Mr. Wilfong's Snow Packet

Biology

Days 1 - 5

Instructions: Read ALL instructions carefully.

1. This document contains all 5 of your snow packet assignments for this class. Please do 1 assignment per day. You may use all or none of these assignments – pay close attention to the Inclement Weather announcements.

2. Be sure to follow all directions on the pages below and given by your teacher in class. You may be asked to turn in work on your own paper or digitally.

3. Turn in the completed work to your teacher on the day you return to school. If you have technology issues, family emergencies, or illness you may have up to five days to turn work in.

Biology Daily Instructions

Day 1

Instructions: Complete the Enrichment activity for food webs and the Concept Mapping activity for Organisms and Energy.

This can be handwritten on notebook paper or typed.

Day 2

Instructions: Complete the Enrichment activity for Terrestrial Biomes and Aquatic Ecosystems and the Concept Mapping activity for Terrestrial Biomes.

This can be handwritten on notebook paper or typed.

Day 3

Instructions: Complete the Enrichment activity for Human Population Controls and the Concept Mapping activity for Describing Populations.

This can be handwritten on notebook paper or typed.

Day 4

Instructions: Complete the Enrichment activity for Should Endangered Species be Protected and the Concept Mapping activity for Threats to Biodiversity.

This can be handwritten on notebook paper or typed.

Day 5

Instructions: Complete the Concept Mapping activity for Organic Macromolecules and the Interactive Reading activity for Chemical Bonds and Chemical Reactions.

This can be handwritten on notebook paper or typed.

Biology Day 1 Worksheet 1

Enrichment

CHAPTER 2
Diagramming: A Food Web

Studying the flow of energy in an ecosystem is one way that ecologists learn about the relationships between the different organisms in the ecosystem. Ecologists try to determine how the organisms obtain the energy they need and thereby identify the trophic level of each organism. Most ecosystems are complex, and it is often difficult or impossible to trace all the energy pathways between organisms. Ecologists use models, called food chains and food webs, to help them study the flow of energy in an ecosystem.

Food Chains A simple model of the energy flow in an ecosystem is a food chain. A food chain represents the one-way flow of energy, which starts with an autotroph and moves to heterotrophs. An example of a simple food chain is:

grass → rabbit → hawk

Arrows represent the direction of the energy flow.

Food Webs More complex and realistic energy flows within ecosystems are modeled by food webs. Because most organisms use more than a single source of food, food webs more closely model the relationships in ecosystems. In the preceding example, rabbits are not the only herbivores that consume grass, and hawks eat other organisms besides rabbits.

Directions

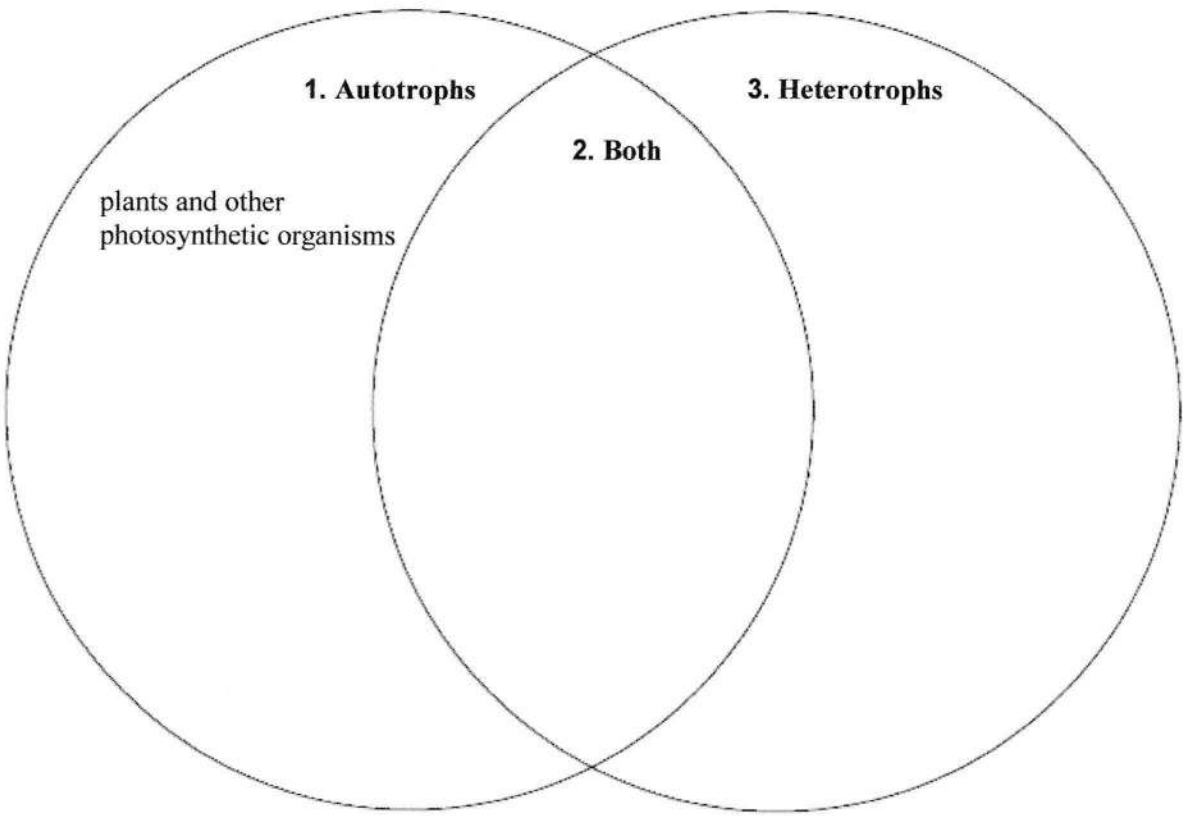
In the space below, draw a diagram that shows an example of a food web in a terrestrial ecosystem. The organisms in the ecosystem include the following: fungi, snakes, rabbits, grass, mountain lions, mice, shrubs, seed-eating birds, trees, hawks, bacteria, and deer. Use arrows to represent the flow of energy in this ecosystem. Also indicate the trophic level of each organism: decomposer, autotroph, or heterotroph. Use your text and other resources as references. Be sure to label all the organisms in the food web, as well as their trophic levels.

Biology Day 1 Worksheet 2

Concept Mapping

CHAPTER 2
Organisms and Energy

Complete the Venn diagram about how organisms get energy. These terms may be used more than once: are described by their energy source, carnivores, consumers, detritivores, form the base of all ecological pyramids, herbivores, make organic molecules from inorganic molecules, part of food chains and food webs, producers, some absorb nutrients from dead organisms, some eat other organisms.



Enrichment

CHAPTER 3
Analyze a Problem: Terrestrial Biomes and Aquatic Ecosystems

A terrestrial biome is a large group of ecosystems that are classified primarily by the plant communities found within them. These plant communities are largely a function of climatic conditions, such as precipitation and temperature. Terrestrial biomes are greatly influenced by latitude, elevation above sea level, and other physiographic features, such as mountain ranges, oceans, and other large bodies of water.

Aquatic ecosystems are classified by water depth, flow, distance from shore, salinity, and latitude. Particular plant and animal species are adapted to differing water salinities and water temperatures. Aquatic ecosystems are further classified by water depth and relationship to the coastline.

Select Suppose you are writing an article about a terrestrial biome or an aquatic ecosystem for a science magazine. The table below lists six examples of terrestrial biomes and aquatic ecosystems. Select one of the biomes or ecosystems to research.

Research Once you have selected a biome or eco-system, research information about it. Concentrate on one location that provides a good example of that biome or ecosystem. Questions to consider while researching include: What are the climatic or water conditions of the biome or ecosystem? What plants and animals characterize the biome or ecosystem? Are there any abiotic or biotic factors, such as pollution, human development, natural disaster, or a key endangered species, that currently affect the location?

Discuss Use your textbook and other reference materials to find information. Discuss your topic and possible answers to your questions with your teacher and classmates.

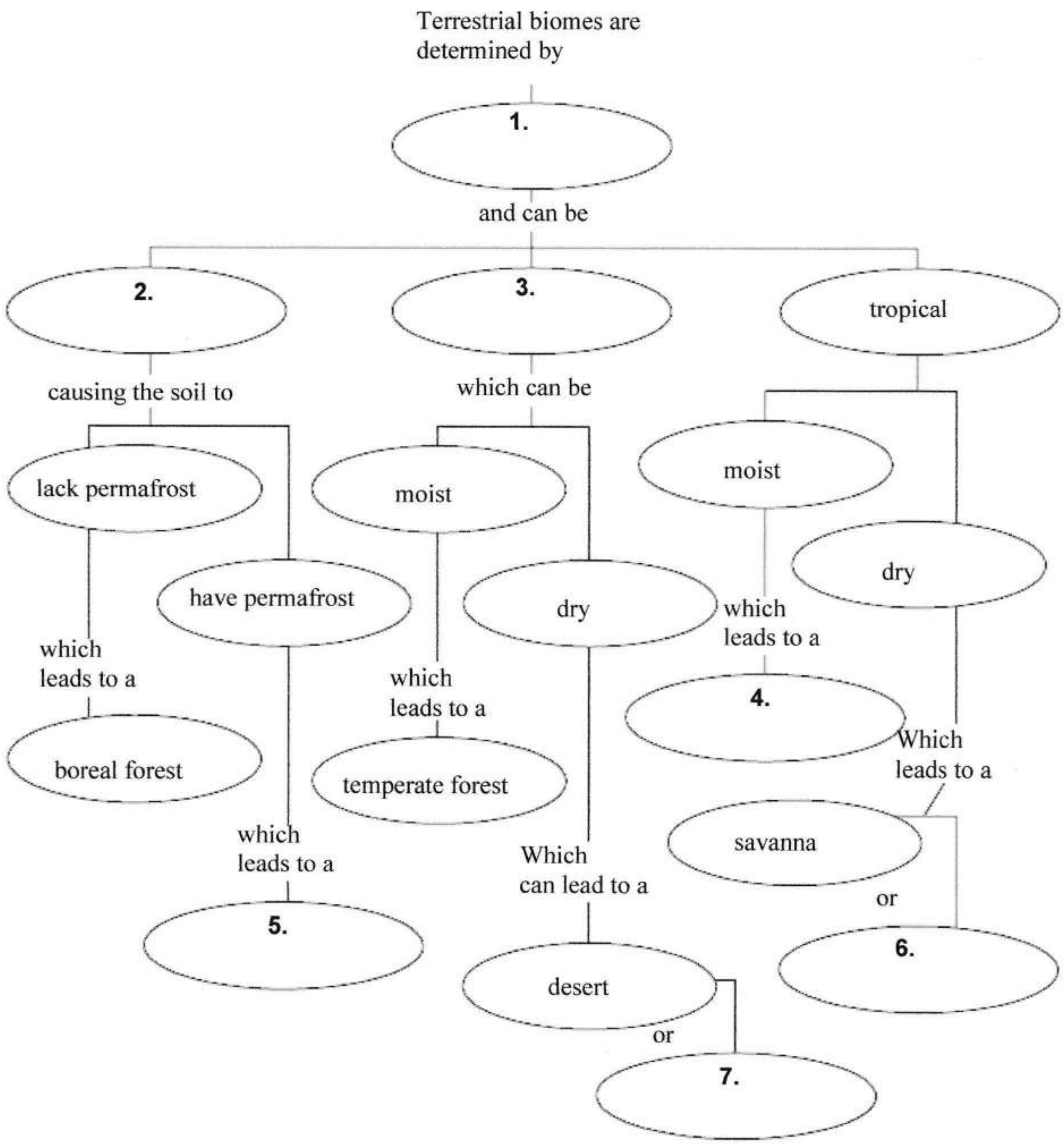
Terrestrial Biome	Examples
Desert	Mojave Desert, United States; Sahara, Africa; Gobi Desert, Asia; Kalahari Desert, Africa
Boreal forest	northern Scandinavia (Sweden and Norway); northern Canada; Alaska; northern Russia
Tropical rain forest	Indonesia; Amazon Basin, Brazil; Central America (Guatemala, Honduras); Papua, New Guinea
Aquatic Ecosystem	**Examples**
Wetland	Everglades National Park, Florida; Mississippi River Delta, Louisiana; Chesapeake Bay area, Virginia, Maryland, and Delaware; mangrove areas on Caribbean Islands
Coral reef	Great Barrier Reef, Australia; South Florida, United States; Fiji, South Pacific; Bahamas, Caribbean Sea
Deep-ocean hydrothermal vent communities	Galápagos Rift, eastern Pacific Ocean; East Pacific Rise, south of Baja California, Mexico; Juan de Fuca Ridge, west of Washington and Oregon

Biology Day 2 Worksheet 2

Concept Mapping

CHAPTER 3
Terrestrial Biomes

Complete the network tree about terrestrial biomes. These terms may be used more than once: climate, cool, desert, grassland, temperate, tropical rain forest, tundra.



Enrichment

CHAPTER 4
Human Population Controls

The size of human populations can vary considerably, depending on natural factors and decisions made by humans. For example, populations might diminish significantly in nations ravaged by war or epidemics. Or they might increase significantly if governments adopt laws that encourage couples to have more children. In some nations, governments might use demographic information to decide which policies it should adopt. In other nations, the growth or decline in populations seems to be largely a chance event to which governments pay little attention.

In this activity, you will advise a national legislature about actions it should take to influence future population patterns. The table below lists population data for six different nations. Choose one nation to study in more detail.

Analyze Begin by using the data provided to calculate the nation's population growth rate. Then draw a graph that shows projected changes in population over the next decade, assuming the growth rate remains the same. Decide whether you think the projected trend is desirable or undesirable.

Recommend Choose any one of the four variables given in the table (number of births, deaths, immi-
grants, or emigrants) to change. Suggest a mechanism—natural or human-made—by which that
change might come about. For example, you might want to study the effects of decreasing the number of births in the nation by one-quarter. Calculate the new birthrate from the new data, and draw a new graph (but on the same axes as the original graph) to see how the change you made alters your original projections for population growth or decline. Find out how altering one variable or another affects short-term and long-term population changes in the nations being studied.

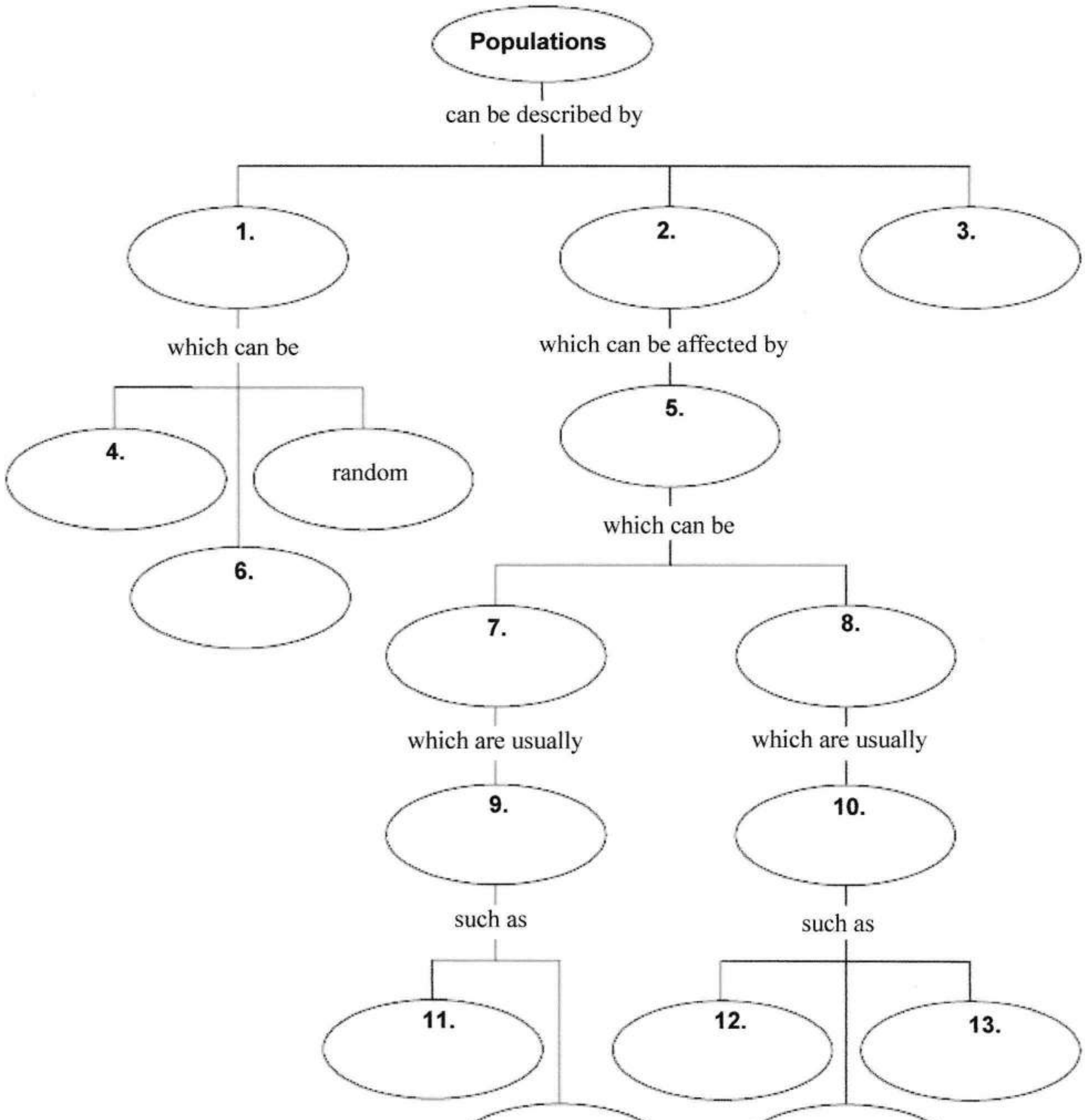
Nation	Population Size in 2006	Population Data for 2007			
		Births	Deaths	Immigrants	Emigrants
A	100,000	4000	1000	50	100
B	100,000	4000	2000	50	50
C	100,000	4000	3000	100	50
D	100,000	4000	4000	250	50
E	100,000	4000	5000	50	300
F	100,000	4000	6000	150	100

Biology Day 3 Worksheet 2

Concept Mapping

CHAPTER 4
Describing Populations

Complete the network tree about populations. These terms may be used more than once: abiotic, biotic, clumped groups, competition, density, density-dependent factors, density-independent factors, dispersion, drought, growth rate, population-limiting factors, predation, and uniform.



Enrichment

CHAPTER 5
Analyze a Problem: Should endangered species be protected?

The federal government has tried to protect the nation's biodiversity in a number of ways. One of those ways is the Endangered Species Act, passed by the U.S. Congress in 1973. The act has two main purposes: (1) to list plant and animal species that are endangered or threatened (likely to be endangered in the foreseeable future), and (2) to protect the habitat in which these species live, with the goal of helping them recover.

The Endangered Species Act has always been the subject of much controversy. Some people feel that humans have to give up too much to protect plant and animal species that are not important. Others argue that humans should do everything they can to maintain biodiversity in the world, including protecting endangered and threatened species.

Prepare Controversies over endangered species almost always involve a specific species: bison, grizzly bear, the masked bobwhite, or Arizona agave, for example. Good arguments can be made for and against protecting the species.

In this activity, choose one of the plant or animal species listed in the table below to study in detail. Decide whether you want to argue *for* or *against* a program for protecting the species you have selected.

Research Make a list of arguments to support your position. Use your textbook or other library resources to find background information. Consider the role of the species in maintaining biodiversity in its ecological niche. Mention the species' role as prey or predator in the food web and how its absence would alter the balance of nature in the area in which it lives.

Write Prepare a one- or two-page statement that summarizes your position about protecting the endangered species.

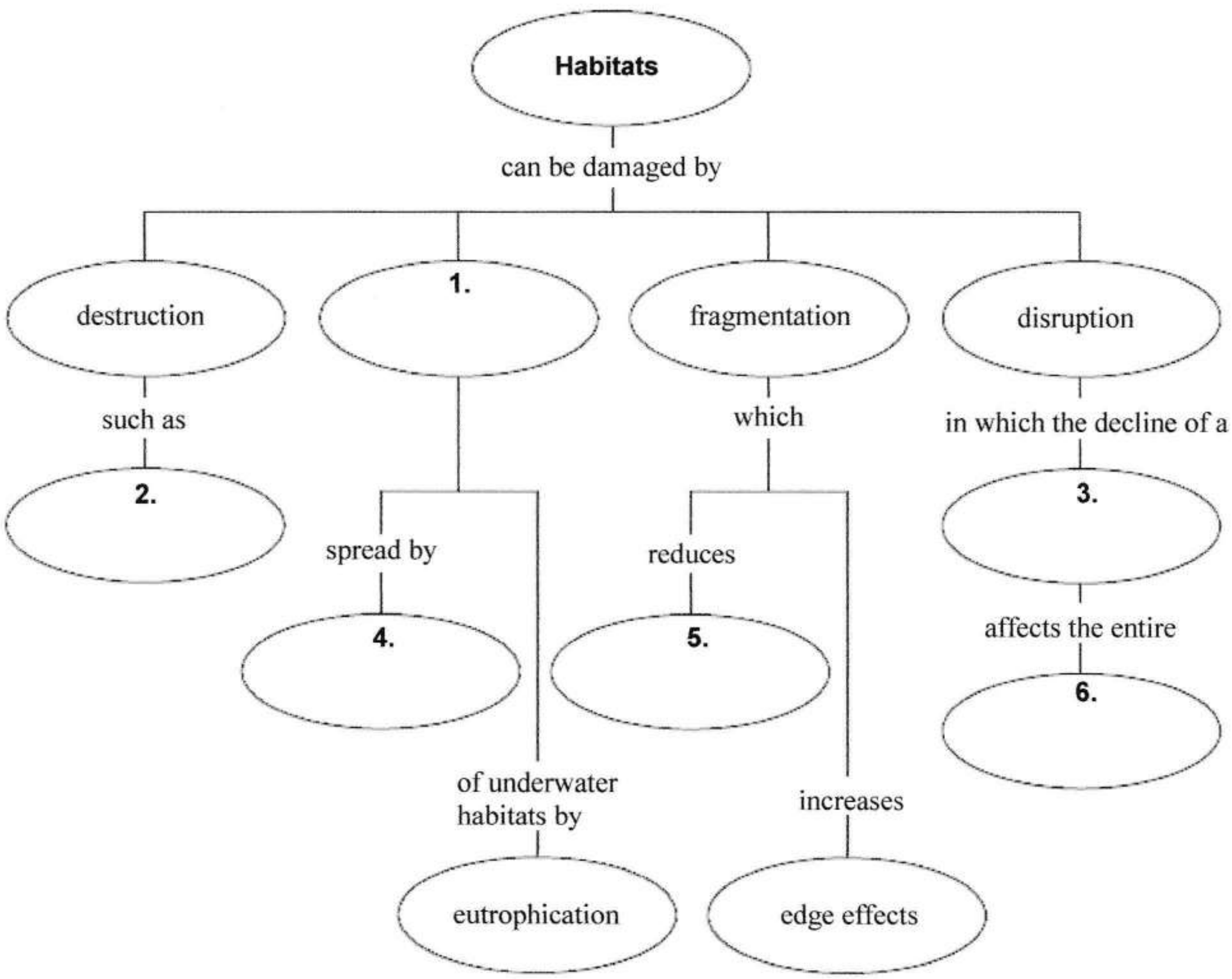
Plants	Animals
Arizona agave *(Agave arizonica)*	grizzly bear *(Ursus arctos horribilis)*
	Florida panther *(Puma concolor coryi)*
Tennessee purple coneflower *(Echinacea tennesseensis)*	humpback whale *(Megaptera novaeangliae)*
	masked bobwhite *(Colinus virginianus ridgwayi)*
San Clemente Island Indian paintbrush *(Castilleja grisea)*	brown pelican *(Pelecanus occidentalis)*
	white abalone *(Haliotis sorenseni)*

Biology Day 4 Worksheet 2

Concept Mapping

CHAPTER 5
Threats to Biodiversity

Complete the network tree about ways that biodiversity can be threatened. These terms may be used more than once: acid precipitation, clearing tropical rain forests, eosystem, genetic diversity, pollution, species.



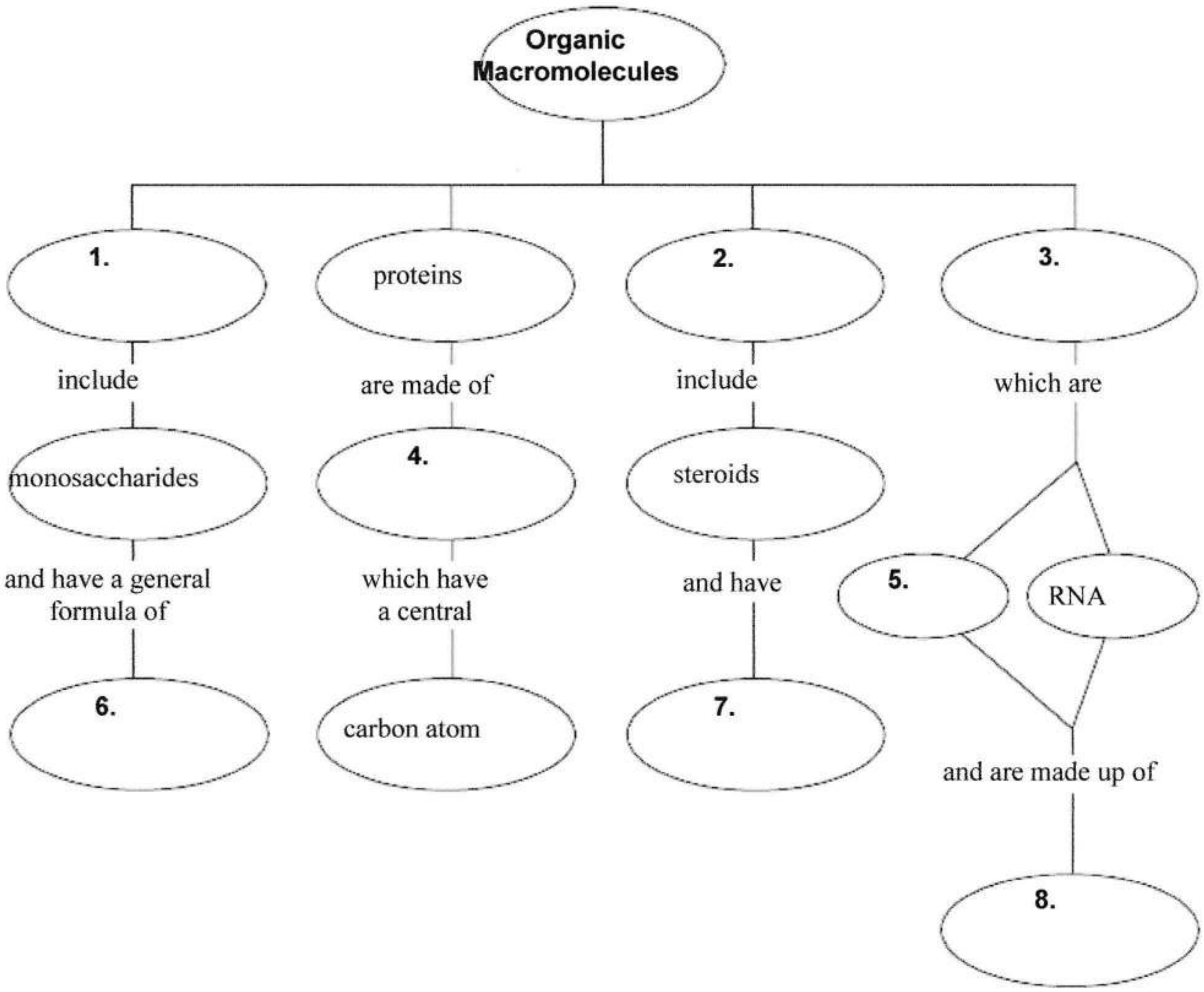
Biology Day 5 Worksheet 1

Concept Mapping

CHAPTER 6

Organic Macromolecules

Complete the network tree about organic macromolecules. These terms may be used more than once: amino acids, carbohydrates, $(CH_2O)_n$, DNA, fatty acid tails, lipids, nucleic acids, nucleotides.



Chemical Bonds

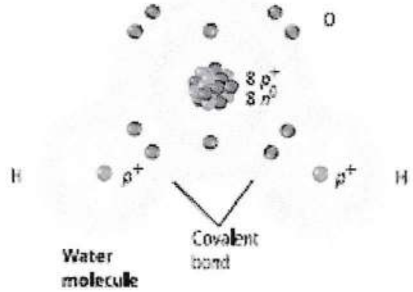
The force that holds substances together is called a chemical bond. Chemical bonding involves electrons. Electrons travel around the nucleus of an atom in energy levels. Each energy level can hold only a certain number of electrons. The first energy level, which is closest to the nucleus, can hold up to two electrons. The second level can hold up to eight electrons.

A partially-filled energy level is not as stable as a full or an empty energy level. Atoms become more stable by losing electrons or attracting electrons from other atoms. This electron activity forms chemical bonds between atoms. The forming of chemical bonds stores energy. The breaking of chemical bonds releases energy for an organism's life processes—growth, development, and reproduction. The two main types of chemical bonds are covalent and ionic.

How do covalent bonds form?

A **covalent bond** forms when atoms share electrons. The figure below shows the covalent bonds between oxygen and hydrogen to form water. Each hydrogen (H) atom has one electron in its outer energy level, and the oxygen (O) atom has six. The outer energy level of oxygen is the second level, so it can hold up to eight electrons. Oxygen has a strong tendency to fill the energy level by sharing electrons from the two nearby hydrogen atoms. Hydrogen also has a strong tendency to share electrons with oxygen to fill its outer energy level. Two covalent bonds form a water molecule.

Most compounds in living things are molecules. A **molecule** is a compound in which the atoms are held together by covalent bonds. Covalent bonds can be single, double, or triple. A single bond shares one pair of electrons. A double bond shares two pairs of electrons. A triple bond shares three pairs of electrons.



Think it Over

4. Apply Look back at the oxygen atom illustrated on the first page of this section. Is the second energy level of the oxygen atom full? Explain.

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Picture This

5. Label the first energy level and second energy level in the oxygen atom. Include in each label the number of electrons required to fill the level.

Biology Day 5 Worksheet 3

How do ionic bonds form?

Recall that atoms do not have an electric charge. Also recall that an atom is most stable when its outer energy level is either empty or full. To become more stable, an atom might give up electrons to empty its outer energy level. Or, the atom might accept electrons to fill the outer energy level. An atom that has given up or gained one or more electrons becomes an **ion** and carries an electric charge.

For example, the outer energy level of sodium (Na) has one electron. Sodium can become more stable if it gives up this electron to empty the energy level. When it gives up this one negative charge, the neutral sodium atom becomes a positively charged sodium ion (Na^+). Chlorine (Cl) needs just one electron to fill its outer energy level. When it accepts an electron from another atom, chlorine becomes a negatively charged ion (Cl^-).

Reading Check

6. Describe what happens to an atom's electric charge if the atom gives up an electron.

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An **ionic bond** is an electrical attraction between two oppositely charged ions. When sodium gives its electron to chlorine, the positively charged sodium ion (Na^+) is attracted to the negatively charged chlorine ion (Cl^-). The ionic bond between them forms the ionic compound sodium chloride (NaCl), or table salt.

Ions in living things help maintain homeostasis as they travel in and out of cells. Ions also help transmit signals that enable you to see, taste, hear, feel, and smell.

Some atoms give up or accept electrons more easily than other atoms. The elements identified as metals in the periodic table tend to give up electrons. The elements identified as nonmetals tend to accept electrons.

van der Waals Forces

Electrons travel around the nucleus randomly. The random movement can cause an unequal distribution of electrons around the molecule. This creates temporary areas of slightly positive and negative charges. Attractions between these positive and negative regions hold molecules together. These attractions between molecules are called **van der Waals forces**. These forces are not as strong as covalent and ionic bonds, but they play a key role in biological processes. For example, attractions between positive and negative regions hold water molecules together. As a result, water can form droplets. Note that van der Waals forces are the attractive forces between water molecules. They are not the forces between the atoms that make up water.

Reading Check

7. Identify the substances that are held together by van der Waals forces. (Circle your answer.)

a. atoms

b. molecules

Biology Day 5 Worksheet 4

chapter 6 Chemistry in Biology

section 2 Chemical Reactions

Before You Read

On the lines below, explain why you think rust forms on metal. Then read the section to learn the role of chemical reactions in living things.

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MAIN Idea

Chemical reactions allow living things to grow, develop, reproduce, and adapt.

What You'll Learn

- the parts of a chemical reaction
- how energy changes relate to chemical reactions
- the importance of enzymes in organisms

Read to Learn

Reactants and Products

Chemical reactions occur inside your body all the time. You digest food. Your muscles grow. Your cuts heal. These functions and many others result from chemical reactions.

A **chemical reaction** is the process by which atoms or groups of atoms in substances are reorganized into different substances. Chemical bonds are broken and formed during chemical reactions. For example, rust is a compound called iron oxide. It forms when oxygen in the air reacts with iron.

What was once silver and shiny becomes dull and orange-brown. Other clues that a chemical reaction has taken place include the production of heat or light, and formation of gas, liquid, or solid.

Study Coach

Create a Quiz After you read this section, create a five-question quiz from what you have learned. Then, exchange quizzes with another student. After taking the quizzes, review your answers together.

How are chemical equations written?

Scientists express chemical reactions as equations. On the left side of the equation are the starting substances, or **reactants**. On the right side of the equation are the substances formed during the reaction, or the **products**. An arrow is between these two parts of the equation. You can read the arrow as "yield" or "react to form." The general form of a chemical equation is shown below.

$$\text{Reactants} \longrightarrow \text{Products}$$

Picture This

1. **Describe** how this general chemical equation would be expressed in words.

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Why must chemical equations balance?

The following chemical equation describes the reaction between hydrogen (H) and oxygen (O) to form water (H_2O).

$$2H_2 + O_2 \longrightarrow 2H_2O$$

Picture This

2. Label the subscripts and the coefficients in this equation after you read the discussion on this page.

Matter cannot be created or destroyed in chemical reactions. This is the principle of conservation of mass. Therefore, mass must balance in all chemical equations. This means that the number of atoms of each element on the reactant side must equal the number of atoms of the same element on the product side. In our example, the number of H atoms on the left side must equal the number of H atoms on the right side. The same must be true of O atoms.

The larger 2 to the left of the element H is called a coefficient. Coefficients are used to balance chemical equations. If no coefficient or subscript appears with an element, both are assumed to be 1.

To see that the above equation is balanced, multiply the coefficient by the subscript for each element. Then add up the total number of atoms of each element. Follow along in the equation above as you read the analysis below.

Reactant side:

2 (coefficient of H) × 2 (subscript of H) = 4 H atoms
1 (coefficient of O) × 2 (subscript of O) = 2 O atoms

Product side:

2 (coefficient of H) × 2 (subscript of H) = 4 H atoms
2 (coefficient of O) × 1 (subscript of O) = 2 O atoms

The equation has the same number of H atoms on both sides. It also has the same number of O atoms on both sides. No mass has been gained or lost. The equation balances.

FOLDABLES

Take Notes Make a three-tab Foldable from a sheet of notebook paper. As you read, record what you learn about reactants, products, and the energy required to start a chemical reaction.

Energy of Reactions

Energy is required to start a chemical reaction. The minimum amount of energy needed for reactants to form products in a chemical reaction is called the **activation energy**. For example, a candle will not burn until you light the wick. The flame from a match provides the activation energy for the candle wick to react with oxygen in the air. Some reactions need higher activation energy than others.