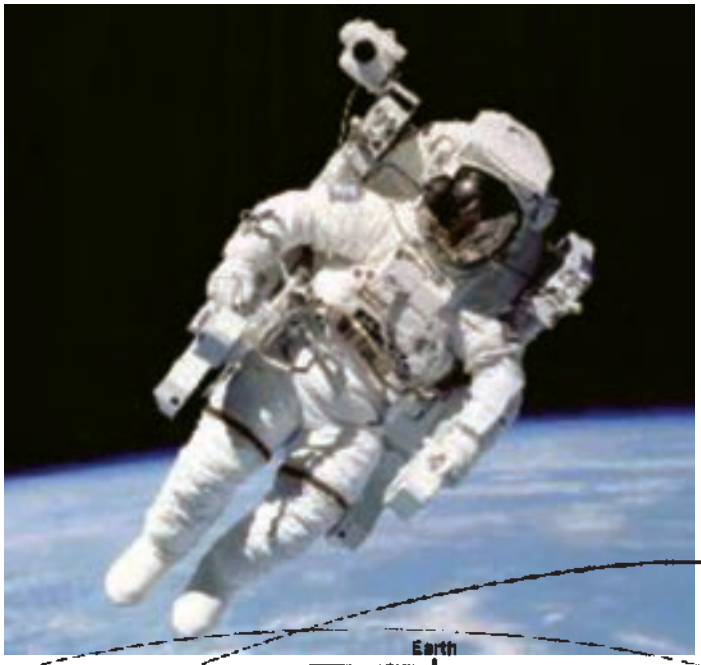
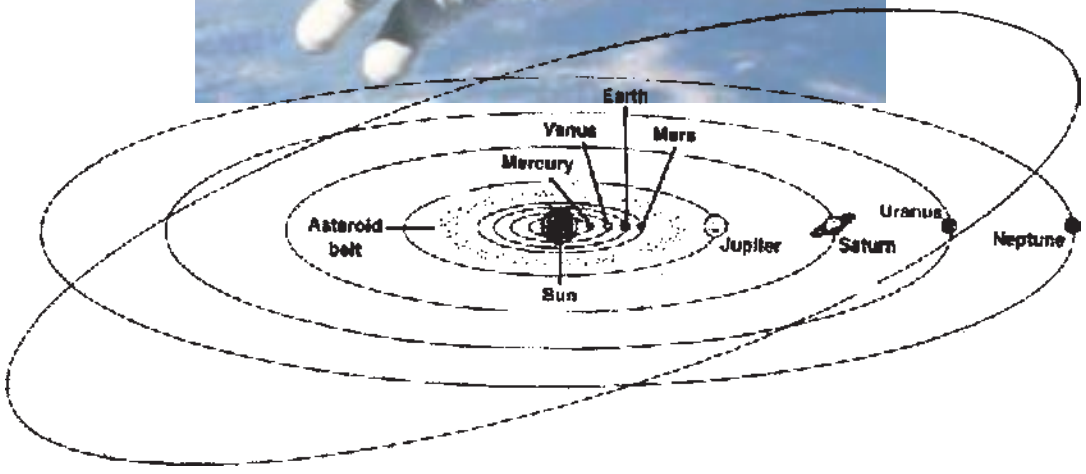
LESSON 6

Space Exploration

Before You Read





Since ancient times, people have dreamed of leaving their home planet and exploring other worlds. In the later half of the 20th century, that dream became a reality. But there are still a lot of mysteries about space. This lesson tries to give you a brief history of space exploration.

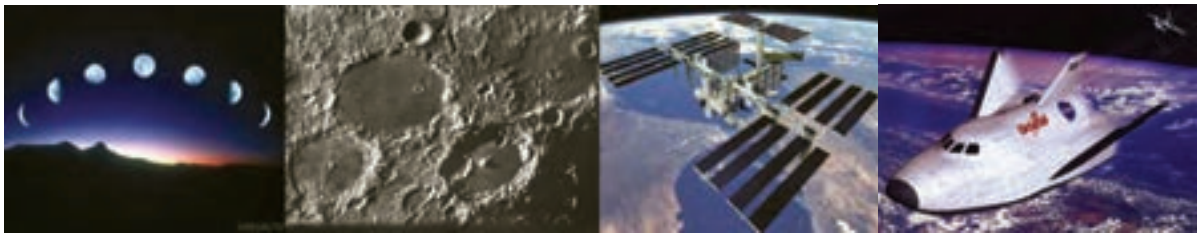
1 ***Answer the following questions.***

1. How important is it to know about space?
2. Why do some countries spend a lot of money on space exploration?
3. Is there life on other planets?
4. Will it be possible for human beings to live on other planets some day in future?
5. What is the Solar System?
6. What is a space station?
7. Do you know anything about the International Space Station?

Now ask your partner the same questions.

2 ***Match the words with the pictures. Then check with a partner.***

craters on the moon a spacecraft space station phases of the moon



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Space Exploration*

1 Thousands of years ago, people observed the night sky and recorded their observations in cave paintings and rock art. These early observations were made without telescopes or other devices. The only things early people could see were the phases of the moon and some of the moon's larger **features**. They could also see some of the planets and many stars. Then, about 400 years ago, the telescope was invented. It allowed people to observe objects in space in much greater detail.

2 In 1609, the Italian scientist, Galileo, was probably the first person to use a new invention–the telescope–to observe the sky. A telescope is an instrument that magnifies, or makes larger, distant objects. With this telescope Galileo observed the moon and saw mountains, valleys, and craters that had never been seen before. He also observed the phases of Venus and the four moons orbiting Jupiter. About fifty years later, the English scientist Sir Isaac Newton used an even better telescope so that he could observe other objects in space.

3 The modern age of space exploration began in 1957, when the former Soviet Union **launched** Sputnik *I,* an **artificial** satellite. A satellite is any natural body, like the moon, or any artificial object that orbits another object. Sputnik, which was about twice the size of a soccer ball, carried instruments to measure the **density** and temperature of the Earth's upper atmosphere. The United States launched its own satellite the next year. Soon both countries were launching humans into space.

exploration: traveling to or around a place to learn

feature: important part or quality of sth

launch: send sb or sth such as a spacecraft into space

artificial: created by people, not natural

density: the amount of sth in a unit volume, area or length

* adapted from: Science for K-2. (2003) Harcourt Brace Jovanovich.

4 One of the best-known American space programs was Project Apollo. The Apollo **missions** landed 12 humans on the moon between 1967 and 1972. These **astronauts** did experiments and brought back **samples** of rock. Their work helped scientists learn more about the moon.

5 In 1977, the *Voyager I* and *Voyager II* space probes were launched. A space probe is a robot **vehicle** used in order to explore deep space. The Voyager space probes sent back pictures of Jupiter, Saturn, Uranus, and Neptune. Both Voyagers are still traveling through space **beyond** the Solar System.

6 Other early space probes included *Viking I* and *Viking II*, which landed on Mars in 1976, and the Pioneer probes, which used instruments to 'see' through thick clouds that cover Venus. Today's scientists use the Hubble Space Telescope, satellites, and space probes to better understand Earth, the Solar System, and what is beyond.

7 The launch of the first units of the International Space Station in 1998 began a new era in space exploration. As many as seven scientists at a time will be able to live and work in space. When completed, the station will be nearly 80 meters long and have a **mass** of more than 455,000 kg. In the future, larger stations could have room for a thousand people or more.

8 People may one day build places to live on the moon, or even on Mars. Although there have been no plans to build **bases** on the moon so far, they could be possible by the year 2020. A moon base could be used as a research station. To save money, some materials needed to build and run the base could come from the moon itself. For example, some of the moon's rocks have oxygen. This oxygen could be taken from the rocks and used by people living on the moon. Recently a probe discovered enough ice at the moon poles to provide a moon base with water. For electricity the base could use solar energy. And some minerals could be mined from the moon and sent back to Earth for processing.

mission:
a flight into space

astronaut:
a traveler in a spacecraft

sample:
a small amount of sth to test

vehicle:
sth such as a car that takes people from one place to another

beyond:
on the other side of sth; further than sth

mass:
the amount of material in sth

base:
a center from which sth is controlled

run:
control sth and make it work

After You Read

A Comprehension Check

1 ***Check your understanding. Are these statements True (T) or False (F)? If they are not mentioned in the text, write (N).***

..... 1. Before the telescope was invented, people knew nothing about space.
..... 2. The modern age of space exploration began in the later half of the 20th century.
..... 3. Scientists still receive pictures sent by the Voyagers I and II.
..... 4. Human beings have been able to land on Mars.
..... 5. The moon doesn't have as much ice as Antarctica does.

Compare your answers with a partner's.

2 **A)** ***What has been the most important development in space exploration?***

a) landing of Vikings I and II on Mars
b) Apollo missions
c) launch of Voyagers I and II
d) launch of the International Space Station

B) Complete the following sentence.

Using telescopes, satellites, and space probes, scientists .....
..... .

C) ***What possibility are scientists thinking about for the future of space exploration?***

..... .

Compare your answers with a partner's.

3 ***Discuss the following questions in class.***

1. Can we consider Galileo as the father of space exploration? Why?/ Why not?
2. Today space organizations use launching probes rather than spacecrafts for exploration. Why?
3. What do you think space exploration can offer human beings in future?

B Sentence Functions

Complete the following table using the text.

Definitions of the following words: a. space probe ..... b. satellite ..... c. telescope .....
Examples of space probes ....
Examples of how we can reduce the cost of building a moon base ....

Compare your answers with a partner's.

Reading Skills

استخراج نکات مهم متن و انتقال آن‌ها به یک جدول به منظور سازمان‌دهی اطلاعات از دیگر مهارت‌های خواندن است که در این درس، با انجام تمرین زیر تجربه می‌کنید.

1 ***What do the following dates from the text refer to? Complete the table. The first one is done for you.***

When?	Who?/ What?	The event
1609	Galileo	using the first telescope
1659		
1957		
1958		
1967-1972		
1976		
1977		
1998		

Compare your answers with a partner's.

2 ***What do the following words from the text mean?***

Word	Paragraph	Meaning
cave	1	
device	1	
era	7	
pole	8	
mineral	8	

Compare your answers with a partner's.

Vocabulary Review

Fill in the blanks with one of the words from the list below. There is one extra word.

distant details measured artificial
vehicles allowed observed experiment magnify

1. There are a lot of motor ..... on the roads of our city.
2. Can you give me further ..... of how the accident happened?
3. A microscope will ..... these germs, so that you can actually see them.
4. We ..... the sunset from the top of the mountain.
5. Tell me, are these beautiful flowers natural or ..... ?
6. Ali's father has traveled to ..... parts of the world.
7. Taking photographs is not ..... inside this museum.
8. The dress designer ..... Mary for her new clothes.

Compare your answers with a partner's.

Focus on Grammar

Expressing Purpose

Read the following sentences carefully.

1. My brother is reading a new book on space exploration **so that** he **will get** more information.
2. Newton used a better telescope **so that** he **could observe** other objects in space.
3. They sent Sputnik into space **so that** it **would measure** the density and temperature of the Earth's upper atmosphere.
4. A space probe is a robot vehicle used **to explore** deep space.
5. **In order to save** money, some materials needed to build and run the base could come from the moon itself.
6. Today's scientists use the Hubble Space Telescope **so as to understand** Earth, the Solar System, and what is beyond.
7. I set the alarm clock **so as not to get up** late in the morning.

Now answer the following questions.

1. What do *so that, to, in order to,* and *so as to* mean in the above sentences?
2. What kind of meaning relationship do they indicate?
3. What is the difference between sentences 1 and 2, 3?

Grammar Practice

1 **Use *so that*, *to*, or *in order to* in the blanks in the following sentences.**

1. Space exploration is the use of space travel ..... discover the universe beyond the Earth.
2. Missions have to be carefully designed …… astronauts will be kept safe from take-off to landing.
3. Today the world's space agencies try to organize robotic missions …… make space exploration cheaper.
4. The first thing to do was to develop powerful rockets …… put a satellite into orbit.
5. These rockets needed both force and guidance systems …… they could be directed to reach their orbits.

Compare your answers with a partner's.

2 **Answer each question in A using *to (infinitive of purpose)* and the most suitable idea in B.**

A	B
1. Why are you going to the library?	a. get to school on time
2. Why do you get up early every day?	b. learn more about Mars
3. Why did he go to Canada?	c. remain healthy
4. Why did they launch a new space probe?	d. return a book
5. Why does she exercise regularly?	e. continue his studies

1. I'm going to the library to return a book.
2. .....
3. .....
4. .....
5. .....

Compare your answers with a partner's.

3 Combine the following sentences using the words in parentheses.

1. He has started walking to work. He wants to get more exercise. (in order to)
   .....
2. I wrote down his address. I didn't want to forget it. (so as to)
   .....
3. Ali turned on the television. He wanted to see the football game. (so that)
   .....
4. Mary is saving money. She wants to buy a new car. (so that)
   .....
5. Reza turned down the radio. He didn't want to disturb his roommate. (so as to)
   .....

Compare your answers with a partner's.

Grammar Digest

1. We use *so that* to talk about the purpose of doing something. *So that* is usually followed by a modal like *can, could,* etc.

- John **goes** to the library **so that** he **can study** in a quiet place.
- John **went** to the library **so that** he **could study** in a quiet place.

2. We use an infinitive to talk about purpose of doing something. In a more formal style, we often use *in order to* or *so as to*.

- I lay down for a minute **to relax**.
- He moved to a new apartment **in order to be** near his work.
- She's going to the post office **so as to buy** some stamps.