



# Astronomy

## Merit Badge Workbook

This workbook can help you but you still need to read the merit badge pamphlet (book). No one can add or subtract from the Boy Scout Requirements #33215.

Requirements revised: 2006, Workbook updated: December 2008.

Scout's Name: \_\_\_\_\_ Unit: \_\_\_\_\_

Counselor's Name: \_\_\_\_\_ Counselor's Ph #: \_\_\_\_\_

1. Describe the proper clothing and other precautions for safety making observations at night \_\_\_\_\_

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and in cold weather. \_\_\_\_\_

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Tell how to safely observe the Sun, \_\_\_\_\_

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objects near the Sun, \_\_\_\_\_

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and the Moon. \_\_\_\_\_

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Explain first aid for injuries or illnesses such as heat \_\_\_\_\_

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and cold reactions, \_\_\_\_\_

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dehydration, \_\_\_\_\_

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bites and stings, \_\_\_\_\_

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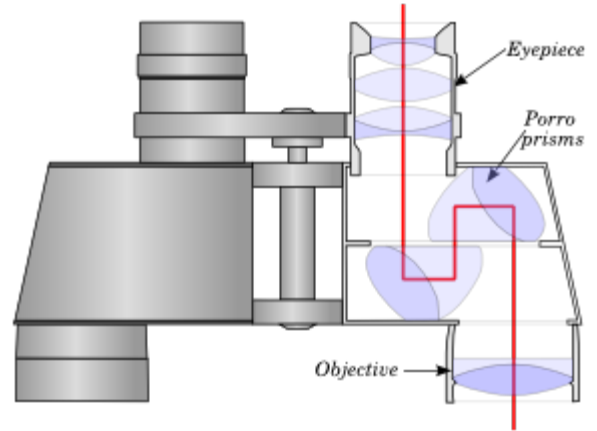
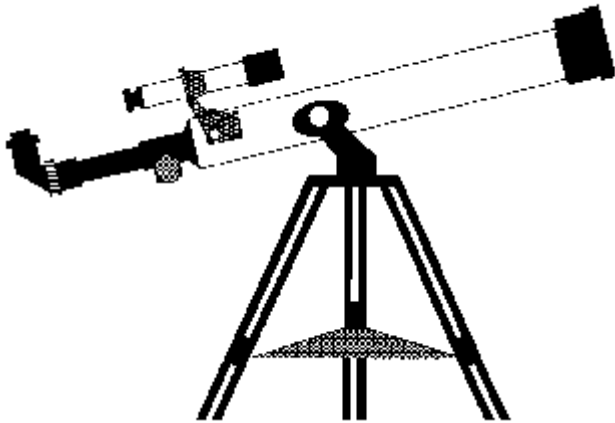
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and damage to your eyes that could occur during observation. \_\_\_\_\_

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:



(a) Explain why binoculars \_\_\_\_\_

and telescopes are important astronomical tools. \_\_\_\_\_

Demonstrate or explain how these tools are used. \_\_\_\_\_

(b) Describe the similarities and differences of several types of astronomical telescopes.

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(c) Explain the purposes of at least three instruments used with astronomical telescopes.

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4. Do the following:

(a) Identify in the sky at least 10 constellations, at least four of which are in the zodiac.

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(h) Identify at least eight conspicuous stars, five of which are of magnitude 1 or brighter.

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(c) 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.

Date: __/__/__ Time: ____	Date: __/__/__ Time: ____

(d) Explain what we see when we look at the Milky Way. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. Do the following:

(a) 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.



7. Do the following:

(a) Sketch the face of the Moon and indicate at least five seas and five craters. Label these landmarks.

(b) 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.

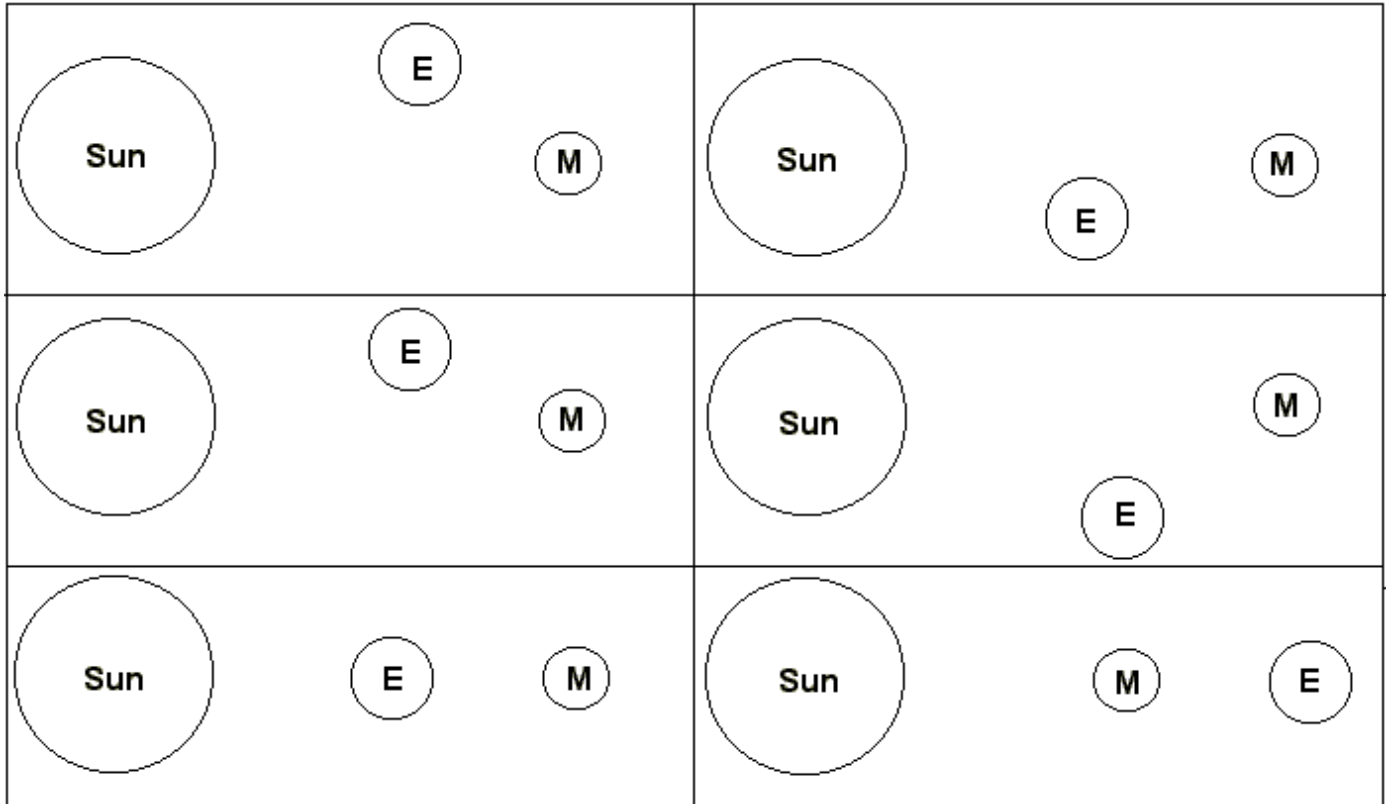
Date: __/__/__ Time: _____	Date: __/__/__ Time: _____	Date: __/__/__ Time: _____
Date: __/__/__ Time: _____	Date: __/__/__ Time: _____	Date: __/__/__ Time: _____

Explain the changes you observe. \_\_\_\_\_

\_\_\_\_\_

(c) List the factors that keep the Moon in orbit around Earth. \_\_\_\_\_

(d) 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:

(a) 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. \_\_\_\_\_

(b) Identify at least one red star, \_\_\_\_\_

one blue star, \_\_\_\_\_

and one yellow star (other than the Sun). \_\_\_\_\_

Explain the meaning of these colors.

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9. With your counselor's approval and guidance, do **ONE** of the following:

a. 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 instruments being used \_\_\_\_\_

4. Celestial objects you observed. \_\_\_\_\_

b. 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. \_\_\_\_\_

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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. \_\_\_\_\_

c. 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. \_\_\_\_\_

d. Help an astronomy club in your community hold a star party that is open to the public. \_\_\_\_\_

e. 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. \_\_\_\_\_

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Pick the one you in which 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. \_\_\_\_\_

Online Resources (Use any Internet resource with caution and only with your parent's or guardian's permission.)

Boy Scouts of America: ► [scouting.org](http://scouting.org) ► [Guide to Safe Scouting](#) ► [Age-Appropriate Guidelines](#) ► [Safe Swim Defense](#)  
► [Scout](#) ► [Tenderfoot](#) ► [Second Class](#) ► [First Class](#) ► [Rank Videos](#) ► [Safety Afloat](#)

Boy Scout Merit Badge Workbooks: [usscouts.org](http://usscouts.org) -or- [meritbadge.org](http://meritbadge.org) Merit Badge Books: [www.scoutstuff.org](http://www.scoutstuff.org)

### Requirement Resources

These resources and much more are at: <http://meritbadge.org/wiki/index.php/Astronomy>

#### 1. First Aid

- [First Aid Lesson Videos: Basics - Basics2 - Wilderness First Aid - CPR Basics - Venomous Snake Bite - First Aid Kits](#)
- **Other First Aid Links:** [First Aid Merit Badge](#) - [First Aid Kit](#) - [Mayo Clinic First Aid Guide](#) - [Bleeding First Aid Video](#) - [Class 1 Exam](#) - [Class 3](#) - [Warning Signs of Cancer](#) - [Heart Disease](#)

#### 2. [Light pollution](#) – [Air pollution](#)

#### 3. [Binoculars basics](#) - [Telescope types and instruments](#) – [Telescopes & Types](#)

#### 4a. [Constellations](#) – [Zodiac Constellations](#) - [Eclipses, moon phases, Milky Way, etc.](#)

#### 4b. [Conspicuous Stars \(brightest\)](#)

#### 4c. [Big Dipper: diagram](#)

#### 4d. [Milky Way](#)

#### '5a. [Planet location and visibility by month](#) - [Solar System with planet links](#) - [Details on the planets](#)

#### 5b. [Monthly planner for upcoming moon and planet events](#)

[Constellation Chart for any date, time, and location](#)

Click [Select from map](#) to enter your location then click [Whole sky chart](#)

#### 6. See above.

#### 7. [Moon phases, surface, moon phase video, etc.](#) – [All about the moon](#)

#### 7d. See the [Astronomy Workbook](#) for the diagrams you will need.

#### 8a. [Sun - Encarta Encyclopedia article](#) – [Wikipedia article](#)

#### 8b. [Notable stars by color](#) - [http://en.wikipedia.org/wiki/Star\\_colors](http://en.wikipedia.org/wiki/Star_colors) Star Colors with examples]

#### 9. [Planetarium](#) – [Astronomical Observatory](#)

#### 10. [Career opportunities in astronomy.](#)

### General Resources

Astronomical League: <http://www.astroleague.org>

NASA: <http://www.nasa.gov>

National Radio Astronomy Observatory: <http://www.nrao.edu>

Sky Maps: <http://www.skymaps.com>

Sky & Telescope: <http://www.skyandtelescope.com/>

SpaceWander.com: <http://www.spacewander.com>

Astronomy Watch: <http://www.astronomy-watch.com>

National Optical Astronomy Observatory: <http://www.noao.edu>

The Planetary Society: <http://planetary.org>

Space Telescope Science Institute: <http://hubblesite.org>

Space.com: <http://www.space.com/>

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