

PEANUTS and SPACE FOUNDATION

Apollo and Beyond

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OBJECTIVES

Students will:

- ◆ Read *Snoopy, First Beagle on the Moon!* and *Shoot for the Moon, Snoopy!*
- ◆ Learn facts about the Apollo Moon missions.
- ◆ Use this information to complete a fill-in-the-blank fact worksheet.
- ◆ Create mission objectives for a brand new mission to the moon.

SUGGESTED GRADE LEVELS

4 – 5

SUBJECT AREAS

Space Science, History

TIMELINE

30 – 45 minutes

NEXT GENERATION SCIENCE STANDARDS

- ◆ 5-ESS1 ESS1.B Earth and the Solar System
- ◆ 3-5-ETS1 ETS1.B Developing Possible Solutions

21st CENTURY ESSENTIAL SKILLS

Collaboration and Teamwork, Communication, Information Literacy, Flexibility, Leadership, Initiative, Organizing Concepts, Obtaining/Evaluating/Communicating Ideas

BACKGROUND

- ◆ According to NASA.gov, NASA has proudly shared an association with Charles M. Schulz and his American icon Snoopy since Apollo missions began in the 1960s. Schulz created comic strips depicting Snoopy on the Moon, capturing public excitement about America's achievements in space. In May 1969, Apollo 10 astronauts traveled to the Moon for a final trial run before the lunar landings took place on later missions. Because that mission required the lunar module to skim within 50,000 feet of the Moon's surface and "snoop around" to determine the landing site for Apollo 11, the crew named the lunar module Snoopy. The command module was named Charlie Brown, after Snoopy's loyal owner.

These books are a united effort between Peanuts Worldwide, NASA and Simon & Schuster to generate interest in space among today's younger children.



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Apollo 1 – 6

Jan. 27, 1967, tragedy struck on the launch pad at Cape Kennedy during a preflight test for Apollo 204 (AS-204). The mission was to be the first crewed flight of Apollo, and was scheduled to launch Feb. 21, 1967. Astronauts Virgil Grissom, Edward White and Roger Chaffee lost their lives when a fire swept through the command module, or CM.

The exhaustive investigation of the fire and extensive reworking of the Apollo command modules postponed crewed launches until NASA officials cleared them for flight. Saturn IB schedules were suspended for nearly a year, and the launch vehicle that finally bore the designation AS-204 carried a lunar module, or LM, as the payload, instead of a CM. The missions of AS-201 and AS-202 with Apollo spacecraft aboard had been unofficially known as Apollo 1 and Apollo 2 missions. AS-203 carried only the aerodynamic nose cone.

In the spring of 1967, NASA's Associate Administrator for Manned Space Flight, Dr. George E. Mueller, announced that the mission originally scheduled for Grissom, White and Chaffee would be known as Apollo 1, and said that the first Saturn V launch, scheduled for November 1967, would be known as Apollo 4. The eventual launch of AS-204 became known as the Apollo 5 mission. No missions or flights were ever designated Apollo 2 or 3.

The second launch of a Saturn V took place on schedule in the early morning of April 4, 1968. Known as AS-502, or Apollo 6, the flight was a success, though two first-stage engines shut down prematurely, and the third-stage engine failed to reignite after reaching orbit.

Apollo 7

Launch: October 11, 1968

Mission Objectives: Demonstrate Command and Service Module (CSM) with crew performance; demonstrate mission support facilities' performance during a crewed mission and demonstrate Apollo rendezvous capability; demonstrate live TV broadcasts from space. **Crew:** Walter Schirra Jr., Commander; R. Walter Cunningham, Lunar Module Pilot; Donn F. Eisele, Command Module Pilot.



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Apollo 8

Launch: December 21, 1968

Mission Objectives: The mission objectives for Apollo 8 included a coordinated performance of the crew, the command and service module, or CSM, and the support facilities. The mission also was to demonstrate translunar injection; CSM navigation, communications and midcourse corrections; consumable assessment; and passive thermal control. The detailed test objectives were to refine the systems and procedures relating to future lunar operations. Crew: Frank Borman, Commander; William A. Anders, Lunar Module Pilot; James A. Lovell Jr., Command Module Pilot.

Apollo 9

Launch: March 3, 1969

The primary objective of Apollo 9 was an Earth-orbital engineering test of the first crewed lunar module, or LM. Other prime objectives included an overall checkout of launch vehicle and spacecraft systems, the crew, and procedures. The LM was to be tested as a self-sufficient spacecraft, and was also to perform active rendezvous and docking maneuvers paralleling those scheduled for the following Apollo 10 lunar-orbit mission.

The flight plan's top priority was the CSM and LM rendezvous and docking. This was performed twice - once while the LM was still attached to the S-IVB, and again when the LM was active. Further goals included internal crew transfer from the docked CSM to the LM; special tests of the LM's support systems; crew procedures; and tests of flight equipment and the extravehicular activity, or EVA, mobility unit. The crew also configured the LM to support a two-hour EVA, and simulated an LM crew rescue, which was the only planned EVA from the LM before an actual lunar landing. Crew: James A. McDivitt, Commander; Russell L. Schweickart, Lunar Module Pilot; David R. Scott, Command Module Pilot.

Apollo 10

Launch: May 18, 1969

The Apollo 10 mission encompassed all aspects of an actual crewed lunar landing, except the landing. It was the first flight of a complete, crewed Apollo spacecraft to operate around the Moon. Objectives included a scheduled eight-hour lunar orbit of the separated lunar module, or LM, and descent to about nine miles off the moon's surface before ascending for rendezvous and docking with



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the command and service module, or CSM, in about a 70-mile circular lunar orbit. Pertinent data to be gathered in this landing rehearsal dealt with the lunar potential, or gravitational effect, to refine the Earth-based crewed spaceflight network tracking techniques, and to check out LM programmed trajectories and radar, and lunar flight control systems. Crew: Thomas Stafford, Commander; Eugene Cernan, Lunar Module Pilot; John Young, Command Module Pilot.

Apollo 11

Launch: July 16, 1969

The primary objective of Apollo 11 was to complete a national goal set by President John F. Kennedy on May 25, 1961: perform a crewed lunar landing and return to Earth. Additional flight objectives included scientific exploration by the lunar module, or LM, crew; deployment of a television camera to transmit signals to Earth; and deployment of a solar wind composition experiment, seismic experiment package and a Laser Ranging Retroreflector. During the exploration, the two astronauts were to gather samples of lunar-surface materials for return to Earth. They also were to extensively photograph the lunar terrain, the deployed scientific equipment, the LM spacecraft, and each other, both with still and motion picture cameras. This was to be the last Apollo mission to fly a “free-return” trajectory, which would enable a return to Earth with no engine firing, providing a ready abort of the mission at any time prior to lunar orbit insertion. Crew: Neil Armstrong, Commander; Edwin E. Aldrin Jr., Lunar Module Pilot; Michael Collins, Command Module Pilot.

Apollo 12

Launch: November 14, 1969

The primary mission objectives of the second crewed lunar landing included an extensive series of lunar exploration tasks by the lunar module, or LM, crew, as well as the deployment of the Apollo Lunar Surface Experiments Package, or ALSEP, which was to be left on the moon’s surface to gather seismic, scientific and engineering data throughout a long period of time.

Other Apollo 12 objectives included a selenological inspection; surveys and samplings in landing areas; development of techniques for precision-landing capabilities; further evaluations of the human capability to work in the lunar environment for a prolonged period of time; deployment and retrieval of other scientific experiments; and photography of

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candidate exploration sites for future missions.

The astronauts also were to retrieve portions of the Surveyor III spacecraft, which had soft-landed on the moon April 20, 1967, a short distance from the selected landing site of Apollo 12. Crew: Charles Conrad Jr., Commander; Alan L. Bean, Lunar Module Pilot; Richard F. Gordon Jr., Command Module Pilot.

Apollo 13

Launch: April 11, 1970

Apollo 13 was supposed to land in the Fra Mauro area. An explosion on board forced Apollo 13 to circle the moon without landing. The Fra Mauro site was reassigned to Apollo 14. At 55 hours, 46 minutes, as the crew finished a 49-minute TV broadcast showing how comfortably they lived and worked in weightlessness, Lovell said, “This is the crew of Apollo 13 wishing everybody there a nice evening, and we’re just about ready to close out our inspection of Aquarius and get back for a pleasant evening in Odyssey. Good night.”

Nine minutes later, oxygen tank No. 2 blew up, causing the No. 1 tank to also fail. The command module’s normal supply of electricity, light and water was lost, and they were about 200,000 miles from Earth. After heroic efforts by the crew and mission control, the command module safely landed in the Pacific Ocean on April 17, 1970. Crew: James A. Lovell Jr., Commander; Fred W. Haise Jr., Lunar Module Pilot; John L. Swigert Jr., Command Module Pilot.

Apollo 14

Launch: January 31, 1971

The primary objectives of this mission were to explore the Fra Mauro region centered around deployment of the Apollo Lunar Surface Scientific Experiments Package, or ALSEP; lunar field geology investigations; collection of surface material samples for return to Earth; deployment of other scientific instruments not part of ALSEP; orbital science involving high-resolution photography of candidate future landing sites; photography of deep-space phenomena, such as zodiacal light and gegenschein; communications tests using S-band and VHF signals to determine reflective properties of the lunar surface; engineering and operational evaluation of hardware and techniques; tests to determine variations in S-band signals; and photography of surface details from 60 nautical miles in altitude. Crew: Alan B. Shepard Jr., Commander; Edgar D. Mitchell, Lunar Module Pilot; Stuart A. Roosa, Command Module Pilot.



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Apollo 15

Launch: July 26, 1971

Apollo 15 was the first of the Apollo “J” missions capable of a longer stay time on the moon and greater surface mobility. There were four primary objectives falling in the general categories of lunar surface science, lunar orbital science and engineering-operational. The mission objectives were to explore the Hadley-Apennine region, set up and activate lunar surface scientific experiments, make engineering evaluations of new Apollo equipment, and conduct lunar orbital experiments and photographic tasks. Exploration and geological investigations at the Hadley-Apennine landing site were enhanced by the addition of the Lunar Roving Vehicle, or LRV.

Another major mission objective involved the launching of a Particles and Fields, or P&F, subsatellite into lunar orbit by the command and service module, or CSM, shortly before beginning the return-to-Earth portion of the mission. The subsatellite was designed to investigate the moon’s mass and gravitational variations, particle composition of space near the moon and the interaction of the moon’s magnetic field with that of Earth. Crew: David R. Scott, Commander; James B. Irwin, Lunar Module Pilot; Alfred M. Worden, Command Module Pilot.

Apollo 16

Launch: April 16, 1972

Three primary objectives were (1) to inspect, survey, and sample materials and surface features at a selected landing site in the Descartes region; (2) emplace and activate surface experiments; and (3) conduct in-flight experiments and photographic tasks from lunar orbit. Additional objectives included performance of experiments requiring zero gravity and engineering evaluation of spacecraft and equipment.

A significant addition to surface objectives was an ultraviolet stellar camera to return photography of the Earth and celestial regions in spectral bands not seen from Earth. Evaluation of the lunar rover through a “Grand Prix” exercise consisting of S-turns, hairpin turns and hard stops also was to be conducted. A final orbital objective was to launch a subsatellite into lunar orbit from the command and service module, or CSM, shortly before transearth injection. Crew: John W. Young, Commander; Charles M. Duke Jr., Lunar Module Pilot; Thomas K. Mattingly II, Command Module Pilot.



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Apollo 17

Launch: December 7, 1972

The lunar landing site was the Taurus-Littrow highlands and valley area.

This site was picked for Apollo 17 as a location where rocks both older and younger than those previously returned from other Apollo missions, as well as from Luna 16 and 20 missions, might be found.

Scientific objectives of the Apollo 17 mission included, geological surveying and sampling of materials and surface features in a preselected area of the Taurus-Littrow region; deploying and activating surface experiments; and conducting in-flight experiments and photographic tasks during lunar orbit and transearth coast. These objectives included deployed experiments, such as the Apollo Lunar Surface Experiments Package, or ALSEP, with a heat flow experiment; lunar seismic profiling, or LSP; lunar surface gravimeter, or LSG; lunar atmospheric composition experiment, or LACE; and lunar ejecta and meteorites, or LEAM. The mission also included lunar sampling and lunar orbital experiments. Biomedical experiments included the Biostack II experiment and the BIOCORE experiment. Crew: Eugene A. Cernan, Commander; Harrison H. Schmitt, Lunar Module Pilot; Ronald E. Evans, Command Module Pilot.

All background information provided by NASA.gov.

VOCABULARY

Astronaut, Mission, Apollo, Crew, Orbit, Launch, Landing

MATERIALS

- ◆ Apollo Cards – 1 set per group
- ◆ Apollo Fact Worksheets – 1 per student
- ◆ Blank paper – 1 sheet per group (for mission planning/mission patch design)

LESSON PROCEDURES

Part I

1. Read *Snoopy, First Beagle on the Moon!* and *Shoot for the Moon, Snoopy!* to the entire class, to give students some background knowledge.
2. Show students the Apollo fact cards and explain that each card has information from a specific Apollo mission. Information includes crew names, orbit statistics, launch information, and landing information.
3. Students will use these cards to fill in the blanks on a worksheet.



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4. Divide students into groups of three or four.
5. Give each group one set of Apollo fact cards.
6. Give each student an Apollo Fact Worksheet.
7. Tell students they will each fill out their own worksheet, but can work as a group to help each other find the answers.
8. When all students have completed the worksheet, review the answers as a class.

Part II

1. Read some of the Apollo mission objectives (from Background section) to the students.
2. As a group, students must work together and discuss a scenario as if they were the next group to go to the moon.
3. They must decide what information they would want to gather from their mission. Students should be able to report decisions to the class.
4. The group can then decide what a mission patch may look like based on their mission objectives and illustrate their own mission patches.

EXTENSIONS

- ◆ Teach students how to navigate through Google Moon to further explore the Apollo missions. <https://www.google.com/moon/> .
- ◆ Have students choose an Apollo mission to research more in-depth using online resources and literature.

RESOURCES

Garcia, M. (2018, July 9). NASA and Peanuts Celebrate Apollo 10's 50th Anniversary. Retrieved from <https://www.nasa.gov/feature/nasa-and-peanuts-celebrate-apollo-10-s-50th-anniversary>

Loff, S. (2015, March 16). The Apollo Missions. Retrieved from https://www.nasa.gov/mission_pages/apollo/missions/index.html

Schulz, Charles M. (2019). *Snoopy, First Beagle on the Moon!* New York, NY: Simon & Schuster.

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Name _____

Apollo Fact Worksheet

1. Apollo _____ was launched a few days before Christmas in 1968. They landed a few days after Christmas on _____, 1968.
2. The Commander of Apollo 14 was _____.
3. Apollo 7 lasted _____ days, _____ hours, _____ minutes, _____ seconds.
4. How many hours did the Apollo 17 astronauts spend on the surface of the moon? _____
5. Which two Apollo missions were NOT launched from launch pad 39A? Apollo _____ launched from _____ . Apollo _____ launched from _____ .
6. The total distance traveled by Apollo 13 was much shorter than many of the other missions. They traveled _____ miles.
7. James A. McDivitt was the _____ of Apollo 9. Russell L. Schweickart was the _____, and _____ was the Command Module Pilot.
8. Which three missions have an image of an eagle as part of their mission patch? Apollo _____, Apollo _____, and Apollo _____.
9. The Lunar Location for Apollo 12 was called _____.
10. The USS Okinawa was the recovery ship for Apollo _____.

Apollo Fact Worksheet

Answer key

1. Apollo **8** was launched a few days before Christmas in 1968. They landed a few days after Christmas on **December 27**, 1968.
2. The Commander of Apollo 14 was **Alan B. Shepard Jr.**
3. Apollo 7 lasted **10** days, **20** hours, **9** minutes, **3** seconds.
4. How many hours did the Apollo 17 astronauts spend on the surface of the moon? **75**
5. Which two Apollo missions were NOT launched from launch pad 39A? Apollo **7** launched from **Launch Complex 34**. Apollo **10** launched from **Launch Pad 39B**.
6. The total distance traveled by Apollo 13 was much shorter than many of the other missions. They traveled **622,268** miles.
7. James A. McDivitt was the **Commander** of Apollo 9. Russell L. Schweickart was the **Lunar Module Pilot**, and **David R. Scott** was the Command Module Pilot.
8. Which three missions have an image of an eagle as part of their mission patch? Apollo **11**, Apollo **16**, and Apollo **17**.
9. The Lunar Location for Apollo 12 was called **Ocean of Storms**.
10. The USS Okinawa was the recovery ship for Apollo **15**.