

SPACE EXPLORATION

Prepared by:

Steve Sokol (1996); updated by Eric Montegna (2000), updated by Ryan Hager (2006) & (2008); updated by Daniel Gerhardt (2013); updated by Brandon Keller (2015); updated by Aiden Shackelford (2024); Updated by Bronson Frieling (2026)

Target Group:

Any Scout

Time Allotted:

Two one-hour blocks
One hour rocket launch Wednesday evening

Pre-Requisites:

None

Materials Needed – Staff:

Hot Glue
Elmer's/Tacky Glue
Markers
Igniters
Rocket engines (A8-3)
Rocket launchers
Batteries (AA)
Scissors
Paper wadding
Paper
Colored Pencils
Pens
Straws
Spare rocket parts
Moon Posters
Notecards (blank, no lines)

Materials Needed – Scout:

Rocket Kit
Pencil or Pen
Notebook

Instructional Outcomes:

Upon Completion of this activity, scouts will have a good introductory knowledge base about space and space exploration practices as a whole. This includes the history of space exploration, space pioneers, energy sources, the workings of rockets, space stations and satellites as well as possible careers in the space exploration field.

MONDAY

Requirement 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

Requirement 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.

TUESDAY

Requirement 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

**Note: This requirement need not be completed in one day.*

WEDNESDAY

Requirement 3

Finish building rockets.

WEDNESDAY NIGHT

Requirement 3

Launch rockets off Cardiac Hill just outside of Maryville Lodge at a time that will be designated by the Nature Director and Program Director. (Rainy day plan-launch rockets during Thursday activity period)

****THIS WILL BE AN EVENT ALL NATURE STAFF ARE REQUIRED TO BE PRESENT AT. IT IS HELD AT 6:30 ON FAMILY NIGHT****

NOTE: It is important to remind the scouts to return their rockets to the box after they retrieve them as they will be needed for the second launch on Friday.

THURSDAY

Requirement 6

Describe the purpose, operation, and components of ONE of the following:

- (a) Space shuttle or any other crewed orbital vehicle, whether government owned or commercial
- (b) International Space Station

Requirement 7

Design and 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

**Note: Have scouts present, and explain each of the considerations*

FRIDAY

Requirement 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.

Requirement 8

8. Explore careers related to this merit badge. Research one career to learn about the training and education needed, costs, job prospects, salary, job duties, and career advancement. Your research methods may include -- with your parent or guardian's permission -- an internet or library search, an interview with a professional in the field, or a visit to a location where people in this career work. Discuss with your counselor both your findings and what about this profession might make it an interesting career.

Requirement 5

Do TWO of the following:

- (a) Discuss with your counselor an robotic space exploration mission and an early manned mission. Tell about each mission's major discoveries, its importance, and what we learned from it about the planets, moons, or regions of space explored.
- (c) Design an robotic mission to another planet or moon that will return samples of its surface to Earth. Name the planet or moon your spacecraft will visit. Show how your design will cope with the conditions of the planet's or moon's environment.

Requirement 3

Conduct the second launch today for every rocket that survived the first launch. If no rockets were retrieved, provide a single communal rocket named "The International Effort"