

# Cadette and Senior Girl Scout Space Exploration Interest Patch

1997 requirements

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This is an adjunct to the guide "Interest Projects for girls 11-17". That guide has guidance for some of these activities. While astronomy is closely related to space exploration, only some of the activities in this interest project benefit from astronomy resources. I have added notes for those activities.

To complete the patch, complete 2 of the Skill Builders, 1 of the Technology activities, 1 of the Service Projects, 1 of the Career Exploration activities, and 2 from any of the categories that you choose.

## **Skill Builders:**

1. Find out about at least four of the following astronomical phenomena:

quasars,

Among the most luminous objects in the universe. A compact region in the center of a massive galaxy surrounding its central supermassive black hole.

pulsars,

Highly magnetized, rotating neutron stars that emit a beam of electromagnetic radiation. The direction of beam depends on magnetic field; if not same as rotation axis, the beam sweeps

novas,

A large nuclear explosion on the surface of the star. Most commonly caused when another object deposits material on the star until it gains enough mass to cause a new kind of nuclear reaction. Stars in this situation commonly have recurring novas.

supernovas,

An explosion that destroys the star by flinging most of its mass out into space. There are several causes, which produce different types of supernovas. A normal part of the life cycle of larger stars. The remnant at the center of a star destroyed by a supernova may become a white dwarf, a neutron star, or a black hole.

black holes,

An exotic object created when a massive star collapses. Sometimes the result of a supernova. The most dense kind of object thought possible in the universe – its gravity prevents even light from escaping.

dwarf stars,

Some classifications use only two categories for stars – they are either dwarfs or giants. In this classification our Sun is a dwarf. Other classifications only put stars that are smaller and cooler (therefore redder) than our Sun into the category of dwarf.

giant stars,

Stars that are massive enough to include a supernova during their lifecycle. Giants are at least several times more massive than our Sun.

protostars,

Masses of gas in the process of condensing into stars. They may be hot enough to see their radiation, but have not yet begun nuclear fusion in their interiors

neutron stars,

A type of star so dense that only neutrons can exist, packed close together. Usually forms as the remnant after a star explodes in a supernova. Not as dense as a black hole, but still an exotic object with properties not found in ordinary stars

variable stars,

While most stars are always the same brightness (until they age and their nuclear reactions change), some stars become brighter and dimmer on a regular cycle. The brightness of variable stars is what varies. The first one known to ancient astronomers was Algol, still one of the easiest variables to observe.

cosmic clouds,

The universe is filled with gas and dust. Gravity draws them together in cosmic clouds. Sometimes these clouds collapse, giving birth to stars.

and globular clusters.

Globular clusters are large collections of stars born approximately together. These clusters contain approximately 100,000 stars. They are much smaller than galaxies, but the gravity of that many stars keeps them bound together in a spherical cluster. These are typically older than most stars. They often orbit a galaxy.

Can you observe any of these with the naked eye?

You can observe some of them with the naked eye. Most stars you can observe with your naked eye are giants. Most dwarfs are too dim to view with the naked eye, though in some classifications our Sun is a dwarf, and it is easily visible with the naked eye. Many cosmic clouds are visible to the naked eye, and at least one of those (the Orion Nebula) contains protostars. Some variable stars are visible with the naked eye (such as Algol). Occasionally (once every several centuries, on average) a supernova occurs that is close enough to Earth to be visible with the naked eye. The other kinds of objects tend to be too far away to observe with the naked eye

2. Visit a museum, planetarium, observatory, or space center to learn about the history of space exploration, or visit the National Aeronautics and Space Administration (NASA) site on the Internet to find out about projects currently in progress. Make a file of your findings and develop a list of Web sites for others to explore.

Rappahannock Astronomy Club can help you learn about nearby museums, planetariums, observatories, and space center.

<http://raclub.org/>

NASA is on the Internet at

<http://nasa.gov/>

3. Learn more about the sun and the moon and their relationship to earth. Do two of the following:
  - Mark your calendar with the phases of the moon for a month.
  - Learn to read an ocean tide chart.

- Make a poster illustrating why and how seasons change.
- Demonstrate what happens during a solar or lunar eclipse.

Rappahannock Astronomy Club has resources for learning about eclipses.

- Identify a tale or superstition about the sun or the moon. Discuss whether or not this is a valid or even measurable belief.

Rappahannock Astronomy Club has resources for stories about the sun and moon.

4. With a group, discuss "the case for space", addressing issues such as: Who owns space? Who owns the moon? Who should fund space travel or research? What are priorities for research in space? What happens if we find other life in space? Come up with charts and posters depicting your questions and answers.
5. Science fiction often predicts future developments. Read science fiction written in the 1960s or earlier, or view an old science fiction film from the sixties or earlier. How do they appear today in light of the new information people have about space? Or try your hand at writing science fiction. Incorporate technological or social changes brought about by space travel.
6. Develop your own space exploration activity. Here are some of the things you might do:
  - Explore what countries around the world are doing in space exploration.
  - Using a telescope, monitor an object in the night sky for a month.
  - Visit NASA and, if possible, view the launching of a space vehicle.

Launches from the NASA Wallops Island launch site are sometimes visible in our area.

- Develop a space exploration resource file. NASA has many educational materials available to the public.
- Keep a scrapbook of news clippings on items related to astronomy and space exploration.

### **Technology:**

1. Find out about the capabilities of today's telescopes. If possible, visit an observatory or a site on the World Wide Web to learn more about these telescopes.  
A star party is an excellent way opportunity to use different types of telescopes. Rappahannock Astronomy Club can help you plan a visit to one of our star parties.
2. Investigate the role of mathematics and computer simulation in developing theories about the universe. Talk with someone knowledgeable in astronomy or physics, if possible.
3. Design a human space colony. Decide whether it is a station in space or one that will be set up on a planet in this solar system. Determine what conditions will need to be considered as well as the purpose of the vehicle/structure, living arrangements, special equipment, health and safety needs, and environmental protection or danger. Share and explain your design or model with others.
4. Build an accurate scale model of a space exploration vehicle. Find out about its design, function, and basic operation. Be able to help others learn about your vehicle.

5. Construct a "flying object" – something that is capable of flight. Be able to explain the scientific principles of flight. Determine which actual flight vehicles operate on the same principles.

### **Service Projects:**

1. Help sponsor an event, such as a space exploration activity day or science career day. Incorporate hands-on and creative activities, such as acting in a play about women who have studied or explored space in some way.
2. Develop a booklet or display that highlights women who have played an important role in the history of flight and space exploration.
3. Help Brownie and Junior Girl Scouts learn about space exploration. Do two of the following: Conduct a night-sky exploration, put on a play about life on a space station, tell a story about a woman astronaut, including her training and achievements, or share stories from different cultures about the night sky.
4. Design a library exhibit about space and astronomy for your school, library, or town recreation center. Include books, an activity box, and a list of resources in your display.
5. Using glow-in-the-dark paint, stars, or reflector tape, make an accurate constellation map on the ceiling. The map should include a minimum of twelve constellations in any season. Create a guided tour of the ceiling.

### **Career Exploration:**

1. Check out at least two of the following careers and show how they are linked to the space program: biomedical engineering, meteorology, ceramics, chemistry, industrial engineering, materials science, metallurgy, optical engineering, physiology, and photography.
2. Plan to attend a "space camp" or astronomy camp to get more hands-on experiences.
3. Contact two science societies for professional women related to astronomy or space exploration. Find out what careers are related to space exploration. Also, find out what benefits members of the society receive and whether they have any special programs for young people.
4. List 5 ways that you can maintain your interest in space and/or astronomy. Investigate and list space-related places to visit or activities to pursue in your community or on the Internet.

### **Resources**

NASA resources to help with Cadette and Senior Interest Patches

<http://spaceplace.nasa.gov/girl-scouts-sr/en/>