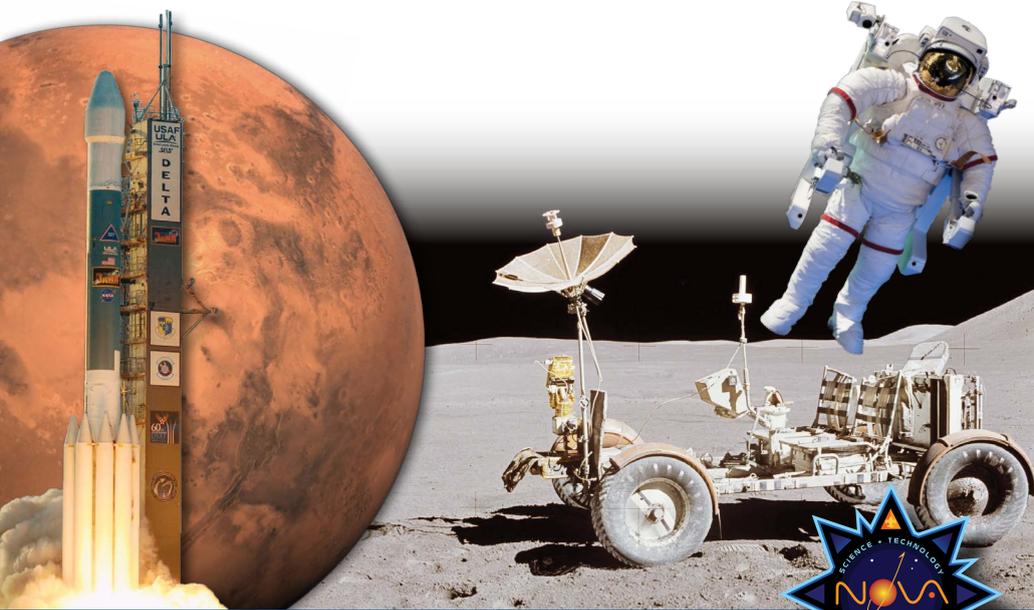
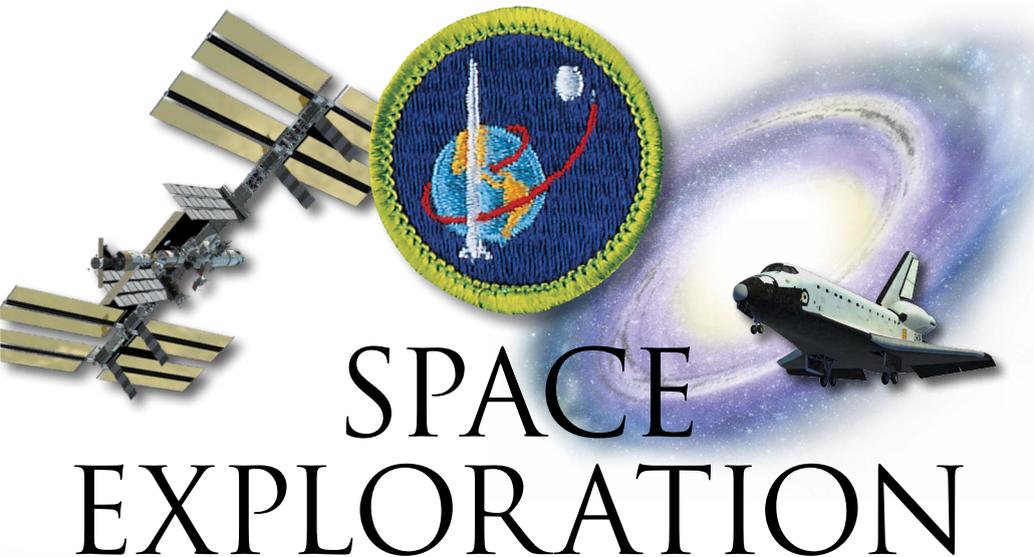


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# SPACE EXPLORATION



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## Space Exploration

1. Tell the purpose of space exploration and include the following:
  - (a) Historical reasons
  - (b) Immediate goals in terms of specific knowledge
  - (c) Benefits related to Earth resources, technology, and new products
  - (d) International relations and cooperation
2. Design a collector's card, with a picture on the front and information on the back, about your favorite space pioneer. Share your card and discuss four other space pioneers with your counselor.
3. Build, launch, and recover a model rocket.\* Make a second launch to accomplish a specific objective. (Rocket must be built to meet the safety code of the National Association of Rocketry. See the "Model Rocketry" chapter of the *Space Exploration* merit badge pamphlet.) Identify and explain the following rocket parts.
  - (a) Body tube
  - (b) Engine mount
  - (c) Fins
  - (d) Igniter
  - (e) Launch lug
  - (f) Nose cone
  - (g) Payload
  - (h) Recovery system
  - (i) Rocket engine
4. Discuss and demonstrate each of the following:
  - (a) The law of action-reaction
  - (b) How rocket engines work
  - (c) How satellites stay in orbit
  - (d) How satellite pictures of Earth and pictures of other planets are made and transmitted
5. Do TWO of the following:
  - (a) Discuss with your counselor a robotic space exploration mission and a historic crewed mission. Tell about each mission's major discoveries, its importance, and what was learned from it about the planets, moons, or regions of space explored.

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\*If local laws prohibit launching model rockets, do the following activity: Make a model of a NASA rocket. Explain the functions of the parts. Give the history of the rocket.

- (b) Using magazine photographs, news clippings, and electronic articles (such as from the internet), make a scrapbook about a current planetary mission.
- (c) Design a robotic mission to another planet, moon, comet, or asteroid that will return samples of its surface to Earth. Name the planet, moon, comet, or asteroid your spacecraft will visit. Show how your design will cope with the conditions of the environments of the planet, moon, comet, or asteroid.
6. Describe the purpose, operation, and components of ONE of the following:
- (a) Space shuttle or any other crewed orbital vehicle, whether government-owned (U.S. or foreign) or commercial
  - (b) International Space Station
7. Design an inhabited base located within our solar system, such as Titan, asteroids, or other locations that humans might want to explore in person. Make drawings or a model of your base. In your design, consider and plan for the following:
- (a) Source of energy
  - (b) How it will be constructed
  - (c) Life-support system
  - (d) Purpose and function
8. Discuss with your counselor two possible careers in space exploration that interest you. Find out the qualifications, education, and preparation required and discuss the major responsibilities of those positions.

# Space Exploration Resources

Information about space exploration changes constantly. Each new mission makes discoveries and shows that some of our old ideas were incorrect. When you look up information about space and humankind's efforts to explore it, always try to find a recently published book or a dependable website.

## Scouting Literature

*Astronomy, Aviation, Chemistry, Digital Technology, Electricity, Electronics, Engineering, Geology, Inventing, Nuclear Science, Photography, Programming, Radio, and Robotics* merit badge pamphlets

Visit the Boy Scouts of America's official retail website at <http://www.scoutstuff.org> for a complete listing of all merit badge pamphlets and other helpful Scouting materials and supplies.

## Books

- Chaikin, Andrew, and James A. Lovell. *Space*. Carlton, 2009.
- Dethloff, Henry C., and Ronald A. Schorn. *Voyager's Grand Tour: To the Outer Planets and Beyond*. Konecky & Konecky, 2009.
- Dyson, Marianne J. *Home on the Moon: Living on a Space Frontier*. National Geographic, 2003.
- . *Space Station Science: Life in Free Fall*. Windward Publishing, 2004.
- Engelhardt, Wolfgang. *The International Space Station: A Journey Into Space*. Tessloff/BSV Publishing USA, 1998.
- Furniss, Tim. *The Atlas of Space Exploration*. Friedman, 2002.
- Lee, Wayne. *To Rise From Earth: An Easy-to-Understand Guide to Spaceflight*, 2nd ed. Checkmark Books, 2000.
- Mullane, R. Mike. *Do Your Ears Pop in Space? And 500 Other Surprising Questions About Space Travel*. John Wiley & Sons, 1997.
- Reich, Tony, editor. *Space Shuttle: The First 20 Years—the Astronauts' Experiences in Their Own Words*. DK Publishing, 2002.
- Sagan, Carl, and Carol Sagan. *Pale Blue Dot*. Random House, 1997.
- Voigt, Gregory, and Alwyn T. Cohall. *Space Exploration Projects for Young Scientists*. Scholastic, 1995.

## Organizations and Websites

### American Institute of Aeronautics and Astronautics

Telephone: 800-639-2422

Website: <http://www.aiaa.org>

### European Space Agency

Website: <http://www.esa.int>

“Europe’s gateway to space” has 19 member countries, including France, Germany, and the United Kingdom.

### Galileo Legacy Site

Website: <http://solarsystem.nasa.gov/galileo>

### Goddard Space Flight Center

Website: <http://www.nasa.gov/centers/goddard>

The center is “home to the nation’s largest organization of combined scientists, engineers, and technologists that build spacecraft, instruments, and new technology to study Earth, the Sun, our solar system, and the universe.”

### NASA Image Galleries

Website: <https://www.nasa.gov/multimedia/imagegallery/>

The NASA image galleries boast a collection of more than a thousand images “of significant historical interest.”

### Jet Propulsion Laboratory

4800 Oak Grove Drive

Pasadena, CA 91109

Telephone: 818-354-4321

Website: <http://www.jpl.nasa.gov>

The JPL is considered NASA’s leading “center for robotic exploration of the solar system.”

### Johnson Space Center

Space Center Houston

1601 NASA Parkway

Houston, TX 77058

Telephone: 281-244-2100

JSC website: <http://www.nasa.gov/centers/johnson/home/index.html>

SCH website: <http://www.spacecenter.org>

### Kennedy Space Center

Telephone: 321-867-5000

Website: <http://www.nasa.gov/centers/kennedy/home/index.html>

### Marshall Space Flight Center

Website: <http://www.nasa.gov/centers/marshall/home/index.html>

### National Aeronautics and Space Administration

Telephone: 202-358-0001

Website: <http://www.nasa.gov>

NASA’s website has a bounty of information about space exploration for students of all ages.

Opportunities at NASA:

<http://nasajobs.nasa.gov>

Astronaut Selection Program:

<http://astronauts.nasa.gov>

SkyWatch applet to track satellite sightings including the International Space Station: <https://spotthestation.nasa.gov/sightings/>

Spinoffs: <http://spinoff.nasa.gov>

### National Association of Rocketry

Toll-free telephone: 800-262-4872

Website: <http://www.nar.org>

The world’s oldest and largest sport rocketry organization. Visit the website to find the club nearest you.

### National Space Society

Telephone: 202-429-1600

Website: <http://www.nss.org>

**Planetary Society**

Telephone: 626-793-5100

Website: <http://www.planetary.org>

**Smithsonian National Air and Space Museum**

Independence Avenue at Sixth Street, SW  
Washington, DC 20560

Telephone: 202-633-1000

Website: <http://airandspace.si.edu>

**Technology Student Association**

Toll-free telephone: 888-860-9010

Website: <http://www.tsaweb.org>

TSA provides programs for middle and high school students interested in the technology.

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