Instructions for Copying

Answers are printed in non-reproducible blue. Copy pages on a light setting in order to make multiple copies for classroom use.

Contents

LIFE SCIENCE

Contents

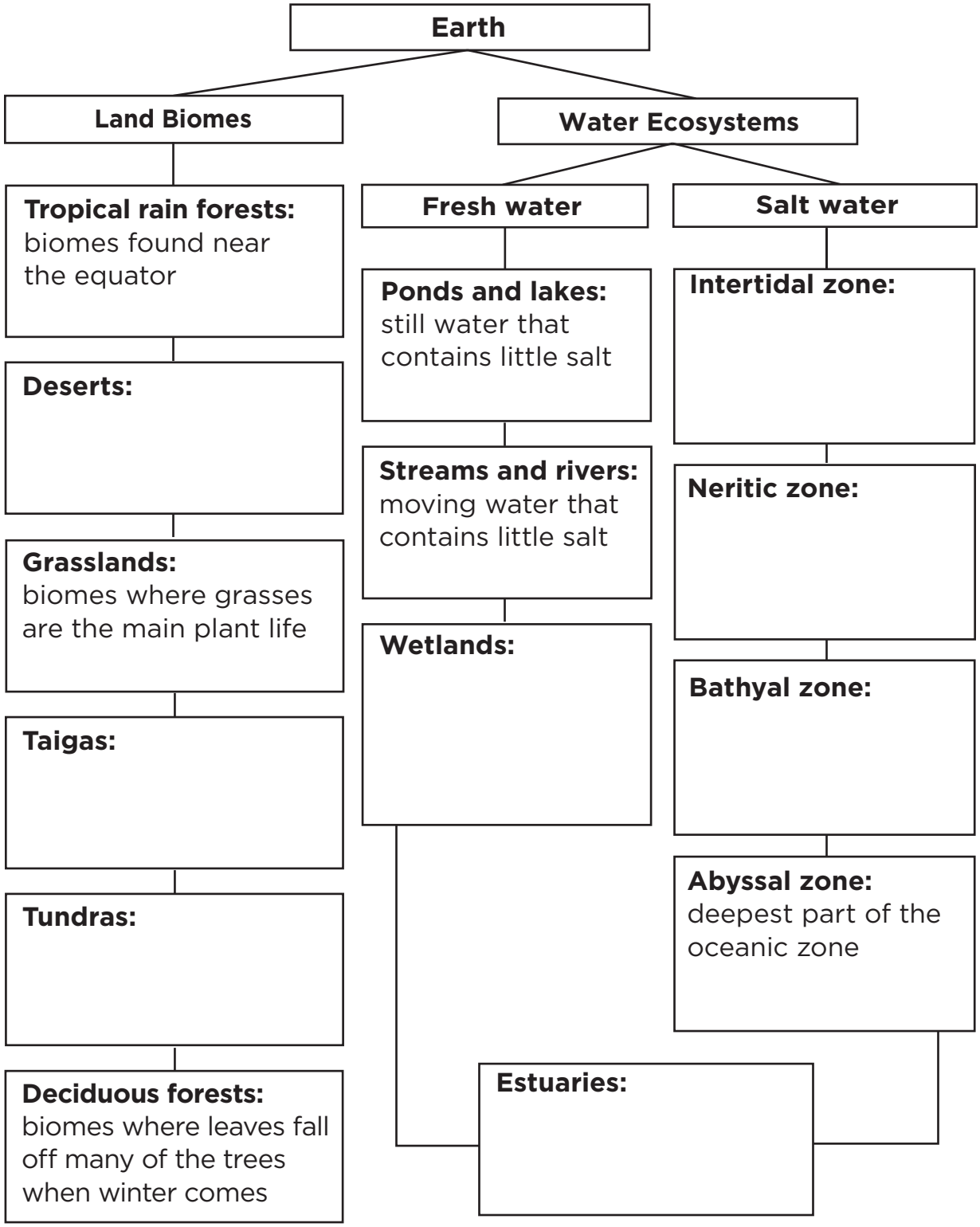
Contents

Contents

Name _____ Date _____

CHAPTER
Concept Map

Complete the concept map on Earth's land and water, using terms and phrases from your textbook.



LESSON
Outline

Name _____ Date _____

GLE 0607.2.3

Living Things and Their Environments

Use your textbook to help you fill in the blanks.

What is an ecosystem?

1. In an ecosystem, living things work together in systems and depend on the same _____ .
2. Any living thing that is part of an ecosystem is a(n) _____ .
3. The nonliving parts of the ecosystem that help make life possible are _____ .

Why are sunlight and temperature important?

4. The amount of sunlight a location receives directly _____ the temperature in that location.
5. The _____ in an area affects the number and types of animals that can survive in a location.
6. The parts of Earth that receive the least direct sunlight are the North and South _____ .
7. Seasonal variations in temperature cause some animals to _____ .

Why is water important?

8. Water is the body's main _____ vehicle, carrying nutrients and oxygen to various parts of the body.
9. Water helps regulate body temperature, cooling skin and carrying excess _____ away from your cells.
10. When a plant does not receive enough water, the leaves and stems become weak, and the plant _____ .

Name _____ Date _____

LESSON
Outline

Why is soil important?

11. Soil supplies plants with the water, _____ , and air that they need to grow.

12. As plant and animal remains break down, they form _____ , which adds nutrients to the soil.

13. The _____ scale measures the acidity or alkalinity of soil.

What lives in an ecosystem?

14. The _____ factors in an area influence what living things are found there.

15. Members of a(n) _____ breed with one another, produce offspring, and compete for resources.

16. All the organisms of the same kind make up a population; two or more of these make up a(n) _____ .

How do organisms compete and survive in an ecosystem?

17. Organisms _____ with one another for limited resources.

18. The role that a species plays in its community is its _____ .

19. Competition among species is reduced when different species obtain their _____ in unique ways.

Critical Thinking

20. What part does a fox play in an ecosystem?

_____

_____

_____

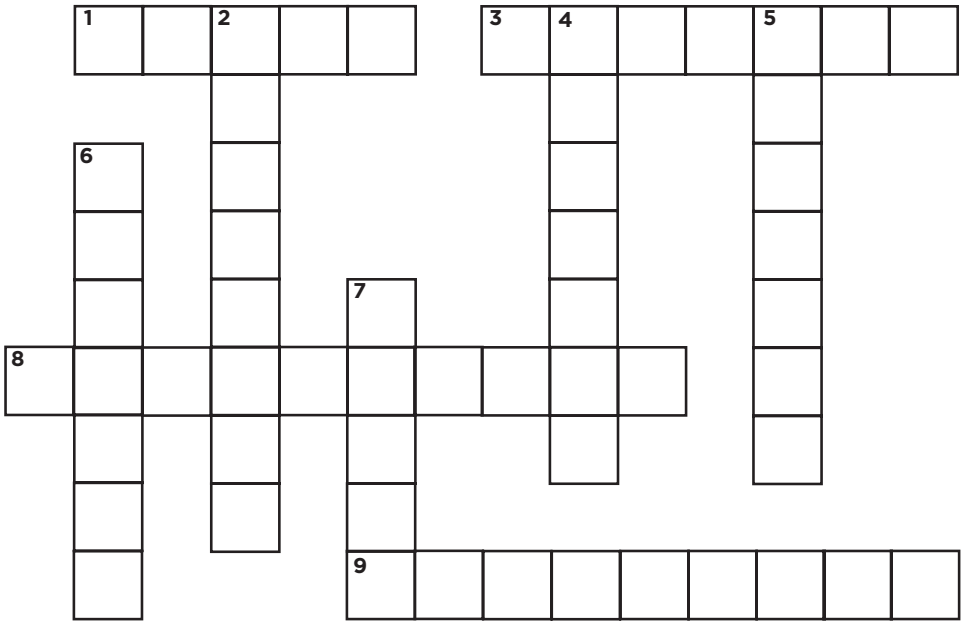
_____

Name _____ Date _____

Living Things and Their Environments

acidity	ecosystem	minerals
alkalinity	habitat	niche
ecology	humus	topsoil

Use the clues to fill in the crossword puzzle.



ACROSS

1. the material in soil formed by the breakdown of plant and animal remains

3. the place in which a population lives

8. the amount of base in a substance

9. the living and nonliving things in an area that interact with one another

DOWN

2. naturally occurring solid materials of Earth's crust

4. the amount of acid in a substance

5. the upper layer of soil, which is made mostly of humus, minerals, water, and air

6. the study of organisms and how they interact in an ecosystem

7. the role of an organism in an ecosystem

Name _____ Date _____

LESSON
Cloze Activity

Living Things and Their Environments

abiotic factors	biotic factors	erosion	temperature
acidity	community	habitat	vegetation
alkalinity	ecosystem	populations	

Fill in the blanks.

A system is a group of things that form a unified whole. Living and nonliving things in an area interact with one another in a(n) _____ . The _____ in this area form a(n) _____ . Several _____ influence the number and kinds of living things that can survive in a(n) _____ . For example, in places with little rainfall, _____ is sparse. If _____ has occurred, there may not be enough fertile soil to support healthy plant growth. The kinds of plants that do grow are determined by the amount of _____ or _____ in the soil. Another factor is the _____ of the region. As you can see, nonliving elements directly affect _____ . These factors influence the number and types of organisms in an ecosystem.

Name _____ Date _____

GLE 0607.Inq.5

Meet Joel Cracraft

Read the Reading in Science feature in your textbook. Look for facts and opinions.

Fact and Opinion

Use the fact and opinion chart below to list two opinions and two related facts discussed in the article.

Opinions	Facts
1.	
2.	

Write About It

Fact and Opinion

1. What opinion does the writer express in this statement: "In its forests live some of the most spectacular and colorful birds in the world"?
2. "There are more than 90 kinds of birds of paradise on New Guinea." Is this statement a fact or an opinion?

Planning and Organizing

1. What are the two adjectives the writer uses to describe the birds in the second sentence of the article?

_____

2. What does the writer tell us about the birds in the second sentence of the second paragraph of the article?

_____

_____

Drafting

Now evaluate the two sentences you looked at in the questions above. Based only on the information in the sentence referenced in question 1, how does the author seem to feel about the birds?

_____

_____

Based only on the information in the sentence referenced in question 2, how does the writer feel about the birds?

_____

_____

_____

LESSON
Outline

Name _____ Date _____

GLE 0607.2.2

Populations

Use your textbook to help you fill in the blanks.

How do populations survive?

1. A(n) _____ is a(n) _____ that limits how large a population can grow.
2. If populations grow too large, _____ for resources causes some individuals to die.

How do limiting factors affect populations?

3. Abiotic factors affect how much _____ an ecosystem can produce for the populations that live there.
4. Organisms such as cactuses survive by _____ to conserve water in dry climates.
5. Animals need shelter to protect themselves from _____ .
6. Populations must have enough _____ to live and grow in order to meet their needs.

What are carrying capacity and biotic potential?

7. The largest number of individuals of one species that an ecosystem can support over time is its _____ .
8. The highest rate of reproduction under ideal conditions is a population's _____ .
9. A pattern that shows how larger populations grow more quickly is called _____ .

Name _____ Date _____

LESSON
Outline

How do populations interact?

10. A relationship between two kinds of organisms that lasts over time is called _____ .

11. A symbiotic relationship in which one organism benefits at the expense of the other organism is _____ .

12. In a relationship known as _____ , one organism benefits from another organism without harming it.

13. In _____ , both of the organisms involved benefit from their relationship.

How do population changes affect ecosystems?

14. Populations may decline because of _____ and _____ factors.

15. A change in the population of one _____ can affect an entire ecosystem.

Critical Thinking

16. What effects could a rapidly growing population have on an ecosystem?

_____

_____

_____

_____

_____

_____

Name _____ Date _____

Populations

Use the clues to unscramble each word. Then unscramble the circled letters to answer the last question.

limiting factor	carrying capacity	biotic potential	exponential growth
commensalism	parasitism	mutualism	

1. COTIPOILABTENIT — the highest rate of reproduction under ideal conditions

_ _ _ _ ◯ _ _ _ _ _ _ _ _ ◯ _

2. AMUTUMLIS — a relationship that benefits both participants

_ _ _ _ _ _ _ ◯ _

3. MRIFILINTTACOG — an environmental factor that limits how large a population can grow

_ _ ◯ _ ◯ _ _ _ _ _ _ _ _ _

4. TPELONWIAGHTNEORX — a pattern in which the larger a population gets, the faster it grows

_ _ ◯ _ _ _ _ _ _ _ _ _ ◯ _ _

_ _

5. SCMOSMELINMA — a relationship in which one organism benefits without harming the other

_ _ _ _ _ _ _ ◯ _ _ ◯ _

6. RGACPCYCNIYAITAR — the largest number of individuals of one species that an ecosystem can support over time

_ _ _ _ _ _ _ _ _ _ _ _ _ ◯ _ _

7. What do you call a relationship in which one species benefits at the expense of the other?

_ _ _ _ _ _ _ _ _ _

Name _____ Date _____

LESSON
Cloze Activity

Populations

Fill in the blanks.

carrying capacity	exponential growth	parasitism
competition	limiting factors	species
ecosystems	mutualism	symbiosis

In nature, populations expand until _____ stop their growth. These factors can change over time, and different factors limit different _____ . Some factors are food, water, shelter, and space. If a population grows too large, some individuals may die because of _____ for limited resources.

The largest number of individuals of a population that an ecosystem can support over time is called the _____ . If the carrying capacity is not reached, a population may experience _____ . This means that as a population grows larger, it also grows faster.

Some living organisms have relationships with other organisms over time called _____ . Some relationships benefit one organism but hurt the other; this is called _____ . When both organisms benefit, the relationship is called _____ .

A change in the population of just one species can affect an entire _____ . Changes may be caused by human or environmental factors.

LESSON
Outline

Name _____ Date _____

GLE 0607.2.4
SPI 0607.2.3

Land Biomes

Use your textbook to help you fill in the blanks.

What are biomes?

1. A region that contains certain types of living things and has a particular climate is called a(n) _____ .
2. A region's climate is based partly on the amount of _____ that the region receives.

What are tropical rain forests?

3. The climate of tropical rain forests is _____ and humid with a lot of rainfall.
4. The top level of vegetation in a tropical rain forest is called the _____ layer.
5. Because the _____ shades the rain forest with a thick blanket of foliage, little sunlight reaches the lower two levels.
6. Tree trunks, shrubs, vines, and small plants make up the _____ .

What are deserts?

7. The four major desert types are determined by their temperature ranges and the amount of _____ they receive.
8. Hot and dry deserts have extreme differences between their nighttime and daytime _____ in the summer.
9. Cool winters and warm summers characterize _____ deserts.

10. The Atacama Desert in Chile is Earth's _____ desert.

What are grasslands and savannas?

11. Grasslands are often used for _____ , since they have some of the world's most fertile soils.

12. Savannas receive _____ rainfall than other grasslands, but natural fires occur during the dry season.

What are temperate deciduous forests?

13. In deciduous forests the leaves fall off many of the trees when _____ comes.

14. Deciduous forests are found in eastern North America, northeastern Asia, and western and central _____ .

What are taigas and tundras?

15. A taiga is a cool _____ of cone-bearing evergreen trees.

16. A tundra is a very cold, dry biome that includes a frozen-soil layer called _____ .

What lives in Earth's coldest places?

17. There is no land near the North Pole, while snow and ice near the South Pole cover the continent of _____ .

18. Earth's largest land carnivore, the _____ , can be found close to the North Pole.

19. What adaptations would an animal require to survive in a tundra?

_____

_____

Name _____ Date _____

Land Biomes

a. biome	**d.** grasslands	**g.** tropical rain forest
b. climate	**e.** savanna	**h.** tundra
c. deciduous	**f.** taiga	

Match the correct letter with the description.

1. _____ the average weather pattern of a region
2. _____ grassland that stays warm year-round with very wet summers and long, dry winters
3. _____ a very cold, dry biome that includes a layer of permanently frozen soil
4. _____ tending to fall off during a particular season
5. _____ biome located near the equator, where the Sun's rays strike Earth's surface most directly
6. _____ a cool forest of cone-bearing evergreen trees
7. _____ a region with a particular climate that contains certain types of plants and animals
8. _____ biomes in which grasses are the main plant life

Name _____ Date _____

LESSON
Cloze Activity

Land Biomes

conserve	grasslands	precipitation
equator	permafrost	resting
evergreen	Pole	taiga

Fill in the blanks.

A biome is a region that has a particular climate. The climate in each biome is mainly determined by temperature and _____ . For example, the rain forests located near the _____ are hot and humid with a lot of rainfall. In contrast, the tundra near the North _____ is cold and dry. Some plants and animals have adapted to the harsh conditions, but _____ prevents trees and large plants from rooting. The _____ also has very cold winters, but it supports large forests of _____ trees. One way animals adapt to desert conditions is by _____ during the hot days and becoming active when the temperatures fall at night. Desert plants are able to _____ water. Rainfall is irregular and usually not plentiful in _____ , but like the deciduous forests, the soil is very rich and fertile, and the vegetation supports a variety of animals. All the organisms in a biome are adapted to live in the region's weather conditions.

Name _____ Date _____

GLE 060I.3.3

A Trip to a "New" Rain Forest

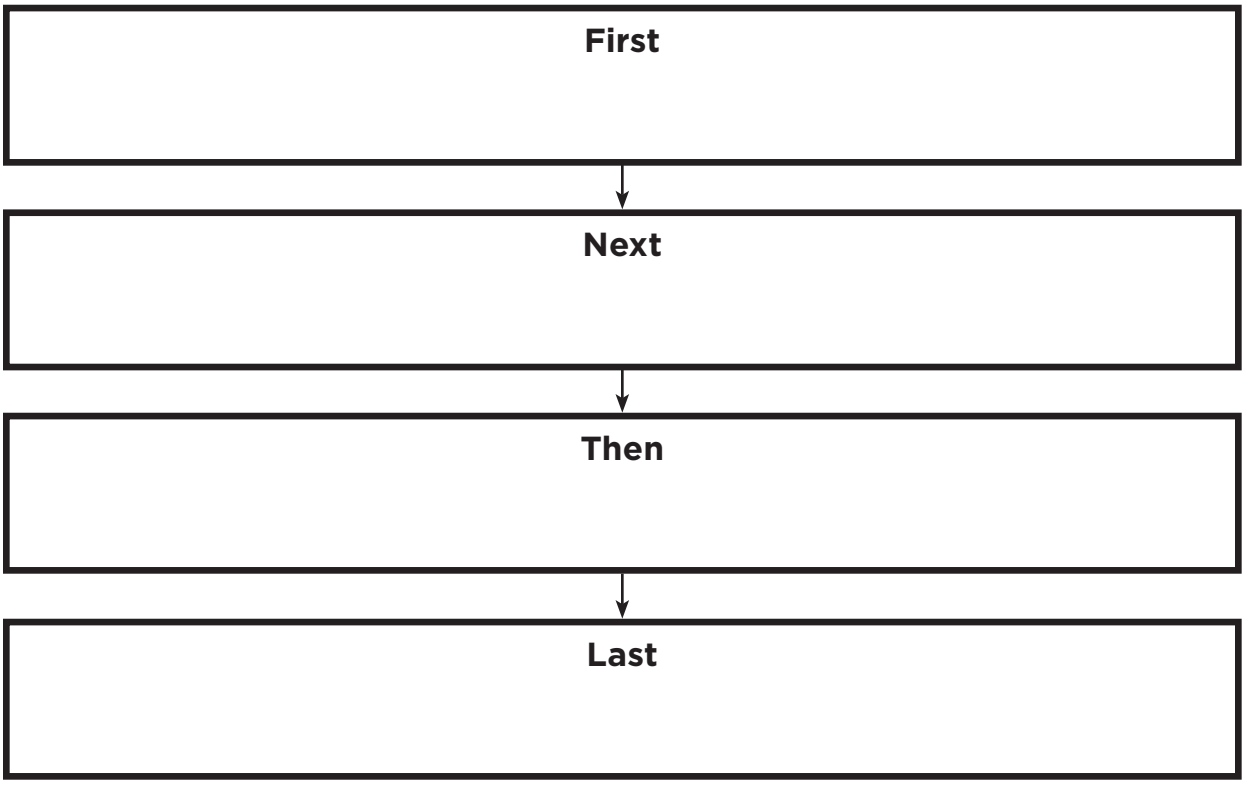
Read the Writing in Science feature in your textbook.

Write About It

Personal Narrative Write a personal narrative about a trip you made to a distinct environment, or ecosystem. It can be a desert, a tropical rain forest, or an ice-covered land. It can be the beach or the marshlands outside of town. Use the first-person point of view (I) to tell what you observed and what you did there.

Getting Ideas

Brainstorm a list of places about which to write. Then choose one. Fill in the sequence chart below. Write the things you did there in time order.



Name _____ Date _____

Drafting

Write a sentence to begin your personal narrative. Tell where you went and why this place is special. Remember to use the pronoun *I*.

_____

_____

_____

Now write your personal narrative. Use a separate piece of paper. Begin with the sentence you wrote above. Tell what you did and observed in time order. Do not forget to use details and describe your own feelings. Tell what this event meant to you.

Revising and Proofreading

Here are some sentences that Geraldo wrote. He forgot to use the first-person pronoun *I* to write about his experiences. Rewrite each sentence in the first person.

1. He was very careful not to touch the living coral.

   _____

2. He enjoyed floating in the warm, shallow water of the inner reefs.

   _____

Now revise and proofread your story.

Ask these questions:

- Have I told a story from my personal experience in the first-person point of view?
- Have I told what I did and observed there in time order?
- Have I corrected all grammar, spelling, capitalization, and punctuation errors?

LESSON
Outline

Name _____ Date _____

GLE 0607.2.4
SPI 0607.2.3

Aquatic Ecosystems

Use your textbook to help you fill in the blanks.

What are freshwater ecosystems?

1. Freshwater ecosystems are found in and near bodies of water that contain little _____ .
2. Streams and rivers have _____ water, which makes them different from ponds and lakes.
3. Ponds may have many _____ because of their lush plant growth.
4. Lakes are _____ and _____ than ponds, so plants grow mostly in the shallow areas near the shore.

What are wetlands?

5. Marshes and bogs are examples of _____ .
6. Wetlands are home to many animals, many of which lay _____ and raise their _____ there.
7. People in the United States began working to _____ and _____ wetlands in the 1970s.

What are ocean ecosystems?

8. Water from the ocean is _____ by energy from the Sun, then the evaporated water rises and forms clouds, then it falls back to Earth as rain or snow.
9. Factors that affect ocean organisms include temperature, salt content, water pressure, tides, and the amount of _____ that penetrates the water.

10. During _____ tide, the intertidal zone of the ocean is covered by water.

11. The _____ zone extends from the low-tide line to the point where the ocean floor drops off.

12. Sharks, squid, and octopuses live in the _____ zone, the top level of the oceanic zone.

13. Organisms that live in the abyssal zone have adapted to the cold and _____ conditions.

What happens when fresh water meets salt water?

14. Estuaries are the parts of _____ where fresh water meets the sea.

15. The water in an estuary contains less salt than the water in the _____ .

16. The change in the _____ causes the amount of salt in the estuary to change.

17. About three-fourths of all the _____ caught in the United States each year spent part of their lives in estuaries.

Critical Thinking

18. Why might it be difficult for many plants and animals to live in estuaries?

_____

_____

_____

Name _____ Date _____

Aquatic Ecosystems

Match the correct letter with the description.

a. estuary	**d.** lake	**f.** pond
b. freshwater ecosystem	**e.** ocean	**g.** wetland
c. intertidal zone		

1. _____ I am a small, shallow body of water and am often home to much animal and plant life. What am I?

2. _____ I am the part of a river where fresh water meets the sea. I am affected by the tides. What am I?

3. _____ I make up about 75 percent of Earth's surface. I am divided into regions with different conditions. What am I?

4. _____ I am an area in which water is near the surface of the soil much of the time. What am I?

5. _____ I exist in and around bodies of water that contain little salt. What am I?

6. _____ I am a large, deep body of water. My plant growth is limited to shallow areas along the shoreline. What am I?

7. _____ I am the shallowest part of the ocean between the high-tide line and the low-tide line. What am I?

Name _____ Date _____

Aquatic Ecosystems

Fill in the blanks.

estuaries	nutrients	runoff
freshwater	plankton	wetland
neritic	ponds	young

Many different aquatic ecosystems exist on Earth. One type, called a(n) _____ ecosystem, is located near bodies of water with little salt. A great deal of plant and animal life may exist near small, shallow pools of water called _____ . Larger bodies of water, such as lakes, have life forms called _____ near their surfaces. An ecosystem such as a bog, in which water is near the surface of the soil, is a(n) _____ . For many years, these areas were damaged by _____ and other human activities, but people now are trying to protect these delicate ecosystems.

Water ecosystems called _____ form where rivers enter the ocean. These water ecosystems have more salt than a river but less salt than an ocean. Oceans are divided into regions in much the same way that land is divided into biomes. The _____ zone is richer in plant life than any other part of the ocean. This zone has complex food chains because of the large number of _____ and the amount of sunlight in the water.

Estuaries are also important _____ for many species of birds and fish. Many birds and animals raise their _____ in estuaries.

Name _____ Date _____

GLE 0607.2.4

Life in the Deep

Read the Writing in Science feature in your textbook.

Write About It

Expository Writing Write a report telling how sunlight helps support your life. Engage your reader right away, and clearly state your purpose for writing. Introduce the main idea, and develop it with facts. Use supporting details and precise verbs, nouns, and adjectives to describe and explain your subject. Do print and online research. Summarize your findings at the end of the report.

Getting Ideas

Sometimes you choose your own topic to write about. Other times your teacher specifies the topic. Underline the topic in the assignment above. Now think about what you know about this topic, and gather information.

Write what you already know in the first column of the chart below. In the second column, write questions you have about the topic. This is the information you want to find out for your report. Then do some research to find answers to your questions. In the third column, write what you found out from your print and online research.

Topic: How Sunlight Supports Your Life		
What I Already Know	**What I Want to Know**	**What I Learned**

Name _____ Date _____

Drafting

A good report begins with a thesis statement that focuses the topic and tells readers what to expect. It gives important information about a topic. Circle the thesis statement that is a better way for Armando to begin his report.

I do not like to think about what the world would be like without sunlight.

Without sunlight the world as we know it would cease to exist.

Now write your first draft. Use a separate piece of paper. Begin with a strong thesis statement, introduce your main idea, explain your subject, and end with a summary of your findings.

Revising and Proofreading

Replace the underlined word in Armando's sentence with a precise adjective. Rewrite the sentence on the lines below it.

The Sun heats Earth, causing seawater to <u>dry</u> and form clouds.

_____

_____

Now revise and proofread your report. Ask these questions:

- Have I written a thesis statement?
- Does my introductory paragraph engage readers?
- Have I supported my ideas with facts and details?
- Have I used precise verbs, nouns, and adjectives?
- Have I used transition words to connect ideas?
- Have I ended with a conclusion that summarizes my ideas?
- Have I corrected all grammar, spelling, punctuation, and capitalization errors?

Name _____ Date _____

Ecology

Circle the letter of the best answer.

1. All of the abiotic and biotic factors in a given area form _____ .

A a community

B an ecosystem

C a population

D a species

2. A low pH indicates that soil is _____ .

A alkaline

B balanced

C spongy

D acidic

3. A community is made up of _____ .

A environments

B populations

C water

D carbon

4. The largest number of individuals of one species that an ecosystem can support over time is its _____ .

A carrying capacity

B biotic potential

C limiting factor

D population growth

5. When a larger population grows more quickly, as it gets bigger it experiences _____ .

A overcrowding

B competition

C exponential growth

D parasitism

6. All biomes have specific _____ .

A climates and pioneer communities

B climates and types of organisms

C ecosystems and successions

D species and overcrowding

7. When two organisms have a relationship from which both benefit, the relationship is called _____ .

A commensalism

B competition

C mutualism

D parasitism

8. The bottom level of the rain forest is called the _____ .

A understory

B canopy

C forest floor

D emergent layer

9. Deciduous trees conserve energy when their leaves _____ .

A decay

B change color

C fall off

D remain green

10. The biome with the coldest climate is the _____ .

A grassland

B deciduous forest

C taiga

D tundra

11. The ecosystem that covers most of Earth's surface is _____ .

A grassland

B rain forest

C taiga

D ocean

12. Areas in which water is near the surface of the soil much of the time are called _____ .

A estuaries

B wetlands

C lakes

D algae

13. The type of ecosystem that forms where a river flows into the ocean is called _____ .

A an estuary

B an ocean

C a rain forest

D a wetland

Name _____ Date _____

Energy and Matter in Ecosystems

Complete the concept map on ecosystems, using words and phrases from your textbook.

Cause		Effect
A rabbit eats grass.	→	Energy is transferred from the _____ to the _____ .
A certain type of food becomes a(n) _____ .	→	The population of the organism that eats that food _____ .
_____ in the soil "fix" nitrogen from the air.	→	Nitrogen from the air is changed into a form that _____ can use.
Plants take in carbon dioxide and _____ .	→	The process of _____ takes place, creating _____ .

Name _____ Date _____

LESSON
Outline

GLE 0607.2.I, 0607.2.3

Energy from the Sun

Use your textbook to help you fill in the blanks.

How is the Sun an important energy source?

1. Plants convert solar radiation into _____ energy, which can be used by other organisms.
2. Solar radiation helped create fossil _____ such as coal, oil, and natural gas.
3. Solar energy drives the water cycle and influences a region's _____ and climate.

What is photosynthesis?

4. Chlorophyll is a green substance in plants that _____ energy from sunlight.
5. Using sunlight, plants and other organisms convert water and _____ into sugar, or food, and oxygen.
6. Oxygen, which is given off by plants as a(n) _____ product during photosynthesis, enters the atmosphere.

What do roots and stems do?

7. Most roots hold plants in the soil and take in water and _____ to feed the plants.
8. The stem of a plant transports _____ and other substances between the roots and leaves.

Name _____ Date _____

What are leaves?

9. Simple leaves have one _____ , and compound leaves have two or more.

10. Water and minerals are brought through leaf blades by _____ .

11. Some leaves store _____ , and others are designed to protect the plant.

How does water move through plants?

12. Water is pushed upward into stems of small plants by _____ built up in the roots.

13. Most plants need forces that pull water upward, such as capillary action and _____ .

14. Cabbage plants store food in their _____ .

What are microscopic organisms that make their own food?

15. Microscopic organisms are classified according to their _____ structure and by what they eat.

16. Prokaryotes do not have a nucleus in each cell, but _____ do have a nucleus in each cell.

17. Many _____ are capable of producing their own food through photosynthesis.

Critical Thinking

18. How do the roots, stems, and leaves of a plant help the plant survive?

_____

_____

_____

_____

Name _____ Date _____

LESSON
Vocabulary

Energy from the Sun

chlorophyll	respiration	stem
photosynthesis	root	transpiration
prokaryotes	solar radiation	producers

Fill in the blanks.

1. The release of energy in plants and animals from food is called _____ .
2. Energy from the Sun that shines on Earth's surface is called _____ .
3. A(n) _____ holds a plant in the soil and takes in water and minerals to feed the plant.
4. The part of a plant that supports leaves and flowers is the _____ .
5. Nearly all plants are _____ , or organisms that are able to make their own food.
6. The green substance that absorbs energy from sunlight is _____ .
7. The process of making food by using sunlight is _____ .
8. The loss of water from the leaves of a plant is called _____ .
9. Organisms called _____ have a simple cell structure without a nucleus in each cell .

Name _____ Date _____

Energy from the Sun

chlorophyll	protists	releases	stores
eukaryote	pull	root hairs	sunlight
nucleus	pushes	stem	veins

Fill in the blanks.

Energy enters ecosystems as sunlight, which is used by plants to make food. First, water and minerals enter the _____ of a plant. Pressure from the roots _____ water into the stem. Capillary action and transpiration _____ the water up into the _____ . Tubes carry the materials to the _____ in the leaves. The substance _____ is located there. With exposure to _____ and air, plants can then carry out photosynthesis. Photosynthesis _____ sunlight and air into food for the plant.

Some microscopic organisms, such as _____ can also perform photosynthesis. A protist is a _____ , which means that it has a _____ in each cell.

Name _____ Date _____

Writing in Science

SPI 0607.T/E.4

Trouble on the Table

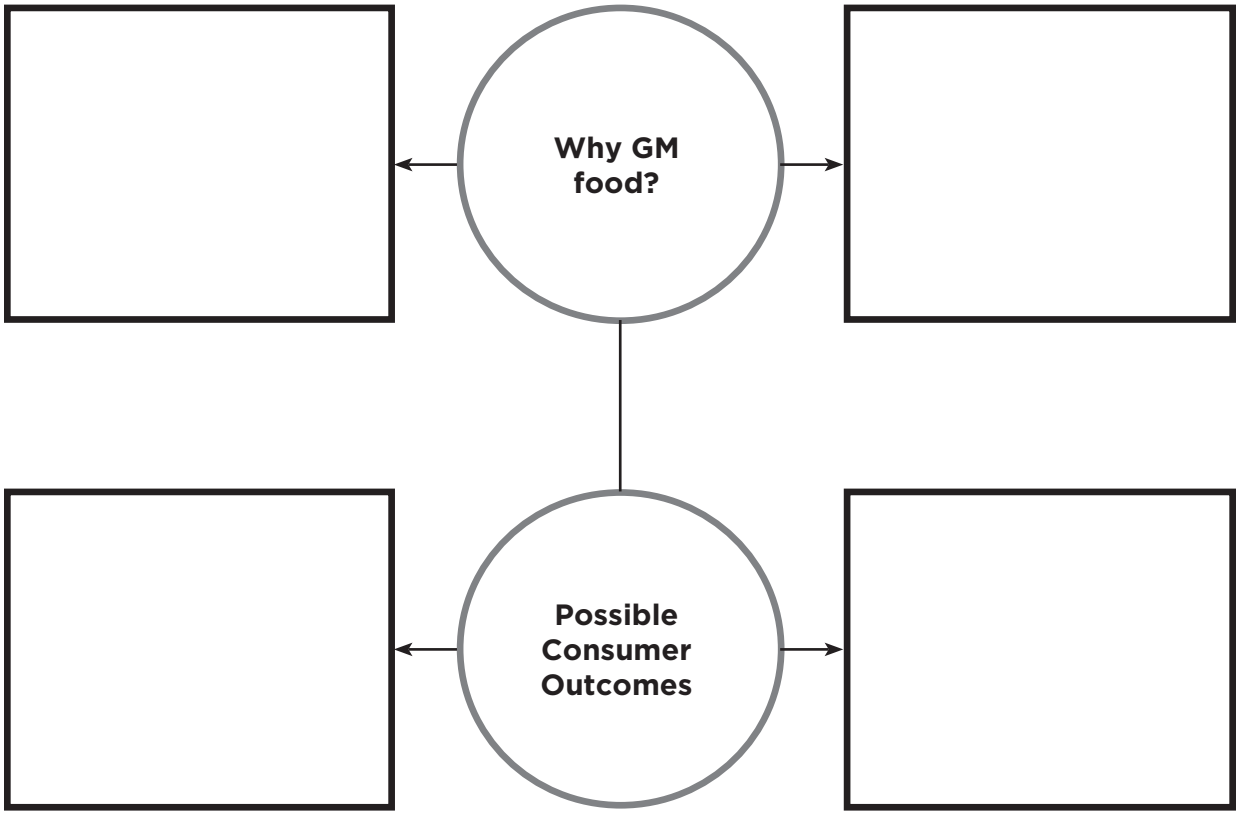
Read the Writing in Science feature in your textbook.

Write About It

Explanatory Writing Choose a GM food that you might find in your local grocery store. Write an explanation of why it has been genetically modified and what that might mean for consumers.

Getting Ideas

Choose a GM food. Think of reasons why people may choose to modify that food and the possible outcomes for consumers. Record your ideas in the graphic organizer below.



Name _____ Date _____

Drafting

Good explanatory writing gives clear details and addresses both sides of a controversial issue. Armando wrote two introductory statements. Circle the statement that is the better way for Armando to begin his report.

Genetically modifying food changes the way plants are supposed to be, so it can only cause negative consequences to people and the environment.

Modifying the genetic structure of plants can help scientists create better food, but some people are concerned that the benefits come with too many risks.

Now write your first draft. Use a separate piece of paper. Begin with a sentence that clearly explains both sides of the issue. Be sure to give specific reasons why scientists choose to modify food and to identify possible outcomes for consumers. Use cause-and-effect words and phrases such as *because*, *since*, and *as a result* to help readers understand the issue.

Revising and Proofreading

Now revise and proofread your essay. Ask these questions:

- Have I written an introduction that clearly explains the issues?
- Have I provided specific reasons and outcomes?
- Have I used cause-and-effect words to connect ideas?
- Have I corrected all grammar, spelling, punctuation, and capitalization errors?

Name _____ Date _____

LESSON
Outline

GLE 0607.2.I, 0607.2.2
SPI 0607.2.I

Food Chains, Webs, and Pyramids

Use your textbook to help you fill in the blanks.

What are food chains?

1. The energy used by almost all living things originally comes from the _____ .
2. A model of the path that energy in _____ takes as it moves from one organism to the next in an ecosystem is called a(n) _____ .
3. Organisms that make their own food through _____ are called producers.
4. Living things that do not make their own food and must therefore eat other organisms are called _____ .
5. Organisms are _____ if they eat producers, and they are _____ if they eat primary consumers.
6. An organism that eats a secondary consumer is a(n) _____ .
7. An organism that breaks down the remains of other organisms is a(n) _____ .

What are food webs?

8. A model that shows how food chains overlap in an ecosystem is called a(n) _____ .
9. An animal that eats only producers is a(n) _____ .

Name _____ Date _____

10. Animals that eat other animals are _____ .

11. Humans are _____ , because they eat both producers and other consumers.

12. An animal that eats dead animals that it did not hunt and kill is called a(n) _____ .

What are ocean food chains like?

13. Chemosynthesis allows _____ deep in the ocean to produce food.

14. The plankton known as _____ can make food through photosynthesis.

15. Microscopic animals called _____ feed on phytoplankton and are eaten by small fish and other animals.

What is an energy pyramid?

16. A model that shows how energy flows through a food chain is called a(n) _____ .

17. About _____ percent of the energy from one level of an energy pyramid is available to consumers at the next level.

Critical Thinking

18. Explain the places occupied by grass, a rabbit, and a wolf in an energy pyramid.

_____

_____

_____

_____

Name _____ Date _____

LESSON
Vocabulary

Food Chains, Webs, and Pyramids

Use the clues to unscramble each word. Then unscramble the circled letters to answer the last question.

decomposer	food chain	predator	scavenger
energy pyramid	food web	producer	

1. YERPYDMEGNRIA a model that shows how energy flows through a food chain

(E) _ _ _ _ _ _ (R) _ (G) _ _ _ _

2. PATRODER a living thing that hunts and kills other living things for food

_ (P) _ _ _ _ (D) _

3. COOPREMEDS an organism that breaks down the remains of dead organisms into simpler substances

_ _ _ _ (O) _ _ (M) _ _

4. FCOHOADIN a model of the path that the energy in food takes as it moves through an ecosystem

_ (O) _ _ (F) _ _ _ (D)

5. GVSERNAEC an animal that feeds on the remains of dead animals that it did not hunt or kill

(S) _ _ _ _ (C) _ _ _

6. REDRUPCO an organism that uses the Sun's energy to make its own food through photosynthesis

_ (E) _ _ (R) (P) _ _

7. BOWDEFO a model that shows how food chains overlap in an ecosystem

_ _ _ (W) _ (E) _

8. What do you call an animal that eats animals that eat plants?

a(n) _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _

Name _____ Date _____

Food Chains, Webs, and Pyramids

Fill in the blanks.

consumers	food web	scavenger
decomposers	primary consumers	secondary consumers
food chain	producers	tertiary consumers

The Sun is the main source of energy for most living things. Living things that make their own food from the Sun's energy are called _____ . Animals that eat other living organisms are called _____ . The energy flow from one organism to another is shown in a(n) _____ . Food chains overlap in a(n) _____ .

Animals that eat producers are _____ . Primary consumers are food for _____ . Secondary consumers are eaten by _____ . An organism that eats dead animals that it did not hunt is a(n) _____ . Dead animals are also broken down by _____ . These relationships can be seen both on land and in the water.

Name _____ Date _____

LESSON
Outline

GLE 0607.2.2
SPI 0607.2.2

Cycles in Ecosystems

Use your textbook to help you fill in the blanks.

How does Earth have enough air and water to keep us alive?

1. The air we breathe and the water we drink do not run out, because the planet is always _____ them.
2. Water can change from a solid to a liquid to a(n) _____ and back again.
3. The Sun causes _____ when it heats the water in oceans, lakes, rivers, ponds, and puddles.
4. A process called _____ makes the water that hits Earth's surface soak into the ground.

What is the carbon cycle?

5. There is not a lot of carbon in the _____ , so it must be recycled.
6. The buildup of gases that leads to global warming is the _____ effect.
7. Carbon is stored in the air as carbon dioxide and in organic matter in the _____ .
8. The shells of some marine organisms contain _____ carbon dioxide.
9. Living things use _____ to break apart molecules during respiration.

Name _____ Date _____

What is the nitrogen cycle?

10. Nitrogen is needed to make _____ for the growth of muscles, skin, bones, blood, plant cell walls, and internal organs.

11. Lightning can change the nitrogen in the atmosphere into a(n) _____ compound.

12. Nitrogen-fixing _____ live in the roots of beans, peas, and peanuts and can extract nitrogen from the air.

13. Plants absorb nitrates and nitrites and then use them to make _____ .

14. Certain bacteria return the same amount of nitrogen to the air as other bacteria take away from the air, keeping the ecosystem in _____ .

How are plants recycled?

15. Certain kinds of food scraps or yard cuttings can be recycled through the process of _____ .

16. Dead plants and animals are broken down into useful materials such as minerals and rich soils by _____ .

Critical Thinking

17. How are bacteria important to the nitrogen cycle?

_____

_____

_____

_____

_____

Name _____ Date _____

LESSON
Vocabulary

Cycles in Ecosystems

carbon cycle	evaporation	nitrogen cycle
composting	nitrates	precipitation
condensation	nitrites	water cycle

Fill in the blanks.

1. The continuous trapping of nitrogen gas into compounds in the soil and the returning of nitrogen gas to the air is the _____ .
2. Any form of water that falls to Earth is _____ .
3. Plants absorb _____ and _____ and use them to make protein.
4. The process in which a liquid changes into a gas is _____ .
5. Through the _____ , carbon is recycled between the atmosphere and living things.
6. The continuous movement of water between Earth's surface and the air is the _____ .
7. Organic matter is broken down by decomposers during _____ so it can be used as a natural fertilizer for gardening or farming.
8. The process in which a gas changes into a liquid is known as _____ .

Name _____ Date _____

Cycles in Ecosystems

absorb	condensation	gas	precipitation
carbon dioxide	decay	nitrates	
collection	decomposers	nitric acid	

Fill in the blanks.

If the planet did not recycle the air we breathe and the water we drink, they would run out. Water is stored as groundwater through _____ . Water is then evaporated by the Sun, and the process of _____ begins, forming clouds. Eventually the water returns to Earth as _____ to start the process over again. Carbon escapes into the air and ground when plants and animals _____ . Plants use the carbon from _____ in photosynthesis. Animals eat the animals that eat plants that _____ the nitrogen they need. Nitrogen-fixing bacteria extract nitrogen _____ from the air. Other bacteria convert nitrogen into nitrites or _____ , substances plants can use to make proteins. Rainwater and lightning make another usable form of nitrogen called _____ . Organic matter is broken down into nitrogen by _____ . They return important substances back into nature.

Name _____ Date _____

LESSON
Outline

GLE 0607.2.I

Changes in Ecosystems

Use your textbook to help you fill in the blanks.

What changes affect the environment?

1. A predator is an example of a(n) _____ because it controls the size or _____ of a population.

2. Some limiting factors are living, or _____ , and some are nonliving, or _____ .

What happens after the environment changes?

3. Organisms that remain in a region must _____ to _____ change.

4. If a species' numbers have declined to a level at which the species needs protection from becoming endangered, it is considered _____ .

5. When a species' numbers have been so reduced that the species may become extinct, it is considered _____ .

6. When _____ has occurred, a species no longer exists in the wild or in captivity.

7. The loss of any species affects the wide variety of life on Earth, which is called _____ .

What is succession?

8. The gradual replacement of one community by another is called _____ .

Name _____ Date _____

9. A community that is established in what was a lifeless area is called a(n) _____ community.

10. A stable community in which succession has slowed down is called a(n) _____ community.

11. Secondary succession can occur after a(n) _____ such as a forest fire.

What is evidence of change over time?

12. Similar features in different organisms are called _____ structures, and features that are similar but meet different needs are called _____ structures.

13. Scientists can determine the degree to which different species are related by comparing their _____ .

How do environments change over time?

14. Changes to ecosystems can be caused by _____ or by _____ .

Critical Thinking

15. How do forest fires affect a deciduous-forest ecosystem?

_____

_____

_____

_____

_____

Name _____ Date _____

Changes in Ecosystems

Fill in the blanks.

biodiversity	extinction	succession
climax community	limiting factor	threatened
endangered	pioneer community	

1. A species that has decreased until it is almost endangered is considered _____ .
2. When a species no longer exists, it is called _____ .
3. The term used to describe the wide variety of life on Earth is _____ .
4. A species that may become extinct if its population decreases further is considered _____ .
5. A condition that controls the size or growth of a population is called a(n) _____ .
6. When a community has stabilized and succession has slowed down or stopped, it is a(n) _____ .
7. The gradual replacement of one community by another is called _____ .
8. The first species to establish themselves in a lifeless area form a(n) _____ .

Name _____ Date _____

Changes in Ecosystems

Fill in the blanks.

climax community	extinction	limiting factors
DNA	fossils	pioneer community
endangered	homologous	succession

Ecosystems are constantly changing. The first community to populate an ecosystem is a(n) _____ . This community is gradually replaced by others in a process called _____ . A(n) _____ occupies an ecosystem in which succession has slowed down.

To survive, organisms must adapt to changes in _____ , such as food and water, that control the size and growth of populations. If environmental changes cause a population to decrease, the population can become threatened or _____ . When a population no longer exists, it has undergone _____ . Changes in ecosystems over time can be studied by examining _____ , comparative and _____ structures, and the _____ of closely related species. These comparisons show scientists how different species are related to one another.

Name _____ Date _____

GLE 0607.2.3

Meet Eleanor Sterling

Read the Reading in Science feature in your textbook.

Cause and Effect

The article mentioned several things that could cause damage to the reef. List them in the left column of the chart below. Then list a possible effect of each of these dangers in the right column of the chart.

Cause	→	Effect
Reefs are damaged.	→	Organisms that live there are in danger.
	→	
	→	
	→	
	→	
	→	
	→	

Name _____ Date _____

Write About It

Cause and Effect

1. What factors cause damage to coral reefs?
2. How does damage to coral reefs affect the organisms that live in them?

Planning and Organizing

Write a sentence that summarizes the factors threatening coral reefs.

Write a one-sentence summary of what Eleanor Sterling is doing in the Palmyra Atoll.

Drafting

Now explain how Eleanor Sterling's work can be used to protect marine ecosystems all over the world.

Name _____ Date _____

Energy and Matter in Ecosystems

Circle the letter of the best answer.

1. Plants use sunlight to make food in a process called _____ .

A solar radiation

B chloroplasts

C photosynthesis

D chlorophyll

2. The leaves and flowers of a plant are supported by _____ .

A xylem

B stems

C roots

D phloem

3. Microscopic organisms that have a simple cell structure without a nucleus in each cell are called _____ .

A prokaryotes

B cyanobacteria

C protists

D eukaryotes

4. The path that energy takes as it moves from one organism to another in an ecosystem is _____ .

A a cycle

B an energy pyramid

C a food chain

D a food web

5. A model of the way that food chains overlap in an ecosystem is called _____ .

A an energy pyramid

B a carbon cycle

C a food web

D an abiotic factor

Name _____ Date _____

7. The model that shows how much energy is passed from one organism to another is the _____ .

A energy pyramid

B food chain

C food web

D symbiotic relationship

8. The process by which a liquid changes to a gas is called _____ .

A collection

B precipitation

C condensation

D evaporation

9. A buildup of gases that raises temperature and leads to global warming is the _____ .

A nitrogen effect

B condensation cycle

C greenhouse effect

D carbon cycle

10. Energy for most things on Earth originally comes from _____ .

A the Sun

B a producer

C the ocean

D a community

11. When organic matter breaks down so that it can be used as a natural fertilizer, it is called _____ .

A composting

B decomposition

C fungus

D recycling

12. The population of a given species decreasing until the species no longer exists is called _____ .

A endangered

B extinction

C limited

D threatened

13. The first step in succession produces a _____ .

A climax community

B deciduous forest

C pioneer community

D secondary community

Frozen Frogs

Read the Literature feature in your textbook.

Write About It

Response to Literature This article describes a frog during winter. What is the frog doing? What has happened to its body? Choose an animal to write about. Write an essay describing the process that this animal goes through to survive severe weather conditions, such as cold winters or hot summers.

Name _____ Date _____

Exploring Space

Complete the concept map on exploring space by using words and phrases from your textbook.

Observational Tools

A(n) _____ is a special structure in which scientists can use telescopes and other tools.

Special telescopes detect invisible light that is part of the _____ _____ .

A radio telescope is shaped like a giant _____ to catch radio waves.

Early Space Exploration

Powerful engines called _____ can escape Earth's gravity to travel to space.

The first artificial satellite in space was the Russian spacecraft _____ .

In _____ , Project Apollo reached the Moon.

How We Learn About Space

Modern Space Exploration

NASA designed a reusable spacecraft called a(n) _____ to make traveling to space easier and more economical.

Astronauts can live aboard a(n) _____ for long periods of time.

Space technology helps _____ technology in other fields on Earth.

Name _____ Date _____

LESSON
Outline

GLE 0607.T/E.I

Seeing in Space

Use your textbook to help you fill in the blanks.

What is Astronomy?

1. Astronomy is the study of the _____ .
2. The first telescope ever made was probably a _____ telescope.

How do we see in space?

3. Professional _____ often use optical _____ to observe space.
4. A special structure built to hold telescopes and other observational equipment is called a(n) _____ .
5. The _____ orbits Earth and sends back images of distant galaxies.
6. The larger a telescope's lenses or mirrors, the more _____ it can collect. What is electromagnetic radiation?
7. Energy transmitted from one point to another by electromagnetic waves is called _____ .
8. The electromagnetic _____ contains both invisible and visible light.
9. Infrared telescopes detect _____ produced by a newly forming star or planet.
10. X-ray telescopes give us information about _____ and _____ .

Name _____ Date _____

11. Ultraviolet telescopes can contribute data that lend support to the _____ .

What is a radio telescope?

12. A _____ studies radio waves emitted by stars and planets.

13. Because many radio waves are not blocked by Earth's atmosphere, radio telescopes are not usually affected by _____ conditions.

14. A radio telescope is generally shaped like a giant _____ .

Critical Thinking

15. Why might professional astronomers use many different types of telescopes to study space?

_____

_____

_____

_____

_____

_____

Name _____ Date _____

LESSON
Vocabulary

Seeing in Space

Match the correct letter with the description.

a. electromagnetic radiation	**d.** invisible light	**g.** radio telescope
b. electromagnetic spectrum	**e.** observatory	**h.** reflecting telescope
c. *Hubble Space Telescope*	**f.** radio wave	

1. _____ I include things such as ultraviolet light, X rays, infrared waves, radar, and radio waves. What am I?

2. _____ I collect light by using lenses or mirrors. What am I?

3. _____ I am energy transmitted from one point to another by electromagnetic waves. What am I?

4. _____ I am a special structure built to hold telescopes and other observational equipment. What am I?

5. _____ I study radio waves emitted by stars and planets. What am I?

6. _____ I contain the full range of wavelengths, from very short to very long. I contain both invisible and visible light. What am I?

7. _____ I am part of the left end of the electromagnetic spectrum. I have a longer wavelength and lower energy than visible light. What am I?

8. _____ I orbit Earth and send back images of distant galaxies. I was first launched in 1990. What am I?

Name _____ Date _____

Seeing in Space

Fill in the blanks.

astronomers	infrared	radio telescopes	visible
electromagnetic spectrum	invisible	light	X-ray telescopes
electromagnetic wavelengths	observatories	telescope	

Certain scientists study space. These people are called _____ . Astronomers work at places called _____ where they have special equipment to study the sky. One kind of _____ uses lenses and mirrors to capture light. Telescopes with bigger reflectors can capture more _____ and show clearer images.

The Sun and other astronomical bodies give off not only _____ light but also _____ light. Both kinds of light are part of the _____ . It is made up of all the _____ . Astronomers can use _____ telescopes to detect heat. They can also use _____ to learn about supernovas and black holes.

One type of long electromagnetic wave is the radio wave. Special _____ catch these waves to gather data about astronomical objects, such as sunspots, solar flares, and planets.

Name _____ Date _____

LESSON
Outline

GLE 0607.6.I

Early Space Exploration

Use your textbook to help you fill in the blanks.

How do we explore space?

1. A powerful engine that carries its own fuel source and does not require air to work is called a(n) _____ .
2. Rockets can be fueled by both solid and liquid _____ .
3. Unlike other rockets, an air-breathing rocket would not have to store _____ on board.
4. One new rocket technology involves the use of _____ , an electrically charged, very highly heated gas.

What are satellites?

5. Any object, natural or artificial, that revolves around another object is called a(n) _____ .
6. The first _____ satellite, named *Sputnik*, was put into orbit by the Soviet Union in 1957.
7. Weather satellites help forecasters predict the weather by gathering data about _____ , _____ , air _____ , and air _____ .
8. Communications satellites transmit _____ and _____ signals all over the world.

What are space probes?

9. Devices that use onboard instruments to get close-up views of celestial bodies are called _____ .

Name _____ Date _____

10. Space probes do not carry _____ and are often designed not to return to Earth.

11. In 1973, the space probe _____ was launched to gather data about Mercury.

12. Two space probes called _____ were launched in 2003 to search for evidence of water on the surface of Mars.

How did we get to the Moon?

13. In 1961, _____ challenged scientists to send a person to the Moon.

14. In 1962, astronaut _____ became the first American to orbit Earth.

15. In 1969, astronaut _____ became the first person to step onto the Moon.

Critical Thinking

16. Why do space probes not have people on them?

_____

_____

_____

_____

_____

Name _____ Date _____

Early Space Exploration

Fill in the blanks.

artificial satellite	propellant	space junk
plasma	rocket	space probe
Project Apollo	satellite	

1. Pieces of human-made equipment that have fallen into disuse are called _____ .
2. A powerful engine that carries its own fuel source and does not require air to work is a(n) _____ .
3. The first mission to successfully take humans to the Moon was called _____ .
4. An electrically charged, very highly heated gas used in rocket technology is _____ .
5. Any object, natural or artificial, that revolves around another object is a(n) _____ .
6. A device that uses onboard instruments to get close-up views of celestial bodies is called a(n) _____ .
7. The solid or liquid fuel burned by a rocket is called _____ .
8. An object built by humans that revolves around another object is called a(n) _____ .

Name _____ Date _____

Early Space Exploration

Fill in the blanks.

Galileo	Neil Armstrong	rockets	*Sputnik*
John F. Kennedy	planets	satellites	weather
Moon	propellant	space probes	

Sending people and objects into space has helped people learn about the solar system. To travel to space, scientists learned how to build _____ . These engines use special fuel called _____ . Rockets can be used to launch objects such as _____ that orbit Earth. The Soviet Union launched _____ , the first artificial satellite, in 1957. Today, people use satellites to predict the _____ and to gather information.

Scientists can send _____ to get a closer look at far-off places. Space probes can take photographs of or even land on distant _____ . The space probe _____ sent back the first close-up photograph of an asteroid. In 1961, President _____ asked scientists to find a way to put people on the _____ . In 1969, astronaut _____ became the first person to walk on the Moon.

Name _____ Date _____

Reading in Science

GLE 0607.6.I

Meet Mordecai-Mark Mac Low

Read the Reading in Science feature in your textbook. Look for clues in the article to help you draw conclusions about quasars.

Draw Conclusions

Use the graphic organizer to draw conclusions.

Text Clues	Conclusions

Name _____ Date _____

Write About It

Draw Conclusions

1. Why do quasars look like faint points of light when they are viewed from Earth?
2. If scientists observe that a quasar is moving away from us, what can they conclude about its galaxy?

Planning and Organizing

Explain what Mordecai-Mark studies.

What did the scientists conclude about the brightness of quasars?

What did the scientists conclude about the movement of quasars?

Drafting

Now draw a conclusion about how information about quasars helps Mordecai-Mark understand how the universe is changing over time.

Name _____ Date _____

LESSON
Outline

GLE 0607.T/E.I, 0607.T/E.3, 0607.6.I
SPI 0607.T/E.3

Modern Space Exploration

Use your textbook to help you fill in the blanks.

What is a space shuttle?

1. NASA thought it would be less _____ and less _____ to develop something that could be used over and over.
2. A reusable spacecraft that transports astronauts, satellites, and other materials to and from space is called a(n) _____ .
3. While in _____ , astronauts aboard the shuttle can perform many different tasks.
4. After a mission, the shuttle glides back to _____ and lands like an airplane.

What is a space station?

5. An object in space that allows astronauts to stay and work for extended periods of time is called a(n) _____ .
6. In 1973, the United States launched the space station _____ .
7. In 1995, the United States and _____ began cooperating on joint missions aboard *Mir*.
8. The relationship between Russia and the United States laid the groundwork for the _____ .

How do we explore Mars?

9. The Mars _____ carried technology to study the surface of the planet, including a remote-controlled robot rover called _____ .

Name _____ Date _____

10. In 2004, twin rovers landed that provided clues about the role of _____ on Mars.

What's Next?

11. Future missions may involve more trips to the _____ to investigate its properties.

How is space technology used?

12. Medical data gathered aboard the space shuttle or the *International Space Station* have led to better ways to treat and diagnose _____ here on Earth.

13. GPS systems, _____ , and _____ have all been made possible by work originally done for space exploration.

14. The same material designed to protect *Skylab* from solar radiation has since been used to create a thermal _____ that can protect individuals in an emergency.

Critical Thinking

15. Why is it advantageous for astronauts to live on a space station rather than in a space shuttle?

_____

_____

_____

_____

Name _____ Date _____

LESSON
Vocabulary

Modern Space Exploration

Match the correct letter with the description.

a. booster rockets

b. *International Space Station*

c. liquid fuel tank

d. New Millennium Program

e. *Skylab*

f. space shuttle

g. space station

1. _____ I am an orbiting laboratory designed for long-term research projects. I am a joint venture of more than 15 countries. What am I?

2. _____ I am a project designed to develop advanced technology that will let NASA send smart spacecraft into the solar system. What am I?

3. _____ I am a space station launched by the United States in 1973. What am I?

4. _____ I am connected to the space shuttle at launch, but I later separate and fall back to Earth. I am not reused. What am I?

5. _____ I am an object in space that allows astronauts to stay and work for extended periods of time. What am I?

6. _____ I am a reusable spacecraft developed to transport astronauts, satellites, and other materials to and from space. What am I?

7. _____ I hold solid fuel for the space shuttle. I am attached to the space shuttle at launch. What am I?

Name _____ Date _____

Modern Space Exploration

Fill in the blanks.

booster rockets	liquid fuel tank	New Millennium Program	space station
communications	Mars	space shuttle	water
International Space Station	*Mir*		

NASA determined that it would be useful to have a reusable spacecraft. They designed the _____ , which can travel to and from space over and over again. It is launched by using solid-fuel _____ and an external _____ . Because the space shuttle was not designed for long missions, scientists developed a(n) _____ . In 1986, the Russians began building the space station _____ . After the United States and Russia worked together on *Mir*, many countries joined together to build the _____ .

During the 1990s, NASA began to study _____ more closely. Space probes were sent to analyze rocks and soils and to look for signs of _____ . NASA developed the _____ to improve space technology and reduce costs.

Advances in space technology have improved medicine, _____ , and other technologies on Earth.

Name _____ Date _____

Exploring Space

Circle the letter of the best answer.

1. A special structure built to hold telescopes and other observational equipment is a(n) _____ .

   A astronomer **B** observatory **C** reflector **D** dome

2. The energy transmitted from one point to another by electromagnetic waves is called _____ .

   A ultraviolet light **C** electromagnetic spectrum

   B gamma ray **D** electromagnetic radiation

3. Infrared telescopes detect _____ .

   A X rays **B** heat **C** visible light **D** black holes

4. A device that studies radio waves emitted by stars and planets is a(n) _____ .

   A radio telescope **C** ultraviolet telescope

   B X-ray telescope **D** optical telescope

5. A powerful engine that carries its own fuel source and does not require air to work is called a _____ .

   A propellant **B** plasma **C** rocket **D** space probe

6. Any object, natural or artificial, that revolves around another object is a(n) _____ .

   A orbit **B** satellite **C** antenna **D** planet

7. The first successful artificial satellite launched by the United States was called _____ .

   A *Voyager I* **B** *Mariner* **C** *Sputnik* **D** *Explorer I*

8. Devices that use onboard instruments to get close-up views of celestial bodies are called _____ .

   A rovers **B** satellites **C** magnetic fields **D** space probes

Name _____ Date _____

9. The first mission that successfully landed a person on the Moon was called _____ .

A Project Apollo **B** *Magellan* **C** Project Mercury **D** *Voyager 2*

10. A reusable spacecraft developed to transport astronauts, satellites, and other materials to and from space is a _____ .

A cargo bay
B liquid-fuel tank
C space shuttle
D booster rocket

11. An object in space that allows astronauts to stay and work for extended periods of time is called a _____ .

A cosmonaut
B space station
C space shuttle
D Shuttle-Mir Program

12. More than 15 countries have joined to design a laboratory for long-term research projects called _____ .

A *Mir*
B *Destiny*
C *Zarya Module*
D *International Space Station*

13. In 1996, NASA landed a rover on Mars that was called _____ .

A *Pathfinder*
B *Global Surveyor*
C *Spirit*
D *Opportunity*

14. A project designed by NASA to develop advanced technology controlled by onboard computer systems is called _____ .

A Sojourner
B Phoenix
C New Millennium Program
D Lunar Prospector

Name _____ Date _____

CHAPTER
Concept Map

The Solar System and Beyond

Complete the concept map on the universe and solar system, using words and phrases from your textbook.

Our Moon

The appearance of the Moon seems to change each week, producing

_____ of the Moon.

If the Moon comes between Earth and the Sun or the Earth comes between the Moon and the Sun,

a(n) _____ occurs.

Our Sun

The length of our year is the length

of one _____ of Earth around the Sun.

Our Sun is an average-sized,

_____ star, but it will eventually become a red giant.

Our Planet

Earth travels around the _____ . Unlike other planets, Earth has

liquid _____ on its surface.

Our Galaxy

We can sometimes see our galaxy,

the _____ , in the night sky. Our galaxy has a

_____ shape.

Background radiation supports the

_____ theory.

Our Solar System

The inner planets are Mercury,

_____ , Earth, and Mars. The outer planets include

Jupiter, _____ , Uranus, and Neptune.

The solar system also includes orbiting comets, asteroids, and

_____ .

LESSON
Outline

Name _____ Date _____

GLE 0607.6.2, 0607.6.3, 0607.6.6
SPI 0607.6.6

The Earth-Sun System

Use your textbook to help you fill in the blanks.

What are Earth's properties?

1. Earth moves in a circle around the _____ .
2. The shape of Earth is _____ like a ball.
3. Earth is protected from harmful solar radiation by its _____ .
4. The atmosphere absorbs the Sun's _____ and contains _____ that organisms need to survive.
5. Unlike other planets, Earth has liquid _____ on its surface.

How can we prove that Earth rotates?

6. Earth makes one rotation on its _____ every 24 hours.
7. The Sun seems to rise in the east and travel west on its _____ .
8. Earth _____ at a rate of about 360 degrees every 24 hours, or 15 degrees per hour.
9. Earth is divided into 24 vertical belts, each about 15 degrees wide in longitude, called _____ .

Name _____ Date _____

LESSON
Outline

What makes a year?

10. One complete _____ of Earth around the Sun takes _____ days.

11. In a hemisphere's summer, that hemisphere is tilted _____ the Sun and receives the Sun's rays more directly; in winter, that hemisphere is tilted _____ the Sun and receives the Sun's rays at a lower angle.

12. Periods of the year characterized by particular weather conditions are _____ .

What are the parts of the Sun?

13. Most solar energy is produced in the Sun's _____ .

14. The _____ is the surface of the Sun that we can see.

15. Bursts of heat called _____ can disrupt satellite transmissions.

Critical Thinking

16. What three factors can explain changes in the shadows objects cast, time differences, and changes of season over the Earth?

_____

_____

Name _____ Date _____

The Earth-Sun System

Match the correct letter with the description.

a. atmosphere	**e.** revolution
b. axis	**f.** rotation
c. corona	**g.** standard time zone
d. international date line	**h.** sunspot

1. _____ I am a dark spot on the Sun. I have a lower temperature than my surrounding areas. What am I?

2. _____ I am one complete trip around the Sun. What am I?

3. _____ I am a vertical belt, about 15 degrees wide in longitude, in which all locations have the same time. What am I?

4. _____ I am a blanket of air surrounding Earth. What am I?

5. _____ I am an imaginary line that runs from the North Pole to the South Pole through the center of Earth. What am I?

6. _____ I am a line at a longitude of 180 degrees. What am I?

7. _____ I am the outer layer of the Sun's atmosphere. What am I?

8. _____ I am one complete spin of Earth on its axis. What am I?

Name _____ Date _____

LESSON
Cloze Activity

The Earth-Sun System

Fill in the blanks.

axis	solar energy	revolution
gases	sunspots	time zones
magnetic field	Sun	

Earth moves in a circle around the _____ . The atmosphere contains _____ that plants and animals need to survive. Earth's _____ protects the planet from solar radiation.

The Sun produces _____ in its core. Some areas of the Sun have a lower temperature than other parts. These are called _____ .

Earth rotates about 360 degrees on its _____ every 24 hours, or at a rate of 15 degrees every hour. Earth is divided into 24 standard _____ that are about 15 degrees wide in longitude. It takes Earth 365.24 days to make one _____ , or one complete trip around the Sun. The direction in which Earth tilts on its axis during this time causes the seasons to change.

LESSON
Outline

Name _____ Date _____

GLE 0607.6.3, 0607.6.4, 0607.6.5, 0607.6.7
SPI 0607.6.3, 0607.6.5, 0607.6.7.

The Earth-Sun-Moon System

Use your textbook to help you fill in the blanks.

What is the Moon like?

1. Much of our information about the Moon came from data gathered by the _____ .

2. Bowl-shaped depressions on the Moon's surface are _____ that were formed by impacts from space objects.

3. Maria, highlands, valleys, and _____ are features on the Moon's surface.

4. Small amounts of _____ may be present on _____ floors on the Moon.

What causes the phases of the Moon?

5. The shape of the Moon that we see in the night sky is the _____ .

6. Whichever side of the Moon faces the _____ is the lighted side.

7. When the Moon is directly between the Sun and Earth, its phase is the _____ , so we see none of its lighted side.

8. During the _____ phases, we see more and more of the lighted side of the Moon; during the _____ phases, we see less and less of its lighted side.

What causes eclipses?

9. A lunar eclipse occurs when _____ blocks sunlight from reaching _____ .

10. During a lunar eclipse, the Moon passes directly through Earth's _____ at the time of the _____ .

11. A total solar eclipse can occur when Earth passes through the Moon's shadow during the _____ phase.

What causes the tides?

12. Waves come higher up on the shore at some times than at others because of the _____ .

13. Tides on Earth are the result of the pull of gravity between Earth and _____ .

14. When the Sun, Earth, and the Moon are all in a line, a(n) _____ occurs.

15. When the gravitational pulls of the Sun and the Moon are at right angles, a(n) _____ occurs.

Critical Thinking

16. How does the Moon affect Earth?

_____

_____

_____

_____

Name _____ Date _____

The Earth-Sun-Moon System

Match the correct letter with the description.

a. craters	**d.** maria	**g.** tide
b. gravity	**e.** phase	**h.** waning
c. lunar eclipse	**f.** solar eclipse	**i.** waxing

1. _____ the shape of the Moon we see in the night sky

2. _____ the force of attraction among all objects

3. _____ the type of phase that occurs when the lighted side of the Moon becomes more and more visible

4. _____ the bowl-shaped depressions on the Moon's surface formed by impacts from space objects

5. _____ an event that occurs when Earth blocks sunlight from reaching the Moon

6. _____ the regular rise and fall of the water level along a shore

7. _____ the large, dark, flat surface areas on the Moon's surface

8. _____ an event that occurs when Earth passes through the Moon's shadow

9. _____ the type of phase that occurs when we see less and less of the Moon's lighted side

Name _____ Date _____

The Earth-Sun-Moon System

Fill in the blanks.

craters	lunar	shape
Earth	maria	solar
gravity	phases	telescopes

Technology allows scientists to study the Moon in new ways. Apollo astronauts saw firsthand many features that before had been viewed only through _____ . They inspected _____ and saw _____ , highlands, mountain ranges, and valleys.

As the Moon revolves around _____ , it passes through _____ and appears to change _____ . If the Moon passes directly through Earth's shadow, a(n) _____ eclipse occurs. When Earth passes through the shadow of the Moon, a(n) _____ eclipse occurs.

Tides are the result of the pull of _____ between Earth and the Moon. The positions of Earth, the Moon, and the Sun can cause tides to be especially strong or weak.

LESSON
Outline

Name _____ Date _____

GLE 0607.6.l, 0607.6.2
SPI 0607.6.l

The Solar System

Use your textbook to help you fill in the blanks.

What is the solar system?

1. A large body that orbits a star is a(n) _____ ,
   and a large object that orbits a planet is a(n) _____ .
2. A star and all the planets, moons, and other bodies
   that orbit it make up a(n) _____ .
3. The pull between a planet and the Sun is stronger
   when the planet has greater _____ .
4. When a planet is far away from the Sun, the pull of
   gravity between them is _____ .
5. The balance between gravity and inertia keeps planets
   on a curved pathway, or _____ ,
   around the Sun.

What is in the inner solar system?

6. The planets that are closest to the Sun, or the _____ ,
   are rocky and are similar in _____ .
7. Inner planets have few _____ and
   no _____ .
8. Between the orbits of Mars and Jupiter are orbiting
   rocky or metallic objects called _____ .

What are the outer planets?

9. The planets beyond the asteroid belt are known collectively as the _____ .

10. Jupiter, Saturn, Uranus, and _____ are also called the gas giants.

What are other objects in our solar system?

11. Sunlight evaporates the ice in a comet, and a(n) _____ in the shape of a(n) _____ forms, pointing away from the Sun.

12. Small, rocky objects called _____ orbit the Sun throughout the solar system.

13. Meteoroids that enter Earth's atmosphere are called _____ ; if they strike Earth they are called _____ .

Critical Thinking

14. A new planet has been discovered. Its orbit is twice as long as Earth's orbit. Where might this planet be located? Explain your answer.

_____

_____

_____

_____

_____

Name _____ Date _____

The Solar System

Write the correct answers on the lines provided, and circle the answers in the grid.

comet	meteor	meteoroid	planet
inertia	meteorite	moon	solar system

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

1. _____ a large body that orbits a star

2. _____ a large object that orbits a planet

3. _____ a star and all the planets, moons, and other bodies traveling around it

4. _____ the tendency of a moving object to stay in motion

5. _____ a ball of ice and rock that orbits the Sun

6. _____ small, rocky objects that orbit the Sun

7. _____ a meteoroid that enters Earth's atmosphere

8. _____ a meteor that strikes Earth's surface

Name _____ Date _____

LESSON
Cloze Activity

The Solar System

Fill in the blanks.

gas giants	meteor	orbits	stars
inner	meteorite	rings	Sun
metallic	meteoroids	rocky	

A solar system consists of a star that is orbited by planets, moons, and other objects. Planets are large bodies that orbit _____ , and moons orbit planets. The star that planet Earth orbits is the _____ .

Mercury, Venus, Earth, and Mars are called the _____ planets. Their _____ bring them closest to the Sun. They are similar in size, are mostly _____ , and have no rings. The outer planets are all _____ . The gas giants all have _____ and moons. Their cores are small and _____ .

Other objects in our Solar System include asteroids, _____ , and comets. A meteoroid that is pulled by gravity into Earth's atmosphere is a(n) _____ . If a meteor hits Earth's surface, it is called a(n) _____ . A comet is a ball of ice and rock that orbits the Sun.

Name _____ Date _____

GLE 0607.6.2

Is Pluto a Planet?

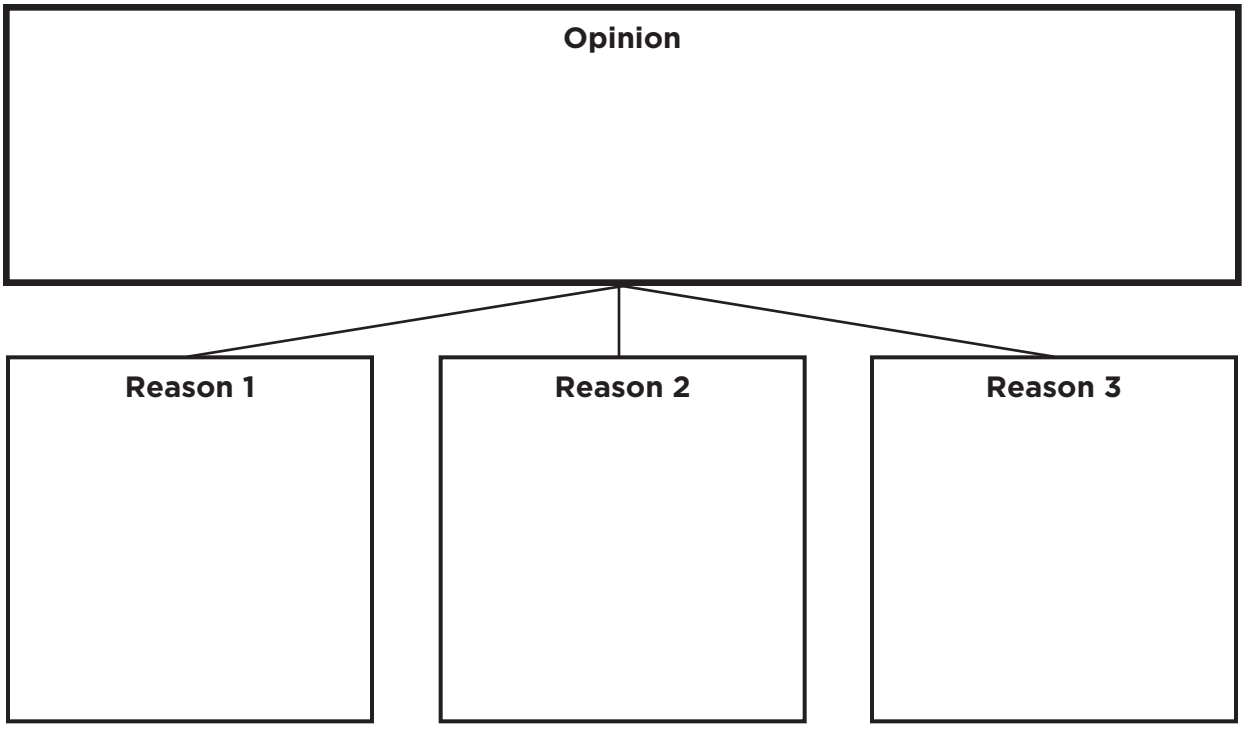
Read the Writing in Science feature in your textbook.

Write About It

Persuasive Writing Recently the International Astronomical Union (IAU) decided to drop Pluto from the list of planets in our solar system. Write a letter to the editor of your local newspaper arguing either for or against this decision. Include facts that back up your opinion.

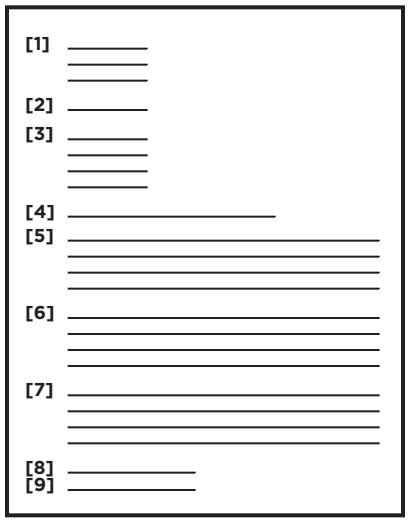
Getting Ideas

Fill in the chart below. In the top box, write your opinion about the IAU's decision. In the bottom boxes, write reasons that support your opinion.



Drafting

Follow these directions to create a formal letter:



1. Write or type your complete address.
2. Write or type the date.
3. Write or type the name, organization, and address of the person to whom you are writing.
4. Write or type the salutation, or greeting. Put a colon at the end of it.
5. Write or type an introductory paragraph. Explain why you are writing, and give your opinion about the problem.
6. Explain the causes and effects of the problem to support your opinion.
7. In your last paragraph, tell what you want to happen.
8. Use a phrase, such as "Sincerely yours" or "Yours truly" to close the letter. Put a comma after these words.
9. Sign your name. If you are using a computer, type your name a few lines below the closing, and then sign your name above that after you have printed the letter.

Now write your first draft. Use a separate piece of paper. Follow the format of a formal letter.

Revising and Proofreading

Now revise and proofread your letter. Ask these questions:

- Have I clearly stated my opinion about the IAU's decision in my first paragraph?
- Have I included convincing reasons and arguments to support that opinion?
- Have I followed the format of a formal letter?
- Have I corrected all grammar, spelling, capitalization, and punctuation errors?

LESSON
Outline

Name _____ Date _____

GLE 0607.6.I
SPI 0607.6.2

Stars

Use your textbook to help you fill in the blanks.

What are stars?

1. Large, hot balls of gases that are held together by _____ and give off their own light are called _____ .

2. Orion is a(n) _____ that can be seen in the winter night sky in the Northern Hemisphere.

3. When a star appears to shift positions as viewed from two places on Earth, this is called _____ .

4. Scientists measure a star's parallax and use _____ to calculate its distance from Earth.

5. Scientists measure distance in space in units called _____ .

What are some properties of stars?

6. A star's brightness, or _____ , is dependent upon how much light it gives off and its distance from Earth.

7. Absolute magnitude measures how bright a star really is, and _____ measures how bright a star looks in the night sky.

8. The temperature on the surface of a star determines the star's _____ .

9. The largest stars are _____ and the smallest are _____ .

10. The H-R diagram shows that most stars, including our Sun, are _____ stars.

How do stars develop?

11. A star begins as a nebula, then heats up and becomes a protostar, then undergoes nuclear reactions, releases energy, and becomes a(n) _____ star.

12. As a star expands, its surface cools and it turns red, and then the star becomes a(n) _____ or a supergiant, depending on its mass.

13. A red giant releases energy and forms a layer of gases called a(n) _____ , heats up to become a white dwarf, and then cools to become a(n) _____ .

14. When a supergiant collapses, it then explodes, becoming a(n) _____ , which can become a neutron star or a(n) _____ .

What kind of star is the Sun?

15. The Sun is a(n) _____ star that will become a(n) _____ .

Critical Thinking

16. What will happen to the large amount of hydrogen in the Sun over the next 5 billion years? Will the Sun be hotter or cooler than it is now?

_____

_____

_____

Name _____ Date _____

Stars

Use the clues to unscramble each word. Then unscramble the circled letters to answer the last question.

black hole	light-year	nebula	star
constellation	magnitude	parallax	supernova

1. RAST — a large, hot ball of gases, held together by gravity, that gives off its own light

◯ _ _ _

2. LETCOSLOANINT — a group of stars that appear to form a pattern

◯ _ ◯ _ _ _ _ _ _ _ ◯ _ _

3. LAPRAXAL — the apparent shift in an object's position when viewed from two locations

_ _ _ ◯ _ _ _ _

4. TRHAGEIYL — the distance that light travels in one year

_ ◯ _ _ ◯ - _ _ _ ◯

5. LEUBAN — a huge cloud of gas and dust in space

_ ◯ _ _ _ _

6. VURANOSEP — an exploded star

◯ _ _ _ _ ◯ _ _ _

7. KECLAOLHB — an object whose gravity is so strong that even light cannot escape from it

_ _ ◯ _ _ _ ◯ _ _

8. GADNIMUTE — the brightness of a star

_ _ ◯ _ _ ◯ _ _ _

9. How is a planetary nebula formed?

by NUCLEAR _ _ _ _ _ _ _ _ _

in RED _ _ _ _ _ _

Name _____ Date _____

Stars

Fill in the blanks.

black hole	light-years	nebula
color	magnitude	neutron star
gravity	main-sequence	supernova

Groups of stars form patterns in the sky called constellations. A star is a large, hot ball of gases that is held together by _____ and gives off its own light. Distances in space are measured in _____ .

The brightness of a star is its _____ . You can tell the surface temperature of a star by its _____ . The Sun, like most stars, is a(n) _____ star.

A star develops from a cloud of dust and gas called a(n) _____ . A very large star, called a supergiant, may collapse and explode to become a(n) _____ and then a(n) _____ . When a very massive star collapses, it may end up as a(n) _____ . X-rays in space provide evidence of the existence of these collapsed stars.

LESSON
Outline

Name _____ Date _____

GLE 0607.6.I

Galaxies and Beyond

Use your textbook to help you fill in the blanks.

What are galaxies?

1. A _____ is a group of star clusters held together by gravity. in the same way that planets orbit a star.

2. Galaxies differ in size, age, and _____ .

3. A whirlpool-shaped galaxy is a(n) _____

   galaxy, a football-shaped galaxy is a(n) _____
   galaxy, and one with no regular shape is called a(n)

   _____ galaxy.

4. Our home galaxy, the Milky Way, is a(n) _____
   galaxy.

What was the big bang?

5. Some of the light produced by the heated gases of stars

   is _____ by the star's atmosphere.

6. The light absorbed by a star's atmosphere drops out of

   its light spectrum, forming dark _____ .

7. When a galaxy is moving toward Earth, the light shining from that galaxy shifts toward the

   _____ end of the spectrum.

8. When a galaxy is moving away from Earth, the light shining from that galaxy shifts toward the

   _____ end of the spectrum.

9. The rapid expansion of the universe that sent matter in all directions is known as the _____ .

10. Billions of years after the big bang, dust and gas gathered into a(n) _____ massive enough to rotate.

11. Gravity has caused space matter to collect into clumps, forming stars and _____ .

12. Radiation that is left over from the beginning moments of the universe and that comes from all directions in space is called _____ radiation.

How did Earth form?

13. Over time the very young Earth became large enough that its _____ could hold an atmosphere.

14. Earth's early atmosphere of hydrogen and helium was replaced over time by water vapor, sulfur, _____ , and nitrogen, which were released by _____ .

15. When plants developed, _____ appeared as a waste product of _____ .

Critical Thinking

16. How is the formation of Earth like the formation of the universe?

_____

_____

_____

Name _____ Date _____

Galaxies and Beyond

Match the correct letter with the description.

a. absorption lines	**e.** galaxy
b. background radiation	**f.** Milky Way
c. big bang	**g.** spectrum
d. expansion redshift	**h.** spiral

1. _____ our home galaxy

2. _____ the beginning moment when the universe was very hot and dense

3. _____ when a galaxy is moving away from Earth, and its light shifts toward the red end of the spectrum

4. _____ dark lines that form when some of a star's light is absorbed by the star's atmosphere

5. _____ a band of colors in white light

6. _____ radiation left over from the beginning moments of the universe that comes from all directions in space

7. _____ a group of star clusters held together by gravity

8. _____ a type of galaxy that is shaped like a whirlpool

Name _____ Date _____

LESSON
Cloze Activity

Galaxies and Beyond

Fill in the blanks.

big bang	expanding	spectrum	stars
blue	red	spiral	

A group of star clusters held together by gravity is called a galaxy. A galaxy with lots of dust and arms wound tightly or loosely around a core is a(n) _____ galaxy.

White light can be separated into a band of colors called a(n) _____ . Absorption lines are shifted toward the _____ end of the spectrum when galaxies are moving toward Earth. Absorption lines are shifted toward the _____ end of the spectrum when galaxies are moving away from Earth. Scientists have found that most galaxies are moving away from Earth because the universe is _____ .

The moment that the universe began to expand is called the _____ . Gravity caused matter to clump together to form _____ and galaxies. Some clumps also formed planets including Earth.

Name _____ Date _____

GLE 0607.6.I

Colors of Stars

Read the Writing in Science feature in your textbook.

Write About It

Fictional Writing Write a science-fiction story about traveling to the Messier 82 galaxy. Describe some of the problems involved in long-distance space travel. What plans do the main characters make in order to allow people to travel such great distances? Use an appropriate point of view, and add dialogue to make your story come alive.

Getting Ideas

The main problem for your story is that M82 is about 12 million light years away from Earth. Write this main problem in the top box of the chart below. Then think about all the minor problems caused by this main problem. In the center box of the chart, write steps the characters in your story take to solve these problems. In the bottom box, write how the characters finally solve the problem.

Problem

↓

Steps to Solution

↓

Solution

Name _____ Date _____

Drafting

Write a sentence to begin your fictional narrative. Introduce your main character. Try to grab your readers' attention so that they will want to read more.

_____

_____

Now write your first draft. Use a separate piece of paper. Begin with the sentence you wrote above. Tell what the main problem is and how the characters solve the problem. Tell the trials they face along the way. Use dialogue to bring the story to life.

Revising and Proofreading

Here is part of the story that Jasmine wrote. She used dialogue, but she forgot to include quotation marks. Read over the sentences below. Add quotation marks where necessary.

I know you are frightened, said Captain Shue, and you are wondering if you will ever see your families again. You are probably also wondering if you will survive. . . .

No one has ever traveled this far, interrupted Ensign Meggs.

We will succeed, said Captain Shue. Our scientists have thought through all the problems.

Now revise and proofread your story. Ask these questions:

- Have I centered my story on the problem of traveling to a galaxy 12 million light years away?
- Have I shown how the characters solved the problem?
- Have I included a beginning, middle, and end?
- Have I corrected all grammar, spelling, capitalization, and punctuation errors?

Name _____ Date _____

The Solar System and Beyond

Circle the letter of the best answer.

1. During a new moon, you face _____ .

- **A** one half of the lighted side of the Moon
- **B** all of the lighted side of the Moon
- **C** the dark side of the Moon
- **D** the waning crescent phase of the Moon

2. A star is hottest when it is _____ .

- **A** blue-white
- **B** orange
- **C** red
- **D** orange-yellow

3. Planets are kept in orbit by _____ .

- **A** nuclear fusion
- **B** gravity and inertia
- **C** redshift and blueshift
- **D** parallax

4. The Milky Way is an example of _____ .

- **A** a spiral galaxy
- **B** an irregular galaxy
- **C** an elliptical galaxy
- **D** a core galaxy

5. Earth completes one full rotation on its axis _____ .

- **A** every 15 degrees
- **B** every 24 hours
- **C** every 365 days
- **D** every 6 months

6. During nuclear reactions in main-sequence stars, _____ .

- **A** oxygen is released
- **B** helium atoms fuse to make hydrogen
- **C** hydrogen atoms fuse to make helium
- **D** carbon dioxide is released

7. One complete trip around the Sun is _____ .

- **A** a revolution
- **B** a month
- **C** a time zone
- **D** a rotation

8. The life of a star begins in _____ .

- **A** a black hole
- **B** a nebula
- **C** a white dwarf
- **D** an Oort cloud

9. All of the following are gas giants except _____ .

A Jupiter

B Neptune

C Mercury

D Saturn

10. According to the H-R diagram, the Sun in our solar system is a _____ .

A main-sequence star

B red giant

C supergiant

D white dwarf

11. The magnitude of a star is a measure of its _____ .

A brightness

B diameter

C mass

D temperature

12. When Earth blocks sunlight from reaching the Moon, the result is a _____ .

A lunar eclipse

B solar eclipse

C spring tide

D neap tide

13. Most rocky or metallic objects that orbit the Sun are found in the _____ .

A Oort cloud

B star nebula

C Kuiper belt

D asteroid belt

14. According to the big bang theory, the universe is _____ .

A contracting

B dying

C expanding

D shrinking

15. The four stages, in order, of the life of a massive star's life cycle are _____ .

A nebula, main-sequence star, supergiant, white dwarf

B protostar, red giant, main-sequence star, neutron star

C nebula, main-sequence star, supergiant, supernova

D supergiant, pulsar, neutron star, supernova

Name _____ Date _____

Weather and Climate

Complete the concept map on weather and climate, using words and phrases from your textbook.

Weather is defined as the state of the _____ at a given place and time. **Climate** is defined as the average _____ of a region. Climate varies with _____ and it is affected by temperature convection currents in _____ , and _____ .

What affects weather?	How do we predict weather?	What is severe weather?
Weather is affected by the angle of the Sun's rays as they hit Earth's surface at different times of the _____ and at different times of the year.	Areas of high _____ usually indicate fair weather; areas of low pressure usually indicate rain, clouds, and storms.	The most common type of severe weather event is a(n) _____ .
Temperature, elevation, and air pressure cause air to move; this movement of air is called _____ .	Weather can change rapidly along the boundaries between regional air masses called _____ .	The most violent thunderstorms can cause spinning funnels of air called _____ .
The water cycle is the process by which ocean water evaporates, condenses, and then falls as _____ in the form of rain, sleet, snow, or hail.	Technology scientists use to predict weather includes weather maps, weather balloons, satellites, and _____ .	Large, swirling storms that start as tropical-ocean thunderstorms merging around a low-pressure center are called _____ .

Name _____ Date _____

LESSON
Outline

GLE 0607.8.2, 0607.8.3

The Atmosphere and Weather

Use your textbook to help you fill in the blanks.

Where is the weather?

1. The layer of the atmosphere in which most weather takes place is the _____ .
2. Weather variables include temperature, wind, moisture, cloud cover, and _____ .

What affects air temperature?

3. The angle of insolation depends on three factors: _____ , time of year, and time of day.
4. The three different temperature scales are Fahrenheit, Celsius, and _____ .

What are convection currents?

5. Convection currents can occur in the air, in the ocean, and in the thick, molten rock of Earth's _____ .
6. Plate tectonics and different types of weather are affected by _____ .

What causes ocean currents?

7. Density, which is affected by _____ and temperature, influences the movements of ocean currents.
8. The water in _____ currents moves much slower than the water in surface currents.

What is El Niño/Southern Oscillation?

9. When El Niño occurs, little water is pushed across the _____ , and the ocean stays warm.

Name _____ Date _____

10. There is a(n) _____ in the ocean-atmosphere system in the Pacific Ocean when El Niño occurs.

What is air pressure?

11. Air moves from areas where air pressure is _____ to areas where air pressure is _____ .

12. Warm air is _____ and has a(n) _____ air pressure than cooler air, so warm air rises above cooler air.

13. Wind speed is measured with a(n) _____ , and wind direction is measured with a(n) _____ .

What are global winds?

14. The Coriolis effect causes winds in the Northern Hemisphere to curve _____ .

15. Winds that blow toward the equator and are curved to the west by the Coriolis effect are called _____ .

Critical Thinking

16. When would average air pressure in the United States be lower: in summer or in winter? Explain your answer.

_____

_____

_____

_____

Name _____ Date _____

LESSON
Vocabulary

The Atmosphere and Weather

Match the correct letter with the description.

a. air pressure	**d.** Coriolis effect	**g.** ocean current
b. atmosphere	**e.** insolation	**h.** sea breeze
c. convection cell	**f.** land breeze	**i.** troposphere

1. _____ wind that blows from the land toward the sea

2. _____ a circular pattern of rising air, sinking air, and winds, caused by unequal heating and cooling of a region's air

3. _____ the layer of the atmosphere closest to Earth's surface

4. _____ the force exerted on a given area by impacts of gas particles in constant motion

5. _____ the amount of the Sun's energy that reaches Earth at a given time and place

6. _____ the layers of gases that surround Earth

7. _____ the shift in the direction of global winds caused by Earth's rotation

8. _____ wind that blows from the sea toward the land

9. _____ a continuous flow of water along a definite path

Name _____ Date _____

The Atmosphere and Weather

Fill in the blanks.

climate	deepwater	latitude	surface
convection current	increases	lower	temperature
	insolation	poles	

Two key factors that determine the weather are temperature and air pressure. Air temperature depends mostly on the angle of _____ ; as the angle _____ , the air becomes warmer. Angle of insolation varies with _____ , time of day, and season.

Air rises and falls in a pattern known as a(n) _____ . In the ocean, _____ currents move much more slowly than _____ currents do. Some currents, such as ENSO, can affect global _____ .

Air pressure varies with _____ . Air moves from areas of higher pressure to areas of _____ pressure. Higher air pressure at the _____ than at the _____ causes global convection cells.

Name _____ Date _____

LESSON
Outline

GLE 0607.8.4

Precipitation and Clouds

Use your textbook to help you fill in the blanks.

How does the water cycle affect weather?

1. Water _____ leaves the surface of lakes, streams, and oceans through a process called _____ .

2. When air cools, water molecules lose energy and change into liquid form. This process is called _____ .

3. The higher the temperature is, the _____ water vapor the air can hold.

4. A measure of the amount of water vapor in the air compared to the total amount that the air could hold at that temperature is called _____ .

What are the types of clouds?

5. There are three basic cloud types: _____ , stratus, and cirrus.

6. A cloud that produces precipitation has the suffix _____ or the prefix _____ added to its name.

7. The amount of shading in a circle representing a weather station indicates the amount of _____ present.

What are the different types of precipitation?

8. Sleet forms when _____ freeze before falling to Earth's surface and turn to pellets of ice.

Name _____ Date _____

What is a thunderstorm?

9. Thunderstorms begin when intense heat causes warm, moist air to rise quickly and form _____ clouds.

10. A buildup of an electric charge inside a cumulonimbus cloud can produce a huge spark called _____ .

11. On very hot days, powerful updrafts during thunderstorms can cause funnels of violent, whirling wind called _____ .

What are hurricanes?

12. Thunderstorms over tropical oceans can merge into one large storm called a(n) _____ .

13. At the center of these merging thunderstorms is a large region of _____ pressure.

How can we predict severe storms?

14. To find and track developing storms, scientists use weather satellites, radar, and _____ fitted with special equipment.

Critical Thinking

15. At what time of year do most thunderstorms and hurricanes occur in the United States? Explain your answer.

_____

_____

_____

_____

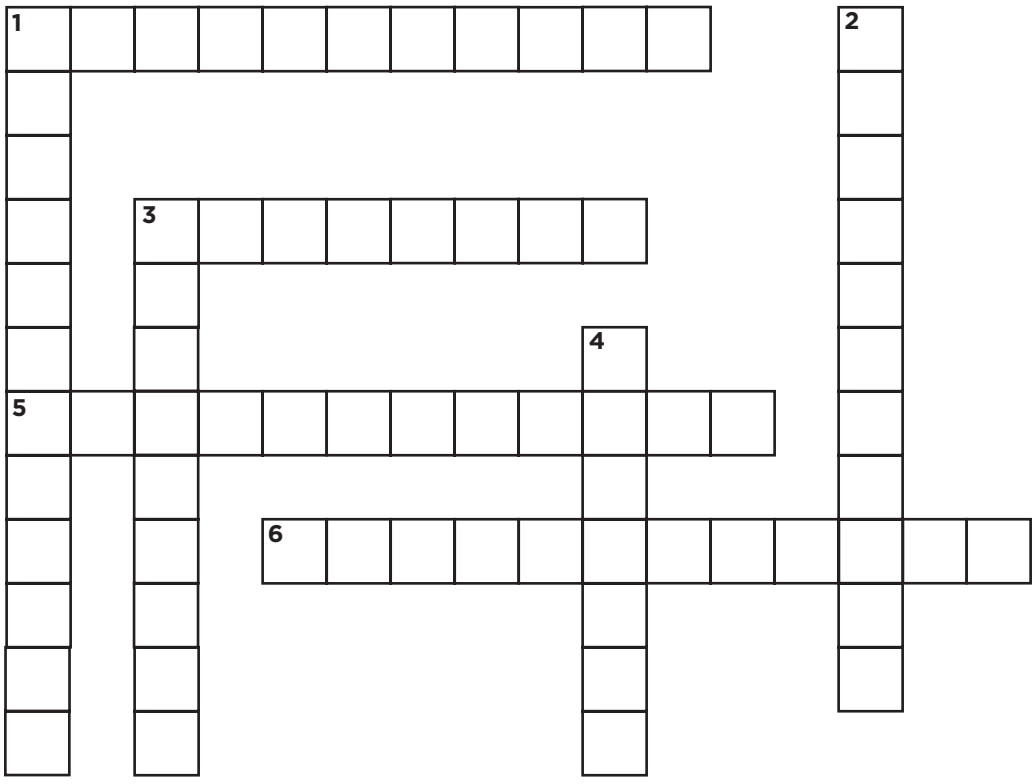
Name _____ Date _____

LESSON
Vocabulary

Precipitation and Clouds

Use the clues to fill in the crossword puzzle.

cirrus cloud	cumulus cloud	humidity	stratus cloud
condensation	evaporation	hurricane	tornado



Across

1. a cloud that has a wispy, featherlike shape
3. the actual amount of water vapor in the air
5. a cloud that appears in blanketlike layers
6. the changing of a gas into a liquid as heat is removed

Down

1. a billowy, puffy cloud that seems to rise from a flat bottom
2. the changing of a liquid into a gas
3. a large, swirling storm with low pressure at the center
4. a violent, whirling wind that moves across the ground in a narrow path

Name _____ Date _____

Precipitation and Clouds

Fill in the blanks.

cirrus	hail	stratus
condensation	hurricanes	thunderstorms
Doppler	precipitation	tornadoes

Water from the surface of Earth's oceans evaporates into water vapor in the atmosphere. Then, through _____ it forms clouds. The three main types of clouds are _____ , _____ , and cumulus clouds. Eventually the water in clouds becomes too heavy for the cloud to hold and falls as _____ . Different types of precipitation include rain, sleet, _____ , and snow.

Cumulonimbus clouds can develop into _____ with strong winds and heavy rain. The most severe thunderstorms can spawn _____ with violent, whirling winds. Thunderstorms over tropical waters can develop into _____ .

Technological advances include weather satellites and _____ radar. These devices help scientists predict the size and speed of approaching storms.

Name _____ Date _____

LESSON
Outline

GLE 0607.T/E.I, 0607.8.4

Predicting Weather

Use your textbook to help you fill in the blanks.

What are highs and lows?

1. Isobars spaced closely together indicate _____ wind speeds.

2. Air always flows outward from the center of a high-pressure system, and in the Northern Hemisphere,

   rotates in a _____ direction around it.

3. In the Southern Hemisphere, the patterns of movement around high- and low-pressure systems are the

   _____ of those in the Northern Hemisphere.

4. An area of high pressure usually indicates _____ weather.

5. When the barometer drops suddenly, _____ is likely.

What are weather fronts?

6. Air masses that form over land tend to be

   _____ , and air masses that form over

   water tend to be _____ .

7. Air masses that form in the tropics tend to be

   _____ , and air masses that form near

   the poles tend to be _____ .

8. The boundary between two air masses is called a(n)

   _____ .

Name _____ Date _____

9. When a cold front catches up to a warm front, cool air moves _____ the warm front.

10. To interpret a weather map, first look for the _____ , and then look at the movements of fronts.

11. In the Northern Hemisphere, fronts rotate _____ around an area of low pressure.

How is technology used to study weather?

12. Weather factors at ground level, such as temperature, wind direction, wind speed, and humidity, are measured at _____ .

13. Weather conditions at high altitudes in Earth's atmosphere are measured from _____ .

14. Large weather patterns are shown with images from _____ .

15. Areas of precipitation and indications of wind speed can be determined by a special kind of radar called _____ .

Critical Thinking

16. Explain how you could use data from ground weather stations to plot highs, lows, and front lines on a weather map.

_____

_____

_____

_____

_____

Predicting Weather

Choose a word from the word box below that answers each question.

a. air mass	**d.** front	**g.** warm front
b. cold front	**e.** isobars	**h.** weather map
c. Doppler radar	**f.** occluded front	

1. _____ I am a large region of the atmosphere in which the air has similar properties throughout. What am I?

2. _____ I am the lines on a weather map that connect places with equal air pressure. What am I?

3. _____ I am the place where warm air moves in over a cold air mass. What am I?

4. _____ I am a tool used to predict weather by showing different fronts and areas of high and low pressure. What am I?

5. _____ I am the place where cold air moves in under a warm air mass. What am I?

6. _____ I am the boundary between two air masses. What am I?

7. _____ I am the place where a cold front catches up with a warm front, forming a wedge of warm air between two masses of cold air. What am I?

8. _____ I am a special type of radar used to detect precipitation and give an indication of wind speed. What am I?

Name _____ Date _____

Predicting Weather

Fill in the blanks.

clear	counterclockwise	thunderstorms
clockwise	forecasts	warm front
clouds	fronts	weather
cold front	precipitation	wind

To predict weather, scientists study how air moves. Air pressure causes _____ and influences _____ . To make accurate _____ , scientists must locate low- and high-pressure systems. A high-pressure system usually produces _____ skies. A low-pressure system usually produces _____ and _____ . In the Northern Hemisphere, winds flow _____ around a high and _____ around a low.

Weather maps track the movements of highs, lows, and _____ . At a(n) _____ , cold air pushes warm air upward; sometimes _____ develop. A warm air mass moves over a cold air mass at a(n) _____ . Expect light precipitation both before and during the passing of a warm front.

Name _____ Date _____

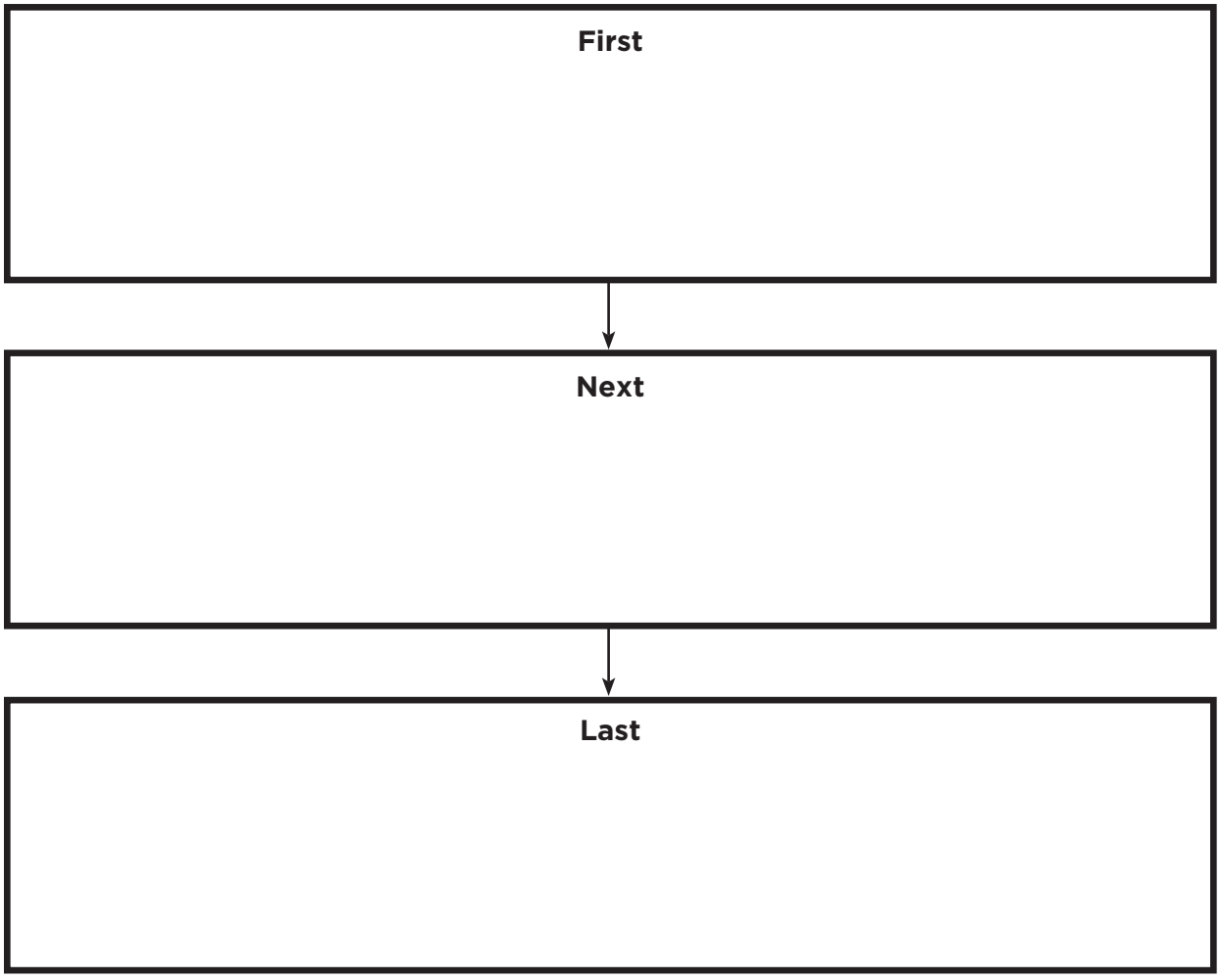
GLE 0607.T/E.I

Wildfire Alert

Read the Reading in Science feature in your textbook. Look for the events in the article, and notice the sequence in which they occur.

Sequence

Use the graphic organizer to record the sequence of events in the article.



Name _____ Date _____

Write About It

Sequence

1. How do the Santa Ana winds affect vegetation before the outbreak of a wildfire?
2. What happens if the Santa Ana winds blow during a wildfire?

Planning and Organizing

Write a sentence that explains how the Santa Ana winds occur.

_____

_____

Write a sentence that explains how the Santa Ana winds affect vegetation.

_____

_____

Drafting

Now explain what happens when a wildfire starts.

_____

_____

_____

Next, tell what happens when the Santa Ana winds blow during a wildfire.

_____

_____

_____

_____

Name _____ Date _____

LESSON
Outline

GLE 0607.8.3

Climate

Use your textbook to help you fill in the blanks.

What is climate?

1. The average weather pattern of a region is its _____ .
2. Climate is closely related to _____ , which is the distance north or south of the equator.
3. Tropical zones, located near the _____ , have _____ climates.
4. At latitudes near the poles, winters are long and _____ , and summers are short and cool.

What affects climate?

5. The two main factors that determine climate are _____ and _____ .
6. Areas with a continental climate often have hot summers, cold winters, and _____ annual precipitation.
7. Areas near the ocean often have warm summers, mild winters, and _____ annual precipitation.
8. Areas in the path of a(n) _____ coming from the water usually receive a high amount of precipitation.

Name _____ Date _____

9. As winds push air up the windward side of a mountain, the air cools , so clouds and _____ form.

10. The Alps in Europe protect the Mediterranean coast from cold air that blows from the _____ .

11. Erupting volcanoes send dust, ash, and gases into the atmosphere, blocking _____ and cooling the air and land.

Have climates changed over time?

12. Every 11 years the Sun has more _____ than usual, causing Earth's average temperature to _____ .

13. Continents have changed positions over time because of _____ .

14. Fossil evidence indicates that _____ once grew in what are now cold areas of Canada.

Critical Thinking

15. The latitude 40°N cuts through the middle of the United States. What factors influence the climate in the United States along that latitude?

_____

_____

_____

_____

_____

_____

Name _____ Date _____

Climate

Fill in the blanks.

continental climate	maritime climate	sunspots
elevation	polar zones	tropical zones
ice ages	rain shadow	

1. Areas near the equator with hot, wet climates are _____ .
2. Areas near the poles that have long, frigid winters and short, cool summers are _____ .
3. Regions located within a large landmass have a(n) _____ .
4. Regions near an ocean or other large body of water have a(n) _____ .
5. The height of an area in relation to sea level is _____ .
6. The leeward side of a mountain where air becomes dry is said to be in a(n) _____ .
7. Cold periods of Earth's history when the brightness of the Sun may have changed are called _____ .
8. Dark areas that appear temporarily on the Sun's surface are called _____ .

Name _____ Date _____

Climate

Fill in the blanks.

altitude	elevation	latitude	rain shadow
cooler	equator	precipitation	windward

The average weather pattern of a place is called its climate. To determine a region's climate, average _____ and temperatures are measured over several years. Climates vary from place to place, mostly because of _____ . Areas near the _____ are warmer and wetter than areas near the poles. Regions near water have milder winters and _____ summers than inland areas at the same latitude.

Another factor that can affect the average temperature and precipitation of a region is _____ . Mountain top temperatures decrease as a mountain's _____ increases. The _____ side of a mountain is wetter, and the leeward side is in a(n) _____ .

Name _____ Date _____

Writing in Science

GLE 0601.3.3, 0607.T/E.I

Underground Homes

Write About It

Expository Writing Choose one of these topics to compare and contrast.

1. Compare and contrast the price of an energy-saving air conditioner or refrigerator to the savings in energy costs. How long would it take the appliance to save as much as it costs?
2. Compare and contrast two brands of refrigerators. Which is more energy efficient? Use energy-guide labels to make your comparison.

Getting Ideas

One way to organize a comparison-and-contrast essay is through a point-by-point analysis. An attribute of the first item is compared to the same attribute of the other item. Repeat this process for each attribute. Use the Internet and the energy-guide labels on appliances to gather information for the chart below. In the top row, list the names of the two items you are comparing. In the left-hand column, list the attributes of each item that you are using to make your comparison.

	Item	Item
Attribute		
Attribute		
Attribute		

Name _____ Date _____

Drafting

A good comparison-and-contrast essay contains a thesis statement that states the main idea. It should list the items that you are comparing and contrasting and the basis on which they are being compared and contrasted. Circle the sentence that Lee should use to state his main idea about his energy-saving device.

1. In a point-by-point analysis, the TriStar Deluxe refrigerator proved to be more efficient than the Kitchen Pro.
2. I like the TriStar Deluxe refrigerator better than the Kitchen Pro.

Now write your first draft. Use a separate piece of paper. Using a point-by-point analysis, include an introduction that states the items that will be compared and contrasted. The body of your essay should include details from your point-by-point analysis.

Revising and Proofreading

Some words and phrases signal comparison—for example, *as, likewise, similarly,* and *in comparison.* Some words and phrases signal contrast—for example, *although, but,* and *on the other hand.*

Now revise and proofread your essay. Ask these questions:

- Have I written a thesis statement about the energy-saving devices?
- Have I explained how the two items are similar and how they are different?
- Have I balanced the information equally for each item?
- Have I used signal words effectively?
- Have I ended with a conclusion based on the evidence presented?
- Have I corrected all grammar, spelling, punctuation, and capitalization errors?

Name _____ Date _____

Weather and Climate

Circle the letter of the best answer.

1. A tool used to measure air pressure is called _____.

A a weather vane

B an anemometer

C a barometer

D a thermometer

2. The most abundant gas in the atmosphere is _____ .

A nitrogen

B carbon dioxide

C water vapor

D hydrogen

3. The lowest layer of the atmosphere is the _____ .

A stratosphere

B thermosphere

C ionosphere

D troposphere

4. Humidity is _____ .

A the weight of the air

B the amount of water vapor in the air

C precipitation

D how hot or cold the air is

5. The process by which a liquid changes into a gas is called _____ .

A condensation

B freezing

C evaporation

D melting

6. Dew forms on grass when water _____ .

A condenses

B evaporates

C melts

D freezes

7. Wispy clouds that form high in the sky are called _____.

A cumulus clouds

B stratus clouds

C fog

D cirrus clouds

8. An air mass that forms over tropical ocean water will be _____ .

A warm and dry

B cold and dry

C warm and moist

D cold and moist

Name _____ Date _____

9. A cold air mass pushing under a warm air mass is called _____ .

A a warm front

B a cold front

C a stationary front

D an occluded front

10. Fronts in the United States tend to move from _____ .

A west to east

B east to west

C north to south

D south to north

11. The most violent thunderstorms can produce _____ .

A tornadoes

B lightning

C winter storms

D hurricanes

12. Global winds are caused by _____ .

A temperature differences between high and low latitudes

B temperature differences between high and low altitudes

C ocean currents

D mountain ranges

13. In general, areas of low pressure are associated with _____ .

A fair weather

B cloudy skies

C severe storms

D rain and clouds

14. Earth receives the most direct rays from the Sun at _____ .

A the North Pole

B the South Pole

C the equator

D the prime meridian

15. The measure of the weight of air pressing down on an area is called _____ .

A air pressure

B temperature

C precipitation

D humidity

16. The type of front most likely to bring light, steady rain or snow to an area is _____ .

A a cold front

B a warm front

C a stationary front

D an occluded front

Strong Storms

Read the Literature feature in your textbook.

Write About It

Response to Literature This article describes the damage caused by severe rainstorms in Los Angeles. Research additional information about damage caused by severe rainstorms. Write a report about the effects of severe rainstorms. Include facts and details from this article and from your research.

Name _____ Date _____

Energy and Forces

Complete the concept map on forces, work, and motion, using words and phrases from your textbook.

Force

Definition: any push or _____ on an object

Work

Definition: a(n) _____ moving an object through a(n) _____

Energy

Definition: the ability to cause change or do _____

Power

Definition: The amount of work done per unit of _____

Forms of Energy

1. Forms of energy include light, _____ , sound, _____ , and nuclear energy.
2. All moving objects have _____ energy.
3. Energy that is stored is called _____ energy.

Characteristics of Motion

1. speed: _____
2. velocity: _____
3. acceleration: _____

Name _____ Date _____

LESSON
Outline

GLE 0607.I0.1

Forces and Motion

Use your textbook to help you fill in the blanks.

What is motion?

1. Using distance and _____ can help you identify the position of something.

2. When you ride in a car and the trees and buildings appear to you to move backward, you are observing _____ motion.

What are speed, velocity, and acceleration?

3. When you describe how fast something is moving, you are describing its _____ .

4. The _____ speed of a moving object is the total distance traveled divided by the total amount of time.

5. If you know both the speed of an object and the direction in which it is moving, then you know the object's _____ .

6. Like velocity, acceleration also has both _____ and direction.

What is a force?

7. Forces can cause a moving object to _____ .

8. Weight is an example of a(n) _____ force.

Name _____ Date _____

What are some forces?

9. Examples of forces are _____ , gravity, and magnetism.

10. A device used to measure force is a _____ scale, and the unit of measurement of force is the _____ .

11. The three types of friction are static friction, _____ friction, and rolling friction.

12. When molecules bump into a moving object and slow it down, _____ force occurs.

How do forces affect each other?

13. Balanced forces are _____ in strength and _____ in direction.

What is inertia?

14. According to Newton's first law of motion, the only way an object's velocity can be changed is by applying an unbalanced _____ force to it.

Critical Thinking

15. Describe two ways that forces and motion are at work as you make the trip from your house to school.

_____

_____

_____

_____

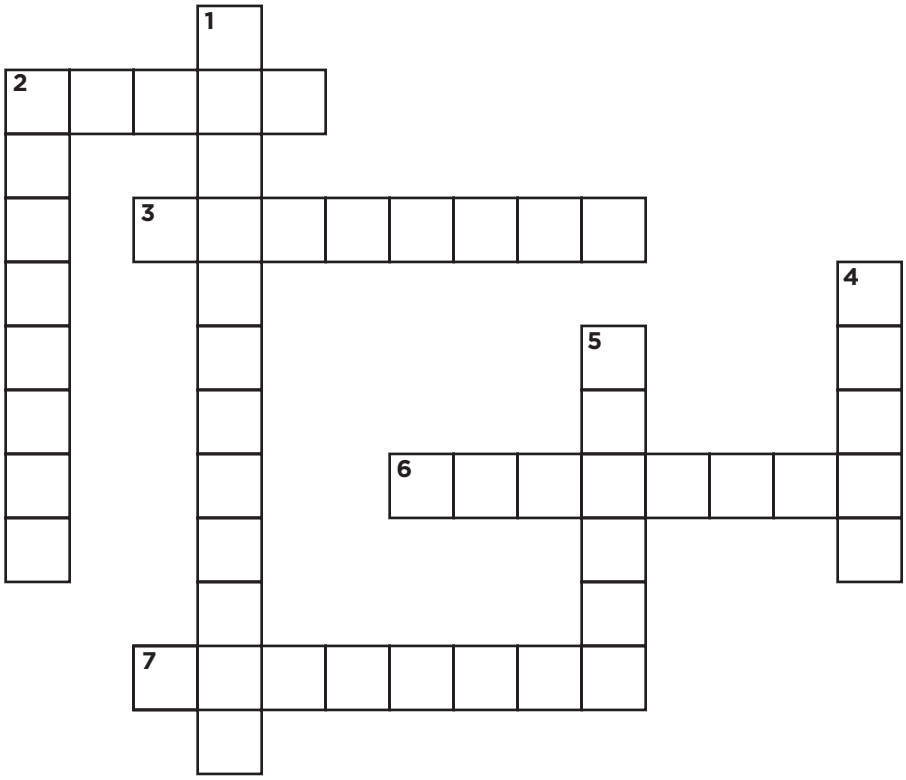
Name _____ Date _____

LESSON
Vocabulary

Forces and Motion

Use the clues to fill in the crossword puzzle.

acceleration	force	motion	speed
distance	friction	position	velocity



Across

2. any push or pull on an object

3. a description of a moving object's speed and direction

6. the length between two places

7. an object's location compared to other things

Down

1. a change in the velocity of an object

2. a force that opposes the motion of an object

4. the distance that an object moves in a particular span of time

5. a change in an object's position compared to a fixed object

Name _____ Date _____

Forces and Motion

Fill in the blanks.

accelerate	friction	time
direction	inertia	velocity
force	speed	

An object is in motion when it changes its position in relation to a fixed object. The position of an object can be determined using its distance and _____ in relation to another object. How fast an object moves is described as its _____ . The speed and direction of an object describe its _____ . Acceleration is a change in an object's velocity over _____ .

Any push or pull on an object is called a_____ . A force can cause a moving object to _____ . A force that opposes the motion of an object is called _____ . An object's tendency to keep moving at the same speed and in the same direction is called _____ . This means that even though the car you are riding in stops suddenly, your body keeps moving forward until your seat belt stops you.

Name _____ Date _____

LESSON
Outline

GLE 0607.I0.I, 0607.I0.3

The Nature of Energy

Use your textbook to help you fill in the blanks.

What is energy?

1. The ability to cause change is called _____ .
2. When changes occur, energy _____ from one place to another.
3. Change does not always involve motion because it comes in many _____ .
4. Some forms of energy include light, _____ , sound, _____ , and nuclear energy.

What are kinetic energy and potential energy?

5. All moving objects have _____ energy because of their motion.
6. Energy that is stored is called _____ .
7. As a roller coaster goes down a hill, its potential energy _____ and its kinetic energy _____ .
8. Kinetic energy can also be changed into _____ energy.

What are the three forms of potential energy?

9. Energy stored in chemical bonds is _____ .
10. Some objects have energy because of their _____ or physical properties.

Name _____ Date _____

11. The energy stored by something that can stretch or compress, such as a rubber band or a spring, is called

_____ .

12. The _____ of an object depends on the object's mass and height above the ground.

How can potential energy be changed?

13. Objects with the same mass at different

_____ have different gravitational potential energies.

14. A roller coaster with higher gravitational potential

energy will have more _____ energy when it reaches the bottom of a hill.

Critical Thinking

15. Describe the different kinds of energy that a bowling ball may have when used.

_____

_____

_____

_____

Name _____ Date _____

LESSON
Vocabulary

The Nature of Energy

Match the correct letter with the description.

a. chemical potential energy	**e.** gravitational potential energy
b. elastic potential energy	**f.** kinetic energy
c. energy	**g.** potential energy
d. form of energy	

1. _____ I am a type of energy such as light, heat, sound, electricity, or nuclear energy. What am I?

2. _____ I am stored energy. I have the ability to cause change. What am I?

3. _____ I am energy stored in chemical bonds. What am I?

4. _____ I am the ability to cause change. What am I?

5. _____ I am the energy that a moving object has because of its motion. What am I?

6. _____ I am the energy stored by something that can stretch or compress. What am I?

7. _____ I am the energy stored by objects due to their position above Earth's surface. What am I?

Name _____ Date _____

The Nature of Energy

Fill in the blanks.

chemical potential energy	elastic potential energy	increase
composition	energy	kinetic energy
decrease	forms	potential
different	gravitational potential energy	

Changes occur all the time. The ability to cause change is called _____ . Energy comes in many _____ , so you cannot always see the energy causing change. If an object is moving, it has _____ . Objects that are not moving might be storing _____ energy. If an object with potential energy moved, its potential energy would _____ , but its kinetic energy would _____ .

Potential energy comes from an object's _____ , shape, or position. Food has _____ that your body releases when you eat. Rubber bands and springs store _____ . Objects that can fall, slide, or roll have energy called _____ . Potential energy can be _____ depending on factors such as mass and height above ground.

Name _____ Date _____

LESSON
Outline

GLE 0607.I0.2, 0607.I0.3
SPI 0607.I0.3, 0607.I0.4

Work, Energy, and Power

Use your textbook to help you fill in the blanks.

What is work?

1. Scientists define, work as what is necessary for a(n) _____ to move an object through a distance.

2. Work is equal to the force of a push or pull multiplied by the _____ the object is moved.

3. When you multiply a force that is expressed in newtons by a distance expressed in meters, the answer is expressed in newton-meters, or _____ .

4. When an object is lifted at a constant speed, the force is equal to the _____ of the object.

How does energy change form?

5. The ability to do work is _____ .

6. A rock located high above the ground and a stretched rubber band are two examples of objects with potential _____ .

7. All forms of energy have a(n) _____ , a means of transfer, and a receiver.

Name _____ Date _____

Where does energy go?

8. When you ride a bicycle, your body's potential energy changes into _____ energy as you pedal.

9. The _____ states that energy can never be created or destroyed.

10. The Sun's energy is generated through a process called _____ .

How do we use energy?

11. Plants use light energy from the Sun to build molecules of sugar, which store _____ energy.

12. As a car moves, its engine changes the chemical energy of fuel into _____ energy.

What is power?

13. Power is the amount of _____ done divided by time.

14. Work is expressed in joules per second, or _____ .

Critical Thinking

15. Follow the chain of energy from a plant to a person riding a skateboard. Explain what type of energy is being used at each step.

_____

_____

_____

_____

_____

Name _____ Date _____

LESSON
Vocabulary

Work, Energy, and Power

Match the correct letter with the description.

a. energy	**f.** power	**j.** law of conservation of energy
b. joule	**g.** thermal energy	**k.** energy transformation
c. kinetic energy	**h.** watt	
d. nuclear fusion	**i.** work	**l.** nuclear power
e. potential energy		

1. _____ the amount of work done per unit of time

2. _____ the unit used to measure work, equal to one newton-meter

3. _____ energy that is stored

4. _____ what is necessary for a force to move an object

5. _____ the ability to do work

6. _____ the energy of motion

7. _____ the standard unit of power, equal to one joule per second

8. _____ the heat energy in an object

9. _____ the process by which the Sun and other stars convert a tiny amount of mass into an enormous amount of energy

10. _____ matter can neither be created or destroyed

11. _____ when one form of energy is coverted to another form of energy

12. _____ the power created when atoms are split

Name _____ Date _____

Work, Energy, and Power

Fill in the blanks.

change	distance	force	potential	time
conservation	divide	kinetic	processed	work

Energy cannot be created or destroyed, but it is constantly changing forms. As you lift an object in the air, you are applying a(n) _____ to counteract gravity. To calculate the work done, you multiply this force by the _____ the object moves. To calculate the power used, take the amount of _____ and _____ it by the _____ used to do that work.

According to the law of _____ of energy, energy cannot be created or destroyed. However, it can _____ from one form to another. Plants such as wheat and corn are _____ to make cereal. If you eat this cereal, your body changes the chemical energy to _____ energy. Once you become active and begin to move around, your body changes the potential energy to _____ energy.

Name _____ Date _____

Reading in Science

GLE 0607.T/E.I

Museum Mail Call

Read the Reading in Science feature in your textbook. Look for clues you can combine with your own knowledge to make accurate inferences.

Infer

Use the graphic organizer to make inferences about what you read concerning energy conservation.

Clues	What I Know	What I Infer

Name _____ Date _____

Write About It

Infer

1. Which washing machine do you think uses more energy: one washing clothes in cold water or one using hot water? Why?
2. How does sealing air leaks around windows save energy?

Planning and Organizing

1. Explain whether you think cold water or warm water would require more energy to produce. Give reasons for your explanation.

_____

_____

_____

2. Describe how sealing windows would save energy.

_____

_____

_____

_____

_____

Drafting

Now, using your explanations from above, write a summary of what you can do to help save energy around your house.

_____

_____

_____

Name _____ Date _____

Energy and Forces

Circle the letter of the best answer.

1. A change in an object's position compared to the position of another object is called _____ .

   A force

   B motion

   C speed

   D distance

2. The distance that an object moves, divided by the time it takes to move, is the object's _____ .

   A position

   B apparent motion

   C acceleration

   D speed

3. A description of a moving object's speed and direction is its _____ .

   A velocity

   B average speed

   C lift

   D thrust

4. A change in the velocity of an object over time is called _____ .

   A continuous force

   B inertia

   C acceleration

   D speed

5. Anything that pushes or pulls an object is a _____ .

   A mass

   B weight

   C thrust

   D force

6. A negative force that opposes the motion of an object is called _____ .

   A friction

   B universal gravitation

   C inertia

   D effort force

Name _____ Date _____

7. Something that is capable of causing change has _____ .

A heat

B motion

C energy

D electricity

8. The energy of motion is called _____ .

A potential energy

B stored energy

C thermal energy

D kinetic energy

9. The energy stored in bonds between atoms is called _____ .

A energy of position

B chemical potential energy

C elastic potential energy

D gravitational potential energy

10. Two objects with the same mass at different heights have different _____ .

A stored energies

B kinetic energies

C chemical potential energies

D gravitational potential energies

11. The application of force to move an object through a distance is called _____ .

A joules

B work

C power

D effort

12. Friction can convert kinetic energy to _____ .

A A thermal energy

B kinetic energy

C potential energy

D conservation of energy

13. The process by which the Sun and other stars generate energy is called _____ .

A friction

B air resistance

C nuclear fusion

D nuclear power

14. The amount of work done per unit of time is called _____ .

A power

B energy

C effort

D force

Name _____ Date _____

CHAPTER
Concept Map

Exploring Energy

Complete the concept map on sound, light, heat, and electricity and magnetism, using words and phrases from your textbook.

Sound

- Sound is a wave consisting of compressions and _____ .
- Properties of sound include pitch (how high or low) and _____ (how loud or quiet).

Heat

- Heat is the flow of thermal _____ from one substance to another.
- Heat can travel by _____ , convection, or radiation.

Waves

- Waves are disturbances that transfer _____ from one point to another.
- Waves are measured by their wavelength, amplitude, and _____ .
- Waves are classified by the type of _____ they cause in a medium.

Light

- Light is a form of energy that travels in straight lines called _____ .
- Objects can let light pass through them, can absorb light, can bend light, or can _____ light.

Electricity

- Electricity refers to the movement and _____ of the energy of charged atomic particles.
- A current-carrying wire also has a magnetic field and can _____ metal objects.

LESSON
Outline

Name _____ Date _____

GLE 0607.I0.2

Waves and Sound

Use your textbook to help you fill in the blanks.

How do waves work?

1. Waves are disturbances that transfer _____ from one point to another.
2. Waves that travel through a medium and cause matter to move up and down are called _____ waves.
3. Waves that cause matter to move back and forth are called _____ waves.
4. Every wave has a point of greatest compression, called a _____ , and a point of least compression, called a(n) _____ .

How can you measure waves?

5. The distance between wave crests or troughs is called _____ .
6. The number of wave crests that pass a point in one unit of time is a wave's _____ .

How does sound travel?

7. A sound wave is a(n) _____ wave produced by vibrations in matter.
8. When sound waves travel from one type of medium to another, the waves refract, or change _____ .

Name _____ Date _____

LESSON
Outline

What are properties of sound?

9. The highness or lowness, or the _____ , of a sound depends on the frequency of the sound waves.

10. The pitch of a sound changes when the source or the listener is in motion because of the _____ .

11. The motion of two or more waves passing through the same medium at the same time is called _____ .

How do we hear music?

12. Guitars and violins are examples of _____ instruments.

13. We hear sounds because sound waves strike our _____ and cause them to vibrate.

14. A pleasant combination of sounds is called _____ , and an unpleasant combination of sounds is called _____ .

Critical Thinking

15. How does sound travel from a piano to make music?

_____

_____

_____

_____

_____

_____

_____

Name _____ Date _____

Waves and Sound

Match the correct letter with the description.

a. amplitude	**d.** frequency	**g.** reflection
b. compression	**e.** period	**h.** refraction
c. Doppler effect	**f.** rarefaction	**i.** wavelength

1. _____ when the direction of a wave changes because of a change in medium

2. _____ a measure of how many wave crests or troughs pass a given point in one unit of time

3. _____ when the pitch of a sound changes because the source or the listener is in motion

4. _____ the amount of time it takes for a wave to complete one full cycle

5. _____ the distance between wave crests or troughs

6. _____ an area in a sound wave where particles of matter are spread apart

7. _____ an area in a sound wave where particles of matter are pushed together

8. _____ the height of a wave from its trough or crest to its midpoint, which is also a measure of the wave's intensity

9. _____ how waves bounce off an object and change their direction of travel

Name _____ Date _____

LESSON
Cloze Activity

Waves and Sound

Fill in the blanks.

compressions	intensity	pitch	spread apart
frequency	medium	rarefactions	wavelength

Sound is a type of wave called a compressional wave. Sound waves cause the particles making up a(n) _____ to squeeze together and then _____ . The places in a sound wave where the particles are close together are called _____ . The places where the particles are spread apart are called _____ .

Sound waves have a(n) _____ , which is the distance from one crest, or point of greatest compression, to the next. Sound waves also have a(n) _____ , which is the number of compressions that pass a point in one second. The frequency of a sound wave determines its _____ . The amplitude of a sound wave is a measure of the wave's _____ . The loudness of sound is measured in a unit called the decibel.

LESSON
Outline

Name _____ Date _____

GLE 0607.I0.2

Properties of Light

Use your textbook to help you fill in the blanks.

How does light travel?

1. Light travels in a straight line called a(n) _____ .
2. Light waves can travel through empty space without needing a solid, liquid, or gas _____ .
3. Rays of light pass through a(n) _____ object with almost no disturbance.
4. Some rays of light pass through a(n) _____ object, and some light rays are blocked or bent in different directions.
5. Rays of light are reflected or absorbed by a(n) _____ object.

How does light interact with mirrors?

6. Light rays that bounce off a(n) _____ can form an image of an object.
7. If you raise your left hand in front of a mirror, in your _____ it appears that your _____ hand is raised.
8. When light rays strike a dull or rough surface, they do not form a(n) _____ .
9. Concave mirrors curve inward, convex mirrors curve outward, and _____ mirrors are flat.

10. The type of mirror that is used to gather light inside a telescope is the _____ mirror.

How does light interact with lenses?

11. A convex lens is _____ in the middle than at its edges; a concave lens is _____ in the middle than at its edges.

12. The point at which the light rays passing through a lens meet is called the _____ .

13. An image that is formed by a concave lens is _____ and smaller than the actual object.

How do we correct vision?

14. If your eye shape is even slightly off, your vision may be _____ .

15. Nearsightedness causes light rays from distant objects to be focused in front of the _____ .

Critical Thinking

16. How do sunglasses work to protect your eyes?

_____

_____

_____

_____

_____

_____

Name _____ Date _____

Properties of Light

Use the clues to fill in the crossword puzzle.

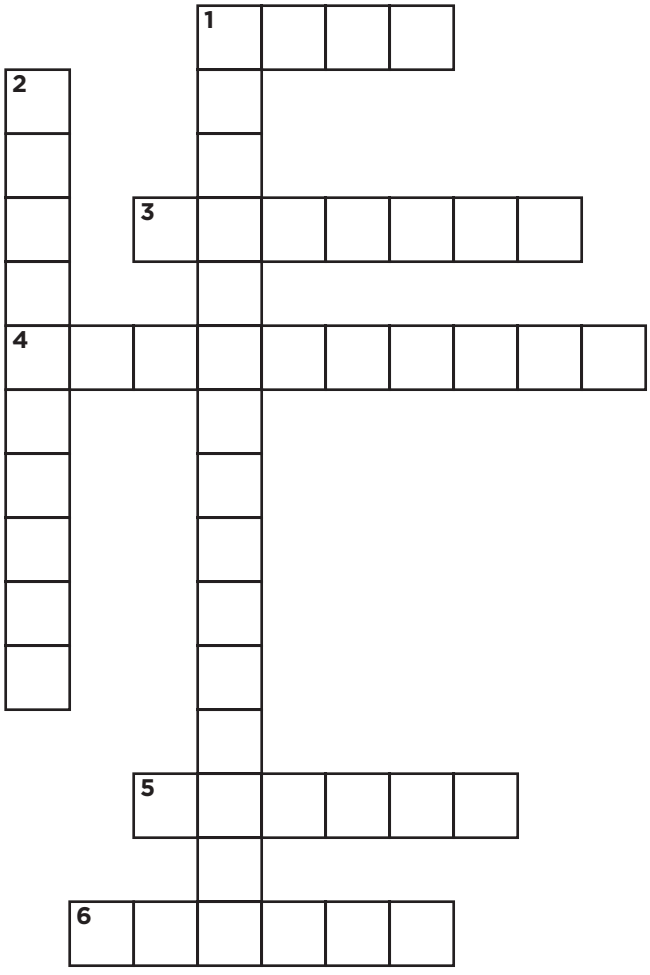
concave	lens	absorption	law of reflection
convex	mirror	refraction	

Down

1. the angle between an incoming light ray and a reflected light ray, from a surface, is equal
2. the process of taking in radiant energy

Across

1. transparent material with at least one curved surface
3. a surface that curves inward
4. when the direction of a wave changes due to a change in medium
5. an object with a polished surface that forms reflected images
6. a surface that curves outward



Name _____ Date _____

Properties of Light

Fill in the blanks.

concave	opaque	translucent
convex	reflect	transparent
mirror	retina	

Light travels in waves that spread out as they move away from their source. When an object lets light pass right through it, the object is described as _____ . When an object lets some light through but also blocks or bends some of the light away, it is described as _____ . Objects that do not allow any light to pass through them are described as _____ .

An object with a polished surface that forms reflected images is called a(n) _____ . When light hits a dull or rough surface, it may still _____ , but it will not form an image. When light passes through a(n) _____ lens, the light rays are refracted together. When light passes through a(n) _____ lens, the light rays are refracted apart. Light rays entering the eye are supposed to focus on the _____ .

Name _____ Date _____

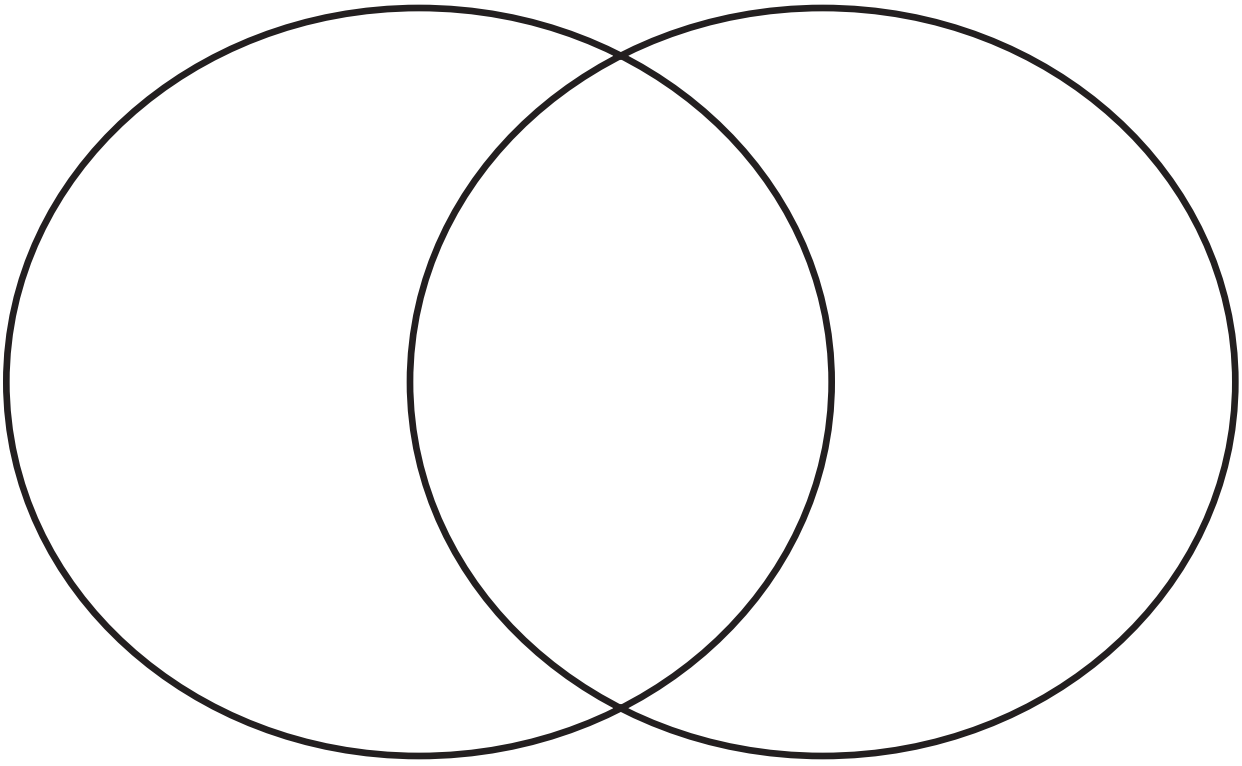
GLE 0607.T/E.I

Seeing in Infrared

Read the Reading in Science feature in your textbook. Look for information you can compare and contrast.

Compare and Contrast

Use the graphic organizer to compare and contrast topics in the article.



Write About It

Compare and Contrast

1. How is infrared radiation different from visible radiation?
2. What do the bolometer, night-vision goggles, and the *Spitzer Space Telescope* have in common?

Planning and Organizing

Write additional details for each of the following terms:

infrared radiation:

_____

visible radiation:

_____

bolometer:

_____

night-vision goggles:

_____

Spitzer Space Telescope:

_____

Drafting

Now explain the differences between infrared radiation and visible radiation.

_____

Next, explain the similarities between the bolometer, night-vision goggles, and the Spitzer Space Telescope.

_____

_____

LESSON
Outline

Name _____ Date _____

GLE 0607.I0.2

Heat

Use your textbook to help you fill in the blanks.

What is heat?

1. Heat is a form of _____ energy caused by the movement of the molecules that make up all matter.

2. The amount of energy needed to raise the temperature of 1 gram of water by 1°C is called a(n) _____ .

3. As heat flows into a substance, the kinetic energy of the _____ in the substance increases.

How does heat travel?

4. Heat energy can move in three ways: by conduction, by convection, and by _____ .

5. Conduction is the movement of energy when two materials _____ and energy flows from one material to the other.

6. Conductors are materials that _____ heat and distribute it evenly throughout an object.

7. Because most liquids and gases become less dense when heated, _____ occurs.

How do we use heat?

8. In a hot-water heating system, water is used to transfer energy from a(n) _____ to the air in a room.

9. In a forced-air heating system, a room is heated by _____ alone.

10. Heating systems turn on and off automatically because they are controlled by a(n) _____ switch.

11. Gasoline is the fuel that is burned in the engine of a car, but it is _____ energy that actually makes the engine move.

How is temperature measured?

12. Temperature, which is a measure of the average kinetic energy of a substance's molecules, is measured with _____ .

13. The rate at which a substance warms up upon absorbing heat is a(n) _____ property of matter.

14. The amount of energy needed to raise the temperature of 1 gram of a substance by 1°C is the substance's _____ .

Critical Thinking

15. What do you think would happen if you were to put an inflated balloon in the freezer?

_____

_____

_____

Name _____ Date _____

Heat

Match the correct letter with the description.

a. conduction	**e.** radiation
b. convection	**f.** specific heat
c. heat	**g.** temperature
d. insulation	**h.** thermal expansion

1. _____ I am the measurement of the average kinetic energy of the molecules of a substance. What am I?

2. _____ I am the transfer of energy by electromagnetic waves. What am I?

3. _____ I tell how much energy is needed to raise the temperature of 1 gram of a substance by 1°C. What am I?

4. _____ I am the flow of thermal energy from one substance to another. What am I?

5. _____ I am a material that absorbs some heat, but I do not transfer it very well. What am I?

6. _____ I am the movement of energy through direct contact. What am I?

7. _____ I am the transfer of energy by the flow of a liquid or a gas. What am I?

8. _____ I am an increase in volume that is caused by an increase in temperature. What am I?

Name _____ Date _____

Heat

Fill in the blanks.

boiler	heat	kinetic	pistons	speed
expand	hot air	molecules	radiation	thermostat

Heat is a form of kinetic energy. It is caused by the movement of the _____ that make up all matter. Temperature is the measure of the average _____ energy of the molecules in a substance. When the average _____ of molecules rises, the temperature also increases.

Heat can be transferred from one object to another by conduction, convection, or _____ . Buildings heated by a hot-water system use hot water to transfer energy from a(n) _____ to the air in a room. Forced-air systems use _____ to heat the air in a room. These systems are typically controlled by _____ switches.

Cars also operate by _____ energy. When gasoline is burned, heat causes gases to _____ and push on _____ that turn a crankshaft. This propels the vehicle forward.

LESSON
Outline

Name _____ Date _____

GLE 0607.I2.I, 0607.I2.2

Electricity and Magnetism

Use your textbook to help you fill in the blanks.

What is electricity?

1. Atoms are made up of _____ , neutrons, and electrons.

2. When an atom loses an electron, it becomes _____ charged, and the atom that gains an electron becomes _____ charged.

3. The buildup of a positive or negative electric charge on a material's surface is called _____ .

How can electricity jump?

4. A rapid movement of electrons that corrects an imbalance of charges is called a(n) _____ .

5. A charged object can cause a(n) _____ in another object.

6. Conductors allow an electric charge to flow easily, and _____ do not.

How can electricity flow?

7. A simple circuit consists of an electrical _____ , a device such as a lamp, and connecting wires.

8. A switch is used to control the flow of _____ in a circuit.

9. Direct current flows in one direction; alternating current is transmitted when current changes direction, moving back and forth at regular _____ .

Name _____ Date _____

LESSON
Outline

What are some kinds of circuits?

10. Electricity can follow only one path through a _____ circuit, but it can follow _____ paths through a parallel circuit.

What are magnets?

11. Iron, _____ , and cobalt form strong magnets.

12. A current-carrying wire has a(n) _____ and can pick up certain metal objects, just as a common magnet can.

How do we use generators?

13. A generator converts _____ into electricity.

14. A transformer that increases voltage so that current electricity can be sent over long distances more efficiently is used in a(n) _____ .

What are some tips on using electricity?

15. You can save fuel and save money by _____ energy.

Critical Thinking

16. How can you use a magnet to find which direction is north?

_____

_____

_____

_____

Name _____ Date _____

Electricity and Magnetism

Fill in the blanks.

current electricity	magnetic field	static electricity
electricity	parallel circuit	
electromagnet	series circuit	

1. The buildup of a positive or negative electric charge on a material's surface is called _____ .
2. The invisible area where the forces of magnetic attraction or repulsion can be detected is called a(n) _____ .
3. The flow of electrons through a circuit is called _____ .
4. A circuit in which there is only one path along which current electricity can flow is called a(n) _____ .
5. A circuit in which there are multiple paths along which current electricity can flow is called a(n) _____ .
6. The movement and transfer of the energy of charged atomic particles is described as _____ .
7. A device that is magnetized by current electricity is called a(n) _____ .

Name _____ Date _____

LESSON
Cloze Activity

Electricity and Magnetism

Fill in the blanks.

circuit	insulation	running water
circuit breakers	open	
closed	power plant	

Many things happen when you turn on a light in your house. The light switch is part of a(n) _____ . When the switch is turned on, the circuit is _____ , and electricity flows through wires to the light bulb. When the switch is turned off, the circuit is _____ , and electricity does not flow.

The electricity in a home comes from an electric _____ , where generators use fossil fuels, nuclear power, or _____ to produce electricity.

Because electricity is extremely dangerous, wires are covered with plastic that serves as _____ . To prevent a circuit from being overloaded by too much current, fuses or _____ are used to stop the flow of electricity. It is important to use electricity safely and to conserve energy.

Name _____ Date _____

Exploring Energy

Circle the letter of the best answer.

1. The height of a wave is called _____ .

A wavelength

B amplitude

C rarefaction

D compression

2. An example of a compression wave is _____ .

A a transverse wave

B a gamma ray

C a reflection

D a sound wave

3. Sounds that have a high pitch also have a high _____ .

A frequency

B volume

C rhythm

D crest

4. When the direction of a wave changes because of a change in medium, it is called _____ .

A reflection

B refraction

C the Doppler effect

D constructive interference

5. Matter that allows light to pass through with almost no disturbance is described as _____ .

A opaque

B translucent

C transparent

D concave

6. An item that forms images by reflection is called _____ .

A a prism

B a lens

C a bulb

D a mirror

7. The type of lens that curves inward and is thinner in the middle is described as _____ .

A concave

B convex

C opaque

D reverse

8. A measure of the average kinetic energy of the particles in a substance is _____ .

A temperature

B specific heat

C thermal energy

D electric energy

9. The unit most commonly used to measure heat is the _____ .

A decibel

B hertz

C volt

D calorie

10. The transfer of energy by currents of a liquid or gas is called _____ .

A convection

B conduction

C radiation

D expansion

11. The amount of energy needed to raise the temperature of 1 gram of a substance by 1°C is _____ .

A temperature

B compression stroke

C thermal expansion

D specific heat

12. A buildup of electric charge on a material's surface is called _____ .

A current electricity

B static electricity

C voltage

D insulation

13. When a charged object is placed near a neutral object, the result is _____ .

A an induced charge

B a magnetic field

C a parallel circuit

D an electromagnet

14. A device that is magnetized by current electricity is called _____ .

A a generator

B an electromagnet

C a series circuit

D a parallel circuit

Name _____ Date _____

Out of Sight

Write About It

Response to Literature This article compares the ways in which different animals see. What role does light play in sight? Think about how things look during the day and at night. Write a brief essay about an indoor or outdoor scene, comparing how it looks to you during the day and at night.

Name _____ Date _____

LESSON
Outline

What is technology?

Use your textbook to help you fill in the blanks.

Ways People Move

1. Technology is how humans adapt _____ to meet certain _____ and _____ .
2. _____ has been around since the beginning of time, when people used _____ from nature to create things such as homes, furniture, and paper.
3. The _____ industry has led to the development of other industries, such as oil refineries, highway construction, and car repair shops.

Science and Technology

4. _____ and _____ depend on each other because people who design things must understand certain scientific concepts.
5. Two of the concepts that transportation designers must understand are _____ and _____.
6. With the invention of the _____ in 3500 B.C., moving things from place to place became much easier.
7. By 2000 B.C., people were using _____ , which were two-wheeled carts pulled by horses.

Critical Thinking

8. What forms of technology did you use today? How did they help meet your needs and wants?

_____

_____

Name _____ Date _____

What is technology?

Match the correct letter with the description.

a. design	**c.** mass transit	**e.** technology
b. industrialization	**d.** properties	

1. _____ physical aspects of materials chosen for the design of a product

2. _____ systems designed to transport large numbers of people

3. _____ technological advances that led to the development of companies that design, develop, manufacture, and sell new products

4. _____ the means by which humans adapt nature to meet their needs and wants

5. _____ the process of imagining how to shape materials from nature into useful products

Name _____ Date _____

What is technology?

Fill in the blanks.

technology	science	materials
mass transit	industrialization	transportation
wheel	steam engine	properties

_____ is the way people adapt nature to meet their needs and wants. The first humans shaped Earth's materials into tools and other necessities. These discoveries and those that followed led to _____ .

Technology and _____ are dependent on each other. People who work in technology must understand the _____ of certain _____ to know which of them will work best in a product.

One example of technology at work is the development of the _____ industry. People needed a way to move easily from place to place, so in 3500 B.C. they began using the _____ . Many years later, scientists developed a _____ that worked by turning wood and coal into energy. Today, people use _____ , such as trains and buses, to get from place to place.

Name _____ Date _____

Right on Track!

Read the Writing in Science feature in your textbook.

Write About It

Expository Writing Use the Internet to identify what problems mass transit systems are designed to address. Write a plan to develop or improve a system near you. Find real-life examples to help you predict how much time, materials, and money it would take. Then draw a picture or make a model.

Getting Ideas

In the left column, list specific problems that mass transit would alleviate. In the right column, indicate how each problem would be addressed by mass transit.

Problems Addressed By Mass Transit		
Problem		**How Mass Transit Solves the Problem**
driving time	→	less travel time because of less road congestion or no road congestion if you are on a train
	→	
	→	
	→	

Drafting

Explanatory writing informs or explains. It is very important to understand your subject clearly before you try to explain it to someone else. An effective introduction to an explanatory piece of writing should state the object, problem, or challenge to be addressed. Write several sentences in the space below that best describe the topic you will be discussing in your explanatory writing. Use the graphic organizer on the previous page as a guide.

_____

_____

_____

Now, begin your first draft. Begin with your introductory sentences to help readers understand some important details about the challenge or problem to be addressed. In a second paragraph, describe how you plan to address those problems by designing a new mass transit system or improving upon one that already exists where you live. Finally, give details as to how much time, the type of materials, and how much money would be required to make the changes you have suggested.

Revising and Proofreading

Explanatory writing involves supporting statements with details. For each statement you make about problems solved by mass transit systems, be sure to include reasons or examples to help the reader better understand your subject.

Now revise and proofread your writing. Ask these questions:

- Have I written about each of problems I identified in the **Getting Ideas** section?
- Have I clearly organized the information gathered about costs, materials, and so on, and presented it in an easily understandable way?
- Would a map, table, or drawing of the plan and associated information help the reader understand the proposal better?

Name _____ Date _____

The Design of Things

Use your textbook to help you fill in the blanks.

1. A _____ is a person who makes a detailed plan to turn an idea into reality.

2. An _____ designs and builds technological solutions and usually specializes in one area.

Improving Old Ideas

3. The development of air travel is one example of how

   _____ improves old ideas.

The Design Process

4. The _____ is a step-by-step procedure that includes drawing plans, building models, and conducting tests.
5. The final step in the design process is the production of a

   _____ , which is a full-scale working version of the product.

More Is Less?

6. The invention of _____ helped computer technology develop from the 30-ton ENIAC to smaller, portable devices.

Critical Thinking

7. Suppose that you want to improve a toaster oven. Where would you begin? Which steps would you take?

_____

_____

_____

_____

_____

Name _____ Date _____

LESSON
Vocabulary

The Design of Things

Use the clues to unscramble each word. Then unscramble the circled letters to answer the last question.

constraint	engineer	prototype	transistors
design process	model	schematic	

1. MTCIAESCH a detailed drawing that shows the parts of a designed object

___ ___ ◯ ___ ◯ ◯ ___ ___ ◯

2. NINTAOCSTR obstacle to overcome when designing a product or process

◯ ___ ___ ___ ___ ___ ___ ___ ___ ___

3. GESNID OCRSEPS identifying a problem and listing ideas for a solution

___ ◯ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

4. RGENIEEN individual classified according to the kinds of designs that he or she makes: civil, mechanical, aerospace, biomedical, agricultural

___ ___ ___ ◯ ◯ ___ ___ ___

5. DLEMO built with specified materials according to design; item helps people visualize what the finished object will look like

___ ___ ___ ___ ◯

6. TYOTEPROP full-sized model that can be tested

___ ___ ___ ___ ___ ___ ___ ___ ___

7. OTSRISNTRA conducts electricity faster than vacuum tubes do

___ ___ ◯ ___ ___ ___ ___ ___ ___ ___

8. What kind of engineer designs machines and parts?

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

Name _____ Date _____

The Design of Things

Fill in the blanks.

transistors	engineers	solutions
schematic	improving	model
prototype	designers	ENIAC

A large part of modern technology depends upon _____ on old ideas. One example of an improvement of an old idea is the development of the computer. In 1945, a computer called _____ was built. It weighed nearly 30 tons! However, because of the invention of small devices called _____ , computers have become much smaller and more powerful.

Many people work on a product as it goes through the design process. _____ take an idea and draw up a detailed plan to turn it into reality. _____ use math and science to design and construct technological solutions.

The first step in the design process involves finding _____ to a problem. After a designer or an engineer chooses the best solution, he or she makes a _____ that shows all of the product's parts and how they work. From the schematic, a _____ of the product is built. The final step is the building of a _____ that can be tested.

Name _____ Date _____

Designing Safer Cars

Read the Writing in Science feature in your textbook.

Write About It

Expository Writing Create a survey that asks drivers what problems they have. Give it to people who drive and use their responses to come up with ideas to solve a specific need. Research the solutions to get an idea of possible constraints, such as time, money, and materials. Then draw a schematic of the best solution.

Getting Ideas

To design a safer car, you must know about the dangers that drivers face. Write *Problems Facing Drivers* in the Main Idea column. In the Details column, identify the kinds of road hazards or dangerous situations that drivers may encounter.

Main Idea	Details
Drivers Face Many Problems	

Drafting

Whether the questions in a survey are answered thoughtfully depends on how well the questions in the survey are written. Most problems related to hazardous driving conditions concern road conditions or drivers' behavior. In the space below, write one question for your survey related to hazardous road conditions. To ensure a detailed answer from the person taking the survey, make sure that your question cannot be answered with *yes* or *no*.

_____

_____

Name _____ Date _____

Now write the first draft of your survey. Use a separate sheet of paper. Include several questions that each describe various conditions related to road-related and driver-related driving hazards.

Revising and Proofreading

Make sure that you have about the same number of questions that relate to road conditions as questions that relate to driver behaviors. Identify the following descriptive phrases as relating more directly to road or driver.

1. staying awake _____
2. potholes _____
3. deer _____
4. sharp curves _____

Now revise and proofread your writing. Ask these questions:

- Have I described the driver and road condition hazards clearly?
- Do my questions cover a variety of situations?
- Are my questions addressing situations that can be corrected by an improved car design?

Name _____ Date _____

LESSON
Outline

Technology in Communications

Use your textbook to help you fill in the blanks.

1. _____ is the exchange of ideas and information through speaking, writing, and the use of signs and symbols.
2. The discovery of _____ allowed people to communicate more easily over long distances.
3. First came the _____ , followed by the telephone, radio, and television.
4. A group of separate parts called a _____ work together to make communication possible, including satellites and computers.
5. Some technologies, such as the system of computers and files called the _____ , use wireless systems to send signals.
6. The communication process has four steps, which are input, _____ , output, and _____ .

Critical Thinking

7. How might the world be different without the advancements in communication technology during the last century? Include at least three ways in your answer.

_____

_____

_____

_____

_____

Name _____ Date _____

Technology in Communications

Match the correct letter with the description.

a. communication	**c.** fiber optics	**e.** Internet	**g.** process
b. feedback	**d.** input	**f.** output	**h.** system

1. _____ the exchange of ideas and information

2. _____ a huge system of interconnected computers and files

3. _____ an initial signal or information that starts a process

4. _____ a group of separate parts that work together to do something

5. _____ hardware that sends signals using light

6. _____ a signal, information, or response that returns to the source

7. _____ a series of steps or changes starting with input and ending with feedback

8. _____ a signal or information that results from processing

Name _____ Date _____

LESSON
Cloze Activity

Technology in Communications

Fill in the blanks.

feedback	communication	output	system
process	pixels	digital	
wireless	input	Internet	

The telephone and the computer are forms of _____ technology. They help you exchange ideas and information with others.

When you communicate with someone using a computer or other device, you're part of a _____ , or group of parts that work together. A communications system includes four steps. The first step is _____ , or the e-mail message you send. The computer itself is the _____ because it sends the message over the _____ . When your friend receives the message on his or her computer, that is considered _____ . When your friend responds, he or she is providing _____ .

Once the telegraph transmitted messages across electrical wires. Now, because of _____ technology, you can use your computer without any wires at all!

Just a few years ago, cameras needed film to preserve pictures. Today, _____ cameras store the images on a memory card. What you see are actually millions of tiny _____ that form a picture. Now that's technology!

Name _____ Date _____

That Colorful TV

Read the Writing in Science feature in your textbook.

Write About It

Expository Writing Research more about the history of the television. Write a report using the details you find in your research. Then make a time line to identify how television has impacted society at various times.

Getting Ideas

Television technology, broadcasting, and programming have changed drastically since the introduction of television. In the graphic organizer below, place these events in chronological order. *Chronological order* is the order in which certain events happened.

- Coaxial cable was invented, allowing more information to be delivered to each television.
- Television was introduced at the World's Fair.
- People began to purchase televisions for their homes.
- Color television was introduced.

First

Next

Next

Last

Drafting

Expository writing, or *exposition*, is a type of writing that is used to explain, describe, give information, or inform. The writer cannot assume that the reader has any prior knowledge or understanding of the topic. The introductory sentence of an expository report should clearly state the topic that will be addressed. Circle the sentence below that is the better introductory sentence for your report.

1. Television has a long and interesting history; it has come a long way since the early beginnings in the 1950s.

2. The history of television shows a fascinating relationship between advances in technology and the effects of that technology on society.

Now write your first draft on a separate sheet of paper. Use your introductory sentence and the information in the sequencing graphic organizer as a basic outline. In your report, mention each piece of information from the graphic organizer, and describe how that advancement in television technology affected society. Use your final report to help you construct a time line of television history.

Revising and Proofreading

Expository writing can be organized in a number of different ways. Your report should not only show events in a chronological order, but it should also show cause and effect relationships—what changes did television technology cause for society?

Revise and proofread your narrative. Ask these questions:

- Have I discussed events in a logical or chronological order?
- Have I provided enough detail to show the relationship between television and society?
- Could my report be understood by someone with no prior knowledge or understanding of this topic?

Name _____ Date _____

Technology in Medicine

Use your textbook to help you fill in the blanks.

1. Medical technology was used by our prehistoric ancestors, who used _____ to meet human medical needs.

Modern Medicine

2. Modern medicine began in the country of _____ , where the first pharmacists prepared and dispensed medicine.
3. _____ discovered a vaccine for smallpox by injecting cowpox microbes into a young boy.

Modern Medical Techniques

4. _____ and _____ show a three-dimensional view of the inside of the body.

Getting Down to Genes

5. _____ is a science that studies how characteristics are passed from generation to generation.

Bio-basics for Solutions

6. The use of _____ includes altering the genes of plants and creating pesticides from naturally occurring bacteria.

Critical Thinking

7. What are some of the risks of genetic engineering? What are some benefits?

_____

_____

_____

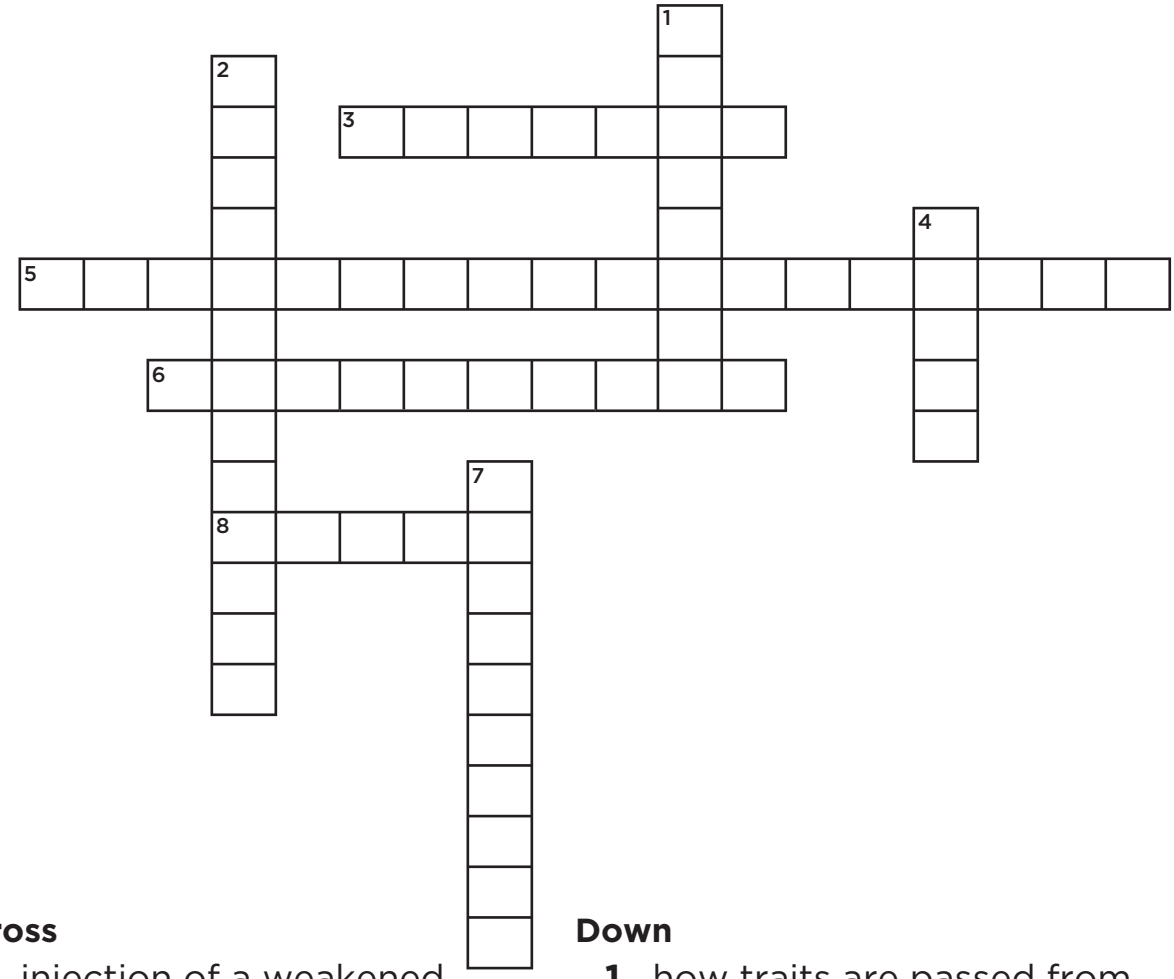
_____

_____

Technology in Medicine

Use the clues to fill in the crossword puzzle.

pharmacist	vaccine	genetics	biotechnology
trait	genetic engineering	laser	prosthesis



Across

3. injection of a weakened microorganism

5. scientists' work with genes to control physical traits

6. person who prepares and gives out medicine

8. tool that focuses intense light waves

Down

1. how traits are passed from one generation to the next

2. science that uses living things to make products

4. observable physical feature or characteristic

7. artificial limb

Name _____ Date _____

Technology in Medicine

Fill in the blanks.

prosthesis	vaccine	biotechnology
pharmacists	lasers	robotic

Medicine of long ago was nothing like it is today. It wasn't until ancient Egypt, when the first _____ began preparing medicines, that medical technology really began.

In 1796, Edward Jenner developed a _____ that protected people from the deadly smallpox disease. Today, doctors do not even need to use their hands to perform surgery! They can control a _____ arm or hand that can do work for them. Some surgeons use _____ that use strong light waves to make cuts in human skin. A _____ is an artificial limb that works like a real one.

In the field of _____ , scientists are studying how to use living things in products that will make life better for people. Experts argue about the risks and benefits of this field. While the products may help people in the short run, they could have unknown effects.

Spare Body Parts

Read the Writing in Science feature in your textbook.

Write About It

Explanatory Writing Research some more information about prosthetic limbs. Write a report about how technology is improving the lives of people with prosthetics. Include specific examples, and detail what materials are being used.

Getting Ideas

Use the table below to help organize your thoughts before you begin your research. In the first column, list what you already know about prosthetic limbs. In the second column, write questions that you have about the topic. Then use print and online resources to learn more about prosthetic limbs. Finally, in the last column, write what you learned from your research.

Topic: How Prosthetics Improve People's Lives		
What I Already Know	**What I Want to Know**	**What I Learned**

Name _____ Date _____

Drafting

Expository writing explains how something works. It is important to engage your readers so that they will be interested in the topic and want to read more about it. One way to engage your readers is to write a good thesis statement. A thesis statement comes at the beginning of a report and "hooks" your readers by telling them what to expect and by giving information about the topic. Helen wants to write a report about the use and benefits of MRI machines. Tell which thesis statement below would be best.

1. MRI machines use magnetic technology to take three-dimensional pictures of the inside of the human body, allowing doctors to see injuries and diseased areas in detail.
2. MRI machines provide the best pictures of the inside of the human body.

Now write your first draft. Use a separate sheet of paper. Engage your readers with a powerful and informative thesis statement. Use the body of your report to develop details that explain the statement further.

Revising and Proofreading

Make the following sentence more specific by using historical facts and examples.

Documented cases of the use of artificial limbs date back many years.

_____

_____

_____

_____

Now revise and proofread your report. Ask these questions:

- Have I written an effective thesis statement that engages my readers?
- Have I covered important landmarks in the development of prosthetic limbs?
- Have I given examples of people who led productive lives with prosthetic limbs?
- Have I corrected all grammar, spelling, punctuation, and capitalization errors?
- Does my paper have a clear introduction, body, and conclusion?

Name _____ Date _____

LESSON
Outline

Technology of the Future

Use your textbook to help you fill in the blanks.

1. Nanotechnology uses the smallest building blocks of _____ to create or improve aspects of everyday life.
2. Scientists from Britain and the United States discovered a _____ when they used a laser to vaporize graphite.
3. A carbon nanotube is stronger than steel and can easily conduct both _____ and _____ .
4. With the invention of the Atomic Force Microscope, scientists are now able to manipulate _____ and _____.

Nanotechnology Now

5. Socks treated with _____ can resist germs that cause odor and can also keep feet dry and comfortable.
6. In medicine, nanodevices are being used to diagnose and treat _____ .

A Look Ahead

7. In the future, NASA hopes to use nanotechnology to create a _____ that will reach nearly 62,000 miles into space.
8. Nanomaterials used in _____ will enable them to drive, hop, fly, and burrow as they explore moons and planets.

Critical Thinking

What advancements in technology would you like to see in the future? Explain.

_____

_____

_____

_____

Name _____ Date _____

Technology of the Future

Fill in the Blanks.

Atomic Force Microscope	manotechnology	space elevator
fullerene	carbon nanotuber	

1. A form of carbon that has atoms bonded together forming a hollow sphere is called a _____ .
2. The new tool developed to help scientists see and manipulate atoms and molecules is a(n) _____ .
3. The use of the tiniest building blocks of matter to make or improve aspects of everyday life is _____ .
4. A rolled up sheet of carbon atoms arranged in hexagonal rings is known as _____.
5. A nanotube ribbon anchored to on an offshore sea platform, propelled upward by a laser beam, is the design envisioned for a(n) _____ .

Name _____ Date _____

Technology of the Future

Fill in the blanks.

fullerene	atoms	carbon nanotube
molecules	manofilters	rover
conductor	nanotechnology	chloroplasts

Scientists are always thinking about the future and making new discoveries. One of these discoveries is the field of _____ , in which the smallest building blocks of matter are used to make or improve things.

Nanotechnology began in 1985, when scientists vaporized graphite and found hollow _____ made up of 60 carbon _____ . The atoms were connected to form a hollow sphere with 20 hexagons and 12 pentagons that looked like a soccer ball. This structure, which scientists called a _____ , is very strong.

A short time later, another scientist discovered the _____ , which is stronger than steel. It is also a very good _____ of heat and electricity.

Nanomaterials have many uses. In Paris, _____ are being used to clean river water to make it drinkable. NASA scientists plan to use nanomaterial will be used in satellites and _____ . Someday, cell phones may use solar power by using spinach _____ .

Name _____ Date _____

Nanotechnology Scores

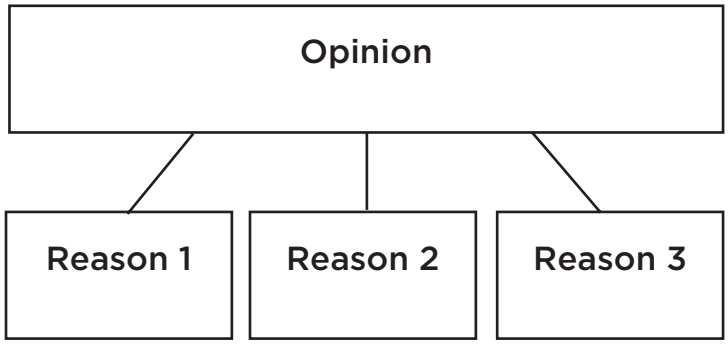
Read the Writing in Science feature in your textbook.

Write About It

Persuasive Writing Do some research to find out when different sports started using nano-equipment. Write a persuasive report in which you argue in favor of nano-equipment or against its use. Consider questions such as these: should there be special rules if nano-equipment is used in a game? Is it fair to give today's players an advantage? What would be the impact on records and statistics?

Getting Ideas

A piece of effective persuasive writing includes several reasons that support an opinion. If your argument is well-supported, it is more likely that your readers will agree with you. Use the graphic organizer below to develop ideas for your paper on the use of nano-equipment in sports. Write your opinion statement in the top box. Then write reasons that support this opinion in the bottom boxes. You may add boxes if needed.



Name _____ Date _____

Drafting

Indicate with *yes* or *no* those opinions that are supported by reasons and those that are not.

1. _____ Nanotechnology has greatly improved performance of many participants in some athletic events.
2. _____ Nanotechnology may have unforeseen negative consequences because of new uses for special substances that haven't been tested.
3. _____ Users of nano-equipment have a competitive advantage over opponents.

Now write your first draft. Begin with a sentence that creates interest. Use the reasons from your organizer to describe why you are for or against the use of athletic nano-equipment.

Revising and Proofreading

Juan's persuasive paper on composting contains six errors in capitalization, spelling, and punctuation. Correct the errors.

When your family has finished eating dinner, what do you do with the table scraps. You probably give them to your dog or throwe them away. What you may not no is that leftover food can actually improve your soil! putting leftover food in a place in which it can decompose is called composting. Composting can leading to better plant growth without fertilizers that can harm animals.

Now revise and proofread your writing. Ask these questions:

- Have I given at least three reasons for each of my opinions?
- Are my arguments clearly stated, and are they convincing?
- Have I found and corrected all errors?
- Did I save my most powerful argument for last?

LESSON
Outline

Name _____ Date _____

Exploring the Impact of Technology on Society

Use your textbook to help you fill in the blanks.

1. Technology has had both positive and negative _____ on society.
2. Most kinds of technology involve a _____ of some sort, usually in the form of cost or safety.

Using Technology Responsibly

3. _____ make sure that people use technology in ways that it is meant to be used.

It's Not Easy!

4. It is difficult to find the perfect technological _____ because there is always a trade-off.

Similar Systems, Different Technologies

5. In the fourth century, _____ relied on a system of _____ for drinking water.
6. New York City uses two large underground _____ to bring water from collection areas into the city.

Critical Thinking

7. What are some ethics that your parents and your school have put in place for computer use?

_____

_____

_____

_____

_____

Exploring the Impact of Technology on Society

Fill in the blanks.

aqueduct	impact	trade-off
ethics	reservoir	

1. Something you have to give up in order to get what you want is known as a(n) _____ .
2. Above-ground stone channel that carried water _____ .
3. A large body of water that holds water delivered for use somewhere else is called a _____ .
4. The affect of one thing on another is a(n) _____ .
5. Rules made to protect people or the environment from harmful impacts are known as _____ .

Name _____ Date _____

Technology of the Future

Fill in the blanks.

ethics	aqueducts	safety
tunnels	cost	trade-off
impacts	watersheds	

Technology has had many _____ , or effects, on society, both positive and negative. _____ help avoid abuses of technology.

Technology also comes with many _____ . This means that in order to enjoy the benefits of technology, we sometimes have to give up something. Some examples of trade-offs are _____ and _____ . Think about the packaging that your favorite snacks come in. The packaging is convenient, but it fills landfills.

You know that technology has been around since prehistoric times. Rome and New York City used very similar technology for getting water—thousand of years apart! Around the fourth century B.C., Rome began using _____ to bring in drinking from other places. More recently, New York City began tapping _____ and bringing that water into the city via underground _____ .

Name _____ Date _____

Tracking with Technology

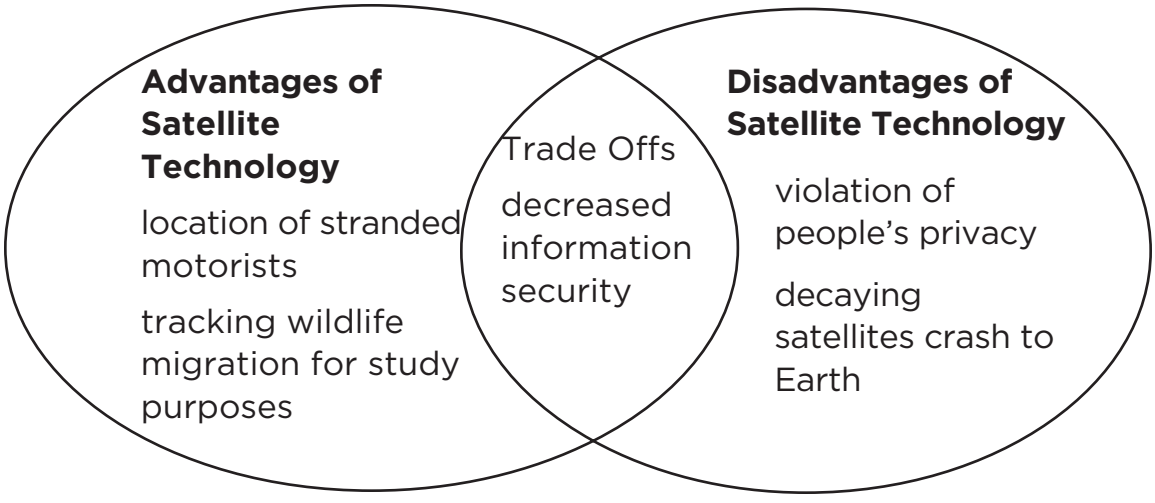
Read the Writing in Science feature in your textbook.

Write About It

Expository Writing Do some research about satellites and how they work. How are they part of a system? What other uses do they have for society? What about their trade-offs? Write a compare and contrast report of your findings in which you evaluate the good and the bad. Do you think satellites are worth the trade-offs?

Getting Ideas

In your paper, you need to compare and contrast the advantages and disadvantages of using satellites. When comparing and contrasting, it often helps to organize your ideas in a Venn diagram. A Venn diagram has two overlapping circles. The differences between two objects or ideas are listed in each circle. Similarities are listed in the area where the circles overlap. Use the Venn diagram below to show the advantages, disadvantages, and trade-offs of satellite technology.



Name _____ Date _____

Drafting

Expository writing provides detailed information about a topic. It includes many facts about the chosen subject. It is important to decide which facts are necessary to include in your paper and which are not. Sophie wrote a paper on the pros and cons of a type of satellite technology called GPS. She included the following statements. Decide whether they are necessary facts. Write *yes* or *no* next to each statement.

1. GPS stands for Global Positioning System. _____

2. My mother's car has GPS, but my father's does not.

   _____

3. GPS is made up of 24 different satellites that were first put into orbit by the U.S. Department of Defense.

   _____

4. You can buy a GPS at most local electronics stores.

   _____

Now write your first draft. Use a separate sheet of paper. Expository writing contains three main parts: introduction, body, and conclusion. Make sure that your paper follows this pattern.

Revising and Proofreading

Now revise and proofread your writing. Ask these questions.

- Have you listed both advantages and disadvantages?
- Have you included trade-offs?
- Does your paper contain an introduction, body, and conclusion?
- Does your paper include necessary, rather than unnecessary, details?
- Have you found and corrected all spelling, capitalization, and punctuation errors?