



Astronomy Merit Badge Workbook

SCOUTMASTER BUCKY

Scouts participating in a Scoutmaster Bucky merit badge opportunity, whether online or in person, should consider using the Astronomy merit badge pamphlet for discovery and knowledge, along with the class preparation pages for clarifications, insights, and expectations.

<https://scoutmasterbucky.com/merit-badges/astronomy/astronomy-pamphlet.pdf>

<https://scoutmasterbucky.com/merit-badges/astronomy/astronomy-cpp.pdf>

REQUIREMENTS 8a, 8b, 8c, 8d, 8e, and 8f REQUIRE COUNSELOR APPROVAL.

REQUIREMENT 5b REQUIRES PARENT / GUARDIAN PERMISSION AND 8f REQUIRES PARENT / GUARDIAN APPROVAL.

REQUIREMENT 1a: Explain to your counselor the most likely hazards you may encounter while participating in astronomy activities, and what you should do to anticipate, help prevent, mitigate, and respond to these hazards.

HAZARD #1

Description:

Anticipate:

Help Prevent:

Mitigate:

Respond:



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HAZARD #2

Description:

Anticipate:

Help Prevent:

Mitigate:

Respond:



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HAZARD #3

Description:

Anticipate:

Help Prevent:

Mitigate:

Respond:



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HAZARD #4

Description:

Anticipate:

Help Prevent:

Mitigate:

Respond:



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HAZARD #5

Description:

Anticipate:

Help Prevent:

Mitigate:

Respond:



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HAZARD #6

Description:

Anticipate:

Help Prevent:

Mitigate:

Respond:



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REQUIREMENT 1b: 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 observations.

Heat and Cold Reactions:

Dehydration:

Bites and Stings:

Damage to your eyes:



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REQUIREMENT 1c: Describe the proper clothing and other precautions for safely making observations at night and in cold weather.

At Night:

In Cold Weather:

REQUIREMENT 1d: Explain how to safely observe the Sun, objects near the Sun and solar eclipses.

Notes:



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REQUIREMENT 2: Explain what light pollution is.

Notes:

REQUIREMENT 2: Explain how light pollution and air pollution affect astronomy.

Notes:



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REQUIREMENT 3: With the aid of diagrams (or real telescopes and binoculars if available)...

Be sure to bring your diagrams and/or telescope and binoculars for your presentation

This requirement must be reviewed with your merit badge counselor.

BE PREPARED!

REQUIREMENT 3a: ...explain why binoculars and telescopes are important astronomical tools. Demonstrate or explain how these tools are used.

Notes:

REQUIREMENT 3b: ...describe the similarities and differences of several types of astronomical telescopes, including at least one that observes light beyond the visible part of the spectrum (i.e., radio, X-ray, ultraviolet, or infrared).

Notes:



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REQUIREMENT 3c: ...explain the purposes of three instruments used with astronomical telescopes.

Notes:

REQUIREMENT 3d: ...describe the proper care and storage of telescopes and binoculars both at home and in the field.

Notes:



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FOR REQUIREMENT 4: IF INSTRUCTION IS DONE IN A PLANETARIUM, SCOUTS MUST STILL IDENTIFY THE REQUIRED STARS AND CONSTELLATIONS OUTSIDE UNDER THE NATURAL NIGHT SKY.

REQUIREMENT 4: Scouts must identify the required stars and constellations under the natural night sky.

REQUIREMENT 4a: Identify in the sky 10 constellations, at least four of which are in the zodiac.

If not indicated in the class preparation pages or the registration summary, information for completing this requirement component will be provided during the class.

This requirement component must be reviewed with your merit badge counselor.

BE PREPARED!

Notes:



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REQUIREMENT 4b: Identify in the sky eight conspicuous stars, five of which are of magnitude 1 or brighter.

If not indicated in the class preparation pages or the registration summary, information for completing this requirement component will be provided during the class.

This requirement component must be reviewed with your merit badge counselor.

BE PREPARED!

Notes:



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REQUIREMENT 4c:

Make two sketches of the Big Dipper or Cassiopeia from direct observation. In one sketch, show the Big Dipper's or Cassiopeia's orientation in the early evening sky. Make another sketch, showing its position several hours later. In both sketches, show the North Star and the horizon. Record the date and time each sketch was made.

Date and Time of this "early evening sky" sketch:

Date and Time of this "several hours later" sketch:



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REQUIREMENT 4d: Explain what we see when we look at the Milky Way.

Date and Time of this “several hours later” sketch:

REQUIREMENT 5a: 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.

Most Visible Planet	Name	Phase (Y or N)	Why?
Planet 1			
Planet 2			
Planet 3			
Planet 4			
Planet 5			



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REQUIREMENT 5b: Using the internet (with your parent or guardian's permission) and other resources, find out when each of the five most visible planets that you identified in requirement 5(a) will be observable in the evening sky during the next 12 months, then compile this information in the form of a chart or table.

PARENT/GUARDIAN PERMISSION: IS REQUIRED.

Parent's / Guardian's Name

Phone or Email

Parent's / Guardian's Signature

Date

☐

permission

Most Visible Planet	Name	When most observable in the EVENING sky
Planet 1		
Planet 2		
Planet 3		
Planet 4		
Planet 5		

Notes:



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REQUIREMENT 5c: Describe the motion of the planets across the sky.

Notes:

REQUIREMENT 5d: Observe a planet and describe what you saw.

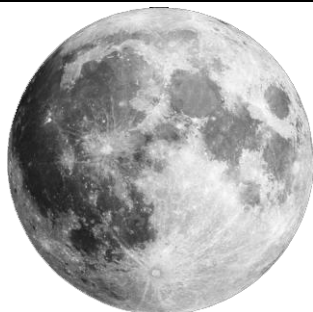
Notes:



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REQUIREMENT 6a:

Sketch the face of the Moon and indicate five seas and five craters. Label these landmarks.





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REQUIREMENT 6b:

Sketch the phase and position of the Moon, at the same hour and place, for four nights (or days) within a one-week period by direct observation. Include landmarks on the horizon such as hills, trees, and buildings.

NIGHT #1:

Date and Time of Drawing:

NIGHT #2:

Date and Time of Drawing:



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NIGHT #3:

Date and Time of Drawing:

NIGHT #4:

Date and Time of Drawing:



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REQUIREMENT 6b: Explain the changes you observe.

Notes:

REQUIREMENT 6c: List the factors that keep the Moon in orbit around Earth.

Notes:



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REQUIREMENT 6d: 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.

Be sure to bring your diagrams for your presentation

This requirement component must be reviewed with your merit badge counselor.

BE PREPARED!

Notes:



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REQUIREMENT 7a: Describe the composition of the Sun.

Notes:

REQUIREMENT 7a: Describe the Sun's relationship to other stars.

Notes:



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REQUIREMENT 7a: Describe some effects of the Sun's radiation on Earth's weather and communications.

Notes:

REQUIREMENT 7b: Define sunspots and describe some of the effects they may have on solar radiation.

Notes:



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REQUIREMENT 7c: Identify at least one red star, one blue star, and one yellow star (other than the Sun). Explain the meaning of these colors.

RED STAR:

Name:

Notes:

BLUE STAR:

Name:

Notes:

YELLOW STAR (OTHER THAN THE SUN):

Name:

Notes:



DO ONE OF THE FOLLOWING (8A, 8B, 8C, 8D, or 8E) FOR REQUIREMENT 8

REQUIREMENT 8: With your counselor's approval and guidance, do ONE of the following:

COUNSELOR APPROVAL: IS REQUIRED.

Counselor's Name

Phone or Email

Counselor's Signature

Date

☐

approved

REQUIREMENT 8a: 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:

1. Activities occurring there
2. Exhibits and displays you saw
3. Telescopes and other instruments being used
4. Celestial objects you observed

Be sure to bring your report, scrapbook, or video presentation to share with your counselor.

This requirement must be reviewed with your merit badge counselor.

BE PREPARED!

Place Visited:

Date and Time of Visit:

Notes:



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REQUIREMENT 8b:

Plan and participate in an observation session that includes using binoculars or a telescope and includes at least 10 celestial objects beyond those observed in requirement 4. These might be lunar features, Messier objects, additional constellations or planets, or artificial satellites including the International Space Station. List the celestial objects you want to observe and find each in a star chart, guidebook or by using an app. Prepare a log or notebook. Discuss with your counselor what you hope to observe prior to your observation session. Review your log or notebook with your counselor afterward.

Consider using the [Scout Planning Worksheet](#) to help complete this Requirement.

This requirement must be done **BOTH** before and after with your merit badge counselor.

READ THE INSTRUCTIONS CAREFULLY.

Be sure to bring your prepared log or notebook to share with your merit badge counselor.

BE PREPARED!

PRIOR TO OBSERVATION SESSION:

Place Observation Session will take place:

Date and Time Observation Session will take place:

Notes:

Don't forget to bring your logbook or notebook to share with your merit badge counselor



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AFTER OBSERVATION SESSION:

Place Observation Session took place:

Date and Time Observation Session took place:

Notes:



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REQUIREMENT 8c:

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.

Star Party Location:

Date and Time of Star Party:

Notes:



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REQUIREMENT 8d: Help an astronomy club in your community hold a star party that is open to the public.

Star Party Location:

Date and Time of Star Party:

Club Representative's Name:

Club Representative's Name

Phone or Email

Club Representative's Signature

Date ☐ confirmed

Notes:



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REQUIREMENT 8e:

Personally take a series of photographs or digital images of the movement of the Moon, a planet, an asteroid, meteor, 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.

Be sure to bring your photographs to share and review with your merit badge counselor.

This requirement component must be done with your merit badge counselor.

BE PREPARED!

Visual Display shared with:

Date and Time of Visual Display sharing:

School / Scout Leader's Name

Phone or Email

School / Scout Leader's Signature

Date ☐ confirmed

Notes:



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REQUIREMENT 8f:

With your parent or guardian's and counselor's approval, use online observing opportunities such as SkyNet to observe planets, comets, galaxies, and/or the sun. Describe your experience to your counselor.

PARENT/GUARDIAN APPROVAL: IS REQUIRED.

Parent's / Guardian's Name

Phone or Email

Parent's / Guardian's Signature

Date ☐ *approved*

COUNSELOR APPROVAL: IS REQUIRED.

Counselor's Name

Phone or Email

Counselor's Signature

Date ☐ *approved*

Notes:



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DO ONE OF THE FOLLOWING (9A or 9B) FOR REQUIREMENT 9

REQUIREMENT 9a: Identify three career opportunities that would use skills and knowledge in astronomy.

Career Opportunity #1:

Career Opportunity #2:

Career Opportunity #3:

REQUIREMENT 9a: Pick one and research the training, education, certification requirements, experience, and expenses associated with entering the field.

Selected Career Opportunity:

Training Requirements:

Education Requirements:

Certification Requirements:

Experience Requirements:



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Expenses associated with entering this field:

REQUIREMENT 9a: Research the prospects for employment, starting salary, advancement opportunities and career goals associated with this career.

Prospects for Employment:

Starting Salary:

Advancement Opportunities:

Career Goals:

REQUIREMENT 9a: Discuss what you learned with your counselor and whether you might be interested in this career.

Notes:



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REQUIREMENT 9b: Identify how you might use the skills and knowledge in astronomy to pursue a personal hobby.

Notes:

REQUIREMENT 9b: Research the additional training required, expenses, and affiliation with organizations that would help you maximize the enjoyment and benefit you might gain from it.

Additional Training:

Additional Expenses:

Additional Affiliations:



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REQUIREMENT 9b: Discuss what you learned with your counselor and share what short-term and long-term goals you might have if you pursued this.

What You Learned:

Short-Term Goals:

Long-Term Goals: