that a muscle could potentially generate and exclude the nervous fatigue of the disease is rarely a problem. The quantity of oxygen required to restore Lactic acid is often called oxygen debt. The muscles specified for the anaerobic exercise with high intensity summarize more glycolic enzymes, while long muscles The aerobic exercise develops more capillaries and mitochondria. This loss changes the osmotic gradient, making the delivery of the CA ions more difficult for muscle fiber. If the respiratory or circulatory system cannot keep up with the demand, the energy will be generated by much less efficient anaerobic breathing. The only glycolysis can provide muscle energy for about 30 seconds, although this interval can be increased with muscle conditioning. If glycogen deposits are spent in muscle fibers, glucose can be created by fats and proteins. In aerobic breathing, the pyruvate produced by glycolysis is converted into additional ATP molecules in the mitochondria through the Krebs cycle. There are four sources of this substance for muscle fibers: free ATP, phosphocrey, glycolysis and cellular breathing. The nervous fatigue and the loss of the nerves of desire are responsible for controlling the contraction of the muscles, determining the number, sequence and strength of muscle contractions. Lactic acid can be converted into pyruvate in well -oxygenated muscle cells; However, during exercise attention to maintaining muscle activity. To continue enjoying the â € ‹â € œ our site, we ask you to confirm your identity as a human being. A small amount of free ATP is available in the muscle for immediate use. The muscle contractions are powered by the Triposphate adenosine (ATP), an energy storage molecule. Lactic acid is transported to the liver where it can be stored before conversion into glucose in the presence of oxygen through the Cori cycle. The muscle fibers shrink or lose and surround the connective tissues, making muscle contraction slower and more difficult. Furthermore, with exercise, improvements to systems And respiratory can facilitate the best delivery of oxygen and glucose to the muscle. Muscle contraction occurs through the metabolism of the gods of the Triposphate (ATP) derived mainly from Da Simple sugar glucose. Thank you so much for your cooperation. The excess pyruvate is converted into lactic acid that causes muscle fatigue. Describe the factors involved in metabolic muscle fatigue takeaWays Key Points muscle fatigue refers to the decline of muscle strength generated over time. It inhibits further anaerobic breathing, inducing fatigue. Cellular respiration is limited by the availability of oxygen, lactic acid can still accumulate if the pyruvate in the Krebs cycle is insufficient. Finfocreatine key terms: a molecule of creatine phosphorylated that acts as a rapidly mobilizable reserve of high energy phosphates in the skeletal muscles. Exercise throughout life can help reduce the impact of aging while maintaining a healthy supply of oxygen to the muscle. The reaction of phosphocreatine + ADP to the creatine ATP + is reversible. However, this conversion is not as efficient. In the muscle there is quite phosphocreatine to provide ATP up to 15 seconds of contraction. The mitochondria in muscle fibers can convert the pyruvate to ATP in the presence of oxygen through the Krebs cycle, generating an additional 30 ATP molecules. Understanding: calcium ions and proteins â € â € â € â € of tropomyosin and troponin control muscle contractions-the muscle contraction process occurs on a series of key passages, including: depolarization and release of football ions releaseactin e Miosin-Mercanism of Actin flow formation and short-sighted short-sighted myosin (muscle contraction) 1. The glycolysis of the glycolysis is the metabolic reaction that produces two ATP molecules through the conversion of the pyruvate glucose, water and Nadh in the absence of oxygen. oxygen.

23/08/2021 · What is Energy? I like to go for runs, and when I do, I think of energy, or perhaps more accurately, my lack thereof.When I run, I also think about matter.Matter is … The energy released from the breakdown of sugar is used by the cells to make another chemical that we call adenosine triphosphate, or simply abbreviated ATP. … ATP is adenosine triphosphate. This chemical compound is what living things use to store energy ADP stored in the body so when it's time to use that stored energy, ADP goes through ATP synthesis to make ATP and use that energy though the body. ATP binds to the myosin head, breaking the cross-bridge between actin and myosin; ATP hydrolysis causes the myosin heads to change position and swivel, moving them towards the next actin binding site; The myosin heads bind to the new … Luciferase is a generic term for the class of oxidative enzymes that produce bioluminescence, and is usually distinguished from a photoprotein.The name was first used by Raphaël Dubois who invented the words luciferin and luciferase, for the substrate and enzyme, respectively. Both words are derived from the Latin word lucifer, meaning "lightbearer", which in turn is derived … ADVERTISEMENTS: This article throws light upon the top six processes of plant physiology. The processes are: 1. Photosynthesis 2. Respiration 3. Photorespiration 4. Transpiration 5. Growth and Development 6. Photoperiodism and Vernalisation. Plant Physiology: Process # 1. Photosynthesis: "Photosynthesis is a process by which chlorophyll containing organism (green …

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