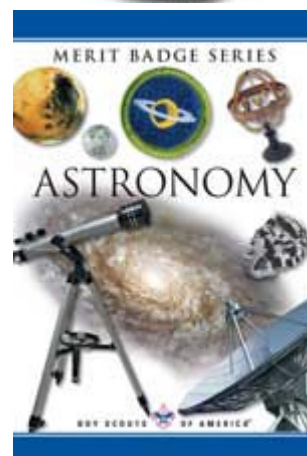


Astronomy

In learning about astronomy, Scouts study how activities in space affect our own planet and bear witness to the wonders of the night sky: the nebulae, or giant clouds of gas and dust where new stars are born; old stars dying and exploding; meteor showers and shooting stars; the moon, planets, and a dazzling array of stars.

Requirements

1. Describe the proper clothing and other precautions for safely making observations at night and in cold weather. Tell how to safely observe the Sun, objects near the Sun, and the Moon. Explain first aid for injuries or illnesses such as heat and cold reactions, dehydration, bites and stings, and damage to your eyes that could occur during observation.
2. Explain what light pollution is and how it and air pollution affect astronomy.
3. With the aid of diagrams (or real telescopes if available), do each of the following:
 - Explain why binoculars and telescopes are important astronomical tools. Demonstrate or explain how these tools are used.
 - Describe the similarities and differences of several types of astronomical telescopes.
 - Explain the purposes of at least three instruments used with astronomical telescopes.
4. Do the following:
 - Identify in the sky at least 10 constellations, at least four of which are in the zodiac.
 - Identify at least eight conspicuous stars, five of which are of magnitude 1 or brighter.
 - Make two sketches of the Big Dipper. In one sketch, show the Big Dipper's orientation in the early evening sky. In another sketch, show its position several hours later. In both sketches, show the North Star and the horizon. Record the date and time each sketch was made.
 - Explain what we see when we look at the Milky Way.
5. Do the following:
 - List the names of the five most visible planets. Explain which ones can appear in phases similar to lunar phases and which ones cannot, and explain why.
 - Find out when each of the five most visible planets that you identified in requirement 5a will be observable in the evening sky during the next 12 months, then compile this information in the form of a chart or table. Update your chart monthly to show whether each planet will be visible during the early morning or in the evening sky.
6. At approximately weekly intervals, sketch the position of Venus, Mars, or Jupiter in relation to the stars. Do this for at least four weeks and at the same time of night. On your sketch, record the date and time next to the planet's position. Use your sketch to explain how planets move.
7. Do the following:
 - Sketch the face of the Moon and indicate at least five seas and five craters. Label these landmarks.
 - Sketch the phase and the daily position of the Moon, at the same hour and place, for a week. Include landmarks on the horizon such as hills, trees, and buildings. Explain the changes you observe.
 - List the factors that keep the Moon in orbit around Earth.
 - With the aid of diagrams, explain the relative positions of the Sun, Earth, and the Moon at the times of lunar and solar eclipses, and at the times of new, first-quarter, full, and last-quarter phases of the Moon.
8. Do the following:
 - Describe the composition of the Sun, its relationship to other stars, and some effects of its radiation on Earth's weather. Define sunspots and describe some of the effects they may have on solar radiation.
 - Identify at least one red star, one blue star, and one yellow star (other than the Sun). Explain the meaning of these colors.
9. With your counselor's approval and guidance, do ONE of the following:
 - Visit a planetarium or astronomical observatory. Submit a written report, a scrapbook, or a video presentation afterward to your counselor that includes the following information:
 - Activities occurring there
 - Exhibits and displays you saw
 - Telescopes and other instruments being used
 - Celestial objects you observed



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- Plan and participate in a three-hour observation session that includes using binoculars or a telescope. List the celestial objects you want to observe, and find each on a star chart or in a guidebook. Prepare an observing log or notebook. Show your plan, charts, and log or notebook to your counselor before making your observations. Review your log or notebook with your counselor afterward.
 - Plan and host a star party for your Scout troop or other group such as your class at school. Use binoculars or a telescope to show and explain celestial objects to the group.
 - Help an astronomy club in your community hold a star party that is open to the public.
 - Personally take a series of photographs or digital images of the movement of the Moon, a planet, an asteroid or meteoroid, or a comet. In your visual display, label each image and include the date and time it was taken. Show all positions on a star chart or map. Show your display at school or at a troop meeting. Explain the changes you observed.
10. List at least three different career opportunities in astronomy. Pick the one in which you are most interested and explain how to prepare for such a career. Discuss with your counselor what courses might be useful for such a career.

Resources

Scouting Literature

Atomic Energy, Chemistry, Computers, Geology, Photography, Radio, Space Exploration, and Weather merit badge pamphlets

Books

- Bond, Peter. *DK Guide to Space*. DK Publishing, 1999.
- Brunier, Serge, and Akira Fujii. *The Great Atlas of the Stars*. Firefly Books, 2001.
- Covington, Michael A. *Astrophotography for the Amateur, 2nd ed.* Cambridge University Press, 1999.
- Davis, Kenneth C. *Don't Know Much About Space*. HarperTrophy, 2001.
- ----- . *Don't Know Much About the Solar System*. HarperCollins, 2001.
- Harrington, Philip, and Edward Pascuzzi. *Astronomy for All Ages*. Globe Pequot Press, 2000.
- Henbest, Nigel, and Heather Couper. *DK Space Encyclopedia*. DK Publishing, 1999.
- Lambert, David. *The Kingfisher Young People's Book of the Universe*. Kingfisher Books, 2001.
- Moore, Patrick, ed. *Astronomy Encyclopedia*. Oxford Children's Books, 2002.
- Price, Fred W. *The Planet Observer's Handbook*. Cambridge University Press, 2000.
- Schaaf, Fred. *40 Nights to Knowing the Sky: A Night-by-Night Skywatching Primer*. Owl Books, 1998.
- Stott, Carole. *New Astronomer*. Dorling Kindersley Limited, 1999.
- Trefil, James. *Other Worlds: Images of the Cosmos from Earth and Space*. National Geographic, 1999.

CDs, DVDs, and Videos

- *Amazing Universe III*. Hopkins Technology, 1995, CD-ROM.
- *IMAX Cosmic Voyage*. Warner Home Video, 1996, DVD.
- *Distant Suns: The Virtual Desktop Planetarium*. Virtual Reality Laboratories, 1994, CD-ROM.
- *Savage Sun*. Discovery Channel, 1999, videocassette.
- *The Solar Empire: A Star is Born*. Discovery Channel and The Learning Channel, 1997, videocassette.

Magazines

Astronomy

21027 Crossroads Circle
 P.O. Box 1612
 Waukesha, WI 53187-1612
 Telephone: 888-350-2413
 Web site: <http://www.astronomy.com>

Sky and Telescope

49 Bay State Road
 Cambridge, MA 02138-1200
 Toll-free telephone: 800-253-0245
 Web site: <http://skyandtelescope.com>

Organizations and Web Sites

Astronomical League

9201 Ward Parkway, Suite 100

Kansas City, MO 64114

Telephone: 816-333-7759

Web site: <http://www.astroleague.org>

Astronomy Watch: Tonight's Sky and Astro Events

Web site: <http://www.astronomy-watch.com>

National Aeronautics and Space Administration

Headquarters Information Center

Washington, DC 20546-0001

Telephone: 202-358-0000

Web site: <http://www.nasa.gov>

National Optical Astronomy Observatory

950 North Cherry Ave.

Tucson, AZ 85719

Telephone: 520-318-8000

Web site: <http://www.noao.edu>

National Radio Astronomy Observatory

520 Edgemont Road

Charlottesville, VA 22903-2475

Telephone: 434-296-0211

Web site: <http://www.nrao.edu>

The Planetary Society

65 North Catalina Ave.

Pasadena, CA 91106-2301

Telephone: 626-793-5100

Web site: <http://planetary.org>

Sky Maps

Web site: <http://www.skymaps.com>

Solar System Exploration: The Planets

Web site: <http://sse.jpl.nasa.gov/features/planets/planetsfeat.html>

Space Telescope Science Institute

3700 San Martin Drive

Baltimore, MD 21218

Telephone: 410-338-4444

Web site: <http://hubblesite.org>

SpaceWander.com

Web site: <http://www.spacewander.com>

SpaceWeather.com

Web site: <http://www.SpaceWeather.com>