Glencoe Science

Chapter Resources

The Nonliving Environment

Includes:

Reproducible Student Pages

ASSESSMENT

- ✔ Chapter Tests
- ✔ Chapter Review

HANDS-ON ACTIVITIES

- ✔ Lab Worksheets for each Student Edition Activity
- ✔ Laboratory Activities
- ✔ Foldables–Reading and Study Skills activity sheet

MEETING INDIVIDUAL NEEDS

- ✔ Directed Reading for Content Mastery
- ✔ Directed Reading for Content Mastery in Spanish
- ✔ Reinforcement
- ✔ Enrichment
- ✔ Note-taking Worksheets

TRANSPARENCY ACTIVITIES

- ✔ Section Focus Transparency Activities
- ✔ Teaching Transparency Activity
- ✔ Assessment Transparency Activity

Teacher Support and Planning

- ✔ Content Outline for Teaching
- ✔ Spanish Resources
- ✔ Teacher Guide and Answers

Glencoe

New York, New York Columbus, Ohio Chicago, Illinois Peoria, Illinois Woodland Hills, California

Glencoe Science

Photo Credits

Section Focus Transparency 1: Brian Brake/Photo Researchers;
Section Focus Transparency 2: Charles McRae/Visuals Unlimited;
Section Focus Transparency 3: Doug Martin

Glencoe

The McGraw-Hill Companies

Send all inquiries to:
Glencoe/McGraw-Hill
8787 Orion Place
Columbus, OH 43240-4027

ISBN 0-07-867115-9

Printed in the United States of America.

1 2 3 4 5 6 7 8 9 10 024 09 08 07 06 05 04

Reproducible Student Pages

Reproducible Student Pages

Hands-On Activities

TRY AT HOME Mini LAB

Determining Soil Makeup

Procedure

1. Collect 2 cups of **soil**. Remove large pieces of debris and break up clods.
2. Put the soil in a **quart jar or similar container that has a lid**.
3. Fill the container with **water** and add 1 teaspoon of **dishwashing liquid**.
4. Put the lid on tightly and shake the container.
5. After 1 min, measure the depth of sand that settled on the bottom and record it in the table below.
6. After 2 h, measure the depth of silt that settles on top of the sand and record it in the table below.
7. After 24 h, measure the depth of the layer between the silt and the floating organic matter and record it in the table below.

Data and Observations

	After 1 min	After 2 h	After 24 h
Soil layer			

Analysis

1. Clay particles are so small that they can remain suspended in water. Where is the clay in your sample?

2. Is sand, silt, or clay the greatest part of your soil sample?

Mini LAB

Comparing Fertilizers

Procedure

1. Examine the three numbers (e.g., 5-10-5) on the **labels of three brands of houseplant fertilizer**. The numbers indicate the percentages of nitrogen, phosphorus, and potassium, respectively, that the product contains.
2. Compare the prices of the three brands of fertilizer and record your findings in the table below.
3. Compare the amount of each brand needed to fertilize a typical houseplant and record your findings in the table below.

Data and Observations

	Percentage of Nitrogen	Price	Amount Needed for 1 Houseplant
Brand 1			
Brand 2			
Brand 3			

Analysis

1. **Identify** the brand with the highest percentage of nitrogen.

2. **Calculate** which brand is the most expensive source of nitrogen. The least expensive.

Humus Farm

Lab Preview

Directions: *Answer these questions before you begin the Lab.*

1. What do the four safety symbols for this lab tell you?

2. Once you have put your jar in a sunny place, how often should you add water? How much water should be added each time?

Besides abiotic factors, such as rock particles and minerals, soil also contains biotic factors, including bacteria, molds, fungi, worms, insects, and decayed organisms. Crumbly, dark brown soil contains a high percentage of humus that is formed primarily from the decayed remains of plants, animals, and animal droppings. In this lab, you will cultivate your own humus.

Real-World Question

How does humus form?

Materials

widemouthed jar
soil
grass clippings or green leaves
water
marker
metric ruler
graduated cylinder

Goals

- **Observe** the formation of humus.
- **Observe** biotic factors in the soil.
- **Infer** how humus forms naturally.

Safety Precautions

Wash your hands thoroughly after handling soil, grass clippings, or leaves.

Procedure

1. Place 4 cm of soil in the jar. Pour 30 mL of water into the jar to moisten the soil.
2. Place 2 cm of grass clippings or green leaves on top of the soil in the jar.
3. Use a marker to mark the height of the grass clippings or green leaves in the jar.
4. Put the jar in a sunny place. Every other day, add 30 mL of water to it.
5. In the space below, write a prediction of what you think will happen in your jar.
6. **Observe** your jar every other day for four weeks. Record your observations in the data table on the next page.

LAB (continued)

Data and Observations

Date	Observations

Conclude and Apply

1. **Describe** what happened during your investigation.

2. **Infer** how molds and bacteria help the process of humus formation.

3. **Infer** how humus forms on forest floors or in grasslands.

Communicating Your Data

Compare your humus farm with those of your classmates. With several classmates, write a recipe for creating the richest humus. Ask your teacher to post your recipe in the classroom. **For more help, refer to the Science Skill Handbook.**

Where does the mass of a plant come from?

Lab Preview

Directions: *Answer these questions before you begin the Lab.*

1. What safety precautions should you take when conducting this experiment?

2. How long should it take for the radish plants to develop four to six true leaves?

An enormous oak tree starts out as a tiny acorn. The acorn sprouts in dark, moist soil. Roots grow down through the soil. Its stem and leaves grow up toward the light and air. Year after year, the tree grows taller, its trunk grows thicker, and its roots grow deeper. It becomes a towering oak that produces thousands of acorns of its own. An oak tree has much more mass than an acorn. Where does this mass come from? The soil? The air? In this lab, you'll find out by conducting an experiment with radish plants.

Real-World Question

Does all of the matter in a radish plant come from the soil?

Materials

8-oz plastic or paper cup
potting soil to fill cup
scale or balance
radish seeds (4)
water
paper towels

Goals

- **Measure** the mass of soil before and after radish plants have been grown in it.
- **Measure** the mass of radish plants grown in the soil.
- **Analyze** the data to determine whether the mass gained by the plants equals the mass lost by the soil.

Safety Precautions

Procedure

1. Fill the cup with dry soil.

2. Find the mass of the cup of soil and record this value in the data table on the next page.

3. Moisten the soil in the cup. Plant four radish seeds 2 cm deep in the soil. Space the seeds an equal distance apart. Wash your hands.

4. Add water to keep the soil barely moist as the seeds sprout and grow.

5. When the plants have developed four to six true leaves, usually after two to three weeks, carefully remove the plants from the soil. Gently brush the soil off the roots. Make sure all the soil remains in the cup.

6. Spread the plants out on a paper towel. Place the plants and the cup of soil in a warm area to dry out.

7. When the plants are dry, measure their mass and record this value in the data table. Write this number with a plus sign in the Gain or Loss column.

8. When the soil is dry, find the mass of the cup of soil. Record this value in your data table. Subtract the End mass from the Start mass and record this number with a minus sign in the Gain or Loss column.

LAB (continued)

Data and Observations

Mass of Soil and Radish Plants

	Start	End	Gain (+) or Loss (−)
Mass of dry soil and cup			
Mass of dried radish plants			

Analyze Your Data

1. **Calculate** how much mass was gained or lost by the soil. By the radish plants.

2. Did the mass of the plants come completely from the soil? How do you know?

Conclude and Apply

1. In the early 1600s, a Belgian scientist named J.B. van Helmont conducted this experiment with a willow tree. What is the advantage of using radishes instead of a tree?

2. **Predict** where all of the mass gained by the plants came from.

Communicating Your Data

Compare your conclusions with those of other students in your class. **For more help, refer to the Science Skill Handbook.**

LAB 1 Laboratory Activity

The Rain Shadow Effect

Interstate Highway 80 runs from San Francisco on the Pacific Ocean eastward across the Sierra Nevada mountain range and into Nevada, as shown by the map in Figure 2 at the back of this activity. The Sierra Nevada range extends north and south about 640 kilometers through eastern California.

When warm, moist air from the Pacific Ocean moves in over the western coast of the United States, it moves eastward and rises as it moves over mountain ranges. This rising causes the water vapor in the air to cool and condense to form clouds. These clouds serve as a source of precipitation in the form or rain or snow. The majority of this precipitation will fall on only one side of the mountain range. The opposite, dryer side of the mountain range is said to be in the "rain shadow" of the mountains. In this activity, you will analyze weather data to determine the effect of mountain ranges on precipitation patterns.

Strategy

You will plot elevation and precipitation data for various locations along Interstate Highway 80 on a graph.

You will infer the effect of a mountain range on the amount of precipitation received in different locations.

Materials

colored pencils

Procedure

1. Study Table 1 in the Data and Observations section and the map at the end of this activity. Table 1 lists data from eleven cities or towns along Interstate Highway 80. They are referred to as reporting stations because they are places where the National Oceanographic and Atmospheric Administration (NOAA) collects data on weather conditions, including precipitation.
2. Use the data in the table to plot a graph of the elevation of each reporting station along the highway. The grid for your graph is provided in Figure 1 in the Data and Observations section. Mark the elevation of each station above its location with a dot. Then connect the dots with a line. The resulting graph will give you a rough idea of the shape of the land as you travel along Highway 80.
3. Refer back to Table 1 and use the precipitation ranges in Table 2 to mark off regions of average precipitation on the *x*-axis of your graph. (Note: There may be more than one station contained within a particular region, or range of precipitation, and changes from one region, or range of precipitation, to another may occur in the areas between stations.) Using your marks as a guide, shade the area between your graph line and the *x*-axis with the appropriate color from Table 2 for each region, or range of precipitation. Note: The resulting graph will look something like a rainbow under your graph line. Notice that each color represents a different range of precipitation.

Laboratory Activity 1 (continued)

Data and Observations

Table 1

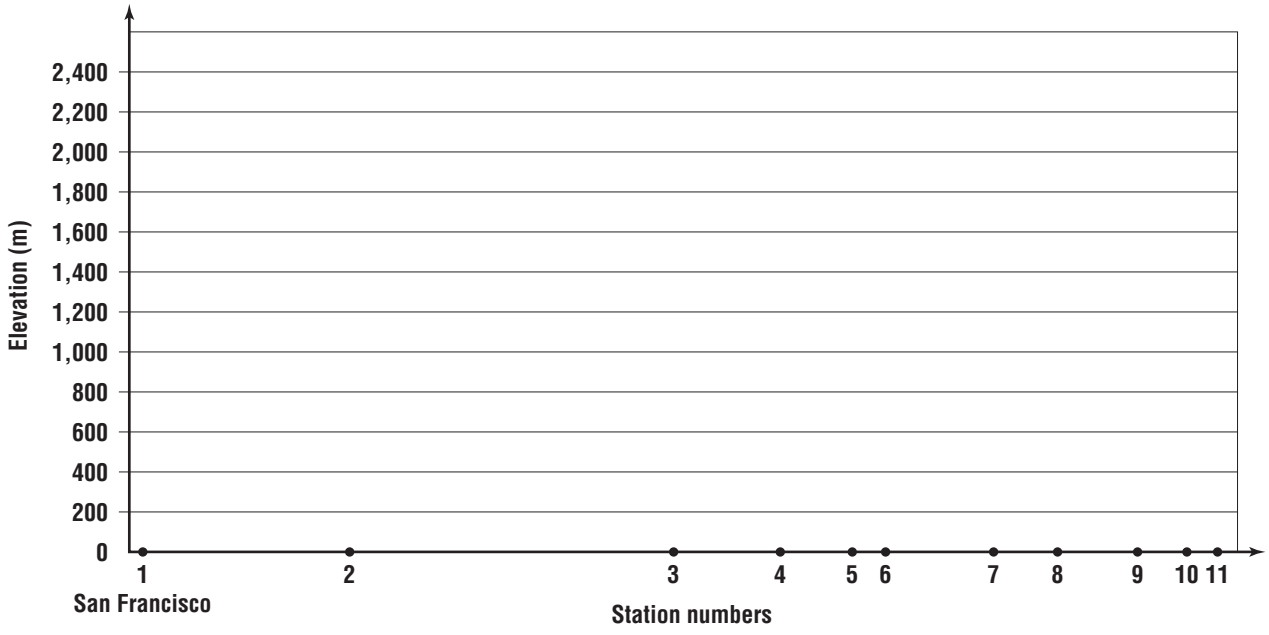
Reporting Station	Elevation	Average Annual Precipitation (cm)
1 San Francisco, CA	5	61
2 Vacaville, CA	34	64
3 Auburn, CA	394	88
4 Colfax, CA	732	123
5 Baxter, CA	1129	142
6 Blue Canyon, CA	1449	174
7 Soda Springs, CA	2099	163
8 Truckee, CA	1799	83
9 Verdi, NV	1488	41
10 Reno, NV	1344	19
11 Sparks, NV	1328	21

Table 2

Amount of Precipitation	Color
0 to 25 cm	Red
26 to 75 cm	Orange
76 to 125 cm	Blue
Over 126 cm	Green

Laboratory Activity 1 (continued)

Figure 1



Questions and Conclusions

1. Which side of the Sierra Nevada Mountains receives the greatest amount of precipitation? Why?

2. Why is there more rain or snow at Baxter than at Auburn?

3. Which stations receive the greatest amounts of precipitation? Why?

4. The elevation of Reno, Nevada, is higher than the elevation of Baxter, California. Why does Reno receive less precipitation than Baxter does?

5. On which side of the Sierra Nevada Mountains would you expect to find environments that support a greater diversity and number of organisms? Why?

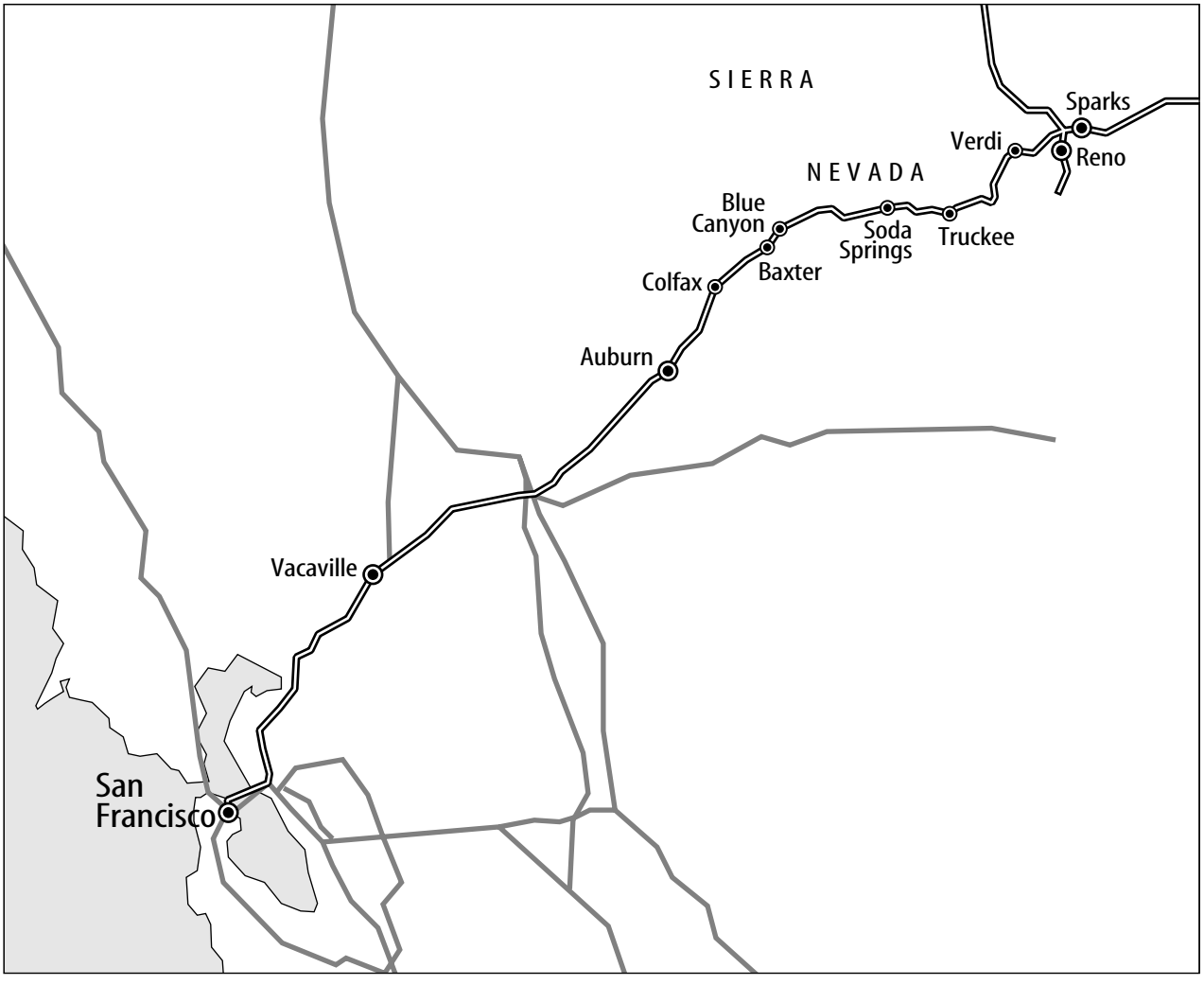
Laboratory Activity 1 (continued)

Strategy Check

_____ Can you plot elevation and precipitation data of locations along Interstate Highway 80 on a graph?

_____ Can you infer the effect of a mountain range on the amount of precipitation received in different locations?

Figure 2



LAB 2 Laboratory Activity

Carbon Dioxide and Earth's Temperatures

Since the Industrial Revolution in the 1800s, humans have burned greater and greater amounts of fossil fuels in order to produce more energy. As the burning of fossil fuels increases, so does the amount of carbon dioxide released into the atmosphere. Historical data from ice cores and modern data from the Mauna Loa Observatory in Hawaii show that carbon dioxide levels in the atmosphere have increased 30 percent since 1860. Growing evidence suggests that increases in atmospheric carbon dioxide may contribute to an increase in average temperatures on Earth. In this activity, you will examine the effects of an increased level of carbon dioxide, produced by fizzing antacid tablets, on air temperature.

Strategy

You will measure the air temperatures in two air samples containing different amounts of carbon dioxide.

You will graph the air-temperature data and compare the graphs.

You will infer how an increased level of carbon dioxide could affect temperatures in Earth's atmosphere.

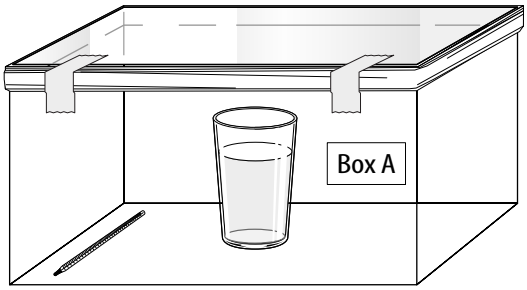
Materials

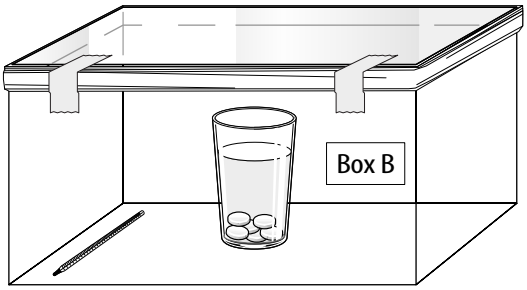
graduated cylinder or metric measuring cup
2 clear-plastic cups
water
2 clear-plastic boxes with lids
masking tape
marking pen
2 thermometers
6 fizzing antacid tablets
sunlight or bright lamp
clock with second hand or timer
2 different colors of pencils or pens

Procedure

1. Using a graduated cylinder, measure and pour 100 mL of water into each of the two plastic cups.
2. Set one cup in the center of each plastic box.
3. Use masking tape and a marking pen to label one of the boxes *A* and the other *B*.
4. Place one thermometer in each of the boxes. Put the lids on the boxes. Check to make sure you can read the thermometers when looking into the boxes through the lids. If necessary, reposition the thermometers. Be sure the thermometers are located in the same positions in both boxes.

Laboratory Activity 2 (continued)





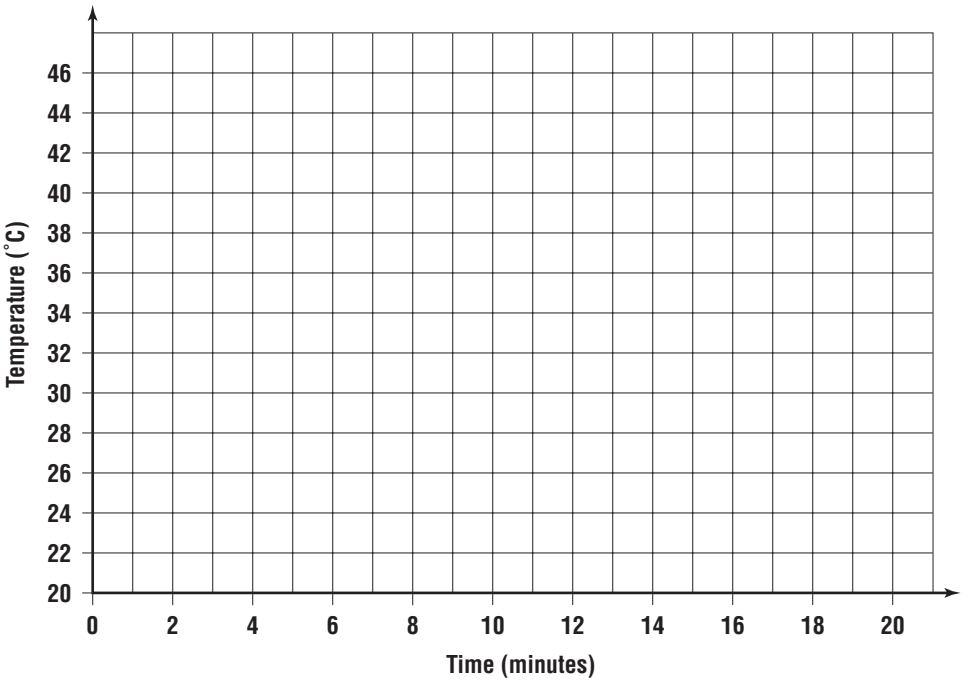
5. Remove the lids from both boxes.
6. Place the lid on Box A and seal it with tape.
7. Add six antacid tablets to the water in the plastic cup in Box B. Immediately place the lid on the box and seal the lid to the box with masking tape. Observe what happens in the cup.
8. Being careful not to disturb the contents of the boxes, place both boxes, side by side, in an area where they will receive bright sunlight. If that is not possible, place both boxes the same distance from a single, bright light source.
9. Once the boxes are in place, begin taking temperature readings. Measure the temperatures in both boxes every minute for 20 minutes. Record the temperatures in the table in the Data and Observations section.
10. After you have collected your data, plot your data from Box A on the graph in the Data and Observations section. Then plot your data from Box B on the same graph with a different color of pencil or pen.

Laboratory Activity 2 (continued)

Data and Observations

Time (min)	Temperature in Box A (°C)	Temperature in Box B (°C)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Laboratory Activity 2 (continued)



Questions and Conclusions

1. What evidence did you have that carbon dioxide was being released into the air in one of the boxes?

2. Was there any difference in the graphs of the air temperature in the two boxes? If so, describe it.

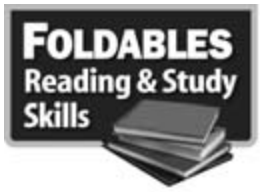
3. What can you infer about how increased levels of carbon dioxide might affect average temperatures in Earth's atmosphere?

Strategy Check

_____ Can you measure the air temperatures in two air samples containing different amounts of carbon dioxide?

_____ Can you graph the air-temperature data and compare the graphs?

_____ Can you infer how an increased level of carbon dioxide could affect temperatures in Earth's atmosphere?



The Nonliving Environment

Directions: *Use this page to label your Foldable at the beginning of the chapter.*

Nonliving

Water

Soil

Wind

Temperature

Elevation

as this gets higher, air temperatures are cooler

is created when portions of Earth's surface receive more heat energy from the Sun than other portions

limits the growth of organisms if it is too hot or too cold

made of many parts and supports plant growth

required for respiration, digestion, and photosynthesis in organisms

Meeting Individual Needs

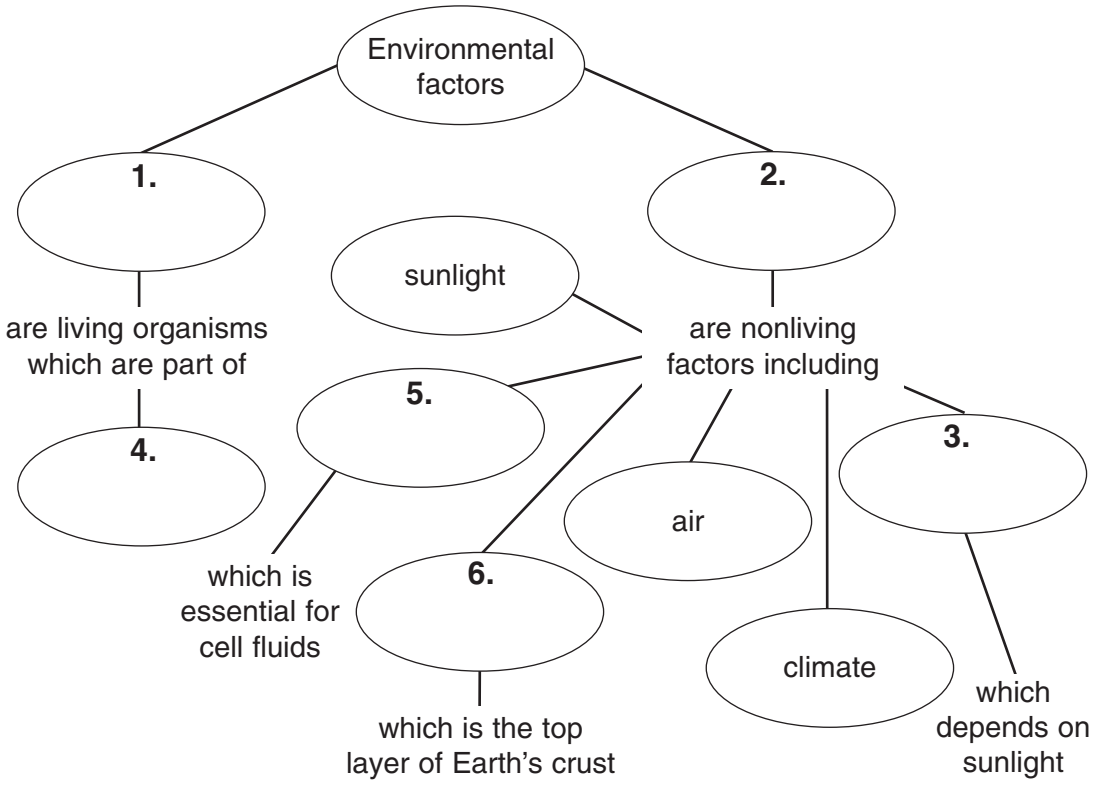
Directed Reading for Content Mastery

Overview
The Nonliving Environment

Directions: *Complete the concept map using the terms in the list below.*

temperature **soil** **water**

food chains **biotic factors** **abiotic factors**



Directions: *Answer the following questions on the lines provided.*

7. What is the name of the process that involves water vapor in the atmosphere becoming liquid water?

_____

8. What are the two methods producers use to make their own energy-rich molecules?

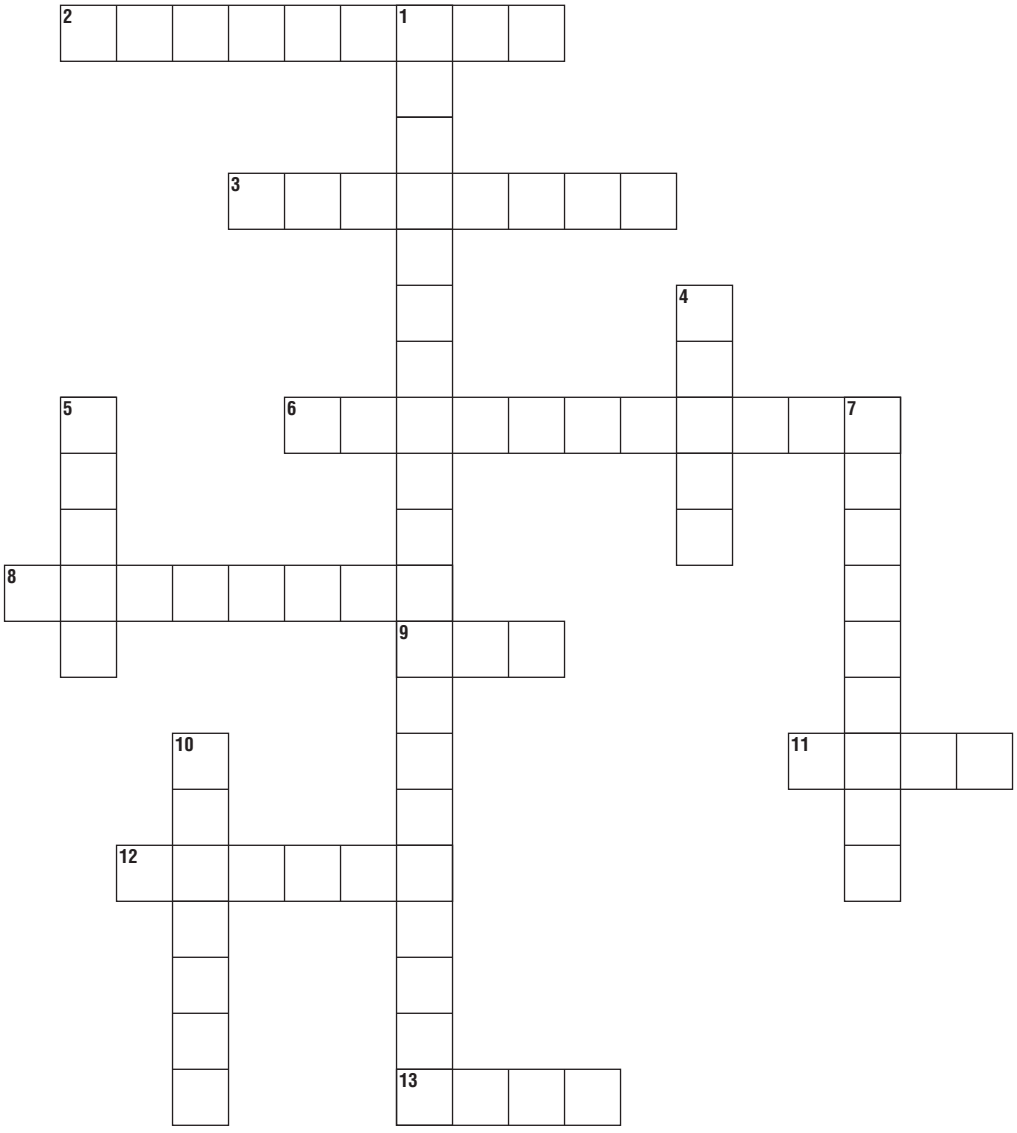
_____

_____

Directed Reading for Content Mastery

Section 1 ▪ Abiotic Factors

Directions: *Use the clues below to complete the crossword puzzle.*



Across

2. Organisms that use photosynthesis
3. Location on Earth relative to equator; helps determine the amount of sunlight an area receives
6. Depends on sunlight and altitude
8. Energy source for most life on Earth
9. Composed of about 78% nitrogen
11. Air currents caused by temperature differences
12. Term that means "living"
13. Topmost layer of Earth's crust

Down

1. Made up of biotic and abiotic features
4. The major ingredient of the fluid inside cells
5. Decaying organic matter in soil
7. As this gets higher, trees get shorter, and the atmosphere gets thinner
10. Average weather over time

Name Date Class

Directed Reading for Content Mastery

Section 2 ▪ Cycles in Nature
Section 3 ▪ Energy Flow

Directions: *Unscramble the terms in italics to complete the sentences below. Write the terms on the lines provided.*

_____ **1.** Cool temperatures cause *ndceotinsaon* of water vapor.

_____ **2.** Photosynthesis uses carbon dioxide, water, and sunlight to make *grasu* molecules.

_____ **3.** Nitrogen fixation is performed by *cerbatia*.

_____ **4.** Energy is stored in fats, *bcaryhodtarse*, and proteins in the body.

_____ **5.** Production of food from chemicals is called *escmhoeshntiys*.

_____ **6.** In a food chain, herbivores eat *desrpocur*.

_____ **7.** Energy decreases moving from level to level in an energy *ymiprad*.

Directions: *Identify each set of steps as the* **nitrogen cycle, the carbon cycle,** *or* **the water cycle.**

8. condensation, precipitation, surface water evaporation, transpiration

_____

9. a gas from the atmosphere is changed into usable compounds by lightning or by bacteria, decomposing organic matter and animal waste release those compounds into the soil, plants use the compounds to build cells

_____

10. a gas given off by plants is used by people and animals, a different gas exhaled by people and animals is used by plants

_____

Directions: *Fill in the blanks with the correct terms from the text.*

11. While most organisms get energy from sunlight, bacteria that use chemosynthesis to produce food get energy from _____.

12. A _____ is made up of food chain(s) and shows all the possible feeding relationships in a community.

13. Carnivores and _____ eat other consumers in a food chain.

14. The process of liquid water changing into water vapor and entering the atmosphere is called _____.

Meeting Individual Needs

Name Date Class

Directed Reading for Content Mastery

Key Terms
The Nonliving Environment

Directions: *Circle the terms in the puzzle. Then write the terms in the blanks at the left of their definitions.*

C H E M O S Y N T H E S I S C
O H W F O O D W E B A M B E R
N E A P P R O T O N Z H U V I
D P T I H M B S L N C Y B A T
E N E R G Y P Y R A M I D P I
N C R O P N T I M B E R L O C
S S C L I M A T E I M O E R A
A O Y H S D R D N O I G C A L
T R C T T O I S C T S E H T T
I T L O I B I O T I C N A I I
O C E M C A T I M C R Y M O V
N E U U L A L L G O L I B N I
G L N Q E N E U T R O E E H T
G E I G E R C O U N T E R P Y

_____ **1.** Nonliving environmental features are _____ .

_____ **2.** mixture of mineral and rock particles, remains of organisms, water, and air

_____ **3.** process in which liquid water changes into water vapor

_____ **4.** shows the comparative amount of energy available at each feeding level in an ecosystem

_____ **5.** average weather conditions over time

_____ **6.** shows how water moves through the environment

_____ **7.** process in which water vapor changes into liquid water

_____ **8.** Living environmental features are _____ .

_____ **9.** model of possible feeding or energy transfer, relationships among multiple organisms in a community

_____ **10.** production of energy-rich nutrient molecules from chemicals

Meeting Individual Needs

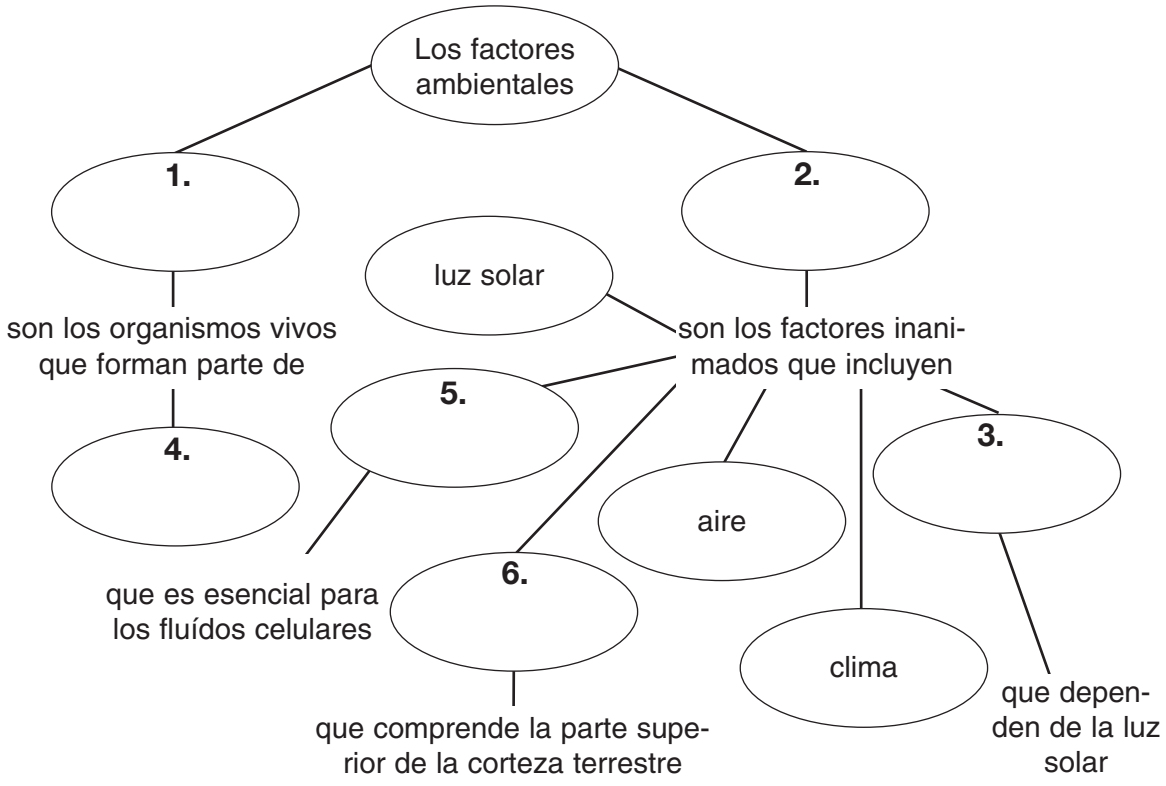
Lectura dirigida para Dominio del contenido

Sinopsis
El ambiente inanimado

Instrucciones: *Completa los mapas de conceptos usando los siguientes términos.*

temperatura **tierra** **agua**

cadenas alimenticias **factores bióticos** **factores abióticos**



Instrucciones: *Responde las siguientes preguntas.*

7. ¿Cómo se llama el proceso que involucra el vapor de agua en la atmósfera cuando se convierte en agua líquida?

_____

8. Menciona dos métodos que usan los productores para elaborar sus propias moléculas ricas en energía.

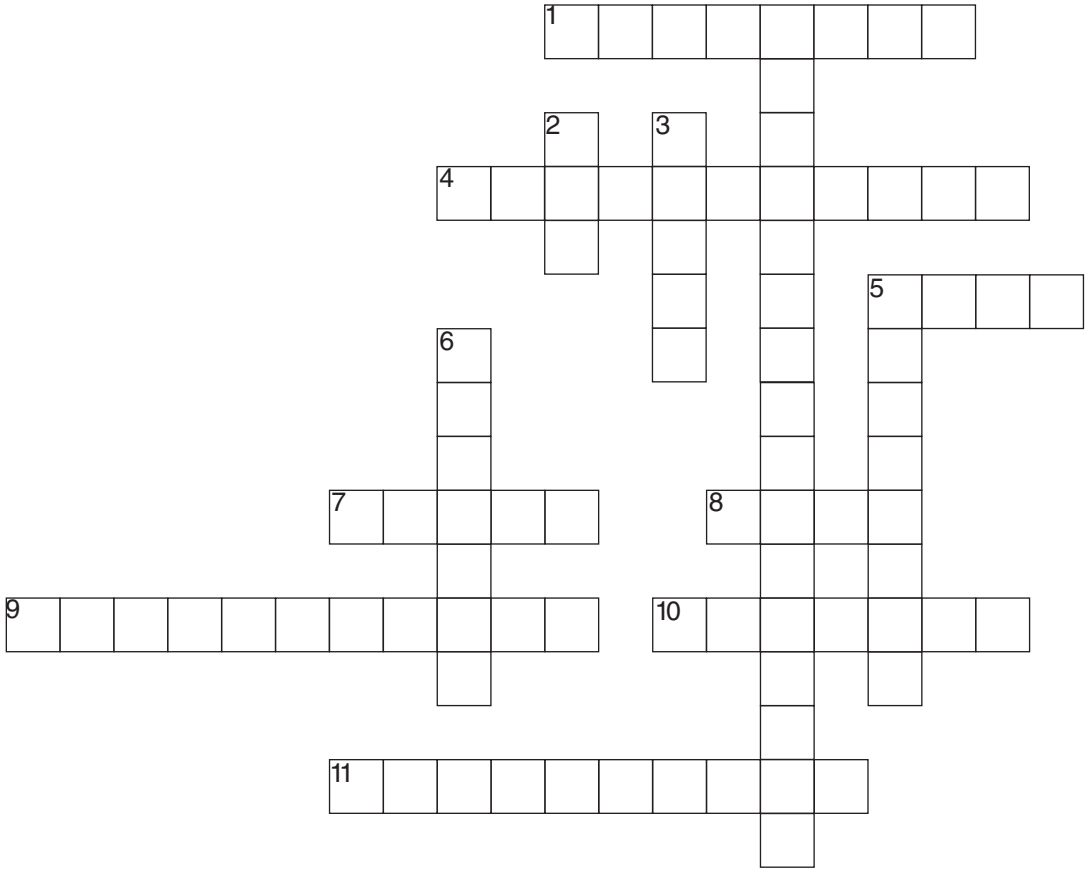
_____

Satisface las necesidades individuales

Lectura dirigida para Dominio del contenido

Sección 1 ▪ Los factores abióticos

Instrucciones: *Usa las claves para completar el siguiente crucigrama.*



Horizontales

1. Capa superior de la corteza terrestre
5. Organismos que llevan a cabo la fotosíntesis
7. Ingrediente principal del fluido de las células
8. Tiempo promedio durante un número de años
9. Un 78% es nitrógeno
10. Depende de la luz solar y la temperatura
11. Lugar en la Tierra relativo al ecuador; ayuda a determinar la cantidad de luz que un área recibe
12. Corrientes de aire causadas por diferencias en temperatura

Verticales

2. Organismos vivos del ambiente
3. Fuente de energía para casi toda la vida de la Tierra
4. Materia orgánica en descomposición que se encuentra en el suelo
6. A medida que aumenta, los árboles se hacen más cortos y la atmósfera se hace más liviana
7. Compuesto por factores bióticos y abióticos

Lectura dirigida para Dominio del contenido

Sección 2 ▪ Los ciclos en la naturaleza
Sección 3 ▪ El flujo de la energía

Instrucciones: *Descifra los términos y completa las oraciones. Escribe cada término en los espacios de la izquierda.*

_____ **1.** Temperaturas frías causan la *soncadenóni* del vapor de agua.

_____ **2.** La fotosíntesis usa dióxido de carbono, agua y luz solar para hacer moléculas de *zacrua.*

_____ **3.** La nitrificación la llevan a cabo *cerbatia.*

_____ **4.** La energía se almacena en el cuerpo como grasas, *harcobdrtaios* y proteínas.

_____ **5.** La producción de alimento a partir de químicos se llama *mceqiusíntoi.*

_____ **6.** En una cadena alimenticia, los herbívoros comen *pucderotres.*

_____ **7.** En una pirámide *laitiramne* la energía disminuye desde los niveles bajos hasta los más altos

Instrucciones: *Identifica cada conjunto de pasos como un paso en el* **ciclo del nitrógeno**, *el* **ciclo del carbono** *o el* **ciclo del agua.**

8. condensación, precipitación, evaporación del agua superficial, transpiración

9. los relámpagos o las bacterias cambian un gas de la atmósfera a compuestos útiles, la materia orgánica en descomposición y los desechos de los animales liberan compuestos al suelo, las plantas usan los compuestos para construir sus células

_____

10. las personas y los animales usan un gas producido por las plantas, las plantas usan otro gas producido por las personas y los animales

_____

Instrucciones: *Usa los términos correctos del texto para llenar los espacios en blanco.*

11. Muchos organismos obtienen energía de la luz solar, pero las bacterias que usan la quimiosíntesis para producir alimento obtienen la energía de _____.

12. Un(a) _____ está formado(a) de una (varias) cadena(s) alimenticia(s) y muestra todas las relaciones alimentarias posibles en una comunidad.

13. En una cadena alimenticia, los carnívoros y los _____ consumen a otros consumidores.

Satisface las necesidades individuales

Lectura dirigida para Dominio del contenido

Términos claves
El ambiente inanimado

Instrucciones: *Haz un círculo alrededor de 10 términos en la sopa de letras y luego escribe los términos en los espacios en blanco, al lado de sus respectivas definiciones.*

B	O	S	N	T	U	A	S	G	T	A	W	R	W	A	N	I	S
A	Q	U	I	M	I	O	S	I	N	T	E	S	I	S	Y	J	N
C	D	E	K	O	M	M	E	S	U	O	V	Y	W	H	I	S	V
A	Q	L	N	C	O	N	D	E	N	S	A	C	I	O	N	F	H
N	K	O	N	B	W	E	B	X	A	X	P	N	M	X	J	M	C
T	K	A	N	G	B	A	X	V	G	I	O	U	V	J	A	N	L
P	I	R	A	M	I	D	E	E	N	E	R	G	I	A	N	A	I
P	H	Y	B	W	O	T	V	T	Y	J	A	M	U	J	U	M	M
E	T	B	M	U	T	F	I	N	H	P	C	A	I	B	W	X	A
M	A	Z	A	E	I	T	T	A	A	B	I	O	T	I	C	A	S
A	Z	I	M	T	C	F	B	O	N	I	O	A	U	T	A	B	U
X	T	R	A	F	O	T	H	I	T	D	N	T	E	O	T	M	U
E	M	A	H	V	S	F	N	J	Y	O	D	N	Z	T	Y	L	C
R	E	D	A	L	I	M	E	N	T	I	C	I	A	W	A	B	B
R	H	E	L	L	O	M	A	Y	O	K	G	R	Q	U	M	W	M
G	C	I	C	L	O	D	E	L	A	G	U	A	Q	P	U	L	K

_____ **1.** características no vivas del ambiente

_____ **2.** mezcla de partículas minerales y rocas, restos de organismos, agua y aire

_____ **3.** proceso en que el agua líquida cambia a vapor de agua

_____ **4.** muestra las cantidades relativas de energía disponibles en cada nivel alimenticio de un ecosistema

_____ **5.** tiempo promedio durante varios años

_____ **6.** muestra cómo se mueve el agua a través del ambiente

_____ **7.** proceso por el cual el vapor de agua cambia a agua líquida

_____ **8.** rasgos vivientes del ambiente

_____ **9.** modelo de las posibles relaciones de transferencia de alimento y energía en una comunidad

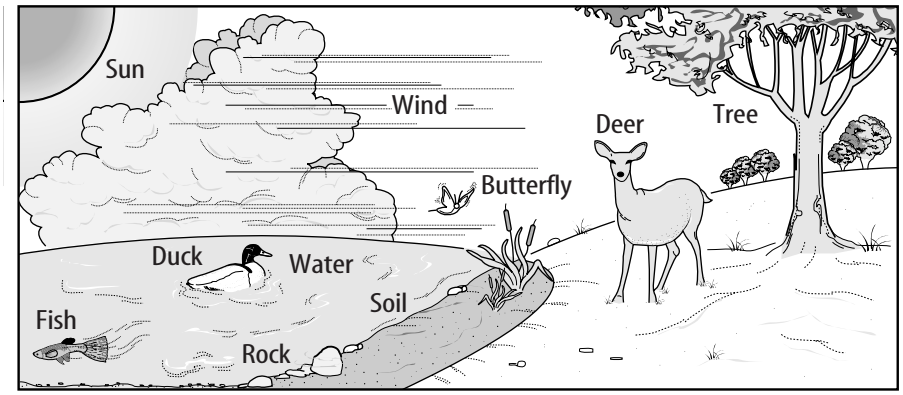
_____ **10.** producción de moléculas nutritivas ricas en energía a partir de sustancias químicas

Name Date Class

SECTION 1 Reinforcement

Abiotic Factors

Directions: *Classify the factors in the picture as either* **biotic factors** *or* **abiotic factors** *by listing them under the correct heading.A factor might fall into both categories.*



1. Abiotic Factors

2. Biotic Factors

Directions: *Identify each statement as* **true** *or* **false**. *Rewrite false statements to make them true.*

3. Air contains 78 percent hydrogen, 21 percent oxygen, and 0.03 percent carbon dioxide.

4. Organisms that are capable of photosynthesis are called consumers.

5. Temperature and precipitation are the two most important elements of climate for the majority of living things.

6. A mountain with forests on one side and desert on the other, is exhibiting evidence of the rain shadow effect.

7. Ecosystems with a lot of water support fewer organisms than ecosystems with little water.

Meeting Individual Needs

Name Date Class

SECTION 2 Reinforcement

Cycles in Nature

Directions: *Match the term in Column II with the description in Column I. Write the letter of the correct term in the blank at the left. All terms may not be used.*

Column I	Column II
_____ **1.** photosynthesis is part of this continuous movement	**a.** nitrogen cycle
_____ **2.** gas removed from the air during photosynthesis	**b.** evaporation
_____ **3.** element that helps plants grow	**c.** carbon dioxide
_____ **4.** process that changes nitrogen gas into compound plants can use	**d.** water cycle
_____ **5.** process of water changing from a gas to a liquid	**e.** respiration
_____ **6.** transfer of nitrogen from air to soil to organism, and back to air or soil	**f.** nitrogen
_____ **7.** process of water changing from a liquid to a gas	**g.** condensation
_____ **8.** continuous movement of water from Earth's surface to the air, and back to Earth's surface	**h.** carbon cycle
	i. transpiration
	j. nitrogen fixation

Directions: *Match the cause in the first column with the effect in the second column. Write the letter of the correct effect in the blank at the left. An effect may have more than one cause.*

_____ **9.** water vapor condenses	**a.** soil infertility
_____ **10.** fossil fuels burn	**b.** precipitation
_____ **11.** forests are cut down	**c.** increase of carbon dioxide in the air
_____ **12.** clouds become large and heavy	
_____ **13.** nitrogen removed when harvesting crops	

Directions: *Answer the following questions on the lines provided.*

14. What are the three primary steps of the water cycle?

_____

_____

15. Explain the importance of nitrogen to living things.

_____

_____

Meeting Individual Needs

Name Date Class

SECTION 3 Reinforcement

Energy Flow

Directions: *Complete the following sentences using the terms listed below.*

chemosynthesis	**producers**	**energy pyramid**
consumers	**photosynthesis**	**food web**

1. The production of energy-rich food molecules from chemicals is called _____.
2. A diagram that shows all the possible feeding, or energy transfer, relationships in a community is called a(n) _____.
3. A food chain begins with _____.
4. _____ make up the second and higher steps in a food chain.
5. A diagram that shows the comparative amount of energy at each feeding level is called a(n) _____.
6. The production of energy-rich sugar molecules using light energy is called _____.

Directions: *The steps in the following food chains are out of order. Put them in the correct order by numbering them using* **1** *as the producer level. Place the number of the step in the blank at the left.*

7. _____ **a.** hawk
_____ **b.** grain
_____ **c.** mouse
_____ **d.** snake

8. _____ **a.** tiger
_____ **b.** grass
_____ **c.** deer

9. _____ **a.** grasses
_____ **b.** hawk
_____ **c.** grouse
_____ **d.** insects

10. _____ **a.** marmot
_____ **b.** grass
_____ **c.** bear

Directions: *Answer the following questions on the lines provided.*

11. In the above food chains, what do all the first-step organisms have in common?

_____

Second-step organisms?

_____

12. Explain why an energy pyramid is in the shape of a pyramid.

_____

_____

_____

_____

Meeting Individual Needs

SECTION 1 Enrichment

Desert Plants

Think back to the hottest summer day you've ever experienced. Remember how the sweltering Sun beat down on you? Remember how *thirsty* you were? Now imagine that every day is like that—only you have to wait and wait and wait before getting a nice, cold drink. Perhaps you'd have to wait days, weeks, or even months. Such is the life of some desert plants.

Deserts, which make up five percent of Earth's surface, can be hot, cold, sandy, or rocky. Lack of precipitation makes an area a desert. By definition, deserts get less than 250 mm of rain each year. Every desert is different. For example, the Chihuahuan Desert in New Mexico has two rainy seasons each year, while the Atacama Desert in Chile is one of the driest places on the planet.

Plant Adaptation

Each desert is home to some kind of plant population. In fact, up to ten percent of desert land can be covered by plantlife. Desert plants can survive long periods without water because they've adapted to the very dry conditions. The kinds of plants vary by desert, but most desert plants are low-growing; thorny, leafless, or small-leaved; and are light green or gray in color. These typically include cacti, yuccas, creosote or other shrubs, and short grasses.

Some desert plants have very short life cycles, living only days or weeks. Plants with fine, shallow root systems, like most cacti, efficiently and quickly absorb large amounts of surface water. Surface water comes from the rainfall that the desert receives each year or from permanent rivers that can flow down from mountain areas that may be nearby.

Plants with long, deep roots draw upon subsurface water; the mesquite, for example, has been documented to have roots as long as 24 m! Subsurface water comes from seepage that collects underground over a long period of time.

Ways to Preserve Water

Desert plants' leaves, or lack of them, also help in preserving water. Small leaves and thorny spines are adaptations that help desert plants maximize water conservation. Larger leaves can cause a plant to overheat and lose water through their "pores" (a process known as transpiration). Since desert plants have small leaves, spines, or no leaves at all, they lose less water through transpiration. The ocotillo will drop its small leaves when necessary, just to prevent even more water loss.

Succulent plants like the saguaro hold water in the tissues of their leaves and stems. Others go dormant or "sleep" during the dry season and thrive only when water is plentiful. These plants, known as ephemerals, grow fast, bloom, produce seeds, and then are quickly gone. (Ephemeral means "to last just a short time.") The desert lily is an ephemeral that can stay dormant for years, waiting for the right amount of water before it blooms.

1. Which abiotic factor affects all desert plants? Explain.

2. How are the spiny needles on a cactus an adaptation to desert conditions?

3. Which type of desert plant stores water in the tissues of its leaves and stems? Which type remains dormant until the rainy season? Give an example of each.

SECTION 2 Enrichment

Carbon Sequestering

The word *sequester* means to separate or isolate. That's what scientists want to do with the buildup of CO_2 in the air. Why? Because too much CO_2 can trap heat from the Sun and cause increases in Earth's temperature. Carbon sequestering is one way to reduce the buildup of greenhouse gases.

Scientists are studying the carbon cycle so they can evaluate both the impact of human activity on the cycle and subsequent changes in climate. The carbon cycle has changed dramatically in the last 200 years due to the use of new energy resources following the Industrial Revolution. In fact, CO_2 levels are up by 30 percent since the mid-1800s.

Capturing Carbon

Carbon sequestering involves capturing CO_2 then storing it underground. Power plants produce one-third of the United States' manufactured CO_2 emissions and are ideal places to capture CO_2 before it's released into the atmosphere. Carbon sequestering would supplement, not replace, finding alternative fuel sources and reducing emissions.

Ideas being investigated by the United States Department of Energy include sequestering carbon underground and in the oceans, as well as enhancing natural processes like carbon sinks. Carbon sinks are places, such as forests, that naturally remove carbon from the air and store it. One million hectares of forest can absorb 25 megatons of CO_2 each year. The USDA estimates that 154 million tons of CO_2 could be sequestered by agricultural soils each year.

A Controversial Idea

Perhaps the most controversial sequestering idea is to inject CO_2 into the ocean. Although the CO_2 would be injected well below what scientists call the "biologically rich upper 1,000 m," the environmental risks of carbon sequestering on aquatic life are essentially unknown. Some scientists say that CO_2 changes the pH of the seawater, making it more acidic. This, of course, would have an effect on ocean life.

However, sequestering carbon in the ocean already is being done. Since 1996, offshore oil and gas workers in the North Sea have been taking CO_2 from power plants and injecting it into sandstone beneath the ocean floor. They're able to sequester more than 1 million tons of CO_2 each year.

In the United States, more than 65 oil fields have the technology available to them to inject CO_2 into oil reservoirs. That's because CO_2 commonly is injected underground to make oil recovery easier.

The Department of Energy spent $29 million in 2000 to study carbon sequestering, looking for ways to make it affordable, reliable, and environmentally safe. Although nobody knows if carbon sequestering will become an everyday occurrence, it could be one of the best options we'll have to lessen global warming.

1. What is a carbon sink? How does a carbon sink differ from carbon sequestering?

2. How has the carbon cycle changed in the last 200 years? What was the impact of the Industrial Revolution on the change?

Name Date Class

SECTION 3 Enrichment

Life on the Ocean Floor

In 1977, scientists exploring the floor of the Pacific Ocean in the deep-sea submersible, *Alvin,* made a discovery. They were exploring west of the Galapagos Islands at a depth of about 2,700 meters. The water, which is usually between 3°C and 5°C, was getting *warmer*. The scientists had discovered a hydrothermal vent. These vents are formed when water seeps into fissures or cracks in the ocean floor, becomes superheated, then shoots up through volcanic vents in the ocean floor. The water coming from hydrothermal vents contains minerals and is very hot—about 300°C.

Deep-Sea Creatures

Scientists on the *Alvin* made another surprising discovery: near the vents were giant tube worms, huge clams, and eyeless shrimp. With no sunlight available, how were these organisms obtaining energy?

The vent itself was the energy source for those creatures. Specialized chemosynthetic bacteria, capable of absorbing chemicals carried up from beneath the ocean floor, are first to colonize a newly formed vent. They are able to absorb chemicals, in this case hydrogen sulfide, carried by water from the vents. The chemosynthetic bacteria use the energy in the hydrogen sulfide molecules, rather than the energy in sunlight, to build organic molecules such as glucose. These bacteria become the food, or energy source for the other creatures.

Life at a New Vent

Alvin has made many more trips to hydrothermal vents. In April 1991, scientists onboard witnessed the birth of a hydrothermal vent in the East Pacific Rise, a mountain range southwest of Acapulco, Mexico. They visited the site many times after that to learn about the stages of vent colonization. By March of 1992, small worms and crustaceans had joined the bacteria living near the vent. By December 1993, giant tube worms were living there.

These life forms make up an extraordinary ecosystem. The producers are not green plants, as in land and other water ecosystems, but chemosynthetic bacteria. This ecosystem depends on the chemical energy found in the molecules of chemicals such as hydrogen sulfide instead of energy from sunlight.

1. What are chemosynthetic bacteria?

2. Why is this ecosystem unusual?

3. What are the biotic and abiotic factors in this ecosystem?

Meeting Individual Needs

Name Date Class

Note-taking Worksheet

The Nonliving Environment

Section 1 Abiotic Factors

A. Living or once-living environmental features are called **biotic** factors; _____ factors are nonliving physical features.

B. Atmosphere—the _____ that surrounds Earth

C. _____—the major ingredient of the fluid inside the cells of all organisms

D. _____—a mixture of mineral and rock particles, the remains of dead organisms, water, and air

E. _____—the source of energy for most life on Earth

F. Most organisms' body _____ should stay within the range of 0°C to 50°C for survival.

1. Temperature is affected by _____; areas closer to the equator are warmer than areas farther from the equator.

2. _____—distance above sea level that affects temperature, wind, and soil

G. Climate—an area's average _____ conditions over time, including temperature, precipitation, and wind

1. For most living things, _____ and _____ are the two most important components of climate.

2. Heat energy from the Sun creates air currents called _____

Section 2 Cycles in Nature

A. Earth's biosphere contains a fixed amount of water, carbon, nitrogen, oxygen, and other materials that _____ through the environment and are reused by different organisms.

B. Water cycle—how water moves from Earth's surface to the _____ and back to the surface again

1. Evaporation—when liquid water changes into water _____ and enters the atmosphere

2. _____—the process of changing water from a gas to a liquid

Meeting Individual Needs

Note-taking Worksheet (continued)

3. When water drops become large and heavy enough, they fall to the ground as rain or other _____.

C. _____—the transfer of nitrogen from the atmosphere to the soil, to living organisms, and back to the atmosphere

1. **Nitrogen fixation—**a process in which some types of soil _____ can form the nitrogen compounds that plants need
2. Farmers replace nitrogen in the soil by growing nitrogen-fixing crops or using _____ that contain nitrogen compounds that plants need for growth.

D. _____—how carbon molecules move between the living and nonliving world

1. Producers remove _____ from the air during photosynthesis.
2. _____—the chemical process that provides energy for cells

Section 3 Energy Flow

A. Matter can be _____ over and over again, but energy is _____ from one form to another.

1. During _____ producers convert light energy to chemical energy.
2. _____—the production of energy-rich nutrient molecules from chemicals

B. Energy stored in the molecules of one organism is transferred to another when one organism becomes _____ for another organism.

1. _____—a simple way of showing how matter and energy pass from one organism to another
2. **Food web—**shows all the possible feeding _____ among the organisms in a community

C. _____—shows the amount of energy available at each feeding level in an ecosystem

Assessment

Name Date Class

Chapter Review

The Nonliving Environment

Part A. Vocabulary Review

Directions: *Write the correct term in the spaces beside each definition. Unscramble the boxed letters to find a word that describes a biological process discussed in the chapter.*

1. average weather conditions over time ___ ___ ___ ___ ___ ☐ ___
2. environmental factors that include soil, sunlight, and air ___ ___ ___ ☐ ☐ ___ ___
3. organisms that are not capable of photosynthesis ___ ☐ ___ ☐ ___ ___ ___ ___ ___
4. made of overlapping food chains ___ ___ ___ ___ ___ ☐ ___
5. gas used during photosynthesis ___ ___ ___ ___ ___ ☐ ___ ___ ___ ___ ___ ___ ___
6. decaying matter found in soil ☐ ___ ___ ___ ☐
7. bacteria in hydrothermal vent communities use this process to produce food ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ☐ ___
8. the air that surrounds Earth ___ ___ ___ ___ ___ ___ ☐ ___ ___ ___
9. a model that shows comparative energy levels for different feeding levels ___ ___ ___ ___ ___ ___ ☐ ☐ ___ ___ ___ ___ ___
10. place where humus is found ☐ ___ ___ ___
11. An important biological process: _____

Part B. Concept Review

1. Number these food chain steps in the correct order using the blanks provided.

   _____ **a.** omnivores and carnivores

   _____ **b.** producers

   _____ **c.** herbivores

2. Number these gases in order from the one with the greatest amount in the atmosphere to the one with the least amount in the atmosphere.

   _____ **a.** oxygen

   _____ **b.** nitrogen

   _____ **c.** other gases

   _____ **d.** carbon dioxide

Chapter Review (continued)

Directions: *Correctly complete each sentence by underlining the best of the three choices in parentheses.*

3. Plants, algae, animals, and bacteria use oxygen for (transpiration, respiration, condensation).

4. Temperature depends on (sunlight, rainfall, wind), which depends on latitude.

5. (Chemosynthesis, Photosynthesis, Humus) is the production of food without light energy.

Directions: *Answer the following questions on the lines provided.*

6. List the three main components of the water cycle and provide a brief description of each.

a. _____

_____

b. _____

_____

c. _____

_____

7. If nitrogen in the atmosphere is not in a form plants can use, how do they get nitrogen? What is this process called?

_____

_____

8. Why are the numbers of organisms smaller at high levels of an energy pyramid?

_____

_____

Directions: *Answer the following questions using complete sentences.*

9. What types of organisms are found in soil?

_____

_____

10. Explain how soil can be both biotic and abiotic.

_____

_____

11. Using the carbon cycle as an example, explain how Earth's biosphere recycles materials over and over.

_____

_____

_____

Assessment

Transparency Activities

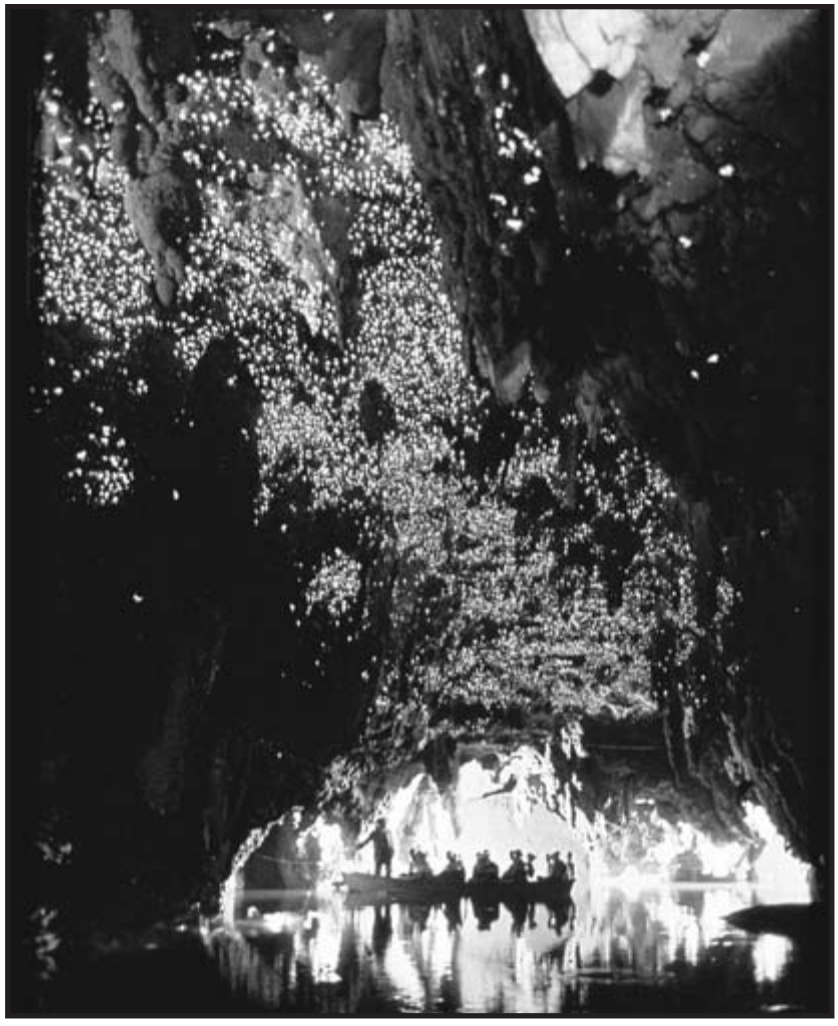
Name Date Class

SECTION 1

Section Focus Transparency Activity

All Aglow

What are the hanging lights in this picture? They're a species of glowworm that lives in New Zealand. The worms secrete a sticky thread that glows. This light attracts other insects that become stuck to the thread and are soon eaten! The glowing threads also attract mates. If disturbed, the glowworms can douse their lights.



1. **What is the main factor of cave life that makes glowing an advantage for the glowworm?**
2. **When might glowing not be an advantage?**
3. **What environmental factors might a glowworm need in order to stay alive?**

Name Date Class

SECTION 2 Section Focus Transparency Activity

A Vital Job

All living things generate waste products. Luckily, some living things decompose and recycle that waste. Fungi, a group of organisms that includes mushrooms, are great decomposers. The decomposing actions of fungi release nutrients back into the environment.

1. **What are these mushrooms living on?**
2. **If there were no decomposers, what might happen?**
3. **Describe the role of fungi in recycling nutrients.**

Name Date Class

SECTION 3 Section Focus Transparency Activity

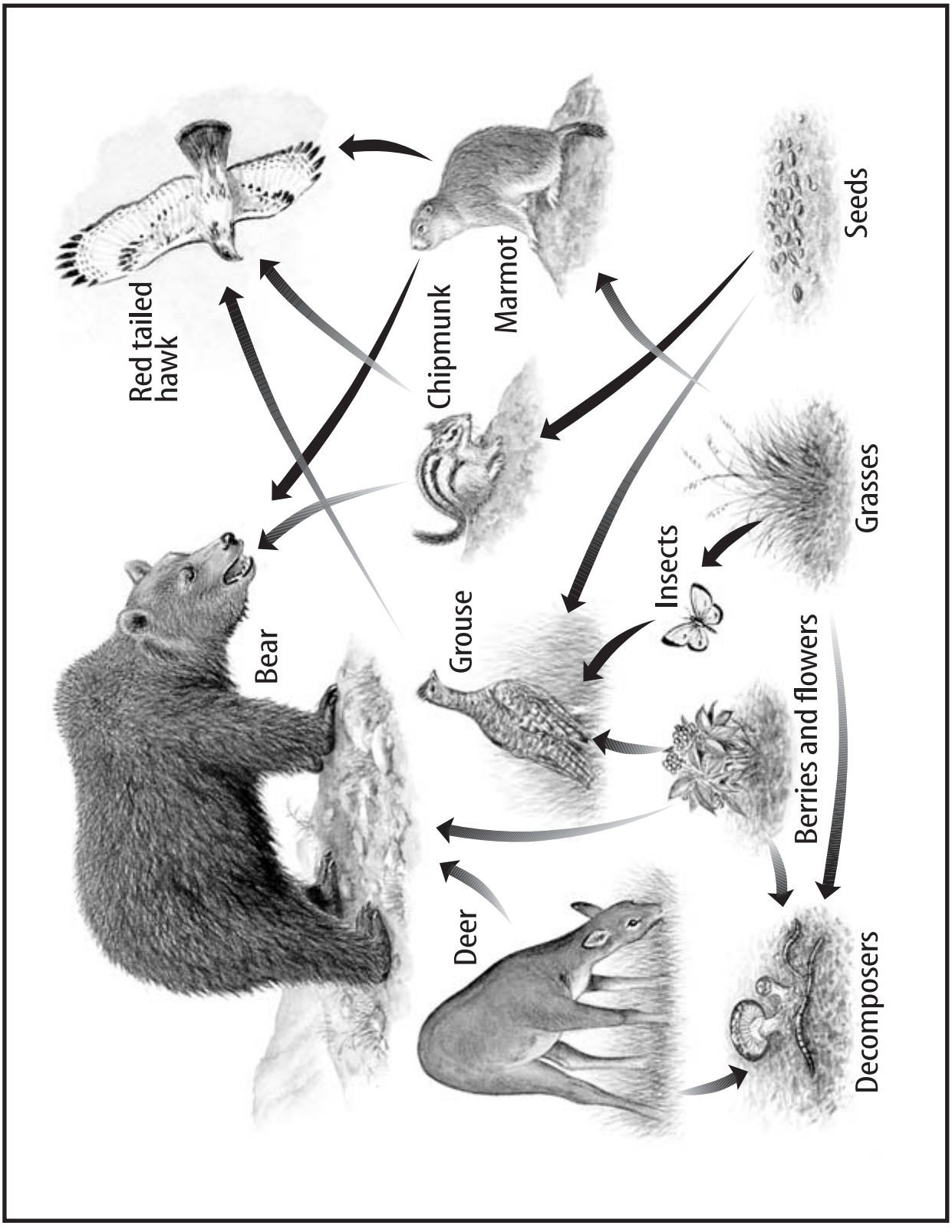
What's for dinner?

Living things need energy to survive. Plants can get the energy they need directly from the Sun. Other organisms feed on plants or animals in order to get energy. This family is having a nutritious dinner. How many different kinds of food can you see in this picture?

1. **How do living things use energy?**
2. **How do apple trees get energy? How do fish get energy?**
3. **Some organisms are said to be at the top of the food chain. What does this expression mean? Does a food chain ever end? Explain.**

SECTION 3 Teaching Transparency Activity

Food Web



Teaching Transparency Activity (continued)

1. In the food web, the grouse is prey to which animal?

2. Which animals have no predators above them on the food web?

3. What is a food web?

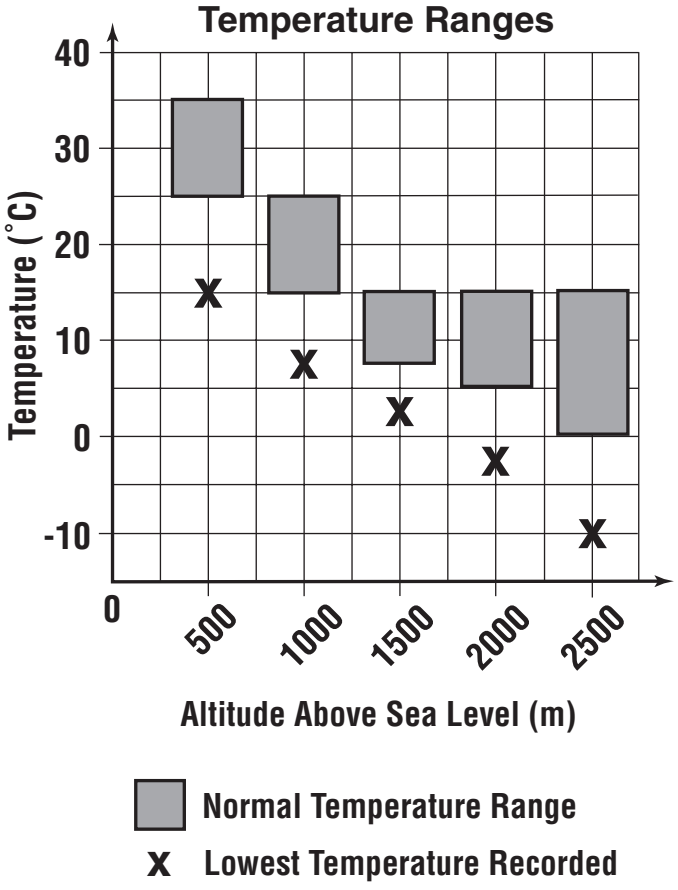
4. Compare a food web with a food chain.

5. Every organism is eventually recycled by which group on the food web?

Assessment Transparency Activity

The Nonliving Environment

Directions: *Carefully review the graph and answer the following questions.*



1. At which altitude was the lowest possible temperature recorded?

A 1000 m
B 1500 m
C 2000 m
D 2500 m

2. Which altitude could have a measured temperature of 20°C?

F 1500 m
G 1000 m
H 2000 m
J 2500 m

3. At which altitude is the normal range of temperatures the widest?

A 500 m
B 1000 m
C 2000 m
D 2500 m