



Astronomy

Scouts BSA · STEM

Name

Started

Completed

Astronomy opens up the night sky, from the Moon's craters to distant stars and planets. This badge teaches you how to observe safely, find constellations, and understand what you're seeing. A dark sky and a little patience are all you need to start.

Requirements

Every official requirement, in plain language. Check the official wording when you sign off (scouting.org/merit-badges/astronomy/). Tips and examples are ideas, not extra requirements.

1 Safety

Tips for this section: Never look at the Sun directly or through binoculars or a telescope without a proper solar filter. Dress warmly and bring a buddy for night sessions.

- ☐ **1a** Explain to your counselor the likeliest hazards in astronomy activities and how to anticipate, help prevent, reduce, and respond to them

- ☐ **1b** Explain first aid for injuries or illnesses that could happen while observing, including dehydration, heat and cold reactions, bites and stings, and eye damage

- ☐ **1c** Describe the right clothing and other precautions for observing safely at night and in cold weather

- ☐ **1d** Explain how to safely observe the Sun, objects close to the Sun, and solar eclipses

- ☐ **2** Explain light pollution, and how both it and air pollution affect astronomy

Tip: Compare the stars you can see in town versus a darker spot outside town. Notice how streetlights and haze wash out faint stars.

Example: Do a star count twice: once from your driveway or yard and once from a darker spot like a campsite. Count stars inside the bowl of the Big Dipper or Orion's body each time, then explain what blocked the faint ones and simple fixes like shielded outdoor lights.

3 Binoculars and telescopes

Tips for this section: Ask a local astronomy club member to show you how their telescope works and how they keep the lenses clean.

- ☐ **3a** Using diagrams or real instruments, explain why binoculars and telescopes are key astronomy tools and show or explain how to use them

- ☐ **3b** Using diagrams or real instruments, compare several kinds of telescopes, including at least one that detects light outside the visible spectrum (radio, X-ray, ultraviolet, or infrared)

- ☐ **3c** Using diagrams or real instruments, explain what three instruments used with telescopes are for

- ☐ **3d** Describe how to care for and store telescopes and binoculars at home and in the field

4 Stars and constellations

Tips for this section: Use a star chart or sky app to find a few easy constellations first, then use them as signposts to find others.

Example for this section: Learn a few signpost patterns first: follow the Big Dipper's pointer stars to Polaris, then use Orion's belt to find Sirius in winter or the Summer Triangle's three bright stars in summer. A chart helps you plan, but point them out to your counselor in the real night sky.

- ☐ **4a** Find 10 constellations in the real night sky, at least four of them zodiac constellations (planetarium lessons don't replace finding them outdoors)

- ☐ **4b** Find eight prominent stars in the real night sky, five of them magnitude 1 or brighter (planetarium lessons don't replace finding them outdoors)

- ☐ **4c** From direct observation, sketch the Big Dipper or Cassiopeia twice: early evening and several hours later, showing the North Star and horizon each time and noting the date and time

- ☐ **4d** Explain what we are seeing when we look at the Milky Way

5 Planets

Tips for this section: Check a sky app to see which planets are up tonight. They shine steadily and don't twinkle like stars.

- ☐ **5a** Name the five most visible planets, and explain which can show phases like the Moon's, which can't, and why

- ☐ **5b** Using online (with parent or guardian permission) and other sources, find when each planet from 5a will be visible in the evening sky over the next 12 months, and put it in a chart or table

- ☐ **5c** Describe how the planets move across the sky

- ☐ **5d** Observe a planet and describe what you saw

6 The Moon

Tips for this section: Sketch the Moon on several nights in a row. You'll see the phases change and understand its orbit better.

Example for this section: Sketch the Moon at the same time and from the same spot on four nights within one week, drawing its lit shape, where it sits in the sky, and a tree or rooftop on the horizon. Label each with its phase name and explain why the lit part and position change as the Moon moves along its orbit.

- ☐ **6a** Sketch the Moon's face and mark and label five seas and five craters

- ☐ **6b** By direct observation, sketch the Moon's phase and position at the same time and place on four nights (or days) within one week, including horizon landmarks; explain the changes

- ☐ **6c** List the factors that keep the Moon orbiting Earth

- ☐ **6d** Using diagrams, explain where the Sun, Earth, and Moon are during lunar and solar eclipses and during the new, first-quarter, full, and last-quarter Moon

7 The Sun and stars

Tips for this section: Look at star colors on a clear night, and learn how to view sunspots safely with an adult using proper equipment.

Example for this section: Compare star colors: red Betelgeuse in Orion is cooler, blue-white Rigel is much hotter, and yellow Capella is in between, a lot like our Sun. For sunspots, view only with an adult using a certified solar filter or a projection method, and sketch what you see.

- ☐ **7a** Describe what the Sun is made of, how it compares with other stars, and some ways its radiation affects Earth's weather and communications

- ☐ **7b** Define sunspots and describe some of their possible effects on solar radiation

- ☐ **7c** Find at least one red, one blue, and one yellow star (not the Sun) and explain what the colors mean

8 Observing project: Choose 1 of 6

Tips for this section: Many planetariums and astronomy clubs host public nights. If you plan a star party, pick a dark, safe spot and invite your family or patrol.

Example for this section: Plan a star party for your patrol: pick a dark site with an adult, check the Moon phase and weather, set a time, make a list of five objects to show, bring red flashlights, and invite a club member with a telescope.

- ☐ **8a** With counselor approval, visit a planetarium or observatory; then give your counselor a written report, scrapbook, or video covering the activities, exhibits, telescopes and instruments, and objects you observed

- ☐ **8b** With counselor approval, plan and join an observing session using binoculars or a telescope to see 10+ objects beyond those in requirement 4; list and find them in a chart, guide, or app, discuss plans with your counselor first, keep a log, and review it with them after

- ☐ **8c** With counselor approval, plan and host a star party for your troop or another group (like your class), using a telescope or binoculars to point out and explain objects in the sky

- ☐ **8d** With counselor approval, help a local astronomy club run a star party open to the public

- ☐ **8e** With counselor approval, take your own series of images of a moving Moon, planet, asteroid, meteor, or comet; label each with date and time, plot the positions on a star chart, show the display at school or a troop meeting, and explain the changes

- ☐ **8f** With approval from a parent or guardian and your counselor, use an online observing service such as SkyNet to view planets, comets, galaxies, and/or the Sun, and describe the experience to your counselor

9 Careers or hobby: Choose 1 of 2

Tips for this section: Ask an amateur astronomer or a science teacher how they got hooked, or look into jobs like astronomer or planetarium educator.

- ☐ **9a** Find three careers using astronomy skills; research one's training, education, certifications, experience, costs, job outlook, starting pay, and advancement, then discuss it and your interest in it with your counselor

- ☐ **9b** Find how you could use astronomy skills in a personal hobby; research the extra training, costs, and helpful organizations, then discuss your findings and your short- and long-term goals with your counselor