

# Exploring Space

## ACADEMIC PATHWAYS

**Lesson A:** Listening to a Presentation by a Medical Doctor  
Talking about the Future

**Lesson B:** Listening to a Talk by a Tour Guide  
Planning a Trip to an Astronomical Site

# 7



An astronaut moves himself through space with a guidance gun.

## Think and Discuss

1. Look at the photo. What do you see?
2. Would you like to be an astronaut? Explain.
3. What do you think you will learn about in this unit?

# Exploring the Theme: Exploring Space

Look at the photos and read the captions. Then discuss the questions.

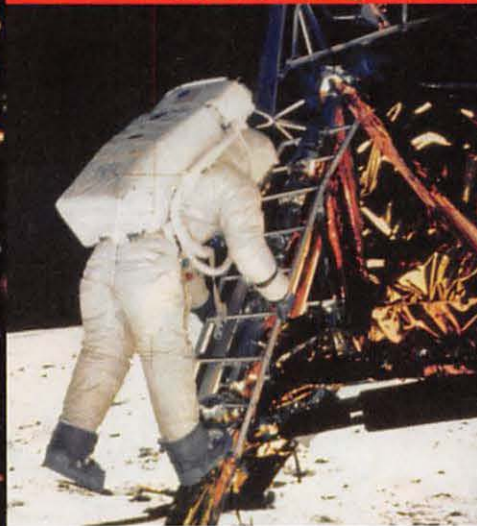
1. What kinds of space technology do the captions talk about?
2. What did the Soviet Union do first in space?
3. What did the United States do first in space?
4. What information on these pages do you find most interesting? Explain.

## Satellites



The Soviet Union sent the first **satellite** (*Sputnik 1*) into space in 1957, the first man (Yuri Gagarin) in 1961, and the first woman (Valentina Tereshkova) in 1963.

## The Moon Landing



Neil Armstrong stepping onto the moon during the Apollo 11 **moon landing** in 1969. The United States was the first country to put a man on the moon.

## Space Agencies



**Space agencies** from around the world, including Japan, Russia, the United States, Europe, and Canada, work together on the International Space Station (ISS).

View of a distant galaxy from the Hubble Space Telescope. In the future, new telescopes will provide even better pictures of space.





track 2-25

**A | Using a Dictionary.** Listen and check (✓) the words you already know. Then use a dictionary to help you with any new words. These are words you will hear and use in Lesson A.

- ago (adv.)     appears (v.)     become (v.)     gas (n.)     in contrast (phrase)  
 amazing (adj.)     atmosphere (n.)     even (adv.)     gravity (n.)     lasted (v.)



track 2-26

**B | Meaning from Context.** Read and listen to the article about stars. Notice the words in blue.

## A Look at the Stars

Here on Earth, we like to look up at the stars in the night sky. In space, the stars look **even** more **amazing**!

Astronaut Don Thomas flew into space on the space shuttle *Columbia*. He said later, “I could see many more stars. I also could see stars of different colors. Some are white. Others are blue, red, or yellow like our sun.”

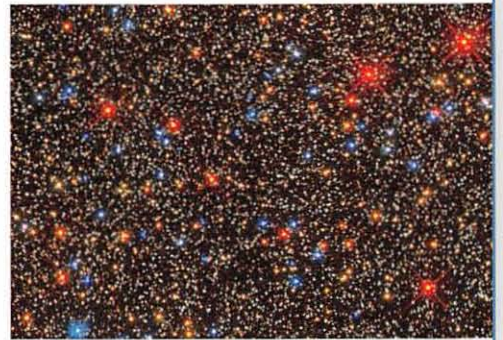
For most of us, stars in the night sky **appear** to twinkle.<sup>1</sup> That’s because light from the stars travels through the Earth’s **atmosphere** before we see it. **Gases** in the atmosphere are always moving, and that makes the light from the stars look unsteady. **In contrast**, “They don’t twinkle in space,” says Thomas. “They look like steady points of light.”

Our own sun is a yellow, average-sized star. It formed around 4.6 billion years **ago**—probably in a very large cloud of gas and dust<sup>2</sup> called a nebula. Bits of gas and dust came together, and then **gravity** began to pull the gas and dust into a ball. As the ball grew larger, its gravity grew stronger. Over time, the gravity **became** so strong that the ball collapsed<sup>3</sup> and the gas heated up. A star was born!

Stars **last** a very long time—for millions or even billions of years. Our sun will get cooler and die someday, but it won’t happen any time soon.



An astronaut at work on the space shuttle *Columbia*



You can tell a star’s temperature by its color. Blue means hot. Red stars are cooler.

<sup>1</sup>When a star **twinkles**, its light appears to go on and off.

<sup>2</sup>**Dust** is powder that is made up of small pieces of sand, earth, dirt, etc.

<sup>3</sup>When something **collapses**, it breaks down suddenly.




**C |** Work with a partner. Student A will explain why Don Thomas talks about the colors of the stars. Then Student B will explain why stars in the sky appear to twinkle. Use your own words as much as possible.

## USING VOCABULARY

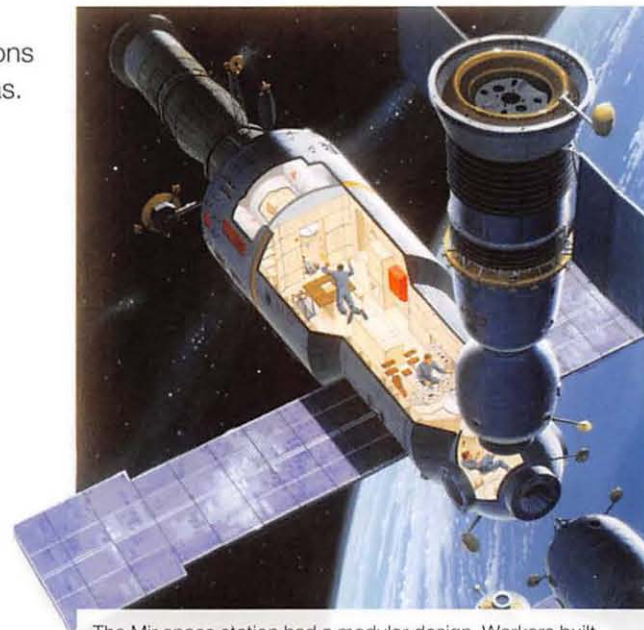
**A** | Look at the illustration on this page and read the caption. Then complete each statement with a word from exercise **A** on page 124.

1. For most of us, it is still \_\_\_\_\_ to think that astronauts traveled to the moon.
2. From Earth, a space station \_\_\_\_\_ to be a star moving across the night sky.
3. Space stations are in orbit above the earth's \_\_\_\_\_, where there is no air.
4. People in space need air to breathe, so they bring oxygen and another \_\_\_\_\_ called nitrogen to space stations.
5. The earth's \_\_\_\_\_ keeps space stations in their orbits in the same way it keeps the moon in its orbit.
6. Astronauts went to the U.S. space station *Skylab* only three times in 1973 and 1974. \_\_\_\_\_, cosmonauts<sup>1</sup> went to the *Mir* space station many times over a twelve-year period, mostly in the 1990s.
7. The *Mir* space station had everything the cosmonauts needed— \_\_\_\_\_ a shower and space toilets!
8. The *Mir* program began in 1986, and it \_\_\_\_\_ for 15 years.
9. The *Mir* program ended several years \_\_\_\_\_—in 2001.
10. People from many countries now work on the International Space Station. In the future, space stations will probably \_\_\_\_\_ even more international as more and more countries participate.

 **B** | **Prior Knowledge.** Take turns asking and answering the questions with a partner. Use the information in this unit and your own ideas.

1. Why is the **atmosphere** important to life on Earth?
2. How long **ago** did the first person go into space?
3. What kind of person wants to **become** an astronaut?
4. Why does the moon **appear** larger when it's low in the sky?
5. How does the earth's **gravity** affect you every day?

<sup>1</sup>A **cosmonaut** is a Russian astronaut.



The *Mir* space station had a modular design. Workers built the station by adding parts, or modules, to the station once it was in space. Here, cosmonauts inside the station prepare to add two new modules.

## Pronunciation

### Contractions with *Will*

We often use contractions with *will* when talking about the future. All of the following contractions are pronounced as one syllable.



track 2-27

#### Examples:

*I'll see you tomorrow.*

*You'll really like that movie.*

*She'll tell us about the assignment soon.*

*Do you know when he'll get here?*

*Just think, next week we'll be in Hawaii!*

*After the plane takes off, they'll bring us something to drink.*



track 2-28

**A** | Listen and repeat each contraction and sentence.

- |            |  |
|------------|--|
| 1. I'll    | I'll be home by eight thirty.                      |
| 2. You'll  | I know you'll enjoy this book.                     |
| 3. He'll   | He'll call you when he gets to Geneva.             |
| 4. She'll  | She'll finish the project by the end of the week.  |
| 5. They'll | They'll have to wait in line to buy their tickets. |
| 6. We'll   | We'll come and visit you as soon as we can.        |



**B** | Work with a partner. Take turns saying the sentences.

- He'll start high school next year.
- Do you know when they'll arrive?
- We'll meet them at the airport at five o'clock.
- She'll stay with her friends in Toronto.
- You'll see your family in December, right?
- I'll have the spaghetti next time we eat at this restaurant.

## Before Listening



**Predicting Content.** You will hear a doctor's presentation about the health effects of space travel. With a partner, decide which topic the doctor will probably NOT talk about. Circle your answer.

- Astronauts often don't get enough sleep.
- Astronauts wear special spacesuits to protect their bodies.
- Astronauts need to get a lot of exercise in space.
- Astronauts have special jobs to do while they're in space.





An Apollo spacesuit on display in Washington, D.C., USA.

## Listening: A Presentation by a Medical Doctor


An airplane lets astronauts experience zero gravity for around 30 seconds.



 track 2-29 **A** | **Checking Predictions.** Look back at your answer from the Before Listening section on page 126. Then listen and check (✓) each topic you hear about in the presentation.


 track 2-29 **B** | **Listening for Main Ideas.** Read the statements and answer choices. Then listen again and choose the correct word or phrase to complete each statement.


1. Spacesuits give astronauts air and \_\_\_\_\_.
  - a. cold temperatures
  - b. light
  - c. air pressure
2. The astronauts will eat \_\_\_\_\_ small meals every day on the space station.
  - a. three
  - b. four
  - c. five
3. To get more sleep, the astronauts can \_\_\_\_\_.
  - a. cover windows
  - b. take medicine
  - c. drink warm tea
4. Astronauts need to get a lot of exercise so that they don't become \_\_\_\_\_.
  - a. heavy and slow
  - b. thin and weak
  - c. tired and bored

 track 2-29 **C** | **Making Inferences.** Read the statements. Then listen again and circle **T** for *true* or **F** for *false*. The answers are not in the speakers' exact words. You need to think about what you hear. (See page 205 of the *Independent Student Handbook* for more information on making inferences.)

- |   |          |          |
|---|----------|----------|
| 1. Dr. Carter is presenting to children for the first time.                 | <b>T</b> | <b>F</b> |
| 2. Dr. Carter knows about life in space from his own experience.            | <b>T</b> | <b>F</b> |
| 3. Dr. Carter doesn't like the food in the space station very much.         | <b>T</b> | <b>F</b> |
| 4. One hour of exercise each day is enough to stay healthy in zero gravity. | <b>T</b> | <b>F</b> |

## After Listening

 **A** | **Collaboration.** With a partner, create a schedule for one day in the life of an astronaut on the International Space Station. Use the information from the presentation. Remember that astronauts need time each day for both work and leisure.

 **B** | **Critical Thinking.** Form a group with another pair of students and compare your schedules from exercise **A**. Which schedule do you think is better for keeping the astronauts healthy? Which schedule has the astronauts doing more work?

## Grammar

Future Time: *Will* and *Be Going To*

We use *will* and *be going to* with the base form of a verb to talk about the future.

People **will walk** on the moon again in the future.

The professor **is going to give** us a quiz tomorrow.

We often use contractions when we use *will* and *be going to*.

**I'll / You'll / He'll meet** my brother Nathan at the airport in Boston.

**I'm / You're / He's going to write** a report on early astronomers.

To talk about future plans, we usually use *be going to*.

After this class, **I'm going to walk** to the library. Would you like to join me?

**They're going to eat** dinner at Sanborn's. Then, **they're going to take** a taxi home.



- A** | Read the conversation and underline *will* and *be going to*. Then practice the conversation with a partner.

**Raymond:** How's your presentation going, Kiki?

**Kiki:** Fine, but I want to change my topic a little.

**Raymond:** How are you going to change it?

**Kiki:** Well, I'm still going to talk about life on the space station.

**Raymond:** Uh-huh.

**Kiki:** But I'll add information about future research on the station.

**Raymond:** That sounds interesting. What kind of research are they going to do?

**Kiki:** Oh, research on human health, space science, and engineering.

**Raymond:** But aren't they researching those things now?

**Kiki:** Sure, but the research projects will be even more international in the future.

**Raymond:** So astronauts from different countries will work together more?

**Kiki:** Exactly!



- B** | With your partner, take turns asking and answering the questions.

1. When do you think people will walk on the moon again?
2. Where do you think people will travel in space?
3. What are you going to do after this class?
4. What are you probably going to eat for dinner tonight?
5. Who will probably call you on the telephone during the next 24 hours?
6. Where are you probably going to go the next time you travel?





track 2-30 **C** | Read and listen to a magazine interview with a space scientist. Then underline *will* and *be going to*.

## The Future of Space Exploration

**Interviewer:** Dr. Takei, when do you think humans will live on Mars?

**Dr. Takei:** That's an interesting question. Mars is a cold planet. If astronauts go to Mars, they'll need spacesuits to stay warm. And even though Mars has some atmosphere, it's not like the air on Earth. Those spacesuits will need to provide oxygen and air pressure, too.

**Interviewer:** I see, but I've read articles about this. They say we can make Mars more like Earth.

**Dr. Takei:** Yes, that's probably true. There is ice on Mars, and the atmosphere is mostly carbon dioxide. That's a greenhouse gas, and if you add a few things to it, it's going to begin to warm the planet.

**Interviewer:** Global warming on Mars?

**Dr. Takei:** Yes, that's the idea—global warming to melt the ice on Mars. However, oxygen is still going to be a problem. Some scientists think that future astronauts will bring plants to Mars to make oxygen—simple plants at first, but over time, even trees could grow!

**Interviewer:** That's amazing! But what's your opinion? Will any of this really happen?

**Dr. Takei:** In my opinion, it won't happen during our lives, or any time soon. Space exploration is expensive, and right now, countries don't have the money. It also takes a lot of time. It could take 1000 years to make Mars more like Earth!



**D** | **Critical Thinking.** Form a group with two or three other students. Discuss the questions.

1. The picture below shows the process of making Mars more like Earth. In the interview, Dr. Takei says that this process is probably possible. What reasons does he give?
2. Do you think this will probably happen? Why, or why not?
3. In your opinion, is making Mars more like Earth a good idea? Explain.



## Language Function

### Making Predictions

We often use *be going to* and *will* to make predictions, or talk about things we think will happen in the future.

People **are going to** travel to Mars someday, but they **won't** be able to live there. In 20 years, **we will** know much more about space than we know now.

**A** | Complete each sentence with your own predictions about the future.

1. In 15 years, cars will run on hydrogen instead of gasoline.
2. In 20 years, the space station will \_\_\_\_\_
3. Someday, people are going to \_\_\_\_\_
4. In the future, computers are going to \_\_\_\_\_
5. Fifty years from now, electricity will \_\_\_\_\_
6. In my lifetime, I'm probably going to \_\_\_\_\_



**B** | Work with a partner. Read the information in the Student to Student box. Then take turns saying your predictions from exercise **A** and asking for your partner's opinion about them.

### Student to Student: Asking for Another Person's Opinion

Asking for a person's opinion is a good way to find out more about that person. It's also a way to keep a conversation going. Here are some expressions you can use to ask for someone's opinion.

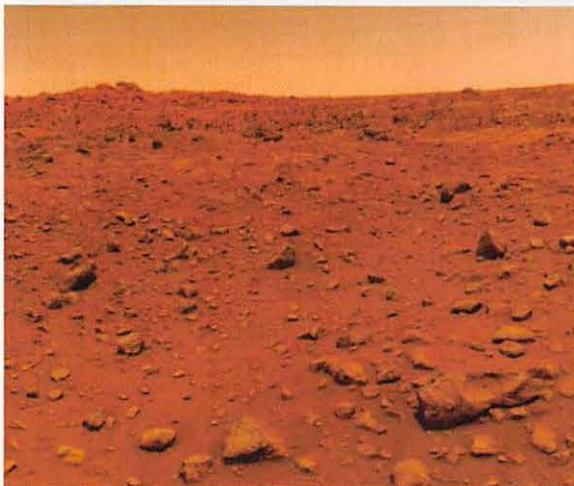
*What do you think? Do you agree? What's your opinion? How about you?*

*I don't think people will ever live on the moon. **Do you agree?***

**What do you think** about the space program?

*I want to learn more about this topic. **How about you?***

In 15 years, cars will run on hydrogen instead of gasoline. Do you agree?



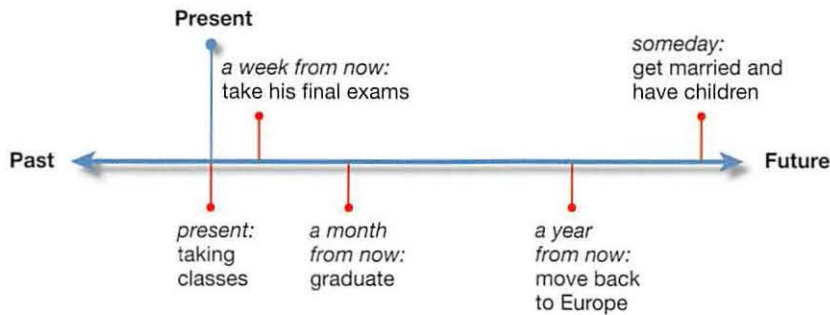
View of Mars from the Viking mission's robotic lander



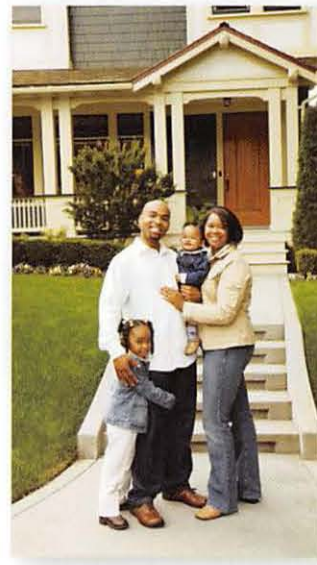
Clouds of frozen water drift over the surface of Mars.

## Talking about the Future

**A** | Look at the timeline that shows John's plans for the future. Then complete the sentences below with the correct verb tenses.



1. Right now, John \_\_\_\_\_ at the university.
2. In a week, he \_\_\_\_\_.
3. Then in a month, he \_\_\_\_\_.
4. In a year, John \_\_\_\_\_ where his family lives.
5. Someday in the future, perhaps John \_\_\_\_\_.



**B** | Take turns saying the sentences from exercise **A** with a partner.

**C** | **Self-Reflection.** Check (✓) some of the things you want to do in the future. Add at least two more ideas.

- |  |   |
|--|---|
| <input type="checkbox"/> get a new job             | <input type="checkbox"/> get more education |
| <input type="checkbox"/> travel to other countries | <input type="checkbox"/> buy a new car      |
| <input type="checkbox"/> get married               | <input type="checkbox"/> _____              |
| <input type="checkbox"/> buy a house               | <input type="checkbox"/> _____              |

**D** | Read the information in the Presentations Skills box about using signal words. Then take turns telling a partner about your plans for the future. Use signal words. When you are finished, repeat the process with a new partner.

### Presentation Skills: Using Signal Words


We use signal words and expressions to help our audience understand us. Here are some signal words and expressions you can use when you talk about the future.

*next (week/month/year) in a (week/month/year) after that eventually*


*I'm going to graduate **in two months**, and I plan to get a job **next year**. **After that**, I'll start saving money. **Eventually**, I'll have enough money to buy a house. (See page 219 of the Independent Student Handbook for more information on signal words and phrases.)*

# EXPLORATION OF THE

## Before Viewing

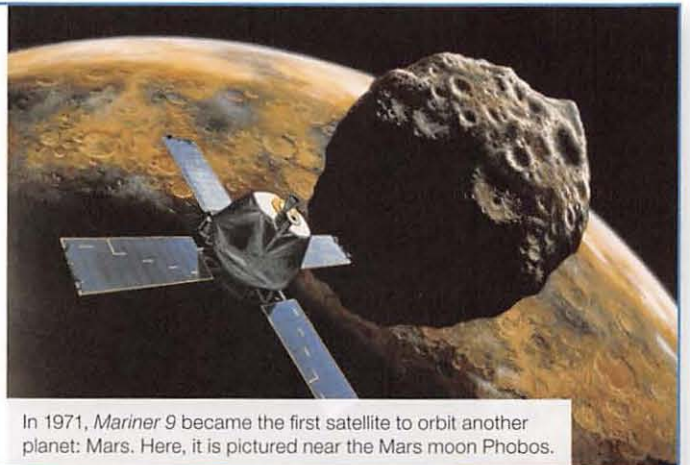
-  **A | Critical Thinking.** In Lesson A of this unit, you learned about manned space exploration, in which human beings travel to space. With a partner, list two advantages (good things) about manned space exploration and two possible disadvantages (problems).

Manned Space Exploration	
Advantages	Disadvantages
<i>We can learn more about space.</i>	<i>It's very expensive.</i>

-  **B | Using a Dictionary.** Read and listen to the information. Then use your dictionary to help you with the underlined words.

The last people to walk on the moon were the crew of *Apollo 17* in 1972. By that time, however, unmanned space exploration of the planets in our solar system was already taking place.

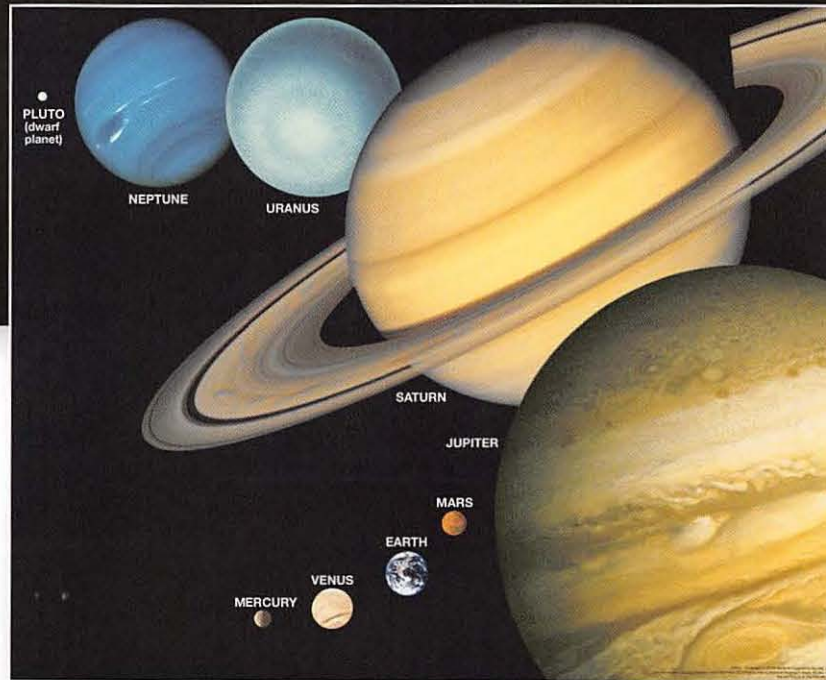
Sending satellites and probes<sup>1</sup> into space is safer and less expensive than sending people. Probes have been sent to the sun, to other planets, and to their moons. Mars alone has been studied by a dozen space probes. The probes either fly by or orbit a planet, and they send pictures and other valuable information back to Earth.




In 1971, *Mariner 9* became the first satellite to orbit another planet: Mars. Here, it is pictured near the Mars moon Phobos.

<sup>1</sup>A **probe** is a scientific instrument used for collecting information.


# SOLAR SYSTEM



## While Viewing

-  **A** | Look at the illustration showing the relative sizes of the planets. Then watch the video and check (✓) each planet when you hear its name.

- |                                  |                                  |   |                                 |                                |
|----------------------------------|----------------------------------|---|---------------------------------|--------------------------------|
| <input type="checkbox"/> Earth   | <input type="checkbox"/> Mars    | <input type="checkbox"/> Neptune              | <input type="checkbox"/> Saturn | <input type="checkbox"/> Venus |
| <input type="checkbox"/> Jupiter | <input type="checkbox"/> Mercury | <input type="checkbox"/> Pluto (dwarf planet) | <input type="checkbox"/> Uranus |                                |

-  **B** | Read the information below. Then watch the video again and match the name of each celestial body<sup>1</sup> to the probe or probes that studied it. You will use some of the probe names more than once.


### Celestial Bodies:

1. The Sun \_\_\_\_\_
2. Mercury \_\_\_\_\_
3. Venus \_\_\_\_\_
4. Jupiter (two probes) \_\_\_\_\_
5. Jupiter's moons \_\_\_\_\_
6. Saturn (two probes) \_\_\_\_\_
7. Uranus \_\_\_\_\_
8. Neptune \_\_\_\_\_

### Probes:

- a. *Magellan*
- b. *Ulysses*
- c. *Pioneer 10* and/or *Pioneer 11*
- d. *Galileo*
- e. *Mariner 10*
- f. *Voyager 1* and/or *Voyager 2*

## After Viewing

 **Critical Thinking.** In Lesson B of this unit, you will learn about telescopes and people who study space, but never leave the earth. In a small group, discuss the questions.

1. Why is the night sky so amazing to human beings?
2. What do you think scientists will discover about outer space in the future?

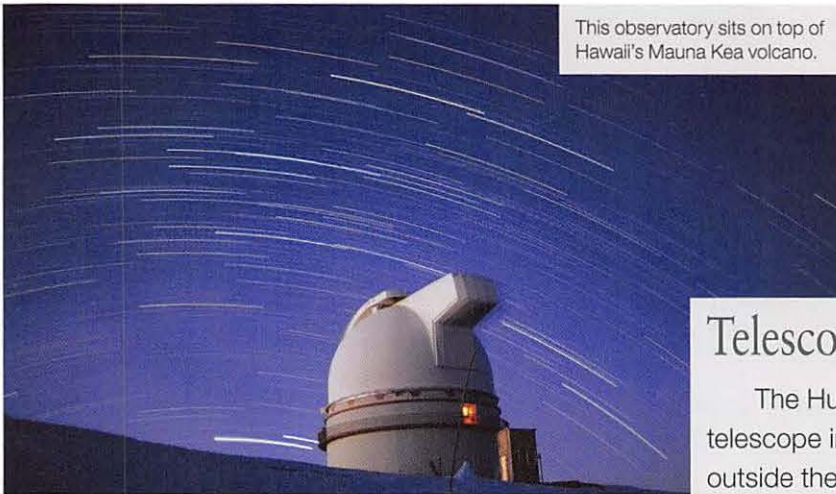
<sup>1</sup>A **celestial body** is a planet, moon, star, or other large object in space.



**A** | **Meaning from Context.** Read and listen to the information. Notice the words in **blue**. These are words you will hear and use in Lesson B.

## Telescopes of the Past

As far as we know, Galileo was the first astronomer to **observe** the moon, planets, and stars through a telescope. In the seventeenth century, telescopes were just glass lenses<sup>1</sup> inside tubes made of wood. The lenses were shaped by hand to make things appear larger. Soon, however, people wanted bigger telescopes to be able to see farther into space. Large glass lenses were heavy and didn't work well in a telescope, so in 1668, Isaac Newton **invented** something new: a telescope that used a mirror to **reflect** light. Soon, reflecting telescopes became the first choice for astronomers.

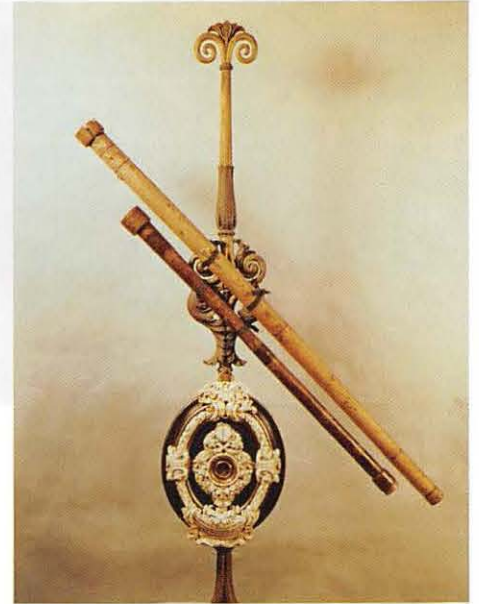


This observatory sits on top of Hawaii's Mauna Kea volcano.

## Telescopes of the Present

As telescopes became larger, it became **necessary** to put them inside some kind of building. Observatories, buildings with telescopes inside for doing research, were built as early as the eighteenth century. With these larger telescopes, astronomers **discovered** planets that Galileo never knew about—Uranus and Neptune.

Three of today's largest observatories stand on top of Mauna Kea in Hawaii. At nearly 14,000 feet (4300 meters), Mauna Kea is above 40 percent of the earth's atmosphere. The Keck Observatory is **among** the observatories on Mauna Kea, and the mirrors in its two reflecting telescopes are 33 feet (10 meters) across! Their **size** allows astronomers to see far into space.



Two of Galileo's telescopes are at a museum in Florence, Italy. The oval-shaped frame holds a 1.5-inch (38 millimeter) glass lens made in 1609.

## Telescopes of the Future

The Hubble Space Telescope was not the first telescope in space, but it is large, and it is **completely** outside the earth's atmosphere. Hubble can **reach** farther into space and **view** more kinds of objects in space than any telescope before it. Work on newer, larger telescopes is also happening here on Earth. The Large Synoptic Survey Telescope will be able to view a wide area of space instead of the narrow area of older telescopes. And the Giant Magellan Telescope will be able to collect four times as much light as the telescopes on Mauna Kea.



A technician inspects the large Synoptic Survey Telescope mirror.

<sup>1</sup>A **lens** is a curved piece of glass or plastic used in cameras, telescopes, eyeglasses, etc.

## USING VOCABULARY

**B** | Write each word in **blue** from page 134 next to its definition.

- \_\_\_\_\_ (adj.) needed in order for something else to happen
- \_\_\_\_\_ (prep.) part of a group
- \_\_\_\_\_ (v.) thought of and made something new
- \_\_\_\_\_ (v.) to watch carefully in order to learn something
- \_\_\_\_\_ (adv.) as much as possible, one hundred percent
- \_\_\_\_\_ (v.) learned about or became aware of something
- \_\_\_\_\_ (v.) to arrive at a place, a level, or an amount
- \_\_\_\_\_ (v.) to send back from a surface
- \_\_\_\_\_ (v.) to look at or see something
- \_\_\_\_\_ (n.) how large or small something is

**C** | Read each statement. Choose the correct word or phrase.

- Earth is about the same (**view/size**) as Venus, but Jupiter is a much larger planet.
- Earth's atmosphere (**reflects/reaches**) some sunlight back into space.
- A large telescope is nice, but it's not (**necessary/completely**) for viewing the moon.
- In 2009, scientists (**invented/discovered**) a very large ring around Saturn. Our eyes can't see the ring, but the Spitzer Telescope can use special light to view it.
- Saturn is (**among/view**) the largest planets in the solar system.



**D** | With a partner, take turns asking and answering the questions from the quiz below. Then check your answers at the bottom of the page.

### ASTRONOMY QUIZ

- What did Galileo **observe** on the moon?  
a. ice                                      b. mountains                                      c. astronauts
- Who **discovered** the planet Uranus?  
a. Isaac Newton                                      b. William Herschel                                      c. Edwin Hubble
- What did Hans Wolter **invent**?  
a. the X-ray telescope                                      b. the reflecting telescope                                      c. the Giant Magellan Telescope
- Why is Mauna Kea **among** the best places in the world to **view** space?  
a. It's very warm.                                      b. It's very high.                                      c. It's very wet.

ANSWERS: 1.b, 2.b, 3.a, 4.b

## Before Listening

### Listening for Time Expressions

When we listen to a talk, it's helpful to notice time expressions. These words and phrases help us to follow a speaker's ideas. Time expressions can be used in more than one way, but here are some common ways they are used.

- At the beginning of a sentence: **First**, *I'll talk about life on the space station.*  
*first                      second                      next                      finally*
- Before a dependent clause: *Astronauts don't go into space **until** they are well-trained.*  
*after                      before                      as soon as                      until*
- Before a noun to show time order: *This is the **last** part of the tour.*  
*first                      second                      next                      last*
- Before a noun as a preposition: *You can ask questions **during** the tour.*  
*after                      before                      during*



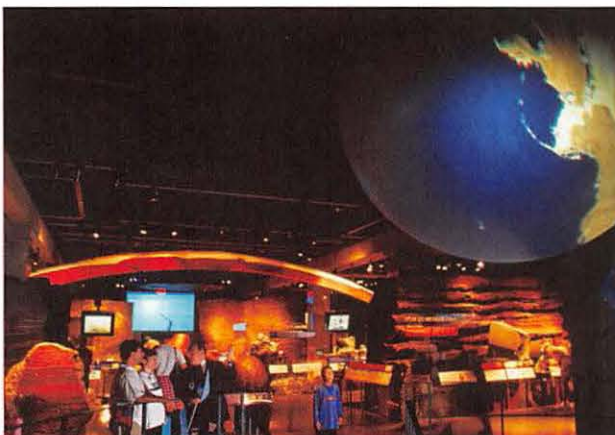
**A** | Listen to part of a talk by a tour guide. Check (✓) the time expressions you hear.

- |                                |                                     |                                 |                                 |                                  |
|--------------------------------|-------------------------------------|---------------------------------|---------------------------------|----------------------------------|
| <input type="checkbox"/> after | <input type="checkbox"/> as soon as | <input type="checkbox"/> before | <input type="checkbox"/> during | <input type="checkbox"/> finally |
| <input type="checkbox"/> first | <input type="checkbox"/> last       | <input type="checkbox"/> next   | <input type="checkbox"/> second | <input type="checkbox"/> until   |



**B** | With a partner, choose the best time expression to complete each sentence. Then take turns reading the sentences aloud.

- Galileo studied medicine (first/before) he studied mathematics.
- You can enter the museum (as soon as/during) you pay and get your ticket.
- The (finally/last) thing we'll see on the tour is the gift shop.
- You can raise your hand (then/during) the talk to ask a question.
- First, she'll give us a tour. (After/Next) that, we'll look at the exhibit by ourselves.
- (Before/Finally), we'll see the telescope and you can ask questions.



The indoor walkway to the Hayden Planetarium at the American Museum of Natural History, New York, USA.



Albert Einstein with the staff at the Yerkes Observatory in Williams Bay, Wisconsin in the United States. The observatory belongs to the University of Chicago, USA.



## Listening: A Talk by a Tour Guide



**A | Listening for Main Ideas.** Read the statements and answer choices below. Then listen to the entire talk and choose the correct answer to complete each statement.

1. The Yerkes telescope is special because it's the \_\_\_\_\_ refracting telescope in the world.
  - a. oldest
  - b. largest
  - c. lightest
2. To look at different parts of the sky, the \_\_\_\_\_ moves around in a circle.
  - a. telescope
  - b. scientist
  - c. room
3. Scientists used the Yerkes telescope to discover the \_\_\_\_\_ of the Milky Way galaxy.
  - a. age
  - b. size
  - c. shape



A galaxy is an extremely large group of stars and planets. This galaxy is called a spiral galaxy because of its shape.



**B | Note-Taking.** Listen again. Complete the notes.

Age of Yerkes Observatory: from the 18 \_\_\_\_\_

Telescope types: 1. Reflecting (use: \_\_\_\_\_ )  
2. Refracting (use: lenses)

Size of lenses in Yerkes telescope: \_\_\_\_\_ inches

Observatory in 1892: 1. in the \_\_\_\_\_  
2. on a hill

## After Listening



**Critical Thinking.** Form a group with two or three other students. Discuss the questions.

1. Do you enjoy guided tours such as this tour of the observatory? Explain.
2. Why does the observatory have no elevator? Do you think modern observatories have elevators? Explain.
3. Do you think the Yerkes Observatory is in a good location? Explain.

## Grammar

## Future Time: The Present Continuous and The Simple Present Forms

In addition to *will* and *be going to*, we often use the present continuous forms to talk about future plans.

*We **are taking** a tour of the observatory on Saturday.*

*The professor **is giving** a lecture on Jupiter's moons next week.*

We can also use the simple present form to talk about scheduled events in the future.

*My brother's train **arrives** at 10:00 a.m. tomorrow*

*The lecture **begins** at 1:20 p.m. in Room 348.*

**A** | Fill in each blank with the present continuous or simple present form of the verb in parentheses. In some sentences, both forms are possible.

1. My friends \_\_\_\_\_ *are taking* \_\_\_\_\_ (take) a vacation next month.
2. The plane \_\_\_\_\_ (leave) at 7:45 a.m.
3. The professor \_\_\_\_\_ (give) us a quiz next week.
4. They \_\_\_\_\_ (get) married in September.
5. Let's hurry! The movie \_\_\_\_\_ (start) at eight o'clock.
6. My next class \_\_\_\_\_ (begin) at ten thirty.



track 2-35

**B** | **Using a Dictionary.** Read and listen to the article. Use a dictionary to help you with any new words. This information will help you with the exercises that follow.

### The Dark-Sky Movement

Most of the world's people now live in or near cities, where doing most things at night is as easy as doing them during the day. Seeing the stars at night, however, is not easy to do in a city. Streetlights and lights from businesses and advertisers shine into the night sky, and only the brightest stars can be seen.

The dark-sky movement wants to change this. They argue that seeing the night sky is important for everyone—not only for astronomers. They say that outdoor lighting affects human health and wildlife, and they recommend simple things such as streetlights that only let light shine down at the street, not up at the sky.

A guest at Kulala Lodge looks at a starry night sky, Sossuvlei, Namib-Naukluft Park, Namibia.





**C** | Read and listen to the conversation. Underline each sentence that uses the present continuous or simple present form to refer to the future.

**Yoshi:** Hi, Tim. What are you reading?  
**Tim:** It's information about a star party.  
**Yoshi:** A star party? Is that a party with a lot of movie stars or something?  
**Tim:** No, Yoshi. At star parties, people get together to look at the night sky.  
**Yoshi:** Do you need to go to a party to do that?  
**Tim:** Well, they're going to a national park. It's far from any cities.  
**Yoshi:** I see—so there are no city lights nearby.  
**Tim:** Exactly. People say it's a lot of fun. Do you want to go?  
**Yoshi:** Maybe. When?  
**Tim:** The bus leaves at five o'clock on Friday afternoon, and it gets to the park around seven thirty.  
**Yoshi:** What time does the bus get back here?  
**Tim:** It gets back pretty late—around midnight. What do you think?  
**Yoshi:** It sounds like fun. Let's go!



Children in New York City use small telescopes to view the night sky. Bright city lights, however, make it difficult to see the stars.



**D** | Practice the conversation from exercise **C** with a partner. Then switch roles and practice it again.

**Critical Thinking Focus: Discussing Pros and Cons**

Considering the different sides of an issue is an important part of critical thinking. Situations are usually not completely good or completely bad, and discussing the pros and cons—the good points and bad points—is a good way to explore a topic and understand it better.



**Critical Thinking.** Form a group with two or three other students. Discuss the pros and cons of city lights and the dark-sky movement. Talk about the ideas in the chart below and your own ideas.

City Lights		Dark Skies	
<b>Pros</b>	<b>Cons</b>	<b>Pros</b>	<b>Cons</b>
-good for business -safety	-people can't sleep -affects plants and animals	-people can see stars -more natural	-hard to make changes (to lights, people's ideas)

## 7

Your group is going to choose a destination and plan a trip to an astronomical site. Then your group will give an informal presentation of your plan.

**A** | Read the information about three possible destinations for your trip.



## Palomar Observatory Tour

Located near San Diego, California in the United States, the Palomar Observatory offers a six-hour astronomy tour for \$65. It includes a tour of the observatory, the museum, gift shop, and the 200-inch Hale reflecting telescope. With the help of observatory guides, visitors can look through several telescopes at the night sky over Palomar Mountain.






## Hortobágy National Park

Hortobágy is a certified dark-sky park. Located in eastern Hungary, the park features Europe's largest area of natural grassland. Visitors can ride in an open train through the park to see animals such as grey cattle, water buffalo, sheep, and horses. There are nature trails for hiking and for observing the stars at night. The entrance fee to the park is \$3.



## Peter Harrison Planetarium

The planetarium is part of the Royal Observatory complex. It's located on a hill in Greenwich Park, London in the U.K. Visitors can choose from several shows, including one about comets<sup>1</sup> and an exciting show for children called *Space Safari*. Shows take place indoors, so bad weather is never a problem. Tickets are \$10 for adults and \$6 for children.

-  **B** | **Discussion.** Form a group with two or three other students. As a group, decide which astronomical site you want to visit. You should consider the pros and cons of each site, the cost of travel, and the things your group is most interested in.
-  **C** | **Planning a Presentation.** Decide which group member(s) will talk about each topic below. Then practice your presentation.
- your group's decision and the reasons for it
  - how you will travel to the site
  - what you will do at the site
-  **D** | **Presentation.** Get together with another group. Tell them about your group's plans. Everyone in your group should do some of the talking.

<sup>1</sup>A **comet** is an object that travels around the sun and looks like a bright star.