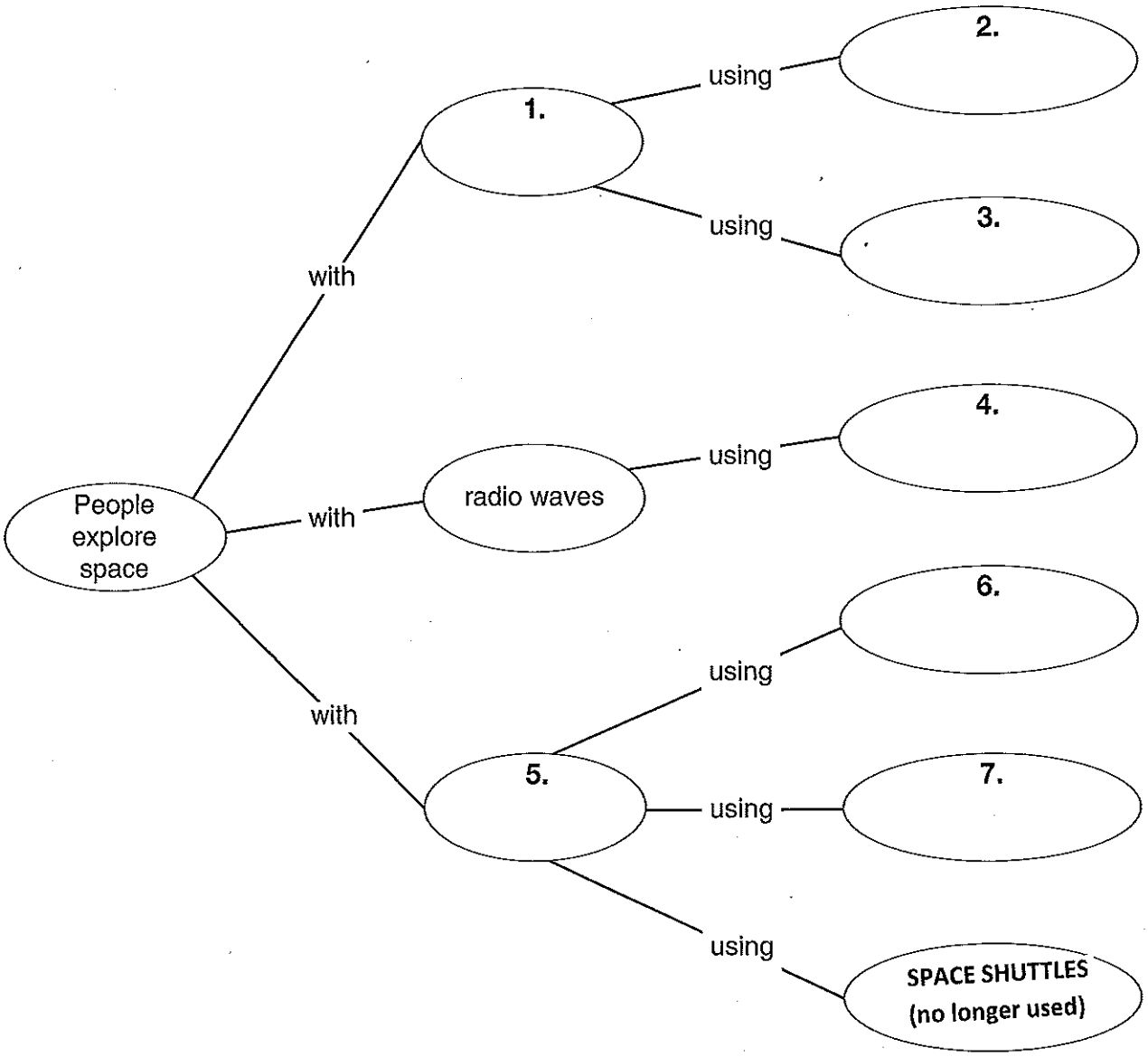
Name Date Class

Directed Reading for Content Mastery

Overview Exploring Space

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

radio telescopes **satellites** **visible light**
space probes **rockets** **reflecting telescopes**
refracting telescopes



Meeting Individual Needs

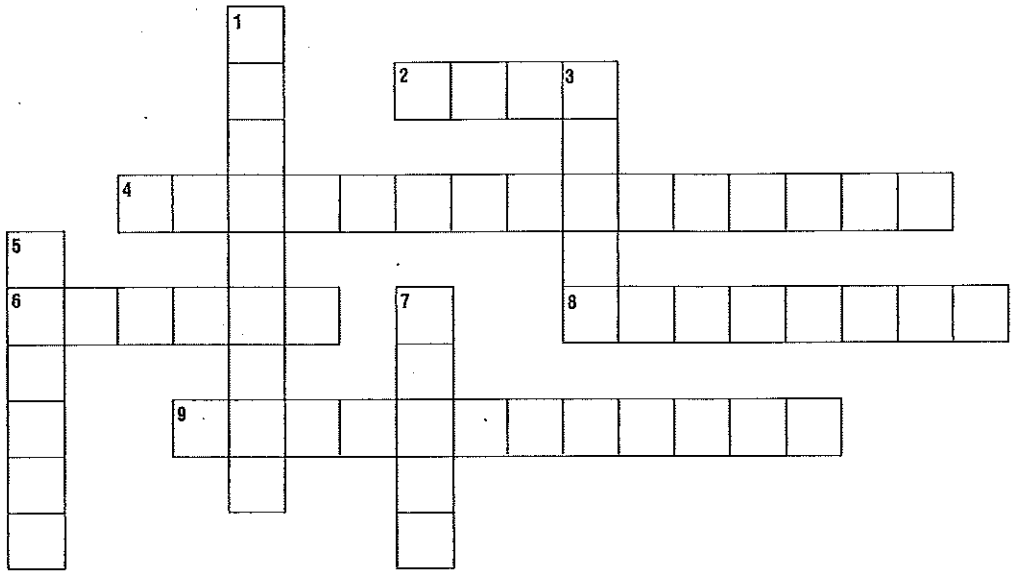
Name Date Class

Directed Reading for Content Mastery

Section 1 ▪ Radiation from Space

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

speed of light		**optics**	**lens**	**electromagnetic**
spectrum	**convex**	**radio**	**stars**	**telescope**



Across

2. A piece of curved glass that magnifies objects

4. These waves carry energy through empty space.

6. Active_____ uses a computer to correct for changes.

8. This appears when white light passes through a prism.

9. 300,000 km/s

Down

1. An instrument that produces magnified images of distant objects

3. These can be seen in the night sky.

5. Refracting telescopes use _____ lenses.

7. Radio telescopes pick up these waves.

Meeting Individual Needs

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SECTION 1 Reinforcement

Radiation from Space

Directions: *Complete the following sentences using the correct terms.*

_____ 1. A refracting telescope is a type of _____ telescope.

_____ 2. Radio waves and gamma rays are two types of _____ waves.

_____ 3. Sound waves are examples of _____.

_____ 4. A _____ uses mirrors to focus light from the object being viewed.

_____ 5. Because radio waves can pass freely through Earth's atmosphere, _____ are useful under most weather conditions.

_____ 6. A _____ is a motor that burns fuel without air.

_____ 7. In a _____, a convex lens focuses light to form an image at the focal point.

_____ 8. To hear astronauts in space, the sound waves are converted to _____ and then back to sound waves.

_____ 9. All electromagnetic waves travel at the same _____.

_____ 10. _____ travels at 300,000 km/s in a vacuum.

_____ 11. In a radio telescope, radio waves strike a large, concave _____.

_____ 12. Today the largest optical telescope has four 8.2-meter _____.

_____ 13. Because the *Hubble Space Telescope* uses mirrors, it is a _____ type of optical telescope.

_____ 14. Optical telescopes allow scientists to study the _____ from objects in space.

_____ 15. At the end of the reflecting telescope is a _____ mirror.

_____ 16. Most optical telescopes used by professional astronomers are in _____.

_____ 17. The _____ is the arrangement of the forms of electromagnetic radiation according to their wavelengths.

_____ 18. The _____ views stars from orbit

_____ 19. Earth's _____ makes it difficult for astronomers to view the universe clearly from the surface.

Meeting Individual Needs

Name _____ Date _____ Class _____

SECTION 2 Reinforcement

Early Space Missions

Directions: *Circle the term in the puzzle that fits each clue. Then write the term on the line. The terms read across or down.*

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

1. The Moon is a natural _____ of Earth.
2. The first human to set foot on the Moon was Neil _____.
3. The path of one object circling another is an _____.
4. _____ was the program that first sent people to the Moon.
5. The _____ probes flew past Jupiter and other planets before heading outward toward deep space.
6. The first citizen of the United States to orbit Earth was John _____.
7. In _____, a team of American astronauts first met and connected with a spacecraft in orbit.
8. A _____ travels far into the solar system, collecting information and returning it to Earth.
9. *Galileo* dropped a smaller probe into Jupiter's _____.
10. Cooperative missions between countries are being planned to send spacecraft to _____ and elsewhere.
11. Launched in 1989, _____ provided information about Jupiter.
12. Space exploration began when the Soviets launched _____, the first artificial satellite.
13. The simplest _____ engine is made of a burning chamber and a nozzle.
14. Weather satellites provide information about the global weather systems on _____.
15. Project _____ began the United States' effort to reach the Moon.

Meeting Individual Needs

Name _____ Date _____ Class _____

Directed Reading for Content Mastery

Section 2 ▪ Early Space Missions

Section 3 ▪ Current and Future Space Missions

Directions: *Explain how each technological advancement listed below has improved or will improve space exploration or our knowledge of the universe.*

1. Space probes such as *Pioneer 10* and *Voyager*

2. *International Space Station*

3. *Next Generation Space Telescope*

Meeting Individual Needs

Name _____ Date _____ Class _____

Directed Reading for Content Mastery

Key Terms
Exploring Space

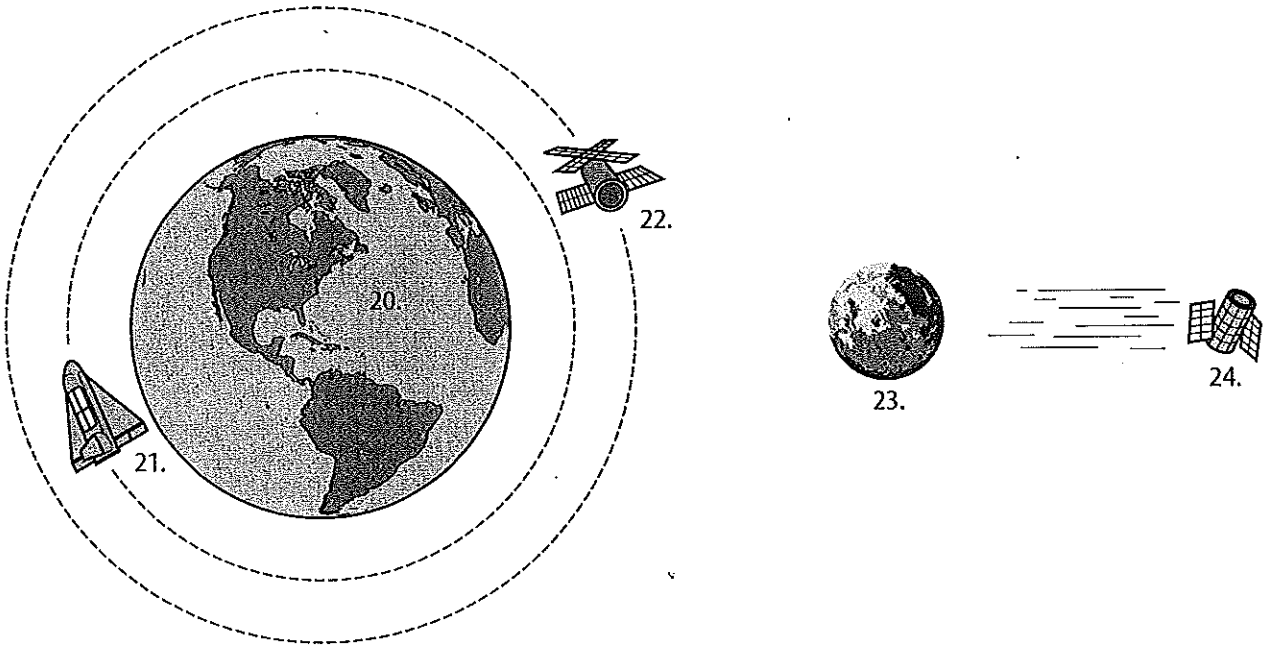
Directions: *Complete the sentences using the terms listed below.* **Record the LETTER & WORDS**

A. Satellite	D. Space Probe	H. Rocket	L. Project Gemini
B. Refracting	E. Mars	I. Reflecting	
C. Observatory	F. Spectrum	J. Sputnik I	
D. Space Station	G. Project Apollo	K. Orbit	

1. Any object that revolves around another object is a(n) _____.
2. A(n) _____ telescope uses mirrors to focus light.
3. The curved path that a satellite follows is a(n) _____.
4. _____ was the last stage in the American effort to land people on the Moon.
5. A(n) _____ telescope uses convex lenses to focus light.
6. The Space Shuttle is a reusable spacecraft that transports astronauts, satellites, and other materials to and from space.
7. A(n) _____ is an instrument that gathers information and sends it back to Earth.
8. During _____ teams of astronauts orbited Earth to practice skills that would be needed to land on the moon.
9. A(n) _____ is a building that houses an optical telescope.
10. The different forms of radiation arranged according to their wavelengths is called the electromagnetic _____.
11. A(n) _____ is an engine that burns fuel without requiring air.
12. *Mir* is an example of a _____.
13. The first artificial satellite was _____.
14. Viking I was the first spacecraft to land on _____.

Chapter Test (continued)

Directions: *Use these words and phrases to identify the numbered parts of the illustration:* **space station, space shuttle, space probe, Earth, Moon.**



20. _____

21. _____

22. _____

23. _____

24. _____

II. Understanding Concepts

Skill: Sequencing

1. Place the various forms of radiant energy in the electromagnetic spectrum in sequence from longest to shortest wavelength. Number the radiant energy with the longest wavelength *1*.

_____ a. infrared waves

_____ b. ultraviolet waves

_____ c. visible light

_____ d. microwaves

_____ e. gamma rays

_____ f. radio waves

_____ g. X rays

Name Date Class

Chapter Test

Exploring Space

I. Testing Concepts

Directions: *Circle the term that correctly completes the sentence.*

1. The Moon orbiting Earth is an example of a(n) (artificial, natural) satellite.
2. In a (reflecting, refracting) telescope, light passes through convex lenses.
3. The *Hubble Space Telescope* is an example of a (reflecting, refracting) telescope.
4. The space probe (*Cassini, Voyager*) was launched in 1997 to study Saturn.
5. The arrangement of electromagnetic radiation according to wavelengths is the (electromagnetic spectrum, electromagnetic waves).
6. (Project Mercury, Project Apollo) was the first stage in the space program designed to send Americans to the moon.
7. The *Voyagers* are (satellites, space probes) that have traveled beyond our solar system.
8. On a (space shuttle, space station), astronauts can live and work in space for long periods of time.
9. (Optical, Radio) telescopes allow us to study the visible light radiated by the stars.
10. A(n) (artificial, natural) satellite is one that is built and launched by humans.
11. As part of (Project Gemini, Project Apollo), Neil Armstrong and Edwin Aldrin became the first humans to walk on the moon.
12. A goal of (Project Mercury, Project Gemini) was to link two spacecraft together while they were in orbit.
13. Most (radio, optical) telescopes used by professional astronomers are housed in observatories.
14. A (reflecting, refracting) telescope uses concave mirrors to focus light.
15. Space stations are (satellites, space probes).

Chapter Test (continued)

Skill: Concept Mapping

Directions: *Write* **true** *in the blank if the statement is true. If the statement is false, change the boldfaced term to make the statement true and write the new term in the blank.*

_____ 2. In an events-chain concept map of the race to the moon, Project Gemini would follow **Project Mercury.**

_____ 3. In a network-tree concept map of the race for space, *Sputnik* would be listed under the **U.S.** space program.

Skill: Outlining

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

4. In an outline of the American space program, John Glenn orbiting Earth would be listed under which space project?

III. Applying Concepts

Writing Skills

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

1. Can you study visible light using a radio telescope? Explain your answer.

2. How are orbital space stations useful?

3. Compare and contrast refracting and reflecting telescopes.

Name _____ Date _____ Class _____

Note-taking Worksheet

Exploring Space

Section 1 Radiation from Space

A. Electromagnetic waves—carry 1 _____ through space and matter

1. 2 _____ radiation includes radio waves, visible light, gamma rays, X rays, ultraviolet light, infrared waves, and microwaves.
2. 3 _____—electromagnetic radiation arranged by wavelength
   a. Forms of electromagnetic radiation differ in their 4 _____—the number of wave crests that pass a given point per unit of time.
   b. The 5 _____ the wavelength, the higher the frequency.
3. All electromagnetic waves travel at the speed of 6 _____, or 300,000 km/s.

B. Optical telescopes—use light to produce magnified images

1. 7 _____ **telescopes**—have convex lenses
2. 8 _____ **telescopes**—use concave mirror
3. Optical telescopes are often located in buildings called 9 _____, which often have roofs that can be opened for viewing.
4. The *Hubble Space Telescope* is located outside 10 _____ atmosphere.
   a. Mistake made in shaping largest 11 _____.
   b. Once the mistake was repaired in 1999, the *Hubble Space Telescope* sent back images of a large cluster of 12 _____.
5. 13 _____ optics—computer helps correct poor images.
6. 14 _____ optics—laser relays information to computer to adjust telescope's mirror and make images clearer.

C. A 15 _____ **telescope**—studies radio waves that travel through space

1. Because radio waves pass freely through Earth's atmosphere, radio telescopes are usually useful 16 _____ hours a day.
2. Scientists use information from radio waves to detect objects in space, map the 17 _____, and look for signs of life on other planets.

Meeting Individual Needs

Name _____ Date _____ Class _____

Note-taking Worksheet (continued)

Section 2 Early Space Missions

A. Early space 18 _____ allowed astronomers to study space in ways not possible using telescopes.

1. Special motors that don't require air are called 19 _____.
   a. 20 _____ rockets cannot be stopped once they are ignited.
   b. 21 _____ rockets can be reignited after they are shut down.
2. A 22 _____—any object that revolves around another object in an 23 _____, or curved path
   a. In 1957 the former Soviet Union launched first artificial satellite, 24 _____.
   b. Today 25 _____ of communication, scientific, and weather satellites orbit Earth.

B. A 26 _____ gathers and transmits information to Earth

1. *Voyager 1* and *Voyager 2* are exploring space beyond the 27 _____ system.
2. 28 _____, first probe to travel through an asteroid belt
3. *Galileo*, launched in 1989, studied Jupiter and two of its moons, 29 _____ and Io.
   a. Gathered information about Jupiter's 30 _____, temperature, and atmospheric pressure
   b. Studies of Europa indicate a possible ocean of 31 _____ and the possible presence of life.

C. United States began race for the 32 _____ in 1960s.

1. First step in program to reach the Moon began with **Project** 33 _____.
   a. In 1961, 34 _____ became first U.S. citizen in space.
   b. In 1962, 35 _____ became first U.S. citizen to orbit Earth.
2. Second step in the Moon race involved **Project** 36 _____.
   a. Teams of astronauts met and 37 _____ with orbiting spacecraft.
   b. 38 _____ of space travel on humans studied.
   c. Unoccupied space 39 _____ also studied the Moon during Projects Mercury and Gemini.
3. **Project** 40 _____—final step in U.S. program to reach the Moon
   a. On July 20, 1969, 41 _____ landed on the Moon's surface, and Neil Armstrong and Edwin Aldrin became the first two people to set foot on the Moon.
   b. 42 _____ lunar landings resulted from Project Apollo, which ended in 1972.

Name _____ Date _____ Class _____

Note-taking Worksheet (continued)

Section 3 Current and Future Space Missions

A. Space Shuttle —reusable spacecraft for transporting people, satellites, and other materials to and from space

1. Launched standing on end **AS OF JULY 2011, NO LONGER USED**
2. Glides back to Earth like an airplane

B. 43 —permanent places in space for humans to live and work

1. U.S. 44 orbited Earth from 1973 to 1979.
   a. Crews performed experiments and collected data on the effects of living in 45.
   b. Fell out of 46 and burned up as it entered Earth's atmosphere
2. Former Soviet Union 47 housed one cosmonaut for more than a year at a time.
   a. Crews from the former Soviet Union and American crews worked together aboard the *Mir*.
   b. Crews from the former Soviet Union spent more time aboard *Mir* than crews from any other country.

C. The United States and Russia have 48 in nine joint space missions.

1. 49 *(ISS)*—cooperation and resources of 16 countries
2. **ISS was completed in 2011.**

D. Several missions explore 50.

1. 51 *Surveyor* and *Mars Pathfinder*—scientists learned water may have covered planet in the past.
2. In 2002, 52 confirmed that Martian soil contained frozen water.

E. 53 (NMP)—purpose is to create advanced technology that will let NASA send smart spacecraft into the solar system

F. 54 —*Lunar Prospector* mapped the Moon's structure and compostition.

1. Scientists wanted to know if water existed in craters at the Moon's poles.
2. Because no material was thrown up when *Lunar* 55 was ordered to crash, more studies needed.

G. Space probe 56 will explore Saturn and its largest moon Titan. **This probe landed on Titan's surface January 14, 2005. Discovered a liquid water-ammonia ocean on Titan.**

H. The _____ *Space Telescope* will study star and galaxy processes.

I. Many people have _____ from research and technology developed for the space program.

Meeting Individual Needs