

# SCIENCE

Student Book

▶ **4th Grade** | Unit 8

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# SCIENCE 408

## OUR SOLAR SYSTEM AND THE UNIVERSE

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LIFEPAC Test |Pull-out

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# OUR SOLAR SYSTEM AND THE UNIVERSE

In this LIFEPAK® you will take an imaginary trip into space. You will learn about the sun, moon, and planets. Hopefully, you will sense the excitement astronomers experience every time they peer into space through their huge telescopes.

During the first three days of Creation, God made our planet Earth. The fourth day He reached into the vastness of outer space. He filled that space with an infinite number of other heavenly bodies.

Many years ago, a shepherd boy named David was watching his sheep. The night was dark and still. The moon rose over the horizon. A million stars began to twinkle in the sky like diamonds. Reaching for his harp, David expressed his gratitude to a loving God. He sang (Psalm 19:1), "The heavens declare the glory of God; and the firmament [sky] sheweth his handiwork."

Since the day of Creation, boys and girls have wanted to know more about the universe. How big is it? What force moves the sun, the moon, and the stars through space? How are the heavenly bodies kept on their courses?

## Objectives

**Read these objectives.** The objectives tell you what you will be able to do when you have successfully completed this LIFEPAAC. Each section will list according to the numbers below what objectives will be met in that section. When you have finished this LIFEPAAC, you should be able to:

1. Tell about the opinions of the ancients in relation to the origin of the universe.
2. Explain the difference between fact and opinion.
3. Identify two astronomers and their discoveries.
4. Explain how some important instruments are used in astronomy.
5. Describe the sun and its relation to the earth, planets, and galaxies.
6. List the planets in order from the sun.
7. Tell some of the ancient myths about the sun.
8. Explain why the sun is important to us.
9. Identify and tell about meteors, comets, and asteroids.
10. Describe the main features of the moon.
11. Give some reasons why God created the stars for "signs."
12. Explain the difference between astronomy and astrology.
13. Recognize some stars and constellations.
14. Tell why we should not go to astrologists or fortunetellers.



# 1. A TRIP THROUGH SPACE

Have you ever looked up into the sky and watched the clouds float by?  
Have you ever looked into the dark night as David did and wondered what is far out in space?

In this section of your LIFEPAC, you will take a quick, imaginary trip to the moon, the planets, and the stars.

When you return to our own planet, Earth, you will learn something about the discoveries of men of science and the methods they use to observe and chart the heavens.

## Objectives

**Review these objectives.** When you have completed this section, you should be able to:

1. Tell about the opinions of the ancients in relation to the origin of the universe.
2. Explain the difference between fact and opinion.
3. Identify two astronomers and their discoveries.
4. Explain how some important instruments are used in astronomy.
5. Describe the sun and its relation to the earth, planets, and galaxies.
6. List the planets in order from the sun.

## Vocabulary

**Study these new words.** Learning the meanings of these words is a good study habit and will improve your understanding of this LIFE PAC.

**astronomers** (u stron' u murz): Scientists who study the stars, the sun, the moon, and the universe.

**astronomy** (u stron' u mē): The scientific study of the universe beyond the earth.

**atmosphere** (at' mu sfir): The air surrounding a planet.

**crater** (krā' tur): A round, ringlike hole on the surface of a heavenly body.

**galaxy** (gal' uk sē): A very large system of stars, gas, and dust far out in space; billions of stars.

**Jupiter** (jü' pu tur): The largest planet in our solar system.

**Mars** (märz): The fourth planet from the sun.

**Mercury** (mēr' kyur ē): The planet closest to the sun.

**Neptune** (nep' tün): The eighth planet from the sun.

**opinion** (u pin' yun): A belief with no positive knowledge or proof.

**orbit** (ôr' bit): The path of the earth or one of the planets around the sun.

**Pluto** (plü' tō): A dwarf planet.

**revolve** (ri volv'): To orbit or go around a central point.

**satellite** (sat' u līt): A small planet that revolves around a larger planet; also a man-made object that circles the earth.

**Saturn** (sat' urn): The sixth planet from the sun.

**solar** (sō lur): Having to do with the sun. Our earth is a part of the solar system.

**spectroscope** (spek' tru skōp): An instrument for looking at and recording light from a distant object.

**telescope** (tel' u scōp): An instrument for making distant objects seem nearer or larger.

**universe** (yü' nu vèrs): All things, everything in space. Our world is a very small part of the universe.

**Uranus** (yü rā' nus): The seventh planet from the sun.

**Venus** (vē' nus): The second planet from the sun.

**Note:** All vocabulary words in this LIFE PAC appear in **boldface** print the first time they are used. If you are unsure of the meaning when you are reading, study the definitions given.

**Pronunciation Key:** hat, āge, cāre, fār; let, ēqual, tērm; it, īce; hot, ōpen, ôrder; oil; out; cup, pūt, rüle; child; long; thin; /TH/ for then; /zh/ for measure; /u/ or /ə/ represents /a/ in about, /e/ in taken, /i/ in pencil, /o/ in lemon, and /u/ in circus.

## Our Solar System

Are you ready for a trip through our **solar** system? Then jump into your imaginary spaceship. Buckle your seatbelt. Turn on the oxygen supply. Give the signal to blast off!

We leave our planet Earth at the speed of light. Light travels 186,282 miles (299,792 kilometers) per *second*. As we leave the earth's **atmosphere**, we notice that the sky is *black* and the stars can be seen all day.

In less than two seconds we reach our nearest neighbor, the moon. While we do not plan to stop here, we get a quick glimpse as we whiz by. We take a quick snapshot of the moon's surface from our window. We notice the moon's deep **craters**, broad, dark plains, and lofty mountains.

At the moon we are about 240,000 miles (386,160 kilometers) from Earth. Our navigator takes another "sighting" of the stars and charts a course that will take us toward the planets but away from the sun. Because the sun is a glowing ball of hot gases with a surface temperature of 11,000 degrees Fahrenheit (6,092° centigrade), we will be careful to pass it at a safe distance.



### | Our Solar System

As we travel away from the sun, we shall leave behind two planets — **Mercury** and **Venus**. Mercury is the second smallest of the planets. Mercury and Venus are closer to the sun than Earth. Ahead of us are five more planets — **Mars**, **Jupiter**, **Saturn**, **Uranus**, and **Neptune**. All of the planets revolve around the sun. About four minutes after leaving Earth, we pass Mars. We notice what looks like a dust storm blowing over a desert. These desert areas probably give Mars its red look as we view it through a **telescope** from earth.



We have now been in flight four or five minutes. Rushing on toward Jupiter, the largest of the planets, we wonder about the strange, red spots moving across its surface.

As we speed past Jupiter, we come to Saturn, the second largest planet. Saturn has at least six thin rings and 23 **satellites**. The satellites look like our moon.

In a few moments we fly past Uranus. Fifteen satellites have **orbits** around Uranus.

After passing Uranus we finally reach Neptune. Uranus and Neptune are so far from the sun that they are very cold and dark. Neptune is more than three times larger than Earth.

Pluto is no longer considered a planet, and has recently been reclassified as a “dwarf planet”—one of many in the Kuiper Belt, the ring of icy objects that astronomers now know marks the outer edge of the solar system. The solar system is now considered to have eight planets.

Pluto follows an orbit around the sun that is not always the same. Sometimes Pluto is farther from the sun than Neptune. During the fourth week of January 1979, Pluto moved closer to the sun than Neptune. Pluto was in this part of its orbit until February 11, 1999.

We have now traveled in imagination over 3.5 billion (3,500,000,000) miles (5,600,000,000 kilometers) in about five hours. Looking back we notice that our sun is only a bright star shining among millions of other stars.

Perhaps it is time to start back to planet Earth. If we were to visit one of the nearest stars in our **galaxy**, *Alpha Centauri*, we would have to travel for more than four years at the speed of light. If we wish to go to the farthest edge of our galaxy, the Milky Way, it would take us about 120,000 years. Then, if we could continue on to other galaxies beyond, we would need to travel for another twenty million years! Even at the speed of light that would be a long, long trip, wouldn't it?



| Sun, Jupiter, Saturn, Uranus and Neptune

**Do this activity.**

- 1.1** Name the eight planets in our solar system in order from the sun. (Do not forget Earth.)
- a. \_\_\_\_\_ b. \_\_\_\_\_
- c. \_\_\_\_\_ d. \_\_\_\_\_
- e. \_\_\_\_\_ f. \_\_\_\_\_
- g. \_\_\_\_\_ h. \_\_\_\_\_

**Write true or false.**

- 1.2** \_\_\_\_\_ Jupiter is the smallest planet.
- 1.3** \_\_\_\_\_ The two planets closest to the sun are Mercury and Venus.
- 1.4** \_\_\_\_\_ Saturn has 23 satellites.
- 1.5** \_\_\_\_\_ Blowing dust gives Mars its red color.
- 1.6** \_\_\_\_\_ Saturn has five rings.

**Match these items.**

- 1.7** \_\_\_\_\_ moon
- 1.8** \_\_\_\_\_ a star
- 1.9** \_\_\_\_\_ *Alpha Centauri*
- 1.10** \_\_\_\_\_ red spots move across the surface
- 1.11** \_\_\_\_\_ Neptune
- a. Jupiter
- b. nearest star
- c. three times larger than Earth
- d. our nearest neighbor in space
- e. sun
- f. Mercury



**Fill in the blanks, with the correct words or numbers.**

- 1.12** Light travels at the rate of 186,282 miles per \_\_\_\_\_ .
- 1.13** If we could travel through space at the speed of light, we could reach the moon in less than \_\_\_\_\_ seconds.
- 1.14** At the speed of light, it would take us more than \_\_\_\_\_ years to reach the outer rim of the Milky Way.
- 1.15** In our solar system we have \_\_\_\_\_ planets.

## Our Big Universe

For many years people have had questions about the **universe**. In ancient times they thought the world rested on the back of an elephant. When asked what the elephant stood on, they answered, “on the back of a turtle.” Most ancient people believed the sun, moon, and stars **revolved** around the earth. Some also taught that the earth was flat because to them it looked that way. They were afraid that if one went too far in any direction, he would fall off the edge.

These beliefs, in the form of legends, myths, and stories, were accepted as facts when they really were **opinions**. Opinions are beliefs that people have without positive knowledge or proof. The fact that God created the universe has, even today, been ignored by many persons. Instead, they have accepted opinions and ideas to replace the truth that God has revealed in the Bible.

**The astronomers’ eyes.** About three hundred seventy years ago, an instrument was made to help scientists learn more about space. The story has been told about a Dutchman who made eyeglasses. His name was Hans Lippershey. One day, unknown to him, his children slipped into the shop where he worked. They began to play with some glass lenses. One of the children picked up two lenses and looked out



| A telescope

the window. He was surprised at what he saw. He noticed that a church which was far away looked much closer and bigger. He called his father. His father rushed in and was amazed at what he saw. By chance Hans' son had made a very important discovery. He had discovered that if he held a lens near his eye and another lens a little farther away, objects at a distance appeared to be much closer and bigger than they really were. A short time later an Italian scientist named Galileo, heard about this discovery. He started at once to use two lenses and made a telescope.

Since the time Lippershey and Galileo made their first telescopes in 1608 and 1609, scientists have made larger and better ones. The telescope has opened new worlds in **astronomy**. With telescopes **astronomers** can see farther and farther into space.

Another instrument that has aided in space study is the spectroscope. A **spectroscope** measures light from heavenly bodies. When you see a rainbow in the sky you are looking at a type of spectroscope. The light of the sun shining on the drops of water is broken into the colors of the rainbow. A spectroscope works like the raindrops to break up the colors of light from faraway heavenly bodies. By using a spectroscope with a telescope, an astronomer can learn important information about the stars.

Astronomers use another important instrument called a *radio telescope* to study the universe. The radio telescope is used to receive radio signals from stars and other objects in space. These radio signals are called waves.

A machine attached to the radio telescope strengthens the signals and records them as wavy lines on a piece of paper. The wavy lines tell the astronomer the distance to the object and where it is located in space. In this way, the astronomer gets the information from stars that are so far away and so dim that they cannot be seen through a regular telescope.

From these instruments, astronomers can get the needed information to make maps of the heavenly bodies.

**The astronomers' observations.** The mind of man is the most important tool of all. God gave man a mind to use the information he gathers. The astronomer must observe, record, and compare. He must *understand* what he sees and hears. As he explores the universe, he must make use of mathematics and other sciences. Unless he knows how to read the message he receives from the universe, his instruments will be useless.



**Write the correct letter and word on each blank.**

- 1.16** Many ancient people believed that the earth rested on the back of \_\_\_\_\_ .  
 a. a dog                      b. a bird                      c. an elephant              d. nothing
- 1.17** This belief in 1.16 was widely accepted as \_\_\_\_\_ by many.  
 a. fact                      b. proof                      c. silly                      d. unbelievable
- 1.18** Opinions are beliefs that some people accept as \_\_\_\_\_ without proving them or having knowledge about them.  
 a. false                      b. silly                      c. truth                      d. error
- 1.19** The fact that \_\_\_\_\_ created the universe has been laughed at by many people.  
 a. man                      b. no one                      c. the wind                      d. God
- 1.20** Theories and ideas of men have often replaced the \_\_\_\_\_ of God's Word.  
 a. error                      b. mistakes                      c. truth                      d. uncertainty
- 1.21** The first telescope was invented by \_\_\_\_\_ in 1608.  
 a. Hans Lippershey                      b. Galileo  
 c. Marconi                      d. none of these
- 1.22** An Italian scientist who improved upon the telescope and made it popular was \_\_\_\_\_ .  
 a. Hans Lippershey                      b. Galileo  
 c. Marconi                      d. none of these
- 1.23** An instrument that measures light from bodies in space is the \_\_\_\_\_ .  
 a. radio telescope                      b. telescope  
 c. radio                      d. spectroscope



**Answer this question.**

- 1.24** What four things must the astronomer do to read the messages he receives from space through his instruments? \_\_\_\_\_  
 \_\_\_\_\_

**Do this activity.****1.25**

Write a paragraph explaining why astronomers' minds are more important than the instruments they use. \_\_\_\_\_

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**Do this research.** Consult an encyclopedia or other reference book. Select one of these instruments which interests you: The telescope, spectroscope, or radio telescope. Find several interesting facts about the instruments which you selected. Write, in your own words, complete sentences that tell something about the instrument which is not explained in the LIFE PAC.

Discuss your sentences with a friend.

**1.26**


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Check \_\_\_\_\_ here when you have discussed your sentences.

Friend's name \_\_\_\_\_



**Review the material in this section to prepare for the Self Test.** The Self Test will check your understanding of this section. Any items you miss on this test will show you what areas you will need to restudy in order to prepare for the unit test.

## SELF TEST 1

**Match these items** (each answer, 2 points).

- |              |                       |                                 |
|--------------|-----------------------|---------------------------------|
| <b>1.01</b>  | _____ opinion         | a. study of the universe        |
| <b>1.02</b>  | _____ Lippershey      | b. at least six rings           |
| <b>1.03</b>  | _____ spectroscope    | c. radio waves                  |
| <b>1.04</b>  | _____ Pluto           | d. discovered the use of lenses |
| <b>1.05</b>  | _____ astronomy       | e. created universe             |
| <b>1.06</b>  | _____ Jupiter         | f. belief                       |
| <b>1.07</b>  | _____ God             | g. second planet from the sun   |
| <b>1.08</b>  | _____ Saturn          | h. measures light               |
| <b>1.09</b>  | _____ Venus           | i. a dwarf planet               |
| <b>1.010</b> | _____ radio telescope | j. largest planet               |
|              |                       | k. hottest planet               |

**Complete these statements** (each answer, 3 points).

- 1.011** Saturn has \_\_\_\_\_ satellites.
- 1.012** The second smallest planet is \_\_\_\_\_ .
- 1.013** In our solar system \_\_\_\_\_ planets revolve around the sun.
- 1.014** The planet \_\_\_\_\_ is nearest the sun.
- 1.015** An \_\_\_\_\_ is a scientist who studies the heavenly bodies.
- 1.016** Many ancient people believed that the earth was supported on the back of a(n) \_\_\_\_\_ .
- 1.017** The \_\_\_\_\_ measures light from distant objects, such as stars, in space.
- 1.018** The \_\_\_\_\_ has made it possible to see distant objects in the sky.





**1.030** Two planets that are very cold and dark are \_\_\_\_\_  
\_\_\_\_\_.

- a. Mercury and Venus
- b. Uranus and Neptune
- c. Jupiter and Saturn
- d. Earth and Mars

**Do this activity** (this answer, 5 points).

**1.031** List five of the eight planets.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_

**Write true or false** (each answer counts 3 points).

- 1.032** \_\_\_\_\_ If we could travel into space at the speed of light, we could reach the moon in about two seconds.
- 1.033** \_\_\_\_\_ God created the universe on the first day of Creation.
- 1.034** \_\_\_\_\_ Mathematics is an important subject for the astronomer who begins to study the universe.
- 1.035** \_\_\_\_\_ The psalmist David praised God for His glory.
- 1.036** \_\_\_\_\_ Galileo was a Dutch scientist who was interested in the telescope.
- 1.037** \_\_\_\_\_ Radio waves can be bounced off the stars.
- 1.038** \_\_\_\_\_ The earth is a planet.
- 1.039** \_\_\_\_\_ The earth revolves around the sun.
- 1.040** \_\_\_\_\_ Light travels at a speed of 186,282 miles a second.
- 1.041** \_\_\_\_\_ If we were several billion miles from the sun, it would look like a shining star.

**Answer these questions** (each answer, 5 points).

**1.042** What are four things which an astronomer must do to “read” the messages received from outer space? \_\_\_\_\_  
\_\_\_\_\_

**1.043** If we could go to the moon and land there, what are two surface features we would be able to see? \_\_\_\_\_  
\_\_\_\_\_

**1.044** On our trip through space, why did we want to pass the sun carefully?  
\_\_\_\_\_  
\_\_\_\_\_

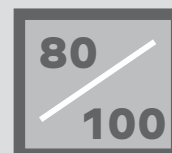


**Teacher check:**

Score \_\_\_\_\_

Initials \_\_\_\_\_

Date \_\_\_\_\_





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