

## Race to the Moon

### Section 1

Most of the universe is empty space with huge swarms of stars called galaxies. There are billions of galaxies in the universe. Our Earth, the sun and the rest of the solar system are a small part of the galaxy called the Milky Way.

There are about 100 billion (100 000 000 000) stars in the Milky Way galaxy! The sun appears to be the largest and brightest star only because it is the star closest to Earth. The sun provides the Earth with light and heat and without it the Earth would be dead and icy.

### Comprehension Questions

1. What is the Milky Way?

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2. Give three facts about the sun.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

**Dictionary:** Provide a definition for:

1. Universe

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2. Galaxy

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Name \_\_\_\_\_ Date \_\_\_\_\_

## Race to the Moon

### Section 2

The Solar System is the name that scientists have given to our sun, the nine planets including Earth, and the 60 moons that orbit around these planets.

Earth is the third planet from the sun. Our closest neighboring planets are Venus and Mars. From space, Earth appears mostly blue because much of its surface is ocean.

Our Earth is surrounded by the atmosphere. The atmosphere blankets the earth with protective layers of gas that provide the air we breathe, protect us from the sun's harmful rays and controls the Earth's temperature.

### Comprehension Questions

1. What collection of heavenly bodies did scientists name the Solar System?

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2. Earth is the \_\_\_\_\_ planet from the sun.

3. How does the atmosphere help the planet Earth? \_\_\_\_\_

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**Dictionary:** Provide a definition for:

1. Atmosphere

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2. Orbit

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**Research:** Fill in the blanks in the correct order

Sun, Mercury, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, Jupiter, \_\_\_\_\_, Uranus, \_\_\_\_\_, \_\_\_\_\_

## Race to the Moon

### Section 3

The moon is 238,860 miles from the Earth. The moon is an airless ball of rock about 1/4 the size of Earth. Its surface is covered with deep craters, ridges, mountains and valleys. Every 27.3 days, the moon orbits once around the Earth.

The moon keeps the same side facing the Earth at all times. Every 29.5 days the moon moves through phases. Depending on how much sunlight is reflecting on the moon it appears in different forms throughout the month. The phases make the moon appear half, crescent-shaped (a “new” moon), or whole (a “full” moon).

### Math Problems

1. If the moon circles around the Earth approximately every 28 days, and there are 365 days in a year, how many times does the moon circle the Earth in one year?

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2. A rocket is traveling at 60 mph to the moon which is 238,860 miles away.

- a. How many hours would it take to fly to the moon? \_\_\_\_\_

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- b. How many days? \_\_\_\_\_

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- c. How many weeks? \_\_\_\_\_

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### Hands-On Science

For the next 30 days chart the phases of the moon. Record the time, date, and appearance of the moon, or if the moon is hidden by the clouds.

Name \_\_\_\_\_ Date \_\_\_\_\_

## Race to the Moon

### Section 4

In October 1958, the National Aeronautics and Space Administration (NASA) was formed. They immediately began working on options for human space flight. This was called project Mercury.

Beaten into space by the Russians (in April 1961, Cosmonaut Yuri Gagarin became the first person in space) the United States pushed ahead and in May 1961 astronaut Alan Sheppard Jr. became the first American to fly in space. The success of this mission immediately prompted President John F Kennedy to announce: "I believe that this nation should commit itself to achieving the goal before this decade is out of landing a man on the moon and returning him safely to Earth". This gave NASA 8½ years to design, test and perfect a rocket that could take two men all the way to the moon and back.

### Comprehension Questions

1. NASA stands for \_\_\_\_\_

\_\_\_\_\_

2. In 1958, when NASA was formed, why didn't they immediately fly to the moon? \_\_\_\_\_

\_\_\_\_\_

3. How much time did NASA have to fulfill President Kennedy's promise? \_\_\_\_\_

\_\_\_\_\_

**Dictionary:** Provide a definition for:

1. Aeronautics \_\_\_\_\_

\_\_\_\_\_

2. Cosmonaut \_\_\_\_\_

\_\_\_\_\_

## Race to the Moon

### Section 5

The biggest challenge was to build something that could travel 28,000 kilometers an hour carrying at least two, and possibly three astronauts and be light enough to lift itself into space.

The next problem was that NASA needed to design something that could land on the moon's surface and then connect back with the command module.

After thousands of man hours, scientists, technicians, and engineers built the Saturn V rocket to take the men to the moon. The rocket stood 364 feet tall (as tall as a 30-story skyscraper). The Saturn V rocket was designed to hold three men, two that would pilot the lunar module to the moon's surface and one that would remain in the Saturn V in orbit around the moon.

The Saturn V was a 'step rocket' with three stages. The first stage was used only to blast the vehicle into space. When the fuel ran out of this stage, it separated and fell back to Earth.

The second stage then fired and increased the speed. Then, it too fell away. The 3rd stage, or service module, then fired to push what remained of the rocket into orbit.

### Math Problem

1. The Saturn V rocket is 364 feet long. How many 4 foot tall people would have to stand on top of each other to be as tall as the rocket?

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### Comprehension Questions

1. The Saturn V was a step rocket. Describe what happens at each step:

a. first stage: \_\_\_\_\_

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b. second stage: \_\_\_\_\_

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c. third stage: \_\_\_\_\_

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## Race to the Moon

### Section 6

A rocket had been built... but who would go on the mission? Nobody was trained or had ever done this before. The men that were to become astronauts were experienced pilots who had flown high speed jets.

Training for these men was continual. They had to be both mentally and physically fit. In an effort to be prepared for any situation, the astronauts spent hours practicing for every imaginable emergency including engine failure, fire and emergency evacuation.

Project Mercury's six flights were successful in the goal of putting piloted space craft into orbit and then retrieving the astronaut safely.

Project Gemini extended the success of the Mercury Program by designing a spacecraft that could hold two men. These astronauts perfected re-entry and splashdown, rendezvous and docking in space. This project also tested the durability of the astronaut suits outside the capsule. This was important because these suits would be a portable life system for them on the moon.

Project Gemini 10 missions advanced the race to fulfill President Kennedy's promise to land on the moon before the end of the decade.

The Apollo missions followed the success of Project Gemini with a tragedy. In January 1967 a fire on the ground took the lives of Apollo One crew of astronauts Rogers Chaffie, Virgil "Gus" Grissom and Edward White. NASA made important changes that were learned from the accident and in less than two years later Apollo 7 completed a successful mission. With the end of the decade drawing closer, Apollo 8 orbited the moon ending the year 1968.

### Research

1. The Mercury Program \_\_\_\_\_

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2. The Gemini Program \_\_\_\_\_

\_\_\_\_\_

3. The Apollo Program \_\_\_\_\_

\_\_\_\_\_

## Race to the Moon

### Section 7

Finally, in August 1969, astronauts Neil Armstrong and Buzz Aldrin became the first men on the surface of the moon. The moon walk outside the capsule lasted for 2 1/2 hours, and captured the attention of the entire world as it was broadcast live back to Earth.

During their time on the moon, the astronauts collected samples of dust and rocks that would tell us more about the moon. From the samples collected and their observations, we learned that:

1. The moon has six times less gravity than on Earth, so the astronauts only weighed 1/6 of their weight on Earth.
2. The footprints that the astronauts made in the moon dust will stay imprinted for millions of years because there is no wind to blow it away.
3. Nothing grows on the moon, but scientists were able to grow plants in the soil that was recovered from the moon.
4. The moon is completely quiet, because there is no air to carry the sound.
5. The largest moon crater is called Bailly. It is 180 miles across and can be seen from Earth.
6. Unlike Earth, the moon has no air or water to wear the rocks away, so the surface has remained unchanged for thousands of millions of years.
7. The temperature on the sunlit side of the moon reaches 200F, and on the dark side minus 270F. The astronauts had a hard time sleeping while on the moon because it was so cold.

### Comprehension Questions:

1. What did the astronauts collect from their moon visits? \_\_\_\_\_

\_\_\_\_\_

2. Scientists learned many things about the moon from samples and data that the astronauts brought back with them. List some of the things.

a. \_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_ Date \_\_\_\_\_

b. \_\_\_\_\_  
\_\_\_\_\_

c. \_\_\_\_\_  
\_\_\_\_\_

d. \_\_\_\_\_  
\_\_\_\_\_

e. \_\_\_\_\_  
\_\_\_\_\_

f. \_\_\_\_\_  
\_\_\_\_\_

g. \_\_\_\_\_  
\_\_\_\_\_

**Math**

If the moon has six times less gravity than on Earth, making people weigh 1/6 of their actual weight, how much would:

1. A 150 lb person weighs on the moon \_\_\_\_\_

2. A 210 lb person weighs on the moon \_\_\_\_\_

3. A 90 lb person weighs on the moon \_\_\_\_\_

4. A 180 lb person weighs on the moon \_\_\_\_\_



## Answer Key

*Note: The definitions provided for the dictionary sections are taken from the Merriam-Webster online dictionary found at [www.m-w.com](http://www.m-w.com)*

### Section 1

#### Comprehension Questions

1. The Milky Way is the galaxy to which our solar system belongs.
2.
  - a. Without the sun the Earth would be dead and icy.
  - b. The sun provides the Earth with heat and light.
  - c. The sun appears to be the brightest and largest star only because it is the closest one to Earth.

#### Dictionary

1. Universe: the entire celestial cosmos
2. Galaxy: any of the very large groups of stars and associated matter that are found throughout the universe

### Section 2

#### Comprehension Questions

1. The collection of heavenly bodies named the solar system are: our sun, the nine planets, and the (approximately) 60 moons orbiting them.
2. 3<sup>rd</sup>
3. The atmosphere provides us with air to breathe and protects us from the sun's harmful rays and controls the Earth's temperature.

#### Dictionary

1. Atmosphere: **(a)** : the gaseous envelope of a celestial body (as a planet) **(b)** : the whole mass of air surrounding the earth
2. Orbit: a path described by one body in its revolution about another (as by the earth about the sun or by an electron about an atomic nucleus)

#### Research

Sun, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto

### Section 3

#### Math Problems

1.  $365 \text{ Days} / 28 \text{ Days} = 13.0 \text{ Times}$
2.
  - a.  $238,860 \text{ Miles} / 60 \text{ Mph} = 3981 \text{ Hours}$
  - b.  $981 / 24 = 165.9 \text{ Days}$
  - c.  $165.9 / 7 = 23.7$

## Section 4

### Comprehension Questions

1. NASA stands for National Aeronautics and Space Administration.
2. They did not fly to the moon immediately because they first needed to design, build and test a rocket.
3. They had 8½ years to fulfill the president's promise.

### Dictionary

1. Aeronautics: **(a)** : a science dealing with the operation of aircraft **(b)** : the art or science of flight
2. Cosmonaut: an astronaut of the Soviet or Russian space program

## Section 5

### Math Problems

1.  $384 \text{ Feet} / 4 \text{ Feet} = 61 \text{ People}$

### Comprehension Questions

- 1
  - a. The first stage blasts the rocket into space and then falls back to Earth.
  - b. The second stage increases the speed of the rocket then falls back to Earth.
  - c. The third stage pushes what's left of the rocket into orbit.

## Section 6

### Research

Answers may vary.

## Section 7

### Comprehension Questions

1. They collected many samples from the moon.
- 2
  - a. The moon has six times less gravity than on Earth so the astronauts only weighed 1/6 of their weight on Earth.
  - b. The footprints that the astronauts made in the moon dust will stay imprinted for millions of years because there is no wind to blow it away.
  - c. Nothing grows on the moon but scientists were able to grow plants in the soil that was recovered from the moon.
  - d. The moon is completely quiet because there is no air to carry the sound.
  - e. The largest moon crater is called Bailly and can be seen from Earth. It is 180 miles across.
  - f. The moon unlike Earth has no air or water to wear the rocks away so the surface has remained unchanged for thousands of millions of years.
  - g. The temperature on the sunlit side of the moon reaches 200F and on the dark side minus 270F. The astronauts had a hard time sleeping while on the moon because it was so cold.

### Math

1.  $150 \text{ Pounds} / 6 = 25 \text{ Pounds}$
2.  $210 \text{ Pounds} / 6 = 35 \text{ Pounds}$
3.  $90 \text{ Pounds} / 6 = 15 \text{ Pounds}$
4.  $180 \text{ Pounds} / 6 = 30 \text{ Pounds}$