

S#12

S#12



319 S. Naperville Road Wheaton, IL 60187 www.questionsgalore.net
Phone: (630) 580-5735 E-Mail: info@questionsgalore.net Fax: (630) 580-5765

**STUDY GUIDE:
THE SPACE PROGRAM**

The Earliest Space Satellites

Sputnik I: First artificial satellite of any kind to be launched into space. Launched by the Russians on October 4, 1957. Its mission: to measure and send back space information about temperature, cosmic rays, and meteoroids.

Sputnik II: Second satellite launched into space by the Russians on Nov. 3, 1957. Passenger on board: a dog called Laika, who died during the first week in orbit due to excessive heat within the cabin. It fell to Earth and was destroyed after five months in orbit.

Explorer I: First **American** artificial satellite. Launched on January 31, 1958, from Cape Canaveral by a U.S. Army launch vehicle called Juno I. It was unmanned. It measured 80 inches long and 6 inches in diameter, and it carried two transmitters plus other instruments. **It confirmed the existence of the Van Allen Radiation Belt, which surrounds the earth.** This satellite remained in orbit for 10 years after its launching date.

Vanguard I: March 17, 1958 by United States.

Explorer III: March 26, 1958 by United States.

Explorer IV: July 26, 1958 by United States.

On January 31, 1961, the United States sent their first animal into space. He was Ham, an African Chimp, who was strapped to a miniature couch inside a pressurized cabin within the Mercury capsule. He returned to Earth unharmed. He ran through a test flight similar to the ones later performed by the Mercury Projects.

Page 2, SPACE PROGRAM

First Man In Space: Russian, Yuri Gagarin (1961) aboard the Vostok I. He made a single orbit of the earth and survived.

NASA's Mercury Projects

Mercury Projects: A series of flights that sent the first Americans into space.

1. **First American into Space: Alan Shepard, Jr.** Aboard the Mercury spacecraft called Freedom 7. The mission: to orbit a manned spacecraft, investigate man's reactions to space travel, and recover both the astronaut and the spacecraft. Launched May 5, 1961, from Cape Canaveral, Florida. The mission was successful. The flight lasted almost 15 minutes, but Shepard did not orbit the earth as Gagarin had.
2. **Second American into Space: Gus Grissom** Launched on July 21, 1961, from Cape Canaveral. Name of capsule: Liberty Bell 7. Flight lasted 15 minutes. Upon splashdown, the hatch blew off, and water entered the capsule. Grissom was rescued but all equipment and film was lost, as well as the capsule itself.
3. **First American to Orbit the earth: John Glenn 1962**
Name of capsule: Friendship 7. He orbited the earth three times. Flight lasted 4 ½ hours.
4. Aurora 7: Scott Carpenter (1962) Successful mission!
5. Sigma 7: Walter Schirra (1962) He orbited earth six times.
6. Faith 7: Gordon Cooper (1962)
34-hour flight. On the 19th orbit, his automatic control system went out, and he was the first astronaut to manually fly a spacecraft back to earth from space.

In all of the Mercury flights, the number 7 was included in the name of the capsule. This stood for the 7 original astronauts who were trained for this mission: Names of the 7 Mercury Astronauts: Alan Shepard, Jr., Gus Grissom, Scott Carpenter, Gordon Cooper, Walter Schirra, John Glenn, and Donald Slayton.

NASA's Gemini Program

Mission of the Gemini Program: to train men for flights to the moon.

The Gemini spacecraft: Followed the basic design of the Mercury craft, but it was much larger and heavier, with 50% more cabin room. It consisted of two major parts: the reentry module, called the capsule, and the adapter module. Only the reentry module returned to earth. Project Gemini was launched by the Titan 2 rockets. **These were the second manned space flights by the U.S., and all Gemini flights carried two men, referred to as the Gemini twins.**

1. Gemini 3: called "The Unsinkable Molly Brown" launched on March 23, 1965. Astronauts aboard: Gus Grissom and John W. Young. It orbited earth three times before landing in the Atlantic, where they were recovered.
2. Gemini 4: Astronauts aboard: James McDivitt and Edward White II. They orbited earth 62 times. White stepped into space for the first space walk. (June, 1965)
3. Gemini 5: August 1965 Astronauts Gordon Cooper and Pete Conrad. Stayed in space for eight days, which was the amount of time needed to fly to the moon, land, and return to the earth.
4. Gemini 6 and 7: The first space rendezvous. The two capsules came so close that the astronauts could have reached out and touched one another. Gemini VI astronauts: Wally Schirra and Thomas Stafford. Gemini VII astronauts: Frank Borman and James Lovell, Jr.
5. Gemini 8: A successful docking with the Agena, and the two traveled together in space for 30 minutes.
6. Gemini 9: Unsuccessful docking with the Agena.
7. Gemini 10: A mission to seek out another Agena target that had been launched nearly four months earlier. Mission successful! 43 orbits taking 70 hours and 47 minutes in space.
8. Gemini 11: Used to refine the techniques of docking and rendezvousing.
9. Gemini 12: Last of the Gemini flights. The mission: to rendezvous and dock with an Agena, photograph an eclipse of the sun, and perform scientific experiments. Buzz Aldrin took the longest space walk ever: lasting 5 hours and 30 minutes.

The Apollo Program

The Apollo flights 1-10 prepared for an American landing on the moon, with Apollo 10 coming within 14.5 kilometers of the moon.

Apollo 11: First Manned Landing on the Moon.

Neil Armstrong was the first person to step upon the moon's surface. He was followed by Edwin Aldrin. They placed the American flag upon the surface of the moon and spend over two hours collecting rock samples and taking scientific readings. Michael Collins stayed within the spacecraft.

The Apollo spacecraft was made up of three sections:

- 1) The command module, which housed the astronauts and controls. It was the only part that returned to the earth.
- 2) The service module, whose engines could be started or stopped as necessary. It was below command module, and it contained the retro-rockets used to slow down the craft.
- 3) The lunar module, which was gently positioned on the surface of the moon.

Space Probes

Basic Purpose of all Space Probes: to send back information about the moon, the planets, and vast expanses of space within the solar system.

Russian Space Probes: The Russians started the lunar (moon) probes.

1. Luna 1: January 2, 1959: flew by the moon, approaching to within 4,600 miles of the surface.
2. Luna 2: September 12, 1959: first man made object to hit the moon.
3. Luna 3: October 4, 1959: circled the moon and sent back the first pictures of the dark side of the moon.
4. Luna 4: Through Luna 8 attempted to land softly on the moon, but all failed.
5. Luna 9: January 31, 1966: set down gently on the moon's surface, proving the surface was hard enough to support a spacecraft.
6. Luna 10, 11 and 12: These were three space satellites that orbited the moon, and sent back data on the moon's radiation belt, magnetic field, and surface.
7. Luna13: Made a successful landing on the moon on December 1, 1966.

American Space Probes

The space probes were America's main source of obtaining information about the planets and the solar system. Eight different groups of space probes were used for these investigations: Pioneer, Vanguard, Explorer, Mariner, Surveyor, Ranger, Viking, and Voyager. The most important probes and the basic highlights are listed below. This is only a partial listing.

1. **The Ranger Space Probes:** These were the first attempts at space probes by the Americans. The first three Ranger probes completely missed the moon. Ranger 4 finally hit the moon. Ranger 7 made a successful mission, bringing back over 4,000 pictures of the moon. (July 28, 1964) Ranger 8 sent back 7,000 photos, and Ranger 9 (February 17, 1965) sent back the first live pictures for television.
2. **The Surveyor Space Probes:** All of these attempted soft landings on the moon. They carried TV cameras, a device to sample lunar soil, and instruments to measure and detect micrometeoroids. Total number of Surveyor Probes: 7.

Surveyor 1: Successful landing May, 1966. Sent back pictures of the moon's surface.

Surveyor 5: Sent back over 19,000 pictures and the first soil sample. September, 1967.

Surveyor 6: Landed on the moon, using retrorockets to slow its approach.

3. **Pioneer 5:** March, 1960, launched toward Venus.
4. **Mariner 2:** August, 1962, flew past Venus at a distance of 22,000 miles, giving our first accurate information about Venus. It discovered that the surface temperature was 700 degrees Fahrenheit, and there was no break in the heavy clouds that hid the planet's surface.
5. **Mariner 4:** November, 1968, flew by Mars and sent back 22 pictures of Mars, the first pictures ever taken of another planet's surface.
6. **Pioneer 6:** 1965, flew to within 75.7 million miles of the sun, and investigated solar flares, winds, and solar magnetic fields.
7. **Mariner 10:** 1974, the only spacecraft to fly by Mercury. It mapped volcanoes, valleys, mountains and plains on Mercury.
8. **Viking 1:** May, 1975, landed on the planet Mars, and was the first spacecraft of any kind to land on another planet. Viking 2 repeated the landing.

Page 6, SPACE PROGRAM

9. **Pioneer 10:** First spacecraft to travel beyond the solar system (June, 1983). It sent back nearly 3,000 photos of Jupiter and its moons.
10. **The Voyager Spacecraft:** Late 1980s and early 1990s Main Mission: to explore Saturn. They also passed by and photographed Uranus and Neptune.

Space Stations

- Salyut 1: First space station sent into space. Launched by the Russians, 1971. Carried three cosmonauts, who lived in space for 23 days. The crew died upon re-entry due to a leaking hatch door.
- Skylab: 1973 first **American** space station to be launched. Three astronauts orbited the earth for 28 days and photographed the sun, earth, and stars. A second crew was sent to work on Skylab for 59 days. Skylab fell to the earth over Australia in July, 1979, with no injuries or damages.
- Salyut 6: Launched by the Russians in 1977. The station was occupied continuously for a four-year period.
- Mir: Launched by the Soviets in 1987. In December of 1988, its crew set a record for the most days in space- 366! Mir recently docked with the American space shuttle, Atlantis, in July, 1995.

The U.S. is currently planning a space station called Freedom, which will be built right in space, and it will serve as a base for return trips to the moon and for the exploration of Mars.

Space Shuttles

In 1972, NASA began developing a reusable craft called the Space Shuttle. The orbiter was the part of the shuttle that carried people and instruments, and it was the part that returned to the earth after each mission.

The five main space shuttles that have been sent into space by NASA: Columbia, Challenger, Discovery, Enterprise, and Atlantis.

The first space shuttle, The Columbia, was sent into space in April, 1981, with two astronauts who landed perfectly in California.

THE WORST DISASTER IN SPACE HISTORY: THE CHALLENGER EXPLODED SHORTLY AFTER LAUNCHING, KILLING THE SEVEN ASTRONAUTS ABOARD.

Communication Satellites

Telstar 1: Launched July 10, 1962, gave the first direct TV connection between two continents. Built by Bell Telephone and launched by NASA.

Telstar 2: May 7, 1963, sent color pictures from the U.S. across the Atlantic to Europe.