

PEANUTS and SPACE FOUNDATION

Are We There Yet, Snoopy? (Mapping the Moon)

OBJECTIVES

Students will:

- ◆ Map the six Apollo landing sites on the Moon using latitude and longitude coordinates.
- ◆ Determine potential landing sites for the upcoming Artemis missions.

SUGGESTED GRADE LEVELS

5 – 8

SUBJECT AREAS

Earth & Space Science, Mathematics, English Language Arts

TIMELINE

60 minutes

NEXT GENERATION SCIENCE STANDARDS

- ◆ 5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

21st CENTURY ESSENTIAL SKILLS

Critical Thinking/Problem Solving, Collaboration and Teamwork, Communication, Information Literacy, Flexibility, Leadership, Initiative, Social Skills, Organizing Concepts, Predicting Patterns, Constructing Explanations, 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.

- ◆ Latitude and Longitude lines are important imaginary lines used to identify specific locations on Earth and the other planets and moons. Latitude lines run horizontally, where north is above the Equator (0°) and south is below the Equator (0°). Longitude lines run vertically, where west is left of Prime Meridian (0°), and east is right of the Prime Meridian (0°).



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The intersection between the two lines creates a coordinate. When plotting coordinates, latitude is listed first and longitude is listed second.

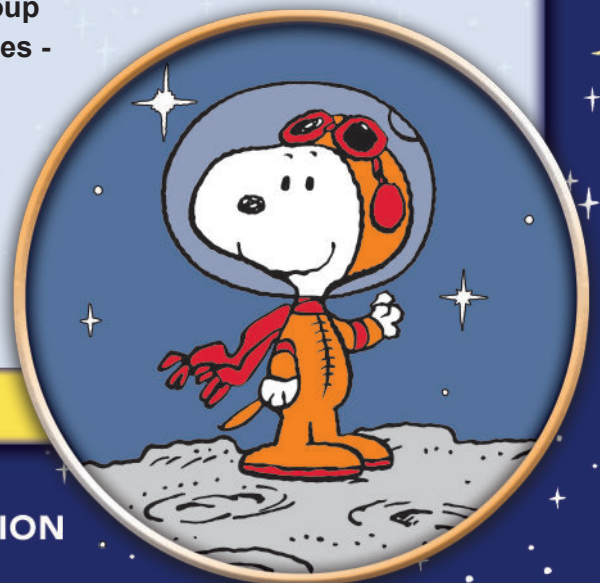
- ◆ A topography map, which uses different colors to signify varying elevations, is also useful for researching landing sites and identifying terrain. This kind of map can help in comparing the topography of land features, such as craters and mountains.
- ◆ Landing on the Moon was a huge feat for humankind. The Apollo missions demonstrated the human drive for exploration. According to NASA, the goals of the Apollo missions went beyond landing Americans on the moon and returning them safely to Earth. They included establishing the technology to meet other national interests in space, achieving prominence in space for the United States, carrying out a program of scientific exploration of the Moon, and developing human capability to work in the lunar environment.
- ◆ It has been 47 years since NASA's last mission to the Moon—and now we're going "back to the Moon and on to Mars!" NASA's new Artemis lunar exploration program (named for the twin sister of Apollo and the goddess of the Moon in Greek mythology) will use innovative technologies to explore more of the Moon than ever before. Artemis aims to once again send astronauts to the Moon's surface by 2024—this time including the first woman to land on the Moon.
- ◆ NASA will collaborate with commercial and international partners to establish sustainable Moon missions by the year 2028. The lessons learned on the Moon will help prepare for the next giant leap: sending astronauts to Mars! The Artemis program seeks to inspire a new generation of astronauts, scientists, engineers, and space explorers.

VOCABULARY

Coordinates, Crater, Equator, Latitude and Longitude Lines, Prime Meridian, Topography

MATERIALS

- ◆ Pencils - one per student
- ◆ Coordinates for the Apollo landing sites - one set per group
- ◆ Enlarged map of the Moon with latitude and longitude lines - one per group
- ◆ Enlarged map of the Moon with colorized topography AND latitude and longitude lines - one per group



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LESSON PROCEDURES

1. Show students, “We Go as The Artemis Generation.” This will provide students with the background knowledge to understand the mission directives from NASA as we prepare to go “back to the Moon and on to Mars!” <https://www.youtube.com/watch?v=dOKKkV-30dE>
2. Introduce mapping coordinates.
 - a. Explain latitude and longitude.
 - b. Show students where latitude and longitude lines are located on a map.
 - c. Inform students that we use these latitude and longitude lines to identify places on a map.
 - d. Explain that a coordinate is the location on a map where latitude and longitude lines intersect.
 - e. When finding a specific location on a map, latitude is first and longitude is second.
 - f. Explain that north latitude lines are above the Equator (0°); and that south latitude lines are below the Equator (0°).
 - g. Explain that west longitude lines are left of the Prime Meridian (0°); and that east longitude lines are right of the Prime Meridian (0°).
3. Explain to students that we use latitude and longitude here on Earth and also on other planets and moons.
4. Show students a topographical map of the Moon with latitude and longitude lines and colored topography.
5. Using the map key as a guide, discuss what the different colors represent.
6. Discuss what land features astronauts might have discovered on the Moon, and how those land features are similar to land features found here on Earth.
7. Organize students into groups of two.
8. Hand each group a set of coordinates for the six Apollo landing sites.
9. Hand each group an enlarged map of the Moon with longitude and latitude lines.
10. Hand each group an enlarged map of the Moon with colored topography and latitude and longitude lines.
11. Have each group plot the six Apollo landing sites on both the enlarged map of the Moon and the enlarged map of the Moon with colored topography.
12. Have each group label the landing sites with the name of the mission that landed there. (For example, 1° North and 23° East would be plotted on both maps, and labeled “Apollo 11.”)



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13. Have students determine the landing site for the next mission to the Moon, using the map key on the colorized terrain and the information gained from plotting the six Apollo landing sites as a guide.
14. Have students write a summative paragraph describing the criteria used to determine the landing site they chose.
15. Working as a class and using a Venn diagram, compare and contrast the Apollo Moon landing sites with the landing sites each group chose for the Artemis mission.

ADAPTATIONS AND EXTENSIONS

- ◆ *Snoopy, First Beagle on the Moon!* and *Shoot for the Moon, Snoopy!* can be used to provide background information, especially for students who are behind grade level in reading or science.
- ◆ Have students research the historical significance of the “Space Race,” the lead-up to the landing of the first mission on the Moon, as well as the people behind the scenes that made the Apollo missions such a success. (*Snoopy First Beagle on the Moon!* pp. 33, & 36 - 37, gives a bit of historical information on Apollo mission 10 and Apollo mission 11.)
- ◆ Have students research the meaning behind the names of each Apollo landing site. Who picked the name? Which astronauts landed there? Why did NASA select that particular landing site?
- ◆ Have students create a public service announcement (PSA) describing WHY their landing site should be chosen for the next landing site on the Moon, as part of NASA’s Artemis mission.

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RESOURCES

Apollo Landing Sites – Moon: NASA Science. Retrieved from <https://moon.nasa.gov/resources/52/apollo-landing-sites/>

Apollo Landing Sites. Retrieved from <https://airandspace.si.edu/multimedia-gallery/5480640jpg?id=5480>

Dunbar, B. (2019, July 23). What is Artemis? Retrieved from <https://www.nasa.gov/what-is-artemis>

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. (2019, June 4). Artemis Program. Retrieved from <https://www.nasa.gov/artemis>

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Apollo Landing Coordinates

Directions: Plot the six Apollo landing sites using the latitude and longitude coordinates below. Remember: latitude lines are horizontal, and longitude lines are vertical. North is above the Moon's equator, and South is below the Moon's equator. East is on the right of the Prime Meridian, and West is on the left of the Prime Meridian. Label each Apollo mission as you plot each coordinate.

Apollo 11: Mare Tranquillitatis - 1° North, 23° East

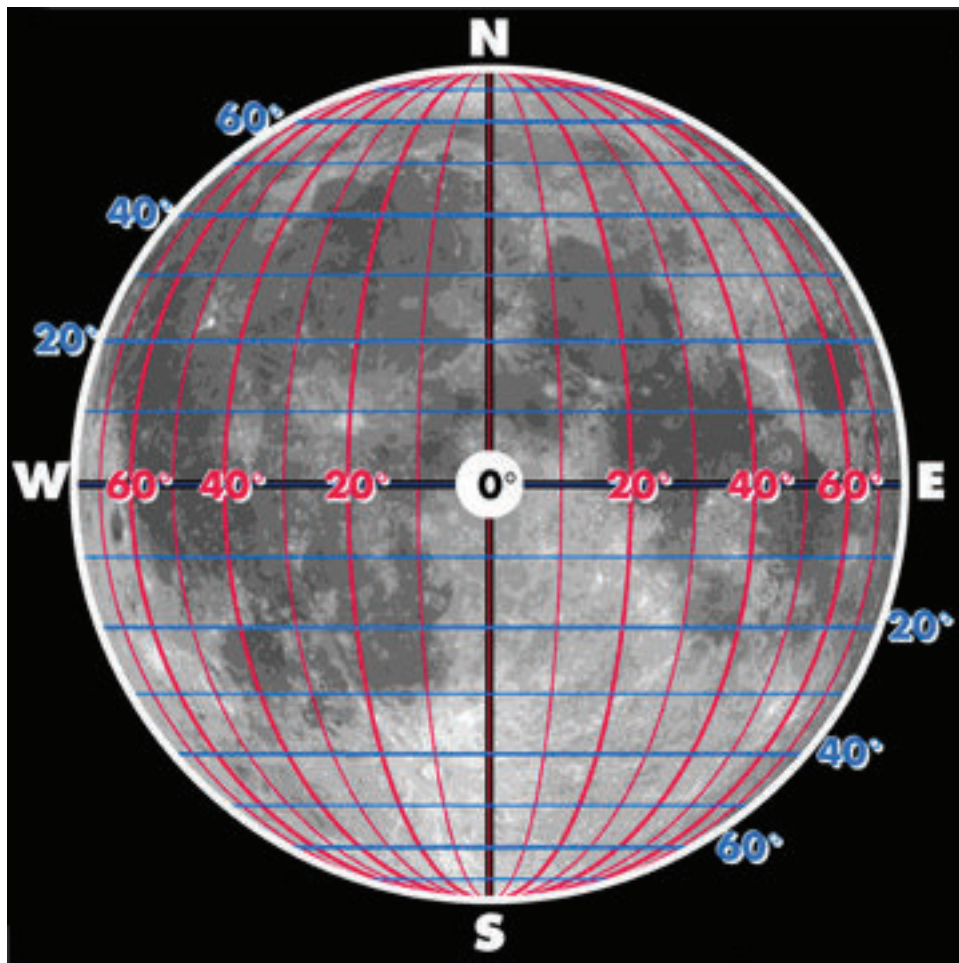
Apollo 12: Oceanus Procellarum - 3° South, 23° West

Apollo 14: Fra Mauro - 4° South, 17° West

Apollo 15: Hadley/Apennines - 26° North, 4° East

Apollo 16: Descartes - 9° South, 15° East

Apollo 17: Taurus-Littrow - 20° North, 31° East



Answer Key

