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of the
LIVING ENVIRONMENT
CORE CURRICULUM WORKBOOK
2nd Edition

The actual workbook correlates with the NYS Living Environment Curriculum. The primary goal of this workbook is to provide students with essential information, strategies, vocabulary, and Regents based practice questions in order to pass the New York State Living Environment Regents.

The actual book contains 7 units, designed to provide complete comprehension of the Living Environment curriculum.

Each unit contains:

- Detailed overview of the material, additional information, diagrams with explanatory captions, vocabulary refresher, and a series of related practice questions.

New to the 2nd Edition:

- Additional diagrams with captions added to each unit.
- New questions have been added, bringing the total to over 850 questions with all of Set 1 questions fully explained.
- Now 228 pages.

Proven to improve Regents scores.

Living Environment Core Curriculum Workbook

2nd Edition

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About This Workbook:

The primary goal of this workbook is to provide students with the necessary information, strategies, vocabulary, and practice questions in order to pass the New York State Living Environment Regents. To this end, as a student, you must diligently work through all sections with complete comprehension. By doing so, your grades will improve cumulating with a passing grade on the Living Environment Regents.

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2nd Edition

The Introduction: Overview, Essential Information, and Additional Information
These sections will give you a comprehensive review of a specific topic in the New York State Living Environment curriculum. Carefully read all sections noting the italicized vocabulary words. Make sure you have a working knowledge of these words. In the Additional Information area are concepts/information related to the given topic and may appear on this year's Regents.

Diagrams:
These visual aids, along with the captions should enhance your understanding of specific concepts. First study the diagrams, then, read the given information.

Vocabulary:
We suggest reading the definitions, then matching them with the correct word or phase. Once you have completed this section, take time to memorize it. Look for help with the vocabulary by revisiting the Essential Information area.

Set 1: Questions and Answers
These questions will test your understanding of the topic. Do all questions in Set 1. Correct your work by going to the Answers for Set 1, which are located at the end of the topic section. The explanations will help you to understand any mistakes you have made.

Set 2: Questions
Correctly answering these questions will verify that you have mastered the subject topic. The answers to these questions are in a separate answer key.

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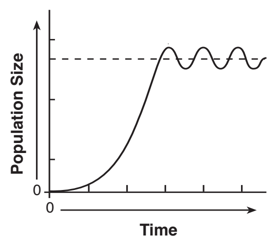
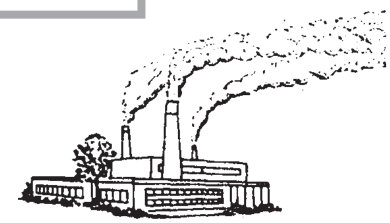
ECOLOGY AND HUMAN IMPACT





Overview:

Ecology is the scientific study of the relationships and interactions that living organisms have with respect to each other and their natural environment. Ecology involves an understanding of the components of nature and how these different components interact to create our environment. The study of ecology reveals many different ecosystems, each maintained by a delicate balance. In these different but connected ecosystems, individual species play a small but significant role in the working of the whole. Throughout the history of the Earth, the delicate balances found within ecosystems have been disrupted by natural and man-made influences. Given enough time, many ecosystems can adjust and regain their natural balance. Human actions, however, like creating air and water pollution, destroying habitats and depleting natural resources, etc., are seriously stressing many ecosystems and sending them out of balance. The saying "we are all connected" is so true. Our present and future actions will determine whether we leave a better planet for future generations.

Essential Information:

Ecological Relationships – The study of life on Earth is organized into levels that define living things and the environment in which they live. The *biosphere* includes all life on Earth. It is subdivided into various *ecosystems* that depend on climate and location. Within each ecosystem, there are *communities* made up of many different *populations* of living organisms that interact with their environment. There are both *abiotic* (non-living) and *biotic* (living) factors that influence life. Abiotic factors include sunlight, temperature, water, air, and soil, whereas, biotic factors include plants, animals, fungi, and bacteria. Within an ecosystem, organisms live in specific habitats – their surroundings. Within a habitat, each organism has a niche it fills or role that it fulfills within that habitat. Different species of organisms may appear to occupy the same habitat, but each has a different niche allowing it to survive in that habitat. Stable ecosystems have *producers*, known as *autotrophs*, that convert light energy from the Sun into chemical energy for use both for itself and other organisms. *Primary consumers*, also known as *heterotrophs*, feed on producers and transfer that energy as they too are consumed. This transfer of energy can be modeled in a *food web* or an *energy pyramid* (see page 3). Energy is passed up each level from producer to primary consumer to secondary consumer. At each level, some energy is lost as heat. Consumers that feed on plants are called *herbivores*, and those that feed on animals are known as *carnivores*. Also necessary in a stable ecosystem are *decomposers*, such as bacteria and fungi, which breakdown and recycle organic matter, dead or decaying organisms, into a usable form.

Ecosystems are constantly changing as energy moves through the system. Change occurs naturally to plant life in an ecosystem over time, and this is known as *succession*. In succession, as the composition and nutrient levels of the soil change, a progression of different plants will be established and replace others until the ecosystem reaches what is known as a *climax stage* – usually a mature forest. The ecosystem will remain stable at this stage until there is a major disruption, either natural (e.g. forest fire) or man-made (e.g. deforestation).

Populations within ecosystems are regulated or kept in check by various factors. Organisms are limited by the amount of *available resources* in an area. The population size that can be supported with resources in an area is known as the *carrying capacity*. When carrying capacity is reached, population growth will slow and level off. *Limiting resources*, such as necessary minerals or nutrients, can affect population growth. Without proper amounts of these nutrients, organisms will not survive. Disease and parasite activity regulate population numbers by keeping those numbers in check. In predator–prey relationships, biological interactions between two different species (like wolves and elk), have a direct effect on population numbers. For example, if the population number of one animal increases, it will impact the numbers of the other population. When conditions become crowded, diseases and parasites are spread more readily. Individuals already weakened by lack of resources may not survive, and therefore population numbers will decrease.

Human Impact – The increase in the world's human population has brought about many situations that have had *negative impacts* on ecosystems. Simply said, more people more problems. As the world population increases, there is a greater demand for resources and living space. Available resources can be either *renewable* (able to be replaced), like water, or *nonrenewable* (unable to be replaced), such as *fossil fuels*. Humans, needing space and housing, tend to destroy *habitats* such as forests and wetlands. More people require more food, so farm production must increase, requiring more chemicals to produce higher yields. Increased use of pesticides and chemicals in agriculture can increase soil and water pollution, ruining habitats and recreational areas.

Increased energy use has led to an increased burning of fossil fuels, creating air pollution, which leads to the formation of *acid rain.* This type of precipitation, having an acidic (low) pH, has adverse impacts on habitats, especially those that are located in the eastern parts of the United States. Burning fossil fuels produces *carbon dioxide*, a *greenhouse gas*, which, when released into the atmosphere, adds to *global warming*. Chemicals, such as *CFCs* from refrigerants, as well as other airborne chemicals, can also lead to the depletion of the *ozone layer*, allowing more harmful UV radiation to reach the Earth's surface, which increases the chance of skin cancer and cell mutations.

Humans have also introduced *non-native* species to ecosystems, either by accident or purposefully. These *invasive species* have no natural predators or population controls and outcompete native species, possibly leading to the extinction of those native species and, in some cases, the total disruption of an ecosystem.

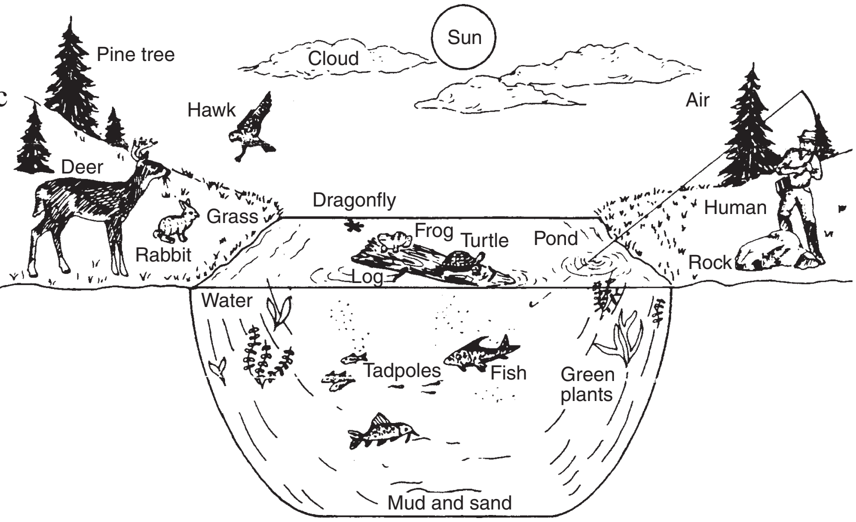
Ecosystems are interconnected, and human action can alter the ecosystem's equilibrium. The result of this can cause an imbalance within the ecosystems. Loss of habitats has reduced populations of certain organisms resulting in loss of *biodiversity* or even extinction of many species. Unstable ecosystems could prevent the discovery of new medicine from plants. Through legislation, public awareness, educational programs, and conservation practices, humans can correct and reduce their negative impact on Earth.

Additional Information:

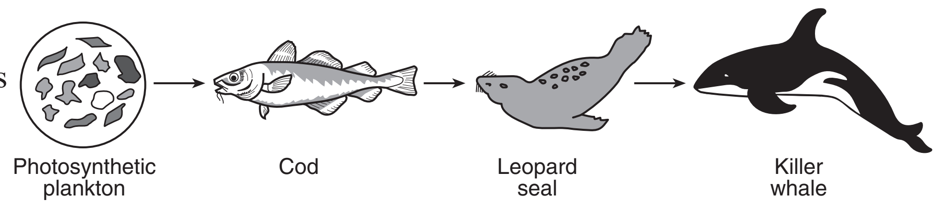
- Several invasive species introduced into New York State that have impacted ecosystems include: emerald ash borer, asian long horned beetle, and zebra mussels found in waterways, as well as purple loosestrife, which is a wetland plant, and hydrilla found in freshwater habitats.
- There are specific types of ecosystems found on Earth, each being defined by climate. The term, biome, is used to describe these large ecosystems types. Each biome has specific plants and animals that inhabit the area. Examples include: Tropical Rain Forests, Deserts, Temperate Deciduous Forests (NYS), and Arctic.

Diagrams:

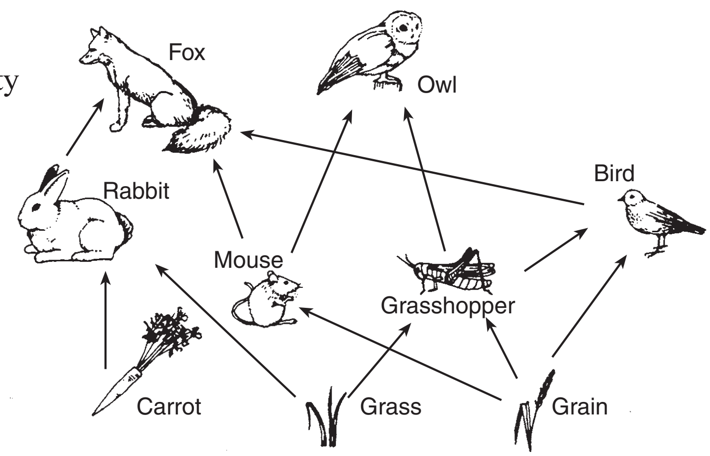
1. **Ecosystem** – Shown here is a pond ecosystem illustrating how the biotic members of the ecosystem interact with one another as well as with the abiotic (non-living) environment. Within all ecosystems are specific habitats that support a number of niches. Each niche is filled by the activity of single species.



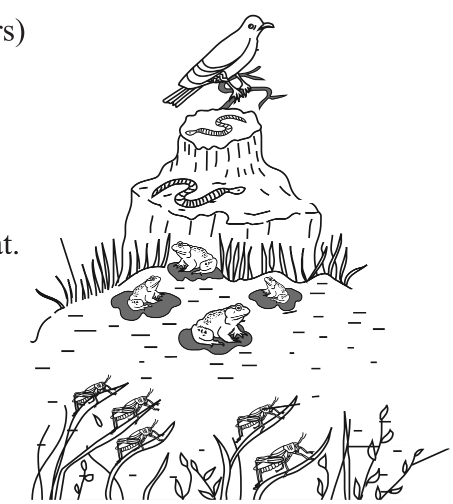
2. **Food Chain** – A food chain shows how living organisms get their food. It starts with a producer and ends with the largest consumer.

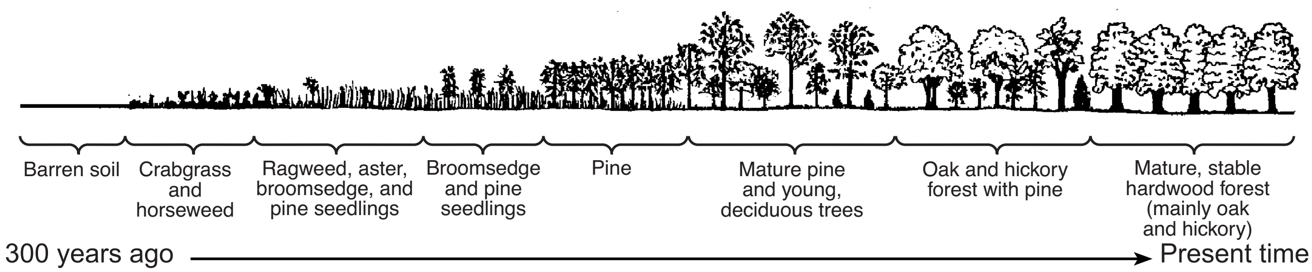


3. **Food Web** – A food web shows the flow of energy between organisms and the community as a whole. Energy, made by the producers, flows upward through the consumers, represented by the arrows. Food webs are much more stable than just simple food chains and have many more energy connections. Removal of an organism from a food web can impact those organisms above and below it within that web.



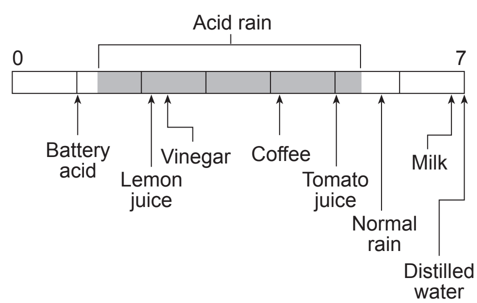
4. **Energy Pyramid** – In an energy pyramid, plants (producers) contain the most energy and are located at the bottom of the pyramid. Producers gain their energy from the Sun by photosynthesis. In the energy pyramid, organisms receive their energy from the level directly below them. As energy moves up it decreases, being lost to the environment as heat.

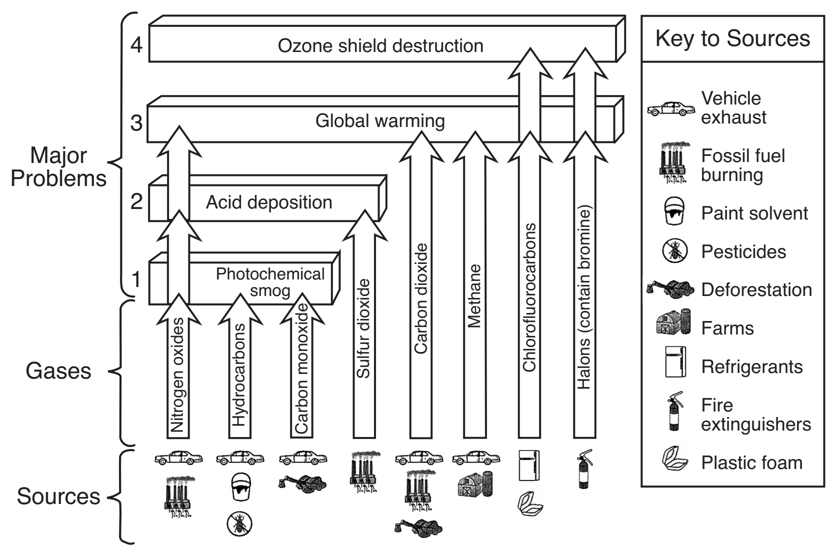




5. **Ecological Succession –** This naturally occurring process takes place when vegetation changes as the environmental conditions evolve over time in an area. The beginning stages of this process involve the emergence of organisms that break down rocks that, when combined with organic material, form soil. Over time, the soil depth increases as larger grasses, shrubs and different trees take over the area. Eventually the area reaches a climax stage that is stable (hardwood forest) and remains until there is a disruption to that ecosystem.

6. **Acid Rain –** The full pH scale goes from 0 to 14, where 7 is neutral. Any pH value less than 7 is acidic. Rain is normally slightly acidic, having a pH around 5.5. When airborne pollutants, especially sulfuric or nitric compounds, are chemically joined with atmospheric moisture, acid rain results, lowering the pH of the precipitation. Acid rain is harmful to young aquatic life and their habitats.





7. **Air Pollution Sources** – A large amount of air pollution is caused by the combustion of fossil fuels which releases large amounts of carbon dioxide, a greenhouse gas. Greenhouse gases have the ability to absorb much infrared radiation, resulting in an increase of atmospheric temperature. Chlorofluorocarbons or CFCs destroy ozone (O_3) molecules, causing the thinning of the ozone layer. The ozone layer traps much harmful ultraviolet (UV) radiation. UV radiation is linked to skin cancer, eye damage, and cell mutations. The reduction of the use of CFCs has had a positive impact on restoring the ozone within the upper atmosphere.

Vocabulary Refresher

Group A *Directions* - Match the correct definition for the following terms:

1. ______Biosphere
2. ______Ecosystem
3. ______Community
4. ______Population
5. ______Abiotic
6. ______Biotic
7. ______Biodiversity
8. ______Energy pyramid
9. ______Autotrophs
10. ______Heterotrophs
11. ______Food web
12. ______Niche
13. ______Herbivores
14. ______Carnivores
15. _____ Nonrenewable resources
16. _____ Climax stage

A. A measure of the richness, with regard to species, that is found within an area. The more varied an ecosystem is, the more stable the ecosystem.

B. Organisms, known as producers, that synthesize their own food source (glucose) by using the process of photosynthesis.

C. All of the living populations that are found and interact within an ecosystem.

D. Complex interconnections that show the feeding relationships of organisms within an ecosystem. The more connections, the more stable the ecosystem.

E. The non-living factors that influence living organisms such as water, temperature, soil, and atmosphere.

F. An organism that feeds exclusively on plant material, example – a deer.

G. The living organisms found within an ecosystem.

H. The realized role that an organism fills within an ecosystem. It defines where it fits within a food web or energy pyramid.

I. All living organisms that encompass the Earth.

J. Organisms that must take in preformed nutrients (organic compounds). These consumers may ingest, absorb, or engulf their nutrients.

K. All living organisms of one species that live and interact within an ecosystem.

L. A model that shows the flow of energy in an ecosystem from producers to consumers. As energy flows up this model, it decreases being lost as heat.

M. The most biodiverse and stable stage of ecological succession.

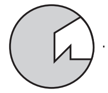
N. Those resources that are unable to be replaced and, once used up, are gone. Fossil fuels are examples of this type of resource.

O. Organisms that feed exclusively on other animals, example – a fox.

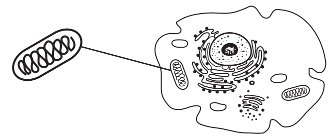
P. The interactions of living organisms and non-living factors within a defined area.

CHEMISTRY AND ENERGY FOR LIFE

$C_6H_{12}O_6$



ATP



Overview:

In order to carry out life functions, living organisms require chemical compounds that can be broken down for energy and synthesized for structure and function. Organisms use the processes of photosynthesis and respiration to create molecules that can be used as energy molecules for life functions. These chemical compounds and processes are universally used by all living organisms to maintain life.

Essential Information:

<u>Chemical Compounds</u> – Living organisms, in order to function successfully within their environment, require specific compounds. Inorganic compounds, such as water and carbon dioxide, are necessary for vital cellular functions. Organic compounds contain the basic elements of carbon and hydrogen and can also be enhanced with the addition of oxygen, nitrogen, sulfur, and phosphorus. Different combinations of these elements result in various types of organic compounds such as:

– *Carbohydrates* include complex sugars and starches that can be broken down into simple sugars like *glucose* to provide energy. Some carbohydrates, like cellulose, serve as part of the structure of the cell wall in plants.

– *Proteins* are compounds that are composed of sequences of *amino acids* – the building blocks of proteins. Proteins are essential for both structure and function in living things. An important class of proteins includes enzymes, which are necessary for many reactions to proceed.

– *Nucleic acids* include both the genetic molecules DNA and RNA. They are made of smaller subunits called nucleotides. Nucleic acids function to provide a means to store genetic information and provide a template for the synthesis of proteins.

– *Lipids* are large molecules that include fats, which store energy, and oils and waxes that prevent water loss. Lipids also are an important component of the cell membrane.

<u>Enzymes</u> – In order to synthesize or break down organic compounds, *enzymes* or biological catalysts are needed. Enzymes have a defined structure based on the sequence of amino acids used to construct them. This structure is important to their function of speeding up chemical reactions. Enzymes have a special location known as the *active site* where *substrates*, substances that enzymes act on, can bind and enter into a reaction. Therefore, enzymes are said to be *substrate specific* because they bind to a particular substrate that fits into the active site like a puzzle piece. This enzyme substrate binding is described as a *lock and key model* (see diagram 2). It is important to understand that an enzyme's shape determines its function.

Each enzyme will work to either synthesize substrates into a more complex compound or to break down a substrate into a simpler and usable form. Several factors can influence enzyme action. Each enzyme has an *optimum temperature* at which it functions. Enzyme action or rate of reaction will increase as temperature increases. When an enzyme reaches a temperature where its reaction rate has peaked, that is said to be the optimum. At a certain point, temperatures become too high, and this causes the enzyme's shape or structure to distort. A change in the enzyme's structure may decrease the function of that enzyme or stop it altogether. Another factor that influences enzyme action is pH, or the measure of acidity or alkalinity of an environment. Each enzyme has an *optimum pH* where it maximizes its function. As the pH value moves away from that optimum value, the function diminishes due to changes in the enzymes structure.

Energy Needs – All living organisms require energy to carry out life functions. Organisms use organic compounds that are cycled through the processes of *photosynthesis* and *respiration* to provide that energy. *Autotrophs*, or producers, such as plants, are able to convert energy from visible light into chemical energy during the process of photosynthesis, within an organelle known as the *chloroplast*. Within the membrane of the chloroplasts, light energy is captured, and this begins the process of synthesizing simple sugar – like glucose. This glucose is then synthesized and used by both heterotrophs (consumers) and autotrophs (producers) for energy. Certain compounds are necessary for this synthesis to take place: water, which enters the plant through the root system, and carbon dioxide, which enters through tiny openings called *stomata* located on the underside of leaves. Stomata are surrounded by guard cells. These cells regulate the opening and closing of the stomata. Through the stomata, gas exchange takes place, with carbon dioxide entering and oxygen being released. As a result of photosynthesis, sugar molecules such as glucose are produced along with the byproduct, oxygen, which exits through the stomata. Certain factors can influence the rate of photosynthesis, including light intensity, amount of available water, and temperature.

Respiration – *Respiration* is a process where the energy held in the chemical bonds of glucose is released to produce an energy molecule, *ATP*. Respiration can occur in two ways depending on the presence or absence of oxygen. Without oxygen, respiration takes place in the form of *fermentation* or *anaerobic respiration*. This process typically takes place in yeast and bacteria where the incomplete breakdown of glucose yields small amounts of ATP, carbon dioxide, and alcohol. This process can also take place in muscles when they lack enough oxygen. It results in the buildup of lactic acid leading to muscle fatigue. Cellular respiration or *aerobic respiration* occurs in the presence of oxygen and takes place in the cell structure known as the *mitochondria*. In cellular respiration, glucose is broken down into carbon dioxide, water, and larger amounts of ATP. The inner folds of the mitochondria provide a surface area for this process to occur. ATP can be used for many activities, such as active transport, synthesis of complex molecules, and locomotion or muscle movement.

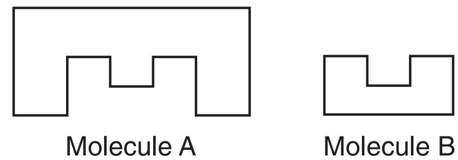
A cyclic relationship exists between the processes of photosynthesis and respiration where molecules of carbon dioxide, oxygen, and glucose are shuttled back and forth in and between living organisms. Producers carry out photosynthesis, providing oxygen and glucose for all living things to utilize in respiration. Carbon dioxide, the byproduct of respiration, is then used by plants to build glucose molecules.

Additional Information:

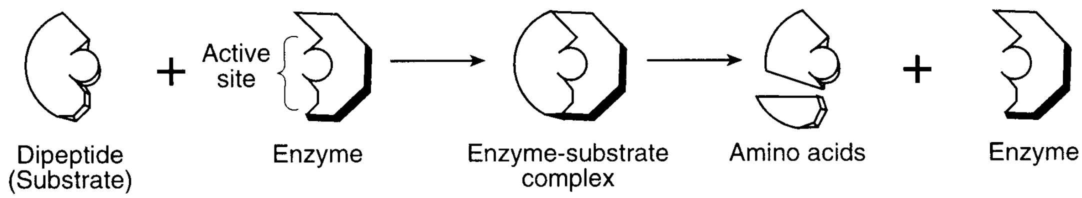
- Enzymes are unchanged by the reactions which they participate in and leave the reaction ready to act again.
- Plants have many structural modifications that allow them to be efficient at photosynthesis. Their flat, broad leaves allow for maximum surface area to absorb light energy. Stomata on the bottom of each leaf prevent excessive evaporation or water loss. Most of the chloroplasts are located on the upper portions of the leaf to capture the most sunlight.
- There are 20 different amino acids that are used to build proteins. Each protein has a different variation of types and sequences of those amino acids.

Diagrams:

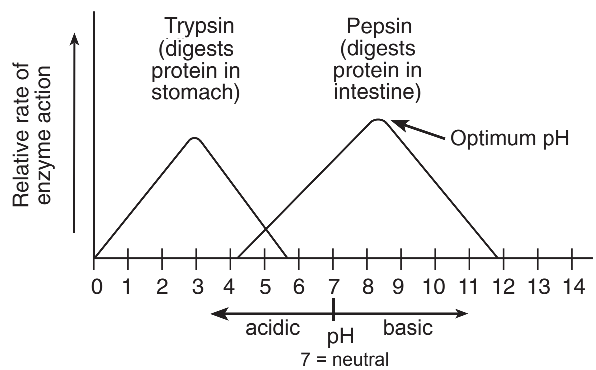
1. **Lock and Key Model of Enzymes** – Molecule *A* represents an enzyme, while molecule *B* represents a substrate. These two molecules fit together in a way that is sometimes referred to as a Lock and Key Model.



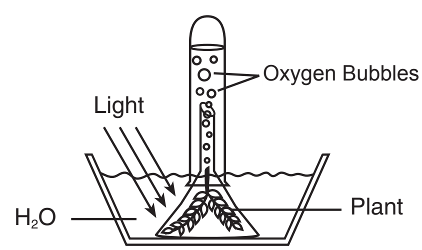
2. **Enzyme Substrate Reaction** – This diagram shows the structures of a substrate and enzyme as they bind together at the active site. In this reaction, the substrate, a dipeptide or protein is broken down into its amino acid products. Notice the enzyme is unchanged by the reaction and ready to act again.



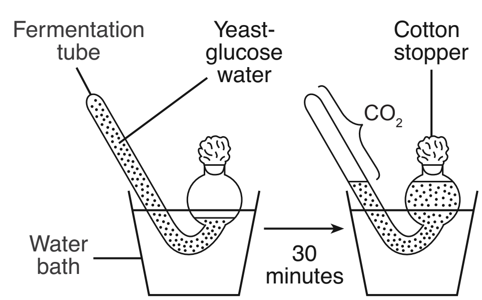
3. **Optimum pH** – The activity of two different enzymes, trypsin and pepsin are shown in this graph. Each enzyme has an optimum pH at which it performs at peak rate. pH is a measure of how acidic or basic conditions are within a system or environment.



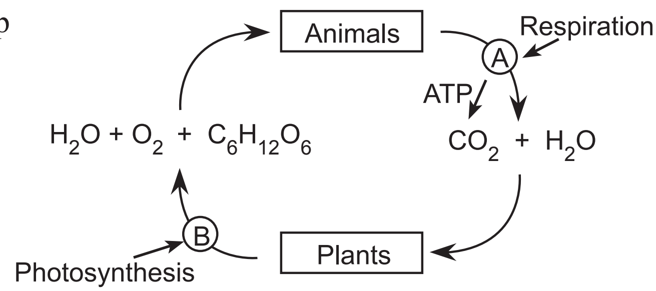
4. **Photosynthesis** – Photosynthetic activity in aquatic plants can be measured by the production of oxygen bubbles, collected in an inverted test tube. As the rate of photosynthesis increases, so will the rate of bubble production until optimum level is reached.



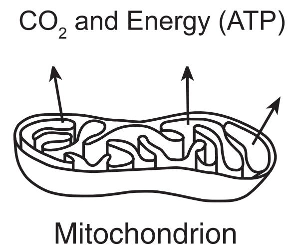
5. **Fermentation** – This diagram illustrates the process of fermentation where yeast cells are carrying out anaerobic respiration (without oxygen). Yeast, glucose and water are placed in the shown apparatus. During the process of fermentation, carbon dioxide is released and collects in the tube. The rate of respiration can be measured by the amount of carbon dioxide collected in the tube.



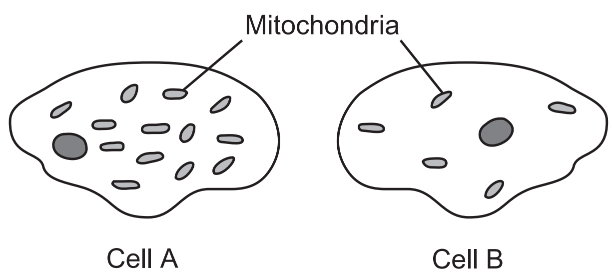
6. **Energy Flow** – This diagram shows a cyclic relationship of the flow of energy and gases between plants and animals. Plants, through photosynthesis, produce glucose ($C_6H_{12}O_6$), water and oxygen. Glucose and oxygen are then used by animals during respiration to produce the energy molecule ATP, while releasing water and carbon dioxide, which are again used by plants.



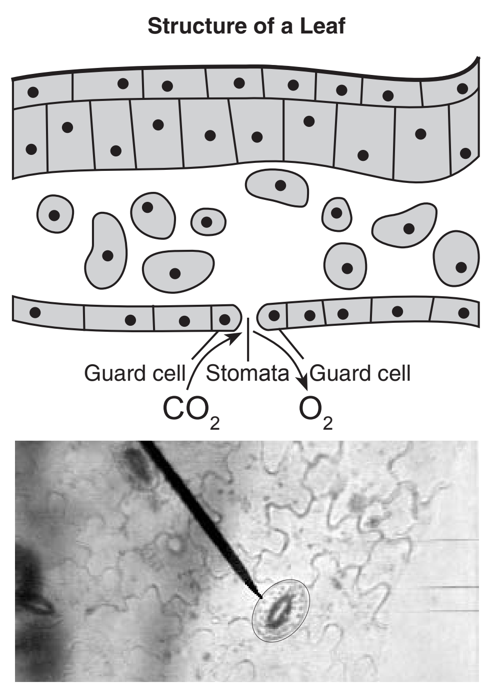
7. **Mitochondrion and ATP** – The cell part pictured here is the mitochondrion, where the process of cellular respiration takes place. The arrows represent the production of the energy molecule, ATP, and the byproduct, CO_2. The inner folds of the mitochondrion provide a surface for this process to take place.



8. **Energy Production in Cells** – When compared to Cell *B*, Cell *A* contains a larger number of mitochondria and is able to carry out more cellular respiration and therefore, produce more ATP. These ATP or energy molecules may be used in the process of active transport. Cells that require much energy for function, such as muscle cells, contain more mitochondria than other cells.



9. **Stomata and Guard Cells** – The diagrams show a cross-sectional view and a microscopic view of a leaf. In the cross-sectional view, the stomata opening is surrounded by guard cells on the bottom of the leaf surface. The pointer in the microscopic view is directed at guard cells that surround the darkened stomata opening. The stomata provides a location for the exchange of gases. Carbon dioxide enters the plant and oxygen exits. Because water can also exit the plant through the stomata, guard cells regulate the opening and closing to maintain homeostasis within the plant.



Vocabulary Refresher

Group A *Directions* - Match the correct definition for the following terms:

1. ______Substrate
2. ______Guard cell
3. ______Organic compounds
4. ______Optimum pH
5. ______Active site
6. ______Nucleotides
7. ______Aerobic
8. ______Photosynthesis
9. ______Autotroph
10. ______Nucleic acids
11. ______ Amino acids
12. ______Enzymes
13. ______Carbohydrates

A. Special proteins that speed up the rate of chemical reactions in living things.

B. The process by which some organisms are able to capture light energy to produce sugar from carbon dioxide and water.

C. Molecules necessary for life that contain both hydrogen and carbon atoms. Carbohydrates are an example of this type of molecule.

D. The basic building block of DNA and RNA, composed of a sugar, phosphate and a nitrogen base.

E. Compounds that the body can break down into simple sugars, like glucose to use for energy.

F. A level of acidic, neutral, or basic condition in which an enzyme functions most efficiently.

G. An organism that produces its own food; the source of energy for all other living things.

H. Specialized cells that control the opening and closing of the pores (stomata) on the surface of a leaf.

I. An environment with the presence of oxygen.

J. A location on an enzyme where the substrate fits closely with that enzyme.

K. The molecule or compound that an enzyme binds to in a reaction.

L. Any one of several building blocks of protein.

M. Large, complex organic molecules that contain the genetic instructions needed to carry out cellular life processes.

Vocabulary Refresher

Group B *Directions* - Match the correct definition for the following terms:

1. ______Respiration
2. ______Chloroplast
3. ______ Substrate specific
4. ______ Lock and key model
5. ______Optimum temperature
6. ______Mitochondrion
7. ______Lipids
8. ______Proteins
9. ______Anaerobic
10. ______Glucose
11. ______Inorganic compounds
12. ______ATP
13. ______ Stomata
14. ______Fermentation

A. Any one of a group of organic compounds that includes oils, fats, and waxes.

B. A small pore found on the underside of most leaves.

C. A favored condition of temperature, in which an enzyme functions most efficiently.

D. A compound that stores energy in cells; a high energy molecule which supplies energy for cells.

E. A simple carbohydrate that is a major source of energy for cells.

F. An environment where there is little or no oxygen is present.

G. The process by which the chemical bond energy stored in nutrients like glucose is released to produce ATP in cells.

H. Organic compounds composed of sequences of amino acids.

I. Organelles that contain enzymes used to extract energy from nutrients; site of cellular respiration.

J. A way to describe the fit of an enzyme with its specific substrate.

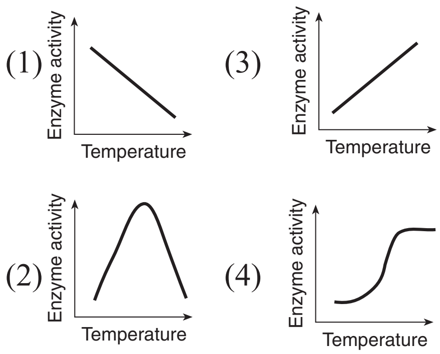
K. An anaerobic process where glucose is partially broken down by bacteria or yeast, yielding limited supplies of ATP, while releasing CO_2.

L. A green organelle that contains chlorophyll where photosynthesis occurs.

M. Describes the close relationship between an enzyme's shape and the molecules that it acts on.

N. Compounds such as water and carbon dioxide that are involved in vital processes like photosynthesis and cellular respiration.

15. Enzymes have an optimum temperature at which they work best. Temperatures above and below this optimum will decrease enzyme activity. Which graph best illustrates the effect of temperature on enzyme activity?



15 ____

16. Most of the starch stored in the cells of a potato is composed of molecules that originally entered these cells as

(1) enzymes (3) amino acids
(2) simple sugars (4) minerals 16 ____

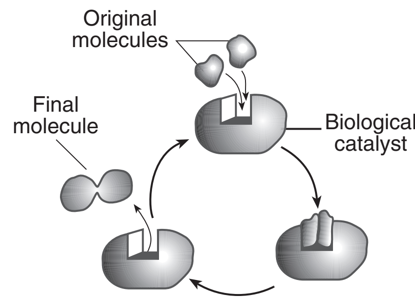
17. Organisms that have the ability to use an atmospheric gas to produce an organic nutrient are known as

(1) herbivores (3) carnivores
(2) decomposers (4) autotrophs 17 ____

18. Which statement concerning proteins is not correct?

(1) Proteins are long, usually folded, chains.
(2) The shape of a protein molecule determines its function.
(3) Proteins can be broken down and used for energy.
(4) Proteins are bonded together, resulting in simple sugars. 18 ____

19. The diagram below represents a series of reactions that can occur in an organism.



This diagram best illustrates the relationship between

(1) enzymes and synthesis
(2) amino acids and glucose
(3) antigens and immunity
(4) ribosomes and sugars 19 ____

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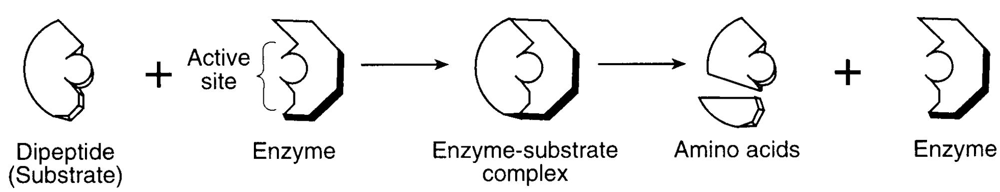
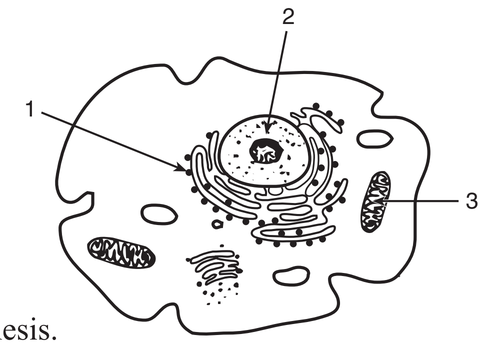
20. A process that occurs in the human body is shown in the diagram below.



What would happen if a temperature change caused the shape of the active site to be altered?

(1) The dipeptide would digest faster.
(2) The dipeptide would digest slower or not at all.
(3) The amino acids would combine faster.
(4) The amino acids would combine slower or not at all. 20____

Base your answers to question 54 on the diagram of a cell.



54. *a*) Describe how structures 1 and 2 interact in the process of protein synthesis.

____

____

b) Describe how structure 3 aids in the process of protein synthesis.

____

55. Photosynthesis and respiration are two important processes. Discuss one of these processes and explain its importance to an organism. In your answer, be sure to:

a) identify the process being discussed ____________________________

b) identify the organelle where this process occurs ____________________________

c) identify two raw materials necessary for this process

1) ____________________________________

2) ____________________________________

d) identify one energy-rich molecule that is produced by this process __________________________

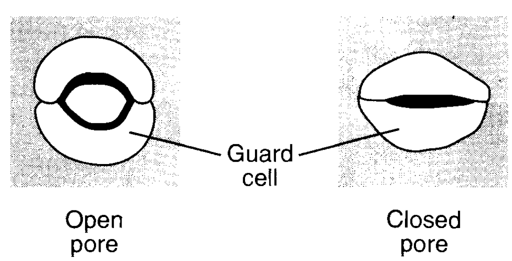
e) state how organisms use the energy-rich molecule that is produced

____

f) state how a gas produced by this process is recycled in nature

____

56. The accompanying diagram represents a change in guard cells that open and close pores in a plant.



This change directly helps to regulate what?

____

57. State one reason why muscle tissues are likely to be affected by mitrochondrial diseases.

____

Chemistry and Energy for Life

Set 1 – Answers

1. 4 Carbon dioxide is used during autotrophic nutrition. Autotrophs carry out a process known as photosynthesis which uses carbon dioxide as a raw material for the synthesis of required nutrients.

2. 4 Respiration uses the stored chemical energy found in glucose. With oxygen, glucose will produce the energy needed for living organisms, while releasing carbon dioxide.

3. 3 Heterotrophs are organisms that must obtain preformed organic molecules or compounds that they can then break down into useful energy or building blocks. Generally these organic molecules are produced as a result of photosynthesis performed by autotrophs.

4. 1 The process of cellular respiration produces ATP molecules within the mitochondria of the cell. This energy is stored in the chemical bonds of ATP molecules. Remember that cells use simple sugars like glucose and oxygen to produce ATP molecules.

5. 3 In food, the original source of energy is sunlight. Through the process of photosynthesis, producers convert light energy, CO_2 and water into glucose and O_2.

6. 3 Photosynthesis and respiration both involve the following molecules: glucose which is organic, and water, oxygen, and carbon dioxide which are inorganic. Photosynthesis uses light energy, CO_2 and water to produce glucose and O_2. Respiration uses glucose and O_2 to produce CO_2 and energy.

7. 1 The section of the leaf that was covered was not exposed to sunlight and therefore could not undergo the process of photosynthesis. Lacking this process, no starch would be created. Remember that glucose, a product of photosynthesis, is converted into starch for storage purpose.

8. 2 In plants, the process of photosynthesis uses the energy of the Sun to convert carbon dioxide into the chemical energy of sugar (glucose), while giving off oxygen as a by-product.

9. 1 Respiration and photosynthesis are processes that maintain oxygen and carbon dioxide levels. Respiration, the energy producing process, uses oxygen and releases carbon dioxide to create the energy molecule, ATP. Photosynthesis uses carbon dioxide to produce sugars while releasing oxygen. Through each of these processes, carbon dioxide and oxygen levels in the atmosphere are maintained.

Please be advised that all Set 1 answers are explained and appear in the actual workbook.