

THE **SOLAR SYSTEM**

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The Solar System

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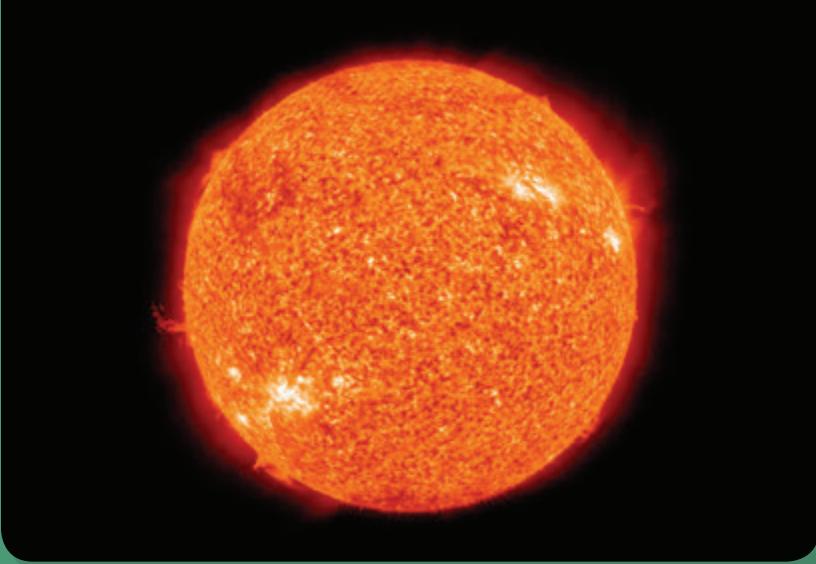
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STRUCTURED GUIDED READING

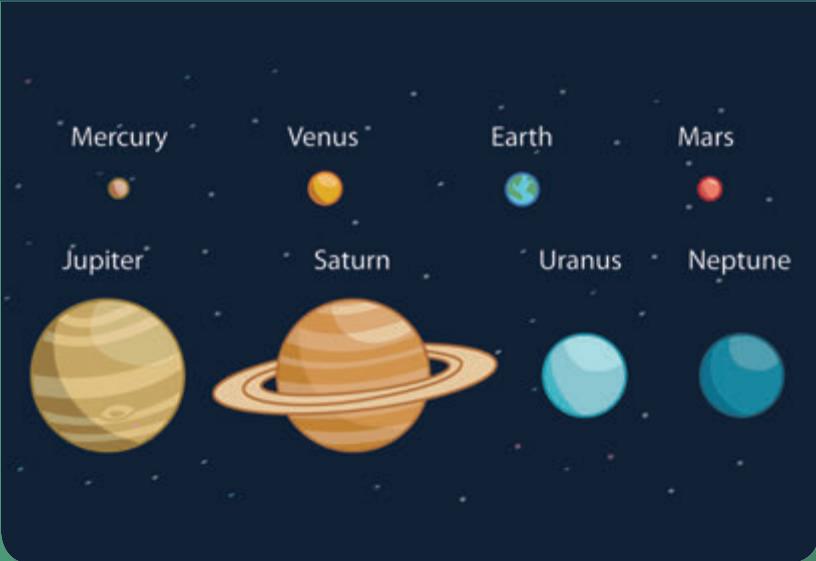
BUILDING BACKGROUND KNOWLEDGE

sun



Credit: NASA/SDO (AIA)

planets



BUILDING BACKGROUND KNOWLEDGE

moon



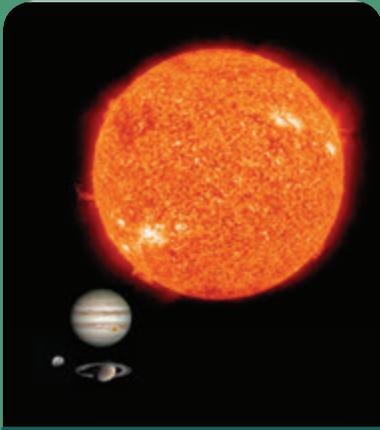
Credit: Luc Viaour

space exploration



Credit: NASA/Kennedy Space Center

VOCABULARY



dominant

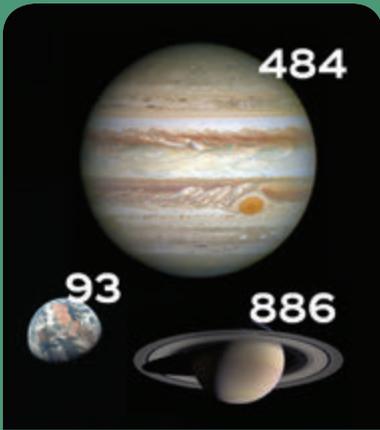
The sun is a dominant player compared to the planets.



gravity

A solar system has three key elements: a sun, gravity, and planets.

Photo: NASA



proximity

The number next to each planet is the planet's proximity to the sun, in millions of miles.



terrestrial

Earth is a terrestrial planet, which means that it has a solid surface.

Credit: NASA

VOCABULARY

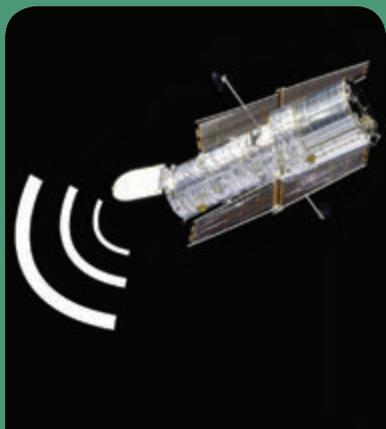


Photo: NASA/Johnson Space Center

detect

Scientists use satellites, space probes, and telescopes to detect other solar systems and galaxies.



galaxy

Within the universe, there are numerous galaxies of stars.

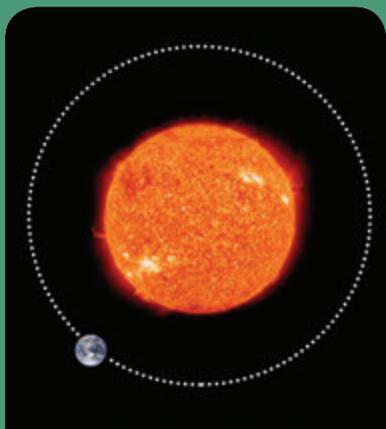


Photo: NASA/SDO (AIA)

revolve

These potential suns may have their own systems of planets revolving around them just like our planets revolve around our sun.

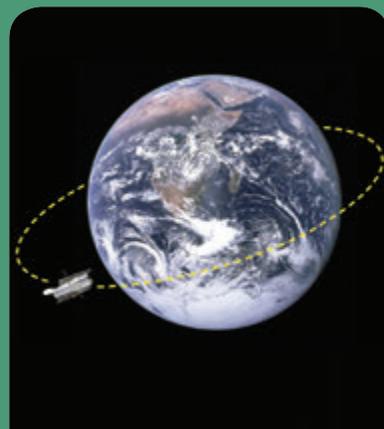
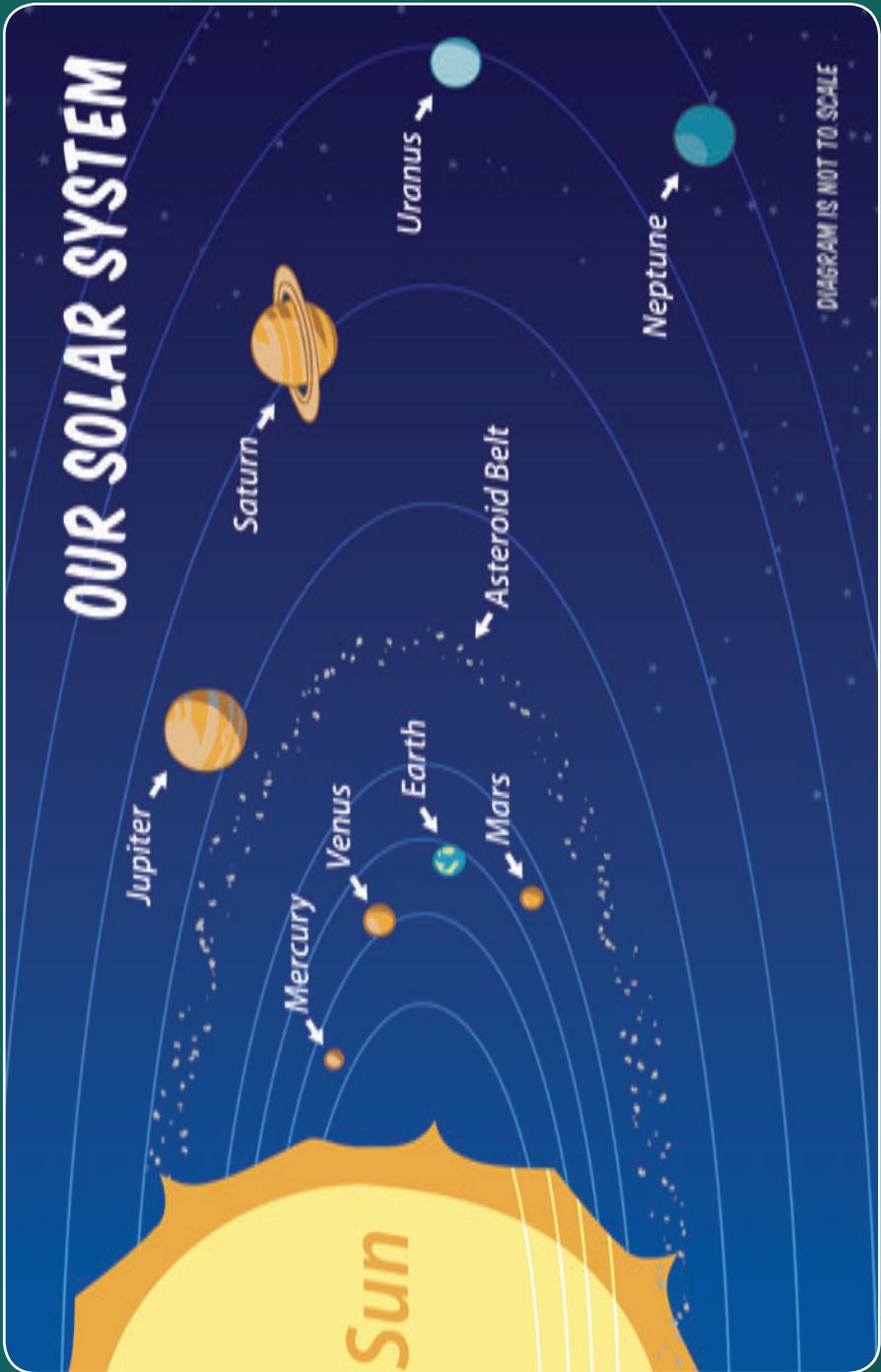


Photo: NASA/Johnson Space Center

satellite

An object that orbits a larger object is called a satellite.

MAPS AND STUFF



Introduction

FUN FACT

Alpha Centauri is actually three stars. They are about a trillion miles apart, but they look like a single star from Earth.

View of Alpha Centauri from
the Digitized Sky Survey 2

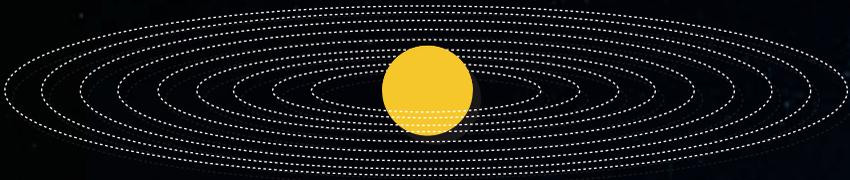
Credit: ESO/DSS 2

Imagine looking up at the night sky. Think about the stars twinkling back at you. Those stars are up in outer space, and they are very far away. Take Alpha Centauri (pronounced AL-fuh sen-TAW-ree) for example. That star is considered very close to Earth, but it is 4 light-years away. This means that even light, which travels extremely fast, takes 4 years to get from Alpha Centauri to us! ¹

However, space holds many wonders that are much closer to us. Even closer than Alpha Centauri, there are planets, asteroids, comets, and one special star. Let's take a look at what makes up our solar system. ²

What is a Solar System?

- 3 A solar system has three key elements: a sun, gravity, and planets. Each solar system has one or more suns. Unlike many solar systems, ours only has one sun. However, ours is big, bright, and powerful. What makes it so powerful? Gravity makes it powerful. The larger the object is, the more gravity that it has to pull on other objects.



- 4 Think of gravity like a game of tug-of-war. The sun is a dominant player compared to the planets. Like the sun, each planet has gravity of its own. However, the planets are less powerful. While each planet tries to tug against the sun, the sun tugs back. It is this tug-of-war that keeps the planets within our solar system. They are tethered to the sun. As the planets pull against the sun, they also move in orbit around it. The orbit is an oval shape called an ellipse.



2,795
Neptune



1,784
Uranus



886
Saturn



484
Jupiter

Our Sun and Planets

The sun is actually a star. Like other stars, it is made of gas that burns so brightly that it illuminates the entire solar system. If our sun is a star, why does it look gigantic compared to other stars? It's all about location. The closer you are to the sun, the larger it looks.

Scientists recognize eight planets in our solar system, including Earth. Other objects exist, but they behave differently. They do not qualify as planets.

Below are the eight planets. The number next to each planet is the planet's proximity to the sun, in millions of miles.

Distances from the Sun

in millions of miles



Earth's Place in the Solar System



- 8 Out of the eight planets, Earth is the third planet from the sun. Our solar system has two types of planets: terrestrial and gas. Earth is a terrestrial planet, which means that it has a solid surface. Gas planets are made of swirling gases and liquids.
- 9 Earth is the only known planet that has life. Scientists believe that terrestrial planets are most likely to support life. Could a living thing stand up or move around on a gas planet like Jupiter?
- 10 We also need air and water to survive. A planet like Mars is terrestrial, but it does not have liquid water or breathable air.
- 11 Life also requires the right temperature. Planets closest to the sun, like Mercury, are too hot to support life. Planets farthest away, like Neptune, are too cold. Earth's distance and temperature are considered just right.

Objects in the Solar System

Comet Hale-Bopp

Credit: E. Kolmhofer, H. Raab



Other terrestrial objects exist in our solar system besides planets. For instance, a group of asteroids orbits the sun between Mars and Jupiter. Rocks of all shapes and sizes make up the asteroid belt. Some asteroids orbit the sun outside of the belt and even cross paths with

12

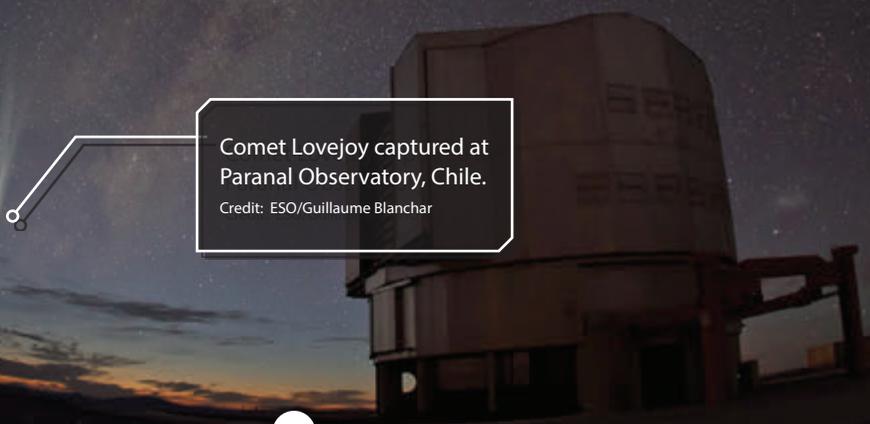
Earth. Some scientists believe that an asteroid hit Earth and wiped out the dinosaurs. However, there is no need to worry about asteroids. Most of the ones that approach Earth are so small that they burn up in our atmosphere.

Comets also visit our solar system. In ancient times, some people thought comets were omens of good or bad events to come. Unlike asteroids, comets are made of an icy core covered in space dust. As a comet orbits the sun, the ice melts and creates a gas tail. In fact, comets have two tails: one made of gas and the other made of dust.

13

Comet Lovejoy captured at Paranal Observatory, Chile.

Credit: ESO/Guillaume Blanchard



Moons

- 14 An object that orbits a larger object is called a satellite. Our moon is a satellite of Earth. Our planet and every planet in the solar system beyond Earth have moons.
- 15 Man-made satellites also orbit Earth, but they are not moons. They send and receive signals, including the ones that cell phones use.
- 16 Large objects like the sun and planets are surrounded by gravitational fields. Earth's gravitational field pulls smaller items toward it. This explains why things on Earth fall down and not up.



The Moon

Credit: NASA



Ganymede, one of Jupiter's moons.

Credit: NASA

Moons do not orbit the sun. Despite the sun's strong gravitational field, moons are closer to planets. Since our moon is closer to us than the sun, Earth's gravitational field controls the moon's orbit.

17

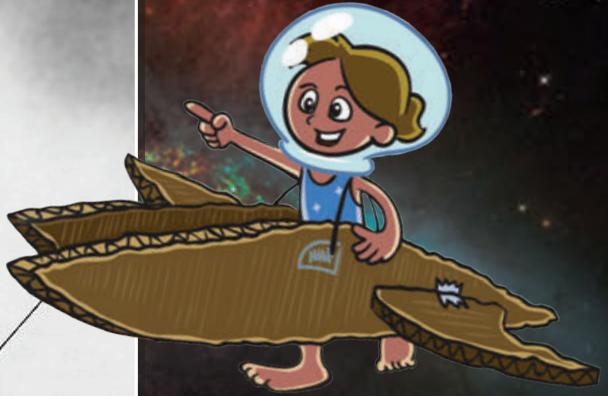
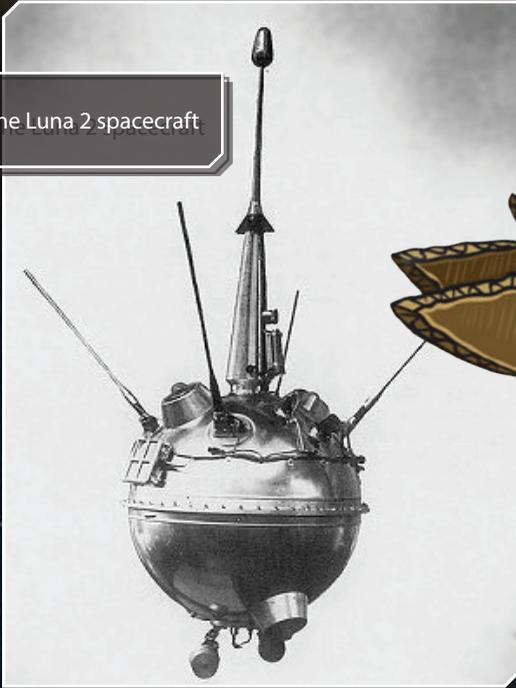
FUN FACT

Jupiter has 50 moons. The largest moon is actually bigger than Mercury.

* Images not to scale.

Exploring the Solar System

The Luna 2 spacecraft



People have looked at the sky for thousands of years. With the naked eye, ancient stargazers could see

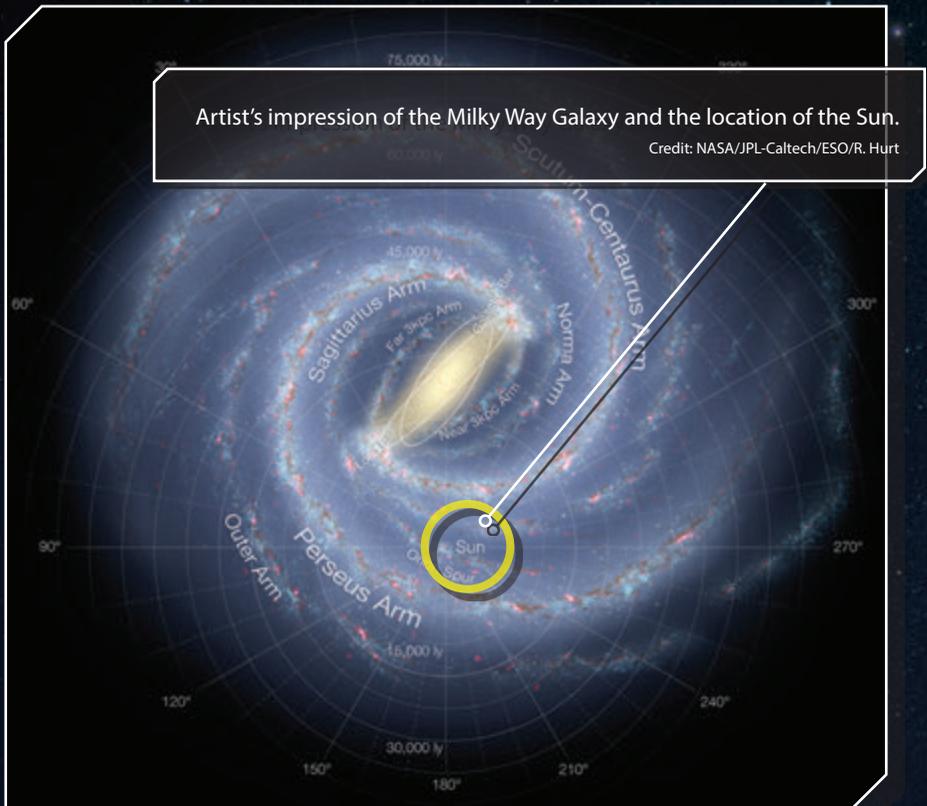
five planets as well as comets and meteors. Most of the names for planets and moons come from either Greek or Roman mythology.

Modern stargazers, on the other hand, have actually ventured out into space. Both the United States and European countries have led the way. Many missions have been unmanned. It's easier and safer to send out machines instead of people.

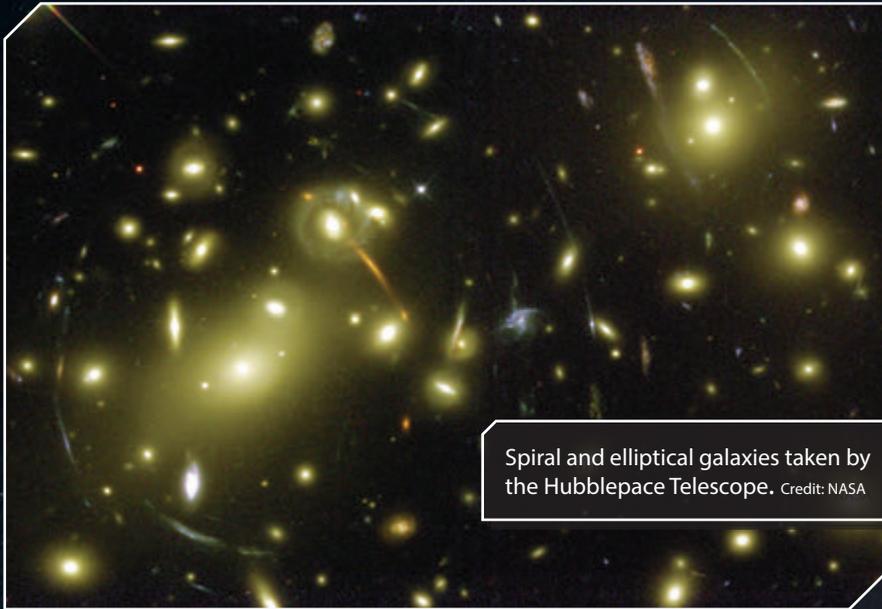
In 1959, the unmanned Luna 2 was the first spacecraft on the moon. In 1969, astronauts walked on the moon. Other missions have flown by, orbited, or landed on all the planets. They have sent valuable pictures and information to scientists.

Other Solar Systems

- 21 Our solar system is just one of many in the universe. No one knows just how many solar systems exist.
- 22 Within the universe, there are numerous galaxies of stars. Some look like swirling whirlpools in space.
- 23 Scientists use satellites, space probes, and telescopes to detect other solar systems and galaxies. They focus on the stars in our night sky to see which stars might also be suns. These potential suns may have their own systems of planets revolving around them just like our planets revolve around our sun.



Conclusion



Spiral and elliptical galaxies taken by the Hubble Space Telescope. Credit: NASA

Throughout history, people have looked to the sky with wonder. Some imagined that Mars was home to a vast civilization. Others saw gods and goddesses in the planets and constellations. Sometimes people even call the planets heavenly bodies. 24

Science has taught us plenty about our solar system. It has explained the principle of gravity. It has shown us the difference between terrestrial planets and gas planets. 25

More space missions are planned for the future. They could reveal fascinating things that we have not even imagined. Our knowledge of the universe begins with our own backyard in space: the solar system. 26

GLOSSARY

civilization - a culture in a specific place and time

illuminate - to light up, to brighten

light-year - the distance that light travels in a year (almost 6 trillion miles)

tether - to control as if tied by a string

whirlpool - something in a round shape that appears to move toward the center (usually water)

wonder - something amazing to look at

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Page 4: *BBK: sun* - NASA/SDO (AIA)

Page 5: *BBK: moon* - Luc Viatour / www.Lucnix.be, *BBK: space exploration* - NASA/ Kennedy Space Center

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Page 17: *A Cosmic Magnifying Glass* - NASA/ Goddard Space Flight Center

WORDS WITH THE MOST COMMON AFFIXES AND GREEK/LATIN ROOTS

tion/ation/sion

create a noun, means act of, state of, result of

adoption

admission

detection

confusion

election

explosion

production

collision

connection

comprehension

attraction

decision

completion

expression

animation

impression

adaptation

occasion

application

vision

aviation

permission

citation

tension

mansion



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