

# Astronomy Day Handbook, 6th Edition



By David H. Levy

With contributions by  
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## Using the Handbook

This handbook is designed to assist institutions, organizations, and individuals on how to plan and execute special events for Astronomy Day. Therefore, groups hosting Astronomy Day activities have permission to:

- Print out the entire handbook
- Duplicate all or parts of the handbook for local Astronomy Day volunteers

For any other use, contact the Astronomical League and Sky Publishing.

## About the Authors

David H. Levy is one of the most successful comet discoverers in history, with 22 finds (nine of them he found visually using his own backyard telescopes). With Eugene and Carolyn Shoemaker at Palomar Observatory in California, he discovered Shoemaker-Levy 9, the comet that collided with Jupiter in 1994. That episode produced some of the most spectacular explosions ever witnessed in the solar system. An author of more than 30 books, Levy is an Emmy Award winner and Science Editor for *Parade* magazine, which reaches almost a quarter of the population of the United States each week. A contributing editor for *Sky & Telescope*, he has appeared on many television programs, such as the *Today* show, *Good Morning America*, and ABC’s *World News Tonight*, where he and the Shoemakers were named Persons of the Week for July 22, 1994. Levy and his wife, Wendee, reside in Vail, Arizona, and host a weekly radio show available worldwide at [www.letstalkstars.com](http://www.letstalkstars.com). Asteroid 3673 Levy was named in his honor.

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## What Is the Astronomical League?

The Astronomical League is a non-profit federation of amateur astronomical societies and individuals working to promote the science by:

- \* Fostering astronomy education
- \* Providing incentives for astronomical observation and research, and
- \* Facilitating communication among the various amateur clubs.

Plans to establish the Astronomical League began in the 1930s. In November 1941 the League's bylaws were ratified and subsequently published in *Sky & Telescope*, but the outbreak of World War II delayed the organization's incorporation until 1947. At that time the League had 31 member societies with about 1,500 individual members. By late 2004 its roster had grown to 260 societies and nearly 19,000 members across the United States, making the League the largest amateur organization in the world. And in late 2003 the Astronomical League opened its very first national office.

### **Benefits of membership in the Astronomical League are:**

- Subscription to the *Reflector*, the League's award-winning, glossy color magazine
- A 10% discount on the list price of many astronomy books
- Young astronomer awards and scholarships, including the National Young Astronomer Award
- The League's award-winning website, which features a wealth of useful astronomical information
- Resources for teaching an astronomy class or giving public presentations
- Tips on how to control light pollution and restore our vanishing night skies
- Dozens of astronomical observing programs and certificates
- Eligibility to enter a number of national awards, including the Newsletter Editor of the Year and the Webmaster of the Year awards
- Annual national conventions, often hosted jointly with other international astronomical organizations
- Affordable liability insurance
- League sales and publications (observing handbooks and many other products are available at discount prices)

For more information about these member benefits and services contact:

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# Astronomy Day Cosponsors

Astronomy Day is sponsored jointly by 14 national and international astronomical and educational organizations. These are:

**ASTRONOMICAL LEAGUE** [www.astroleague.org](http://www.astroleague.org) (see page 5)

**ASTRONOMICAL SOCIETY OF THE PACIFIC** [www.astrosociety.org](http://www.astrosociety.org)

Founded in 1889, the ASP is the largest general-astronomy organization in the world, with members from more than 70 nations. It is also a recognized leader in the field of astronomy education. The Society's free teachers' newsletter, *The Universe in the Classroom*, is posted in its website.

**THE ROYAL ASTRONOMICAL SOCIETY OF CANADA** [www.rasc.ca](http://www.rasc.ca)

The beginnings of the RASC go back to the middle of the 19th century. The Society was incorporated in Ontario in 1890, received its Royal Charter from King Edward VII of England in 1903, and was federally incorporated in 1968. Today, there are 27 Centres across Canada, with more than 4,900 members worldwide.

**AMERICAN ASTRONOMICAL SOCIETY** [www.aas.org](http://www.aas.org)

The AAS was established in 1899 and is the major organization of professional astronomers in North America. Its current membership is approximately 6,500. These include physicists, mathematicians, geologists, engineers, and others whose research interests lie within the broad spectrum of subjects now comprising contemporary astronomy and astrophysics.

**ASTRONOMICAL ASSOCIATION OF NORTHERN CALIFORNIA** [www.aanc-astronomy.org](http://www.aanc-astronomy.org)

The AANC is an association of astronomy clubs in Northern California and is the founding organization of Astronomy Day.

**WESTERN AMATEUR ASTRONOMERS** [www.waa.av.org](http://www.waa.av.org)

The WAA was formed in 1949 as a regional group of astronomy clubs in the US West Coast in order to "effect liaison between astronomical groups, to conduct or participate in an annual convention of amateur astronomers, to present awards to persons or organizations that have made an outstanding contribution to amateur astronomy during the preceding year or years, and, in general, to educate, encourage, and promote interest in science and astronomy."

**AMERICAN ASSOCIATION OF PHYSICS TEACHERS** [www.aapt.org](http://www.aapt.org)

Established in 1930, the AAPT's fundamental goal is to ensure the "dissemination of knowledge of physics, particularly by way of teaching." In addition to helping members learn more about traditional teaching methods, the Association promotes new teaching methods and the use of modern technology to entice students to the wonders of science.

**ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS** [www.lpl.arizona.edu/alpo](http://www.lpl.arizona.edu/alpo)

The ALPO was founded by Walter H. Haas in 1947 to stimulate, coordinate, and promote the study of solar-system bodies by both amateur and professional astronomers.

**AMERICAN METEOR SOCIETY** [www.amsmeteors.org](http://www.amsmeteors.org)

The AMS is a non-profit scientific organization that encourages and supports research activities by both amateur and professional astronomers in the field of meteor astronomy. Its affiliates observe, monitor, collect data, study, and report on meteors, meteor showers, fireballs, and related phenomena.

**AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS** [www.aavso.org](http://www.aavso.org)

The AAVSO was founded in 1911 to coordinate variable-star observations made largely by amateur astronomers. Today, it is the largest organization of its kind in the world, with members in more than 40 countries. Its database now has more than 10 million stellar-magnitude measurements.

**THE PLANETARY SOCIETY** [www.planetary.org](http://www.planetary.org)

The Planetary Society is the world's largest non-profit, non-governmental, space-advocacy group. Funded entirely by individuals, the Society helps to make space exploration happen in many different ways.

**NATIONAL SPACE SOCIETY** [www.nss.org](http://www.nss.org)

The NSS is a non-profit international, educational, grassroots organization dedicated to the creation of a spacefaring civilization. It has more than 22,000 members and 75 chapters in the United States, Canada, Mexico, Australia, Germany, Ireland, and the United Kingdom. Founded in 1974 by Wernher von Braun, the NSS is widely acknowledged as the preeminent citizens' voice on space.

**INTERNATIONAL PLANETARIUM SOCIETY** [www.ips-planetarium.org](http://www.ips-planetarium.org)

The IPS is the largest organization of professional planetarians in the world. Its members come from almost every continent, and has nearly 20 smaller organizations affiliated with it.

**ASSOCIATION FOR ASTRONOMY EDUCATION** [www.astroed.org](http://www.astroed.org)

The AAE, an affiliate of the National Science Teachers Association, disseminates information on how to improve teaching and learning in astronomy and space science as well as provide a forum for its members to share resources and teaching strategies at NSTA national conferences. You can join their mailing list by going to [http://groups.yahoo.com/group/astroed\\_news/](http://groups.yahoo.com/group/astroed_news/)

In addition, the **INTERNATIONAL ASTRONOMICAL UNION** ([www.iau.org](http://www.iau.org)), a worldwide organization of professional astronomers, has officially endorsed the concept of Astronomy Day.

# Preface

## Note to Educators

Astronomy Day is a great tool for educators. Teachers often take their entire classes to Astronomy Day events. Entire schools have entered poster or art contests held in conjunction with the celebration. For example, the Zavala Magnet School in Odessa, Texas, hosted a weeklong series of events, including astronomy workshops for teachers as well as a number of special family and public activities. And the list goes on.

Teachers can use Astronomy Day to educate students about astronomy or have guest astronomers visit their classrooms. In addition, educators will find many sections of this handbook very handy, especially those on Solar-System Scale Models, Astronomy Day for Children and Teachers, the Sky-Q Quiz, Astronomical Art Contest, Film Festivals, NASA Lectures, Astronauts, the Spacemobile, and Moon Rocks, and the resource addresses in the Appendix.

## Using Other Organizations in Your Area

Astronomy Day is supposed to be fun — fun for you, fun for your organization, and certainly fun for the public. This booklet is filled with all sorts of ideas and suggestions designed to make Astronomy Day a success. As you read through it, keep your organization in mind. Plan an event that your members can handle and enjoy. Remember that on a Saturday afternoon the public wants to be entertained as much as educated. If people leave your event not quite remembering what a pulsar is, that is not important. But if they leave remembering that they did astronomy and had fun, you have succeeded in your goal.

Most of the information in this publication comes from experience of hosting Astronomy Day celebrations over the past several years. In this handbook we have tried to cover everything you might want to know about how to mount a successful Astronomy Day program. You can make Astronomy Day as simple or as complicated as your club's resources and enthusiasm will allow, from a few telescopes set up on a street corner to a mall display and multiple events going on all over your town.

Besides being an opportunity to set up telescopes that people can look through, Astronomy Day can have a very important impact on teachers. Although astronomy is a favorite subject with children, many elementary-school teachers know very little about the subject. If we show teachers that there are people and resources out there willing to help, Astronomy Day can lead to better astronomy exposure in schools. Invite teachers to bring their classes to your displays and events.

We strongly encourage organizations to band together to cosponsor events and involve all astronomical organizations in one's area. A local club might join with a planetarium, museum, library, or college astronomy or physics department, resulting in a bigger and better display.

## History of Astronomy Day

San Francisco has long been at the forefront of bringing astronomy to the public. In early 1974 I was visiting Golden Gate Park when I saw an array of telescopes pointed at the Sun, complete with adequate precautions. Amateur astronomer John Dobson was in charge of the display; he had built all the telescopes himself, with the sole purpose of showing off the sky from locations as diverse as downtown sidewalks and remote mountaintops. Levy was surprised to see that the scopes were attracting dozens of people. “I’ve seen telescopes in stores before,” smiled one onlooker, “but this is the first time I’ve ever had the chance to look through one, especially a big one.”

Astronomy clubs have long offered public stargazing events. During the 1950s and 1960s, for example, one group held a Star Night each September, near the time of the first-quarter Moon, in a large city park. Members set up their telescopes at designated spots and kept them trained on assigned objects; depending on a telescope’s strengths it might be assigned the Moon, one of the planets, a double star, a globular cluster, or the Andromeda Galaxy. Because the park was located next to a large skating rink, the entire event could be moved indoors, on a short notice, in case of bad weather.

In San Francisco, Dobson’s approach was to set up telescopes anywhere/anytime, and to do this he founded an informal band of stargazers called the San Francisco Sidewalk Astronomers. At about the same time Doug Berger, a well-known amateur astronomer also from the Bay Area, was looking from a different angle at the problem of how to spread the joys of astronomy. Why not get everyone organized around a single day, concentrating in heavily populated urban areas — “Bringing Astronomy to the People” rather than the other way around? Thus, in 1973, Doug Berger and the Astronomical Association of Northern California (AANC) held the country’s first Astronomy Day.

The event soon spread to the point where it was beyond the regional scope of the AANC. That’s when the Astronomical League started coordinating Astronomy Day and promoting it across North America. As the event gained popularity outside the continent to become the International Astronomy Day, the League continued to coordinate the event, but now other national and international astronomy and astronomy-education organizations joined in as cosponsors. Astronomy Day, now celebrated at hundreds of North American cities and in more than a dozen foreign countries, has become truly international in scope.

### Latest Astronomy Day Information

The Astronomical League maintains an annually updated website, [www.astroleague.org/al/astroday/astroday.html](http://www.astroleague.org/al/astroday/astroday.html), which has the latest information about Astronomy Day, along with important reminders, resources, activities, and other announcements. Some years will have a special Astronomy Day theme (in addition to its standard one of “Bringing Astronomy to the People”). **Be sure** to check this website at least once a year (more often is better). More importantly, the website also allows clubs to post local Astronomy Day events for the whole world to see, including the media and the general population. This is the only place that records all Astronomy Day events in one spot. **Be sure** to list your Astronomy Day event each and every year!

# PART I: Your Objectives

## What Is Astronomy Day?

What exactly is Astronomy Day? One day each spring astronomy clubs, planetariums, and other groups of sky lovers band together to show the public how much fun astronomy can be. “To promote the forerunner of all scientific endeavors and to provide information, resources, and encouragement in all facets of astronomy” is the event’s official reading, but showing that astronomy is fun is really what it’s all about. “Taking Astronomy to the People,” “Astronomy Is Fun!” “Watch the Sky,” and “Look Up!” are slogans that have been used successfully on Astronomy Day, and now we have the official slogan: “Bringing Astronomy to the People.” Some amateur clubs have expanded the celebration into an entire “Astronomy Week.” What a shame, they thought, to spend all that time designing a big mall display and then have to take it down after just one day!

## When Is Astronomy Day?

Astronomy Day is usually celebrated between mid-April and mid-May, on the Saturday closest to the first-quarter Moon. You should, however, host events when they best suit your needs. The table below shows the dates for Astronomy Day and its more ambitious relative, Astronomy Week, for the next few years. Lunar highlights for each day from new Moon are detailed on page 26. Astronomy Day dates could be changed in the future to accommodate a special event like an eclipse, a planetary grouping, or a bright comet.

The formula for determining the dates for Astronomy Day is to first determine the date of the first-quarter Moon between mid-April and mid-May and then choose the Saturday closest to this date so that there is a Moon visible in the sky. If the date of the first-quarter Moon was a Sunday, Monday, or Tuesday, the preceding Saturday was selected. If that date was a Wednesday, Thursday, or Friday, then the following Saturday was chosen.

Astronomy Week is the week containing Astronomy Day, starting on the preceding Monday and ending on the following Sunday. Choosing Astronomy Week in this fashion allows for some groups to hold an Astronomy Weekend.

Year	1 <sup>st</sup> quarter Moon	Astronomy Day	Days from New Moon	Astronomy Week	Theme**
2007	Tue. 4/24	4/21	4	4/16-22	<a href="#">International Heliophysical Year</a>
2008	Mon. 5/12	5/10*	5	5/5-11	
2009	Fri. 5/1	5/2	8	4/29-5/3	<a href="#">International Year of Astronomy</a>
2010	Wed. 4/21	4/24	10	4/19-25	
2011	Tue. 5/10	5/7	4	5/2-8	
2012	Mon. 4/30	4/28	5	4/23-29	<a href="#">Transit of Venus</a>
2013	Thu. 4/18	4/20	9	4/15-21	
2014	Wed. 5/7	5/10*	10	5/5-11	

\*Mother’s Day weekend in the US.

\*\*The annual theme of Astronomy Day is “Bringing Astronomy to the People,” but on occasion there is an additional theme when conditions warrant it. This additional theme is often decided just a few months prior to Astronomy Day so be sure to always check the Astronomical League’s website ([www.astroleague.org/al/astroday/astroday.html](http://www.astroleague.org/al/astroday/astroday.html)) for the latest announcement.

### Why Is Astronomy Day Held in the Spring Instead of the Fall and with a Visible Moon?

In a survey we did, four out of five respondents preferred a spring date. Although a few suggested holding the event at new Moon, 86% agreed that the purpose of the event was to attract urban viewers to the sky, and an evening quarter Moon filled with craters is one of the most impressive celestial sights visible from all city centers.

If you are concerned about holding Astronomy Day during a bright Moon, you may, of course, choose another date, but keep in mind that you don’t have to show deep-sky objects to celebrate Astronomy Day. Since deep-sky objects are best viewed at new Moon anyway, why not entice Astronomy Day visitors to come by your dark-sky site at a later date? Use Astronomy Day as a “hook” to capture their attention.

### Why Sponsor Astronomy Day?

Astronomy Day is a great way to put your organization(s) before the community. Having people look through a telescope and view your displays can generate a good deal of publicity, especially if the press gets involved. It spreads the message about the joys of astronomy throughout the community and could also help recruit new members. Perhaps most important, Astronomy Day is fun and a good boost of morale for your club members. It brings them together for a day of sharing their love of the sky with other people. Finally, it is an opening to talk about light pollution. When \$2 billion a year is spent lighting up the underbellies of airplanes and birds, this issue should concern everyone.

### Where to Get Help for Your Astronomy Day Event

The first place to look is the Astronomical League’s Astronomy Day website, [www.astroleague.org/al/astroday/astroday.html](http://www.astroleague.org/al/astroday/astroday.html). There are several pages in this site so be sure to check them all.

Joining forces with other non-profit organizations, such as astronomy clubs, museums, planetariums, and space-advocacy groups, can enhance your event. Your local university’s astronomy or physics department should be interested, as well as your high-school science clubs. The organizations listed at the end of this handbook might also have a few suggestions. The more people and groups that are brought into this event, the better your chances are for good publicity and a large turnout. Sponsors can help with financial contributions, providing free exhibit space or use of audiovisual equipment, helping with the publicity, and other things to bring in larger crowds and make the event even more successful. Besides, it would be a service to the local community to have every organization involved in astronomy represented — sort of a one-stop shop for local astronomical resources.

Other possible sources of help could be local governments, parks, nature centers, libraries, zoos, and/or military bases. They can provide observing sites as well as assist with mundane but important tasks like security and traffic control. The Star Night event described earlier was

arranged with the local parks department, which provided the venue, covers for the nearby streetlights, and the option of using the nearby skating rink in bad weather.

Commercial sponsors, such as camera stores and telescope dealers, can also provide needed resources. Real-estate companies, grocery stores, or any type of retail outlet might welcome the good PR that comes from being either a sponsor (by providing service or funds) or a host (by providing location). For example, the Berks County Amateur Astronomical Society in Kutztown, Pennsylvania, hosts Astronomy Day at its local SAM's Club. The Society not only sets up telescopes, but its members also host a bake sale, and SAM's Club matches dollar-for-dollar the amount they are able to raise.

Of course, getting too many commercial sponsors can give you a big headache if you end up spending your time trying to please everybody. Our suggestion is to try for as many sponsors as the club needs, and as many that feels right for your club. Inviting one telescope store to participate and ignoring its competitor could generate some bad feelings and nasty letters if the left-out dealer thinks its business is being hurt. If you suspect that this could pose a problem, it might be better to avoid both dealers. Remember, Astronomy Day is supposed to be fun!

At any rate, it is best to put all arrangements in writing to all involved to avoid misunderstandings and to prevent any problems before they arise.

### Dealing with the Public

Sometimes it's not easy dealing with the general public (but it's always a lot of fun). They can come up with unusual ideas and on top of that, they expect you to keep them entertained. To that end, listed below are articles everyone should read:

- "A Lesson from Hollywood" by Bob Berman, *Astronomy*, October 1997, pages 76-79
- "A Common Sense Guide to Cosmic Nonsense" by Phil Plait, *Sky & Telescope*, May 2004, pages 38-43 (see also [www.badastronomy.com](http://www.badastronomy.com))

### Simple 4-Stage One-Day Program

This handbook contains a lot of suggestions for various Astronomy Day programs. Don't let the details put you off. If you find that a far-simpler program would work better, try the model below, which is based on the one used by the Royal Astronomical Society of Canada's Montreal Centre. The Centre holds its main event only for one day.

#### Stage 1:

One month before Astronomy Day, club members approach the media and put up posters around town.

#### Stage 2:

On Astronomy Day, the club joins with other local astronomy-related groups and sets up a display at the Dow Planetarium. The display room looks like a trade show or exposition. It is impressive to see 10 booths, each with telescopes, exhibits, and other paraphernalia; there is a lot to see. The planetarium, with its special Astronomy Day show, is the main crowd draw.

The displays consist of video and slide shows and computer demonstrations. People are attracted to well-arranged, interactive exhibits. The setup also includes posters, photographs, and a big display on light pollution. During the day they attract up to 1,000 people.

After Astronomy Day, the members pack all the exhibits into boxes and store them for next year. After the initial investment of building the displays and planning the exhibits, managing the event from year to year is not difficult. "Once the displays are built," Montreal Centre president Louie Bernstein says, "they need little updating from year to year, and future Astronomy Days are quite easy to set up."

#### Stage 3:

A few weeks after Astronomy Day, the group offers the public a follow-up visit to its observatory. Owing to Canada's temperate climate, having an observatory session later in the spring makes a lot of sense. "Ten percent of our membership is out there for each event," Bernstein says. "We found that 12 reliable volunteers, working eight at a time on partially overlapping shifts, works very well."

#### Stage 4:

An open house is held at the observatory at the end of summer.

A seven-hour drive to the southwest, the RASC's Toronto Centre holds an Astronomy Week. They have telescopes set up every night of the week at three or four locations around the city. Part of the program involves displays and booths at Ontario Science Center and a local shopping mall. With 1,000 members, the Toronto Centre can handle such an extensive program.

#### Simpler 2-Stage Program

If the preceding four-stage process is still too much for your organization, here is a simpler, two-stage program:

#### Stage 1:

Generate publicity for your event.

#### Stage 2:

Put up a couple of telescopes at a central location.

## PART II: Your Program

### Introduction

If your club is showcasing an expensive speaker, you might need to charge admission for people to get in; however, we believe that such fees are inappropriate on Astronomy Day. I remember when, at age 12, I walked down to my first Star Night. I had only 6 cents in my pocket, just enough for my bus ticket home. “What if the admission fee is six cents?” I thought. You can imagine my palpable relief when I arrived at the venue to see friendly faces, not moneyboxes.

### Donations

Donations are another story. For instance, the Jackson County Astronomical Society printed tickets for Astronomy Day, listing “donation 25 cents.” In reality, its members just gave the tickets away for weeks ahead of time (this also served as publicity for the event). They didn’t charge anyone to attend their Astronomy Day activities, but the fact that people got something for nothing made them feel good. It also made people more willing to donate money (see the sample included in the Appendix).

### Advertising Posters and Signs

If you want to create your own poster, you can have it professionally printed, but that is usually quite expensive. The important thing here is to have the poster look professional. If you cannot afford or do not wish to have posters commercially designed and produced, you can make them yourself. Various colors, sizes, and thicknesses of poster or illustration board are available from your local art store. The typical size of a working sign or poster in the US is 22 by 28 inches (55 by 70 centimeters).

For a quick and inexpensive poster, take any astronomy poster (see the section on posters as well as the Appendix for some sources of such posters) and mount it on a piece of poster board with spray glue. Write the information you wish to convey by placing ready-made vinyl letters over the poster’s artwork. The best style for lettering is probably Helvetica, although you might prefer to use the more condensed Gothic. Vinyl letters range from ¼ inch to 6 inches in size and come in a variety of colors.

To affix the sticky vinyl letters, spell out your words first on a sheet of wax paper and then measure the words and lay them down on your poster. Don’t try to remove the letters once you start, or you’ll peel off the poster with them. Use drafting tape and the side of a large sheet of paper to carefully line up your letters. With a ruler, measure equal distances from both sides and from the top and bottom.

However, this is the computer age. Preparing exhibit labels no longer has to be done by hand. Many programs are available with which you can simply type in your information and print it out using laser printers. With some programs you can make high-quality, professional-looking signs, even banners. Don’t print your carefully made signs and posters on a dot-matrix printer. If you don’t have an ink jet or a laser printer, a copy store might have one (maybe even a color printer), as well as the computer to run it.

If you are doing a lot of poster design, you might consider visiting your local college's art department, where you might find students willing to add your project to their portfolios. They would probably be delighted to work with you, and they might even get some credit for themselves in the process. Again, see the Appendix and the section on posters for more information.

## **Displays: Sites and Topics**

### Mall Display

These ideas are useful for smaller, self-contained activities or as part of one large display such as in an indoor shopping mall or other retail sites. Hosting Astronomy Day at such a well-attended public space is what the event is all about — Bringing Astronomy to the People. There are people already present there. These are the people you want to reach — the ones who might not realize their hidden interest in astronomy. With all the pre-publicity you generate, you might bring in additional people who already recognize their interest in the night sky — and the mall would be grateful.

You might set up all activities at Site A, or you could have mirror-grinding demonstrations at Site A, telescopes set up to look at the Sun (safely) at Site B, and posters and other exhibits at Site C. Some groups (those with plenty of volunteers) set up duplicates of everything at two or three locations.

When you design a display, keep in mind that the optimum viewing height is between 3 and 6 feet (about 1 to 2 meters). Labels or signs should be large enough to be readable from several yards (meters) away. Use an easy-to-read sans-serif letter style, using both upper and lower case. Keep the explanations short and to the point like the following example, which describes an antique refractor:

*MEET BETELGEUSE, a refracting telescope from another time and place. Telescopes can help us unlock secrets of the universe of which we are a part. Refractors like this one use an objective lens at the front to gather light from planets, stars, and other objects in space. The light is bent as it travels down the tube, until it reaches a focus at the back. We look through an eyepiece placed at this focus point.*

*Betelgeuse was built around 1900 by the French firm of Bardou, whose telescopes were popular and respected throughout Europe and North America. This telescope is part of the Jarnac Observatory collection.*

## Specific Display Ideas

Each cosponsoring institution should be given an opportunity to put up a display. The exhibits should show the extent of astronomical activity in your area, including your organization and the local planetarium. A local observatory, for example, might want to make up its own display and even send its own people to staff it, but be sure the display meets your (and the mall's) quality standards! You might want to write up guidelines and requirements to insure that each organization uses the same style so the displays will have a consistent look.

Large Dobsonian telescopes attract attention like the dinosaur room in a museum. Different types of telescopes belong in such a display, including historical refractors and perhaps a model of a radio telescope. Behind each kind of telescope there should be a poster detailing how it works and showing pictures of larger models of its type.

With the possible exception of an antique brass refractor, these telescopes are not there just to be looked at. Have them set up to look at a distant store sign or at an astronomical postcard taped to a far-off wall.

Photographic displays usually work well, especially dramatic photos of total eclipses. Comet photos, including demonstrations of the orbit of a comet compared to that of Earth, often attract considerable attention. A large, three-dimensional model of a black hole, perhaps using fancy fiber optics to simulate in-falling matter, would be a challenge for club members to prepare, but would attract a great deal of attention.

### Astronomy Careers

The American Astronomical Society ([www.aas.org/education](http://www.aas.org/education)) has a brochure on careers in astronomy. Young people might be especially drawn to such an exhibit, so be clear in your description of what astronomers do and what preparations are involved. Don't be too starry eyed or too pessimistic. The best way to do this is to get a local professional astronomer to lead a workshop and be available to answer questions. Be sure to highlight local educational institutions that offer astronomy courses.

### Telescope Making and Clinics

Why not grind a telescope mirror from start to finish on Astronomy Day? You can also conduct a telescope clinic. People can bring in their telescopes for advice on how to use or repair them.

### Astronomy and Computers

Computers running astronomical software have become popular for Astronomy Day displays. Programs describing the sky at night, complete with motions of the planets and comets, are probably the most appropriate. A satellite-tracking program is also a possibility. Having the Sky-Q Quiz (see page 31) running on a computer can also make for a fun activity. Downloading Hubble or other space images from the Internet draws a lot of attention too. See, for example:

<http://heritage.stsci.edu/gallery/galindex.html>

<http://antwrp.gsfc.nasa.gov/apod/astropix.html>

<http://hubblesite.org/newscenter>

If there is a computer store in the mall, perhaps you can get them to loan you some equipment or a connection to the World Wide Web.

### Starry Bumper Stickers

- Turn off your lights!
- Turn on to astronomy!
- I would rather see starlight than streetlights!

The Astronomical League (<http://www.astroleague.org/NoBookstore.html>) and the Astronomical Society of the Pacific ([www.astrosociety.org/cgi-local/SoftCart.exe/online-store/scstore/shophome.html?E+scstore](http://www.astrosociety.org/cgi-local/SoftCart.exe/online-store/scstore/shophome.html?E+scstore)) offer astronomy-themed bumper stickers that you can buy in quantity and then sell to the public on Astronomy Day. But do make sure that the mall or museum will let you sell them. If not, just display the stickers.

### Postage Stamps

Many nations have issued stamps that highlight astronomy or space exploration. The US Postal Service offer space stamp packets and some philatelic companies sell first-day covers. If you want more information on stamp collecting, see the following articles: *Mercury*, Jan./Feb. 1977, pages 17-19, and *Sky & Telescope*, Nov. 1977, page 336; Jan. 1978, pages 23-26; Mar. 1978, pages 207-10; May 1978, pages 391-94; and Jul. 1978, pages 15-18.

### Astronomy and the Arts

This exhibit offers a way to involve the arts in astronomy. Stained glasses, rugs, and quilts can add immeasurably to the tone of your display. So can a performance of astronomically oriented music like the Halley's *Comet Rag* or Holtz's *The Planets*. Having a live musical group on-site performing astronomical music would add a lot to any display. An off-site special performance by the local high school or college band or local orchestra would be another great Astronomy Day event.

The Great Lakes Planetarium Association ([www.glpaweb.org/tips.htm](http://www.glpaweb.org/tips.htm)) has published three booklets of interest:

- *Anthology of Astronomical Poetry* (ask for TIPS booklet 12). This is a compilation of more than 450 astronomical poems along with references to more than 40 other poetry sources, including entire books of astronomical poems. Poems published in *Sky & Telescope* are also listed (but unfortunately were not able to be reprinted).
- *Astronomical Poems* (ask for TIPS booklet 13b). This reprints more than 275 additional poems and sayings that were missed in the first booklet above.
- *Music for the Planetarium* (ask for TIPS booklet 20). This lists more than 1,500 astronomical songs, both lyrical and instrumental, along with references to astronomy-themed performers.

Each booklet is relatively inexpensive (less than US\$20), but you must be a member of the GLPA to order. Membership is open to all individuals in any way connected with the operation of planetariums, regardless of geographic location, and costs only US\$20 a year (as of 2007).

## Solar-System Scale Models

If you have large indoor-mall space, why not construct a scale model of the solar system, with Pluto at one exit and the Sun at the other? At each planet's location, place a display (this could be as simple as a poster) about the planet together with directions on how to get to the main Astronomy Day display area. This way, you use the entire mall to advertise your location. "Here is where Halley's Comet would be if the solar system were the size of this mall!" an appropriate poster might say. "At the speed it is going, it will reach our main display area by the year 2061. But you can get there in five minutes by turning left and proceeding to the mall's lobby area outside Sears."

## Portable Planetariums

A few companies, such as Learning Technologies, Inc. ([www.starlab.com](http://www.starlab.com)) produce simple but surprisingly effective planetariums made to fit inside a portable dome. With one of these you can arrange a special demonstration for teachers or the general public. To get in touch with an owner of a portable dome (e.g. Starlab) in your area, contact:

Learning Technologies, Inc.  
40 Cameron Ave.  
Somerville, MA 02144  
E-mail: [starlab@starlab.com](mailto:starlab@starlab.com)  
Phone: 617-628-1459

## Astrophotos

Today, amateur astrophotos are so good that it's often difficult to tell them apart from those obtained at professional observatories. Displaying them side by side, to illustrate what can be done with backyard equipment, would make a very interesting display.

## Posters

Displaying large photographs or posters of astronomical objects is an effective attention-getting strategy. If you download an image from the Web, just be sure you have permission to reproduce and display this image. Besides Sky Publishing ([SkyandTelescope.com](http://SkyandTelescope.com)) and Kalmbach Publishing ([www.astronomy.com](http://www.astronomy.com)), here are some other sources for pictures and posters:

- Astronomy Picture of the Day: <http://antwrp.gsfc.nasa.gov/apod/astropix.html>
- Hubble Space Telescope: [www.stsci.edu](http://www.stsci.edu)
- Space photos and posters: [www.spaceshots.com](http://www.spaceshots.com)
- Astrographics : [www.astrographics.com](http://www.astrographics.com)

## Benefits of the Space Program

Sometimes the general public forgets or is unaware of the return on its money invested in the space program. This is an extremely difficult subject to present effectively. People often hear of the vast amounts of taxpayers' dollars being spent on the space program and believe that

money would be better spent “closer to home.” A display reminding them of what they are getting out of the space program might be helpful.

The United States is one of the biggest spenders on space exploration. Although the actual figure varies from year to year, oftentimes the percentage of the federal budget allocated to it remains close to be the same. With a little research, you can calculate the federal budget allocations. Here’s an example:

#### US Budget Allocations by Category (late 1990s)

53%	Social Security, Welfare, Medicare
14%	Interest on the national debt
15%	National defense
17%	Roads, education, and everything else
1%	Entire NASA budget

Each year NASA publishes a booklet entitled *Spinoff* ([www.sti.nasa.gov/tto](http://www.sti.nasa.gov/tto)), which highlights NASA technology that has been utilized for the public good.

#### Bad Astronomy

There has been a lot written in the past few years about misconceptions in astronomy (but that’s a whole other topic). People with these misconceptions often present their beliefs as facts or sometimes they just plainly misinterpret media reports of scientific findings. One website that EVERYONE should visit is Phil Plait’s Bad Astronomy ([www.badastronomy.com](http://www.badastronomy.com)). Plait points out some incorrect conclusions that are often generally accepted by the public. Doing a display on some of the bad science in print, movies, and TV can be interesting.

### **Building a Display**

You can borrow, rent, buy, or build display stands or cases. If you are doing a mall display, ask for assistance.

Making a display case is difficult. Before you accept a club member’s offer to build one, make sure that he or she knows what is involved, lest you end up with a piece of work that you cannot use. The simplest display setup, of course, is a table on which you mount your exhibit. Be sure you have tablecloths and skirts to cover the table’s top and front to hide any unsightly boxes and supplies stored underneath.

Making a flat panel to display posters or photos is easier. Stiff, corrugated cardboard will work if your displays are not too large, but plywood is better. Two sheets of plywood connected along the long edges with regular door hinges makes for a transportable display that can stand like an open book. If you need more panels for your displays, you can put hinges on both sides of each plywood and connect several sheets in any number of shapes.

To finish the plywood, you can paint it or cover it with contact paper or cork. If you’re going to paint it, buy smooth birch plywood. To secure the visuals to the display panel, use picture hangers, thumbtacks, double-sided adhesive tape, or spray glue. The problem with all these is that they will damage the visuals somewhat when you try to remove them — in fact, glue is considered permanent. For temporary displays, you might try Velcro. This way you can easily

position and transfer displays and quickly tear them down when the event is over. This is especially useful if you've covered the panels with cloth (e.g. felt) that accepts Velcro.

You can also use giant mural astronomical wallpaper available from local wallpaper stores or from Space Toys ([www.spacetoys.com](http://www.spacetoys.com)) to create a fairly attractive display environment.

With any of these panel systems, you can cut an opening for speakers and a rear-projection screen.

Keeping up with the latest trends in exhibits actually requires a magazine, and there is one. It's called *Exhibit Builder* ([www.exhibitbuilder.net](http://www.exhibitbuilder.net)).

### Attracting Attention to Your Display

Now that you have your displays built, you need to get people to look at them. Adding showy things to your display will attract attention more effectively. Holograms, optical mirage mirrors, plasma sculptures, chase lights, and even moving holiday decorative lights are just a few examples.

## **Events and Activities**

Astronomy Day can be as simple or as complicated as your wishes and resources will allow. What follows are some ideas that have worked in the past.

### Slides, Videotapes, and DVDs

Any number of presentations can be shown on Astronomy Day, whether they are professional films or documentaries of your own club activities. For simplicity, it is best to use rear-projection screen systems for these shows; this way, there are no big projectors to trip over and you can show the videos in full light. If you do show visuals this way, however, make sure that they are projected properly; this system means that you have to load the slides differently and/or select "rear projection" on the video projector. There are a variety of sources for videotapes, possibly including your local library. For other sources see the next section.

### Film Festivals

Movies often draw crowds, so why not have a film or videotape/DVD festival? Bob Summerfield of Astronomy to Go ([www.astronomytogo.com](http://www.astronomytogo.com)) rented a laser-disc player and a large bass speaker from a band and played the Space Shuttle launch sequence from the movie "The Dream Is Alive" through a TV monitor. It was loud. People came running to watch it and stayed afterward to view the rest of the exhibit.

Short films like the "Powers of Ten" with Philip Morrison or the National Film Board of Canada's "Universe" with William Shatner, both available from the Astronomical Society of the Pacific ([www.astrosociety.org](http://www.astrosociety.org)), could be easily rented and shown repeatedly as part of a mall display or as shorts before longer feature films, or even as part of an all-night science-fiction festival. Showing films usually involves rental fees, but if you can get a theater for free, this event could actually become profitable for your club. However, make sure that you can charge a fee to show the film you have rented and that the rental includes the rights to show the film in public. There are permutations of this plan: in Grand Rapids, Michigan, for example, the Museum Association paid for the rental fees but kept all the proceeds.

Screening films, videotapes, or DVDs for teachers or setting up a workshop for them is an activity you could do on Astronomy Day (or leading up to it). The Astronomical Society of the Pacific ([www.astrosociety.org](http://www.astrosociety.org)), the regional NASA centers, and NASA's CORE program (<http://core.nasa.gov>) have a good selection of space-oriented films. A local film critic could serve as host for this event. Renting video-projection equipment is not nearly as expensive as it was a few years ago.

### Lectures

Featured talks by famous astronomers or astronauts can be a big part of your program. The key to choosing a good speaker lies in a combination of interesting speaker plus interesting subject. Some speakers are so good that they could talk about the manufacture of clothing and still keep the audience at the edge of its seat. Be careful, however, not to have someone who is a better astronaut than speaker talk about the latest Shuttle flight and have the crowd fall asleep before it is over.

The best way to get a good lecturer is by reputation. Do you know anyone who has attended a national convention and heard a fabulous speaker? There are a dozen or so really excellent speakers across the United States; speakers good enough to bring tears to your eyes and make you want to rush out and embrace the night sky. These speakers deservedly charge for their appearances; a fee of \$500 plus expenses is typical. Authors of astronomy books usually would love to come, give a talk, and sell their books. Authors, too, vary in their fees and in the quality of their presentations.

For clubs on a tight budget, the American Astronomical Society has its Harlow Shapley Visiting Lectureship program ([www.aas.org/education/education.htm](http://www.aas.org/education/education.htm)), which sends an astronomer to talk to local college students and the public. This program is available only to colleges without astronomy programs and its cost typically is in the \$300 range. According to the society's membership directory, the Shapley lectures "are designed to strengthen and stimulate interest in astronomy and related sciences and to enhance the understanding of this discipline by the general public."

### NASA Lectures, Astronauts, Moon Rocks, and the Spacemobile

Although some astronauts are excellent lecturers, you should keep in mind that astronauts are chosen for certain skills, of which public speaking is not at the top. Astronaut speakers may be requested through NASA's Office of Astronaut Appearances at the Johnson Space Center in Houston, Texas, at 281-244-8866. General NASA speakers (scientists, engineers, etc.) may be requested through Community Affairs at 281-483-4754. Other NASA centers operate a non-astronaut speaker's bureau as well. Contact your regional NASA center (see Resources in the Appendix).

NASA has an interesting "Tele-lecture" program in which you receive a set of slides in advance. You provide a speakerphone, slide projector and screen, and the audience. The NASA scientist gives a presentation over the speakerphone. This is not a one-way conversation; the lecturer can take audience questions and hear reaction to his or her presentation. For more information, contact your regional NASA center (see Resources in the Appendix).

You can also schedule the NASA Spacemobile for Astronomy Day. You can arrange with the local school board for the Spacemobile to visit schools as well as present public programs.

Contact the education officer at the NASA center serving your area to see if it would be possible to arrange for a loan of a Moon rock or the Spacemobile. Shuttle tiles may be easier to obtain, along with a host of other NASA artifacts.

There are two types of Moon rocks that NASA loans. One is a museum-quality display in a pyramid-shaped acrylic encasement. These require high security and are available to qualified individuals or organizations without special training (contact your regional NASA center listed under Resources in the Appendix). The other type contains five small samples in a cylinder-shaped acrylic encasement. These require less security (they can be mailed; the other type cannot) but require special training. The samples are designed to be viewed under a microscope in a classroom. Check to see if a local teacher has had this special training. If so, he or she can contact the Johnson Space Center on behalf of your club. Also, you can put together a display on meteorites or how to make a comet, as detailed in the ASP's *The Universe in the Classroom*, ([www.astrosociety.org/education/publications/tnl/tnl.html](http://www.astrosociety.org/education/publications/tnl/tnl.html)) See also the chapter Astronomy Day for Children and Teachers on page 47.

NASA operates several Teacher Resource Centers (one at every regional NASA center plus several satellite locations) where teachers may view and copy NASA materials, including slides, videotapes, filmstrips, etc. Viewing these materials requires a personal visit to the facility. However, if you know what you want, NASA has established the Central Operation of Resources for Educators (CORE), <http://core.nasa.gov>, where audiovisual resources may be purchased via mail order. Unlike the NASA resources listed above, which are available for US locations only, NASA's CORE program will sell materials to non-US locations.

### **Tips for Films and Talks**

If you plan to host a talk on Astronomy Day, the following hints might prove helpful. They are adapted from an article written by the late Jim Loudon, an amateur astronomer and highly successful speaker who could hold his audience's attention for hours.

1. Take care choosing a topic. People are interested in subjects like black holes, volcanoes on Io, how many H-bombs it would take to cover the Moon with 50-mile (80-kilometer)-wide craters, or how Venus came to be covered with thick clouds of sulfuric acid.
2. Select a room of appropriate size. Loudon suggested always getting a room bigger than you think you need. But what if your room is so large that it contains just a handful of people scattered about? It is hard to decide on this. One suggestion: sell tickets for the lecture, say, \$1 in advance and \$3 at the door. Besides the money you can use to help fund Astronomy Day, it will give you an idea on the size of the room you need. If possible, reserve two rooms (a big and a small one). A few days before the lecture, pick and pay for the most appropriate size.
3. Preview the lecture hall. Make sure the sound system works; avoid those with humming or intolerable feedback. Test the projectors, remote controls, and light switches.
4. Appoint someone to your committee who will be fully in charge of the speaker's needs: airport greetings, special-needs dining, and a glass of water or juice at the lecture hall. Most lecturers appreciate a "no-hassle" journey to your city as compensation for taking time out of their busy schedules.
5. Giving a talk is actually a very complicated process. We have heard people say that the trick is to concentrate on only one or two people in the audience. WRONG! Imagine the

consternation of the poor people in the audience you are staring at for an hour. You are talking to everyone, not just two people. There is no trick to giving a good talk, short of developing confidence in yourself and your subject. David Levy — who has been in high demand as a speaker ever since he codiscovered the “pearls on a string” comet that crashed into Jupiter in 1994 — finds that at the height of a talk, his mind is busy with four things at once: what he is saying, the audience’s reaction to what he is saying, how that reaction should affect what he says next, and how the clock is affecting what’s left in the talk. He has added or eliminated whole sections based on split-second decisions made at such moments.

6. Encourage questions during appropriate parts of the talk. And remember that the only stupid question is the one that is never asked. Answer every question with dignity; never make the questioner feel stupid.

## Sky Observations

### Observing the Sun

Shopping-mall parking lots, the bane of light-pollution activists, are actually good sites for star parties, especially if your telescopes are set up right next to a major entrance. No matter how many lights there are, the waxing quarter Moon presents a fine target, as do any bright planets that might be up. The following thoughts on observing the Sun and Moon are adapted from David Levy’s The Sky: A User’s Guide, published by the Cambridge University Press in 1991 and used with its permission:

### Sun Safety

Whether we worship it, plan our lives by its schedule, tan ourselves by its light, bask in its warmth, or study it, this G2-type star called the Sun has an importance that cannot be overstated. Close and always here, the Sun is convenient to study. It is so easy to find that we take it for granted, spending our nights observing distant stars, while during the day this brightest star of all shines, ignored by many astronomers.

The key to a pleasant study of the Sun is to do it in safety. Direct solar viewing is safe if you use the appropriate filters. Eclipse glasses (they should read “safe for direct solar viewing”) are available from Rainbow Symphony ([www.rainbowsymphony.com](http://www.rainbowsymphony.com)).

Do you own a small refractor with a “Sun” filter that attaches to its eyepiece? You do? Then put this handbook down, find a hammer, and destroy that filter! Eyepiece filters are dangerous because they are situated where the Sun’s focused rays are hottest. All that concentration of light is likely to break the filter sooner or later, probably at the moment your eye is looking through it. The resulting eyeful of Sun will injure your vision permanently in an instant.

A good way to demonstrate the dangers of looking at the Sun without adequate protection is to use a cheap plastic garbage bag (they, and the human eye, are damaged faster than the expensive ones). Ask your audience to imagine that their eyes are the equivalent of the bag. Then move the bag to the focus point of the eyepiece, the place where the Sun’s rays are hottest (and the spot where the observing eye is placed) and ask them to count the seconds until the bag ignites. If the sky is not hazy or covered with light clouds, the plastic should ignite almost instantly, burning a clean hole. You can even carve someone’s initials into the material and offer it as a souvenir. When the experiment is over, ask if anyone still wants to look directly

into the unprotected eyepiece. “Are you crazy?” the people should inquire, and you know that they learned an important lesson.

How do you find the Sun safely in a telescope? First, do not use its finderscope. In fact, make sure that the finderscope is either covered or removed so that no one accidentally looks through it. Find the Sun by moving the telescope around until its shadow appears as small as possible. The Sun should then be close to shining its rays straight down the tube.

There are only two safe ways to look at the Sun with a telescope: by eyepiece projection and by direct viewing through a filter that covers your telescope’s front end. With eyepiece projection, you point your telescope toward the Sun and allow the Sun’s rays to project through the eyepiece onto a piece of white cardboard or paper at the bottom of a cardboard box. This way, you can produce a solar image a few inches in diameter, which several people can then observe at once. The advantage for teachers is obvious. Children can see the projected image at the same time, and the whole session need not take more than five minutes. Moreover, you can repeat the session day after day so viewers can see visible spots march across the Sun’s surface.

The other safe way is to place a filter, not at the eyepiece but at the front end of the telescope, before the Sun’s rays hit the primary mirror or objective lens and gets focused. The advantage of this filter method is that the telescope’s optics doesn’t get hot at all, and if the filter is of good quality, it will deliver a solar image of the Sun that you can enjoy safely and comfortably through your eyepiece.

Make sure that the filter material is of good quality. The major astronomy magazines carry advertisements by several companies that sell solar filters (some made of glass, others of aluminized Mylar). Although we have tested some filters and find that the Mylar ones to be comfortable, the material yields an oddly blue solar image. Glass filters are safe too and produce a more pleasing yellow or orange Sun. No matter what type of filter you choose, be very careful: if the material is torn or has pinholes or if the coating on the glass is scratched, do not use it. If you look through a filter that has worked well and suddenly lets in too much light, discard it. Once again: the only safe filters are those designed to fit completely over the front end of your telescope. Those that fit on the eyepiece of an otherwise unprotected telescope are not safe.

### What to See on the Sun

The most obvious solar features are the sunspots, magnetic storms on the solar surface that appear dark because they are relatively cooler than the rest of the Sun’s visible disk. These spots usually appear in groups, and if you look carefully around these groups you may notice some brighter regions called faculae, especially near the Sun’s limb, or edge.

Exactly what constitutes a sunspot group? Although in most cases it is not difficult to determine where one group ends and another begins, when groups become large and complex, the answer is not straightforward. A sunspot group is normally characterized by at least two large spots, known as the preceding and following spots. Sunspot groups also have a number of smaller tag-alongs.

A group evolves from the smallest detectable solar feature — a granule — which, as it begins to darken, becomes a pore. If a pore continues to darken and expand, it becomes what is known as an umbral sunspot. With further growth a lighter penumbra will form around the umbra. Often several nearby pores darken concurrently, in an elliptical cluster. As the pores

evolve into sunspots, they often divide into two regions — the preceding one forming faster than the following one.

At the height of its development a sunspot group, with its two major sets of giant spots, can be quite a sight. As the group begins to fade, the following spot dissolves first, while the preceding one becomes round, loses its penumbra, and eventually disappears as well.

When you get a good look at the active Sun you may be treated to much more than simple sunspots. On a very clear day with steady air and a quality telescope you may see the Sun take on a mottled appearance. This is called granulation; the Sun's surface is covered with convective cells that are separated from each other by slightly darker intergranular material. These cells are always being replaced with others, as each individual granule rarely lives longer than 10 or 15 minutes. When a granule is as dark as its surrounding material, it becomes a pore, a possible precursor to a sunspot.

Near the Sun's limb and around a sunspot group, look for obviously brighter patches or spots; these faculae often exist before a sunspot group is formed, and they outlast a group as well. Sometimes faculae may actually cross the surface of a spot, forming a light bridge. Occasionally, a very bright spot appears on the Sun's surface near a major spot group. Those who have seen these flares assure the rest of us that you cannot miss such an event if it takes place while you're looking at the Sun through a telescope. As seen in ordinary white light, these eruptions are very rare, reported once or twice each sunspot cycle, and they do not last more than a few minutes.

Hydrogen-alpha filters open up a whole new world of Sun viewing. Attached near the telescope's eyepiece, these special filters pass only the red light emitted by excited hydrogen atoms and allow us see prominences and filaments, solar flares, and other features that are normally invisible in white light.

### Observing the Moon

We see the Moon as poetry, the way we were taught when we were young. Its ever-changing phase elicits moods, its soft light shines off clouds to paint beautiful pictures of night, and its eclipses are wonderful. With the smallest telescope we can climb its mountains and explore its craters from our backyards. With huge lava plains called Serenity, Tranquillity, Clouds (Mare Nubium), and Storms (Oceanus Procellarum), the Moon is indeed a poetic place.

Questions such as "How much later does the Moon rise each night?" are not as simple to answer as they might seem. Although the average time is some 50 minutes, the real answer depends on your latitude, on how far north or south the Moon is on its ecliptic path, and on where the Moon is in its elliptical orbit around Earth. In the northern hemisphere, the late-summer Moon may rise less than 15 minutes later than it did the night before. And on winter mornings it may rise more than an hour later each successive night.

The Moon's phases allow you to observe our satellite on its own terms night after night. Because the Moon rotates and revolves at the same rate, we can see only about half of the Moon; the other half, known as the far side, always faces away from Earth. When a crater or mountain range is illuminated by the Sun straight on, such as during the time of full Moon, there is little contrast to show it clearly. However, when the Sun rises or sets on the Moon, it creates beautiful shadows that accentuate these features. The changing border between the Moon's light and dark sides is called the terminator, and it provides the most dramatic views of

the lunar surface. You can follow the terminator as it marches across the Moon's face, taking you on a tour of our celestial neighbor's most scenic features.

### **Day-to-Day Notes for the Moon Near First Quarter**

If you check the Astronomy Day schedule in Part I, you'll see that the event falls between 3 and 9 days from new Moon. Below are descriptions of the Moon on these days, plus Days 10 and 11; these descriptions will make more sense if you read them while consulting a Moon map.

Day 3: Mare Crisium is almost completely visible. Can you see any "ghost" craters on its floor? These are ancient impact features that had been partly covered by younger lava flows. Crisium's southern neighbor, Mare Fecunditatis, is now making its debut. Although Fecunditatis is considerably larger than Crisium, it's less conspicuous because it lacks high mountains along its borders. An extension of Fecunditatis passes just west of the craters Vendelinus and Petavius. For the first time tonight we'll also get a good look at a chain of craters running north from Crisium: the large and prominent Cleomedes, Burckhardt, and Geminus and the harder-to-see Messala.

Day 4: Mare Crisium is now fully visible, and what an area it has turned out to be! Surrounded by a host of beautiful and varied craters, it's truly a sight to behold. If we "drive" along the shores of this immense lava plain, we can stop by crater Proclus (lying just outside the mare) and even take a look at Picard, which stands out like an "island" amid Crisium. Picard is named for a prominent 17th-century observer known particularly for his observations of Comet Halley in 1682 and for his suggestion that a great observatory be established in Paris. Toward the north is another "island" — the crater named Peirce. One of the oldest lunar features is also prominent tonight: Janssen, a 190-km-wide depression whose early history had been overwritten by more recent impacts. Janssen's walls had been shattered in several places so that it no longer appears as a completely formed feature.

Mare Fecunditatis is also fully visible, and we now turn our attention to some of the other maria emerging from the shadows. Mare Tranquillitatis and Mare Nectaris are just beginning to yield to sunrise. We also get to see the sharply defined, 56-km-wide crater Taruntius, whose walls act as a border crossing between Tranquillitatis and Fecunditatis.

Day 5: The "star" tonight is the huge crater Theophilus, easily found right where the now-fully visible Mare Nectaris meets Mare Tranquillitatis. Theophilus, which measures 100 km across, is one of the Moon's finest craters, displaying several high central peaks. It forms an interesting pair with its neighbor, Cyrillus, whose outline looks so square that it is hard to define it as a crater. South of Theophilus is a 480-km-long scarp called Rupes Altai, just beginning its day as a curved fault line right against a darker surface background. It parallels the shores of Mare Nectaris so closely that they must have been formed at the same time. At the scarp's southeast end is Piccolomini, a sharp, 88-km-wide deeply excavated feature. Mare Nectaris is also easily visible tonight.

Fracastorius once had been a complete crater, but today all that is left is a semicircular indentation on the southern rim of Mare Nectaris. Here is a place where a chapter of the Moon's geological evolution is written in clear language for us. Where is Fracastorius's north wall? When the lava flows that filled Mare Nectaris reached this ancient crater, they eroded much of the wall down, leaving behind only some rounded ridges and hills.

Day 6: As the Moon approaches first quarter, Maurolycus is just beginning to reveal its large dimensions. Like Theophilus, this 114-km-wide, 4,730-meter-deep crater has complex central peaks. On this night, Mare Serenitatis is completely visible. The Haemus Mountains, acting as the southwestern border of Serenitatis, are also beginning to appear, complete with Menelaus, a small but well-defined crater 27 km in diameter. The Caucasus Mountains are still mostly hidden in the shadows, but two sharp-edged craters, Eudoxus and Aristoteles, are prominently visible along the Caucasus' northern terminus.

Day 7: First quarter. The Caucasus and Haemus Mountains are now fully visible, but the special feature to see tonight is 150-km-wide Hipparchus, for it shows up well only on the night the terminator passes across the crater's face. Along its ruined, ancient walls are some newer craters, particularly Horrocks and Halley. Two lava plains have also appeared — Mare Vaporum and Sinus Medii — as well as the oval, 136-km crater Albategnius. Sunrise has also hit Piton, the most prominent of the Moon's isolated peaks. Tonight is the best night to see its sharp, 2,250-meter-high summit right on the terminator.

Day 8: Perhaps the most interesting night of the lunar month, this session is devoted to mountain ranges, craters, and the Straight Wall. The Alpine Mountains and Valley are both now visible. The Moon's finest range, the Apennines, shows its full glory. Also, the best known of the vast lava plains, Mare Imbrium, is becoming prominent as the rising Sun exposes more of its surface. Archimedes, which spans 83 km across, is also in sunlight now, forming a beautiful triangle with two other craters: Aristillus (the larger one) and Autolykus. Nearby we can see the Spitzbergen Mountains. We likewise get our first good look at Plato, a huge, 101-km oval crater whose dark floor is quite prominent. South of Plato the towering, 2,400-meter-high peak of Pico lights up the terminator.

On this night we get our first good look at Alphonsus, whose central peak has been the object of some strange reports. This is also the night we see the "Straight Wall," a 110-km-long fault line. It looks like a cliff with a vertical drop, but actually it's more of a steep slope, angled at about 45°.

Can you see Deslandres and Walter, a pair of features southeast of Mare Nubium that represents events at different times in the geologic history of that area?

Deslandres is a very large, 234-km-wide ancient crater whose eastern wall was obliterated by the impact that created Walter. On the eastern floor of Deslandres, near Walter's crater wall, is a strange brightening first seen by 17th-century Italian-French astronomer Giovanni Cassini and now known as "Cassini's bright spot." If you don't see it very well tonight, the spot should become easier to detect as the Sun shines more strongly on Deslandres's floor over the next few nights. Probably related to Tycho's ray system, the brightening is likely more recent than Walter. On the other side of Deslandres is a small, 33-km-wide crater we should look at, if only because it is named for an astronomer and clergyman named Hell.

Day 9: This is the night of Copernicus and Tycho, as both craters dominate the terminator. When Tycho is near the terminator, the rays near it are not easily visible, although the ones farther away can be seen. Named for the late-16th-century astronomers who so radically changed our thinking about the universe, these craters honor Nicolaus Copernicus, the Polish scientist who devised the Sun-centered theory of the solar system, and Tycho Brahe, whose observations of the supernova of 1672 called into serious question the unchanging nature of the "heavenly sphere" of stars.

The 58-km-wide crater Eratosthenes is almost fully visible tonight. Named for the astronomer of Cyrene who, around 240 BC, made the first observational estimate of the size of Earth, Eratosthenes is deep and sharply defined, though nearby Copernicus tends to draw our attention from it. North of Copernicus is a small but sharp crater called Pytheas, and still farther north is the larger but less well-defined Lambert. South of Tycho is the impact basin named Clavius. This is an immense feature, its long side being some 225 km across. It is named for the Bavarian Jesuit astronomer Christopher Clavius, who, in the late 16th century, helped prepare the Gregorian calendar.

Notice how well Plato shows up this night, along with the Teneriffe Mountains that are near its border with Mare Imbrium. North of Plato is Mare Frigoris, an often ignored lava plain which is longer than any other observable mare except Oceanus Procellarum.

Day 10: Tonight's highlights are mountains and ridges rather than craters. A line of peaks known as the "Straight Range" (Montes Recti), as well as the Jura Mountains, Sinus Iridum, and the Laplace and Heraclides promontories, are all prominent tonight. Promontory is a good word; you can see how Laplace and Heraclides protrude into Mare Imbrium. Southwest of Copernicus a small, bright crater called Lansberg is coming into view, and even farther to the southwest are the Rhiphaeus Mountains. Finally, west of Clavius and just receiving the first rays of Sun, is Scheiner, a large impact feature that measures 110 km in diameter.

Day 11: As the Moon continues to wax into a strongly gibbous phase, the rest of the sky is brightening up remarkably. However, the Moon's brightness is still less than half of what it will be on the night of full phase! We are already losing our chance to observe deep-sky objects, so we'll concentrate on observing the Moon. You'll immediately notice that lunar features that looked so obvious just a few nights ago are now difficult to see, as they are now fully lit by sunlight.

This is a night for the maria, and the largest of the lava plains, Oceanus Procellarum, is showing more of itself with each night. Not far from the terminator is Kepler, now almost fully bathed in sunlight. Although it is only about 32 km across, it is a complex crater with an extensive system of bright rays. Johannes Kepler, of course, was the great German astronomer and mathematician who formulated from Tycho's observations the three laws of planetary motion. He was also the discoverer of the great supernova of 1604.

North and west of Kepler is Aristarchus. Named for the Greek astronomer from Samos who estimated the relative sizes of Earth, the Moon, and the Sun, Aristarchus is the brightest spot on the Moon. Like Alphonsus, it is suspected of occasionally showing a dull red glow. Hidden in the glare of Aristarchus is Herodotus, a 35-km-wide flooded crater with a bright rim, but not given its due because of its proximity to bright Aristarchus. North of Herodotus lies Schröter's Valley. Resembling a snake, its southern end is known as the Cobra's Head.

### Observing Artificial Satellites

People are fascinated seeing artificial satellites pass overhead at night, and the International Space Station (ISS) is a nice bright one that holds a lot of public interest. During favorable passes, it appears as a brilliant, fast-moving "star." A very good website that will calculate the visibility for your particular location for not only the ISS but also such things as the Space Shuttle (when in orbit), Iridium flares, etc. is [www.heavens-above.com](http://www.heavens-above.com).

The Astronomical League also has many observing programs, including the Earth Orbiting Satellite Observers Club ([www.csastro.org/eosoc](http://www.csastro.org/eosoc)).

### Observing Other Objects

If you're holding a public stargazing session, you should assign telescope guides/operators to celestial objects based on the level of their observing experience and the nature of their equipment. Small reflectors should be assigned to the Moon, a planet, or a bright double star like Beta Cygni, and larger telescopes, with their presumably more experienced operators, to globular clusters, planetary nebulae, and bright galaxies.

Label each telescope so that the viewers know what they are looking at. The telescope operators should stick to their assigned objects, unless clouds or some other problem force them to aim their scopes at the Moon. If someone stands in line to see Jupiter and instead gets the Dumbbell Nebula, then the new observer might not be happy about it as he or she may have just viewed the Dumbbell at a previous telescope.

You should have a cloudy-night program of slides that can be shown nearby. Also, an "Ask the Astronomer" session will allow viewers to interact with program leaders. Remember that many of the visitors' questions will be basic in nature and that there is no such thing as a stupid question. It might be worthwhile to have an audio program running alongside telescopes where the wait is long. A taped presentation about observing or club members on hand to answer questions will show visitors that you have not just abandoned their queue.

### Birthday Stars

Showing a person a star that is the same number of light-years away as that person is old would not only have more meaning to the person but would also educate him or her that space is three dimensional. The problem, of course, is to find naked-eye "birthday" stars that are visible early on Astronomy Day. The following list is for the Northern Hemisphere (our apologies to Southern Hemisphere celebrants) and is, of course, missing several "years." Just pick out the star with a distance closest to the person's age. Note that the list contains only fairly bright (greater than magnitude 2.6) stars since Astronomy Day always occurs with a moonlit sky.

An article by Jeff A. Farinacci entitled "Stellar Guides for Your Birthday" (*Sky & Telescope*, November 2001, pages 63-66) describes a computer program that does similar calculations, along with additional (although fainter) stars.

#### "Birthday" Stars

Distance (light-years)	Star Name	Apparent Magnitude
11	Alpha Canis Minoris (Procyon)	+0.4
26	Alpha Lyrae (Vega)	+0.0
35	Beta Geminorum (Pollux)	+1.2
36	Alpha Bootis (Arcturus)	-0.1
42	Beta Leonis (Denebola)	+2.1
46	Beta Cassiopeiae (Caph)	+2.3
46	Alpha Aurigae (Capella)	+0.1
46	Alpha Geminorum (Castor)	+1.6

49	Alpha Cephei (Alderamin)	+2.4
55	Alpha Ophiuchi (Rasalhague)	+2.1
69	Eta Ophiuchi (Sabik)	+2.4
72	Alpha Coronae Borealis (Alphecca)	+2.4
75	Beta Ursae Majoris (Merak)	+2.4
75	Delta Leonis (Zosma)	+2.6
82	Epsilon Ursae Majoris (Alioth)	+1.8
85	Beta Aurigae (Menkalinan)	+1.9
85	Alpha Leonis (Regulus)	+1.3
85	Zeta Ursae Majoris (Mizar)	+2.1

## **Other Astronomy Day Activities**

### Getting the Public's Attention

In addition to developing Astronomy Day displays and activities, give some thought on planning other activities that will attract attention. Prize drawings, for example, are invariably lots of fun. You could get a sponsor to donate a prize, such as a pair of good binoculars. Your club could award a year of free membership or free tickets to the local planetarium. Giveaways are another way to publicize Astronomy Day. Companies that make items named after celestial objects might be enticed to donate samples of their products. Who knows, you might get a Saturn car!

In the past few years, *Astronomy Magazine* ([www.astronomy.com](http://www.astronomy.com)) has set up a cooperative program with major Astronomy Day sites that includes a telescope give-away plus many more perks. Be sure to contact them for details.

### Astronomical Art Contest

Create an Astronomy Day art contest with local schools. A project similar to this is conducted each year in Oklahoma City. Students from all over the area take part in this major, high-profile event, and the quality of the hundreds of entries on display is superb. A citywide astronomical art contest is by no means a small event; it takes a lot of coordination, logistical support, and judging, but it can be a good way to involve schools and generate publicity for Astronomy Day.

### Rocket Launches

Launching model rockets is a definite attention-getter. Handled by professionals, it can be a lot of fun for the whole family. It can also be dangerous and should not be tried without the proper safety precautions. Your local hobby store or the National Association of Rocketry ([www.nar.org](http://www.nar.org)) might be able to help.

### Observing at Business Sites

Set up daytime or evening outdoor observing at local businesses such as a car dealership, especially one that might provide financial support for Astronomy Day activities. You would be providing the company with some publicity in return for their donation. This idea might also help persuade a reluctant firm to become a major sponsor.

### Sky-Q Quiz

Why not have fun testing the public's Sky-Q? The questions on this test were developed by Sheldon Schafer of the Lakeview Museum. Don't overdo the competitive aspect of this quiz; if you do it at all, it is supposed to be fun.

Have a copy with the correct answers circled and be sure to have someone there who can discuss the concepts with the quiz takers.

#### Answers:

- |       |       |
|-------|-------|
| 1. d  | 14. d |
| 2. a  | 15. c |
| 3. c  | 16. b |
| 4. d  | 17. a |
| 5. a  | 18. d |
| 6. c  | 19. b |
| 7. a  | 20. d |
| 8. b  | 21. c |
| 9. c  | 22. a |
| 10. d | 23. d |
| 11. a | 24. d |
| 12. c | 25. b |
| 13. c |       |

# Sky-Q Quiz

1. On which day(s) of the year is the Sun directly overhead from locations in the continental United States?
  - a. March 21 and September 23
  - b. June 21
  - c. Every day
  - d. Never
2. On which day(s) of the year does the Sun rise due east?
  - a. March 21 and September 23
  - b. June 21
  - c. Every day
  - d. Never
3. How does the Sun produce its energy?
  - a. By reflecting light from other stars
  - b. By chemically burning its fuels
  - c. By fusing hydrogen into helium
  - d. By explosive chemical reactions near its surface
4. If the Sun were the size of a quarter and the rest of space sized accordingly, where would the nearest star be?
  - a. About 3 feet (0.9 meter) away
  - b. About 33 feet (10 meters) away
  - c. About 3,300 feet (1 kilometer) away
  - d. More than 60 miles (100 kilometers) away
5. What is the brightest star in the night sky at any time?
  - a. Sirius
  - b. The North Star
  - c. Orion
  - d. Venus
6. Of the stars we normally see in the night sky, how many are part of the Milky Way galaxy?
  - a. Just the brightest
  - b. All of the faint stars
  - c. All those visible
  - d. None of those visible

7. About how many stars are there in our galaxy?
- 200 billion
  - 200 thousand
  - 2 million
  - 2,000
8. Why does our Sun look so different from stars seen at night?
- Because it really is much larger than they are
  - Because it is much closer than they are
  - It is altogether different from them
  - It is much hotter than they are
9. What is the difference between an astronomer and an astrologer?
- Not very much; in the long run, both study the stars
  - An astronomer predicts the future; an astrologer studies the stars
  - An astronomer scientifically studies the universe; an astrologer casts horoscopes
  - An astronomer studies the galaxy; an astrologer studies the planets
10. Which planet is closest to the Sun?
- Mars
  - Venus
  - Earth
  - Mercury
11. Which planet has a surface and atmosphere most like the Earth?
- Mars
  - Venus
  - Jupiter
  - Mercury
12. Which is most like the Sun in terms of composition?
- Mars
  - Venus
  - Jupiter
  - Mercury
13. Which planets are known to have rings?
- Only Saturn
  - Mars and Saturn
  - Jupiter, Saturn, Uranus, and Neptune
  - Venus

14. Which of these planets is the smallest? (Hint: some old encyclopedias are out of date on this one)

- a. Mercury
- b. Jupiter
- c. Saturn
- d. Pluto

15. Where do stars go in the daytime?

- a. To the other side of the Earth
- b. Their light automatically dims
- c. They are still there but their light is too feeble to be seen
- d. There are stars only on one side of the Earth at a time

16. Which best describes the Sun?

- a. It is a bright planet
- b. It is an average size star
- c. It is similar to the Moon but brighter
- d. It is a bigger-than-average star

17. Which best describes a comet?

- a. A large, dirty snowball surrounded by a thin veil of gas and dust
- b. A flaming ball of gas
- c. A star streaking across the sky
- d. A rock burning up in the atmosphere

18. When can the Moon be seen in the daytime?

- a. Only right after sunset
- b. Never
- c. Only during an eclipse
- d. Nearly as often as it can be seen at night

19. Based on their average distance from the Sun, what is the order of the planets?

- a. Venus, Earth, Mars, Mercury, Saturn, Jupiter, Neptune, Uranus, Pluto
- b. Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto
- c. Mercury, Venus, Mars, Earth, Jupiter, Saturn, Uranus, Neptune, Pluto
- d. Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Pluto, Neptune

20. Which best describes a “falling star”?

- a. A large dirty snowball
- b. A flaming ball of gas
- c. A star streaking across the sky near Earth
- d. A tiny rock vaporizing as it enters Earth’s atmosphere

21. What is the Moon's period of revolution around the Earth?
- a. 1 day
  - b. 1 week
  - c. 1 month
  - d. 1 year
22. What is Earth's period of rotation?
- a. 1 day
  - b. 1 week
  - c. 1 month
  - d. 1 year
23. What is Earth's period of revolution around the Sun?
- a. 1 day
  - b. 1 week
  - c. 1 month
  - d. 1 year
24. What is the order of planets based on their size, from largest to smallest?
- a. Jupiter, Saturn, Uranus, Neptune, Mars, Venus, Earth, Pluto, Mercury
  - b. Jupiter, Saturn, Uranus, Neptune, Venus, Mars, Earth, Pluto, Mercury
  - c. Jupiter, Saturn, Uranus, Neptune, Pluto, Earth, Venus, Mars, Mercury
  - d. Jupiter, Saturn, Uranus, Neptune, Earth, Venus, Mars, Mercury, Pluto
25. The first day of summer in the United States happens when
- a. The Earth is closest to the Sun
  - b. The Northern Hemisphere is tilted toward the Sun as far as it will go
  - c. The Sun is directly overhead at noon
  - d. Both a and c

**Thank you for taking the Sky-Q Quiz**

## Neighborhood Star Parties

This is an activity that can be part of a larger event (that is, just one event of many) or as an individual activity when no other Astronomy Day events are planned. In local communities, set up telescopes on the front yards or driveways and invite the neighbors and their kids over for a star party. In Evansville, Indiana, for example, people have set up telescopes at multiple locations across the city such that no one was more than a few miles from an observing site.

## Booklets and Handouts

Why not have a special newsletter or booklet about your organization or how to observe the night sky in your area? The Abrams Planetarium has granted permission for anyone hosting an Astronomy Day event to reprint its *Sky Calendar* for the month that features Astronomy Day. This calendar can be downloaded at [www.pa.msu.edu/abrams/SkyCalendar](http://www.pa.msu.edu/abrams/SkyCalendar).

Don't forget the free handouts that you can obtain from major companies and astronomical societies (including yours). Sky Publishing has a nifty little publication entitled "Let's Go Stargazing," which you can request free of charge for distribution on Astronomy Day. To get your copies, contact:

Astronomy Day Information  
c/o Jeannette Beckerdite  
*Sky & Telescope*  
90 Sherman St.  
Cambridge, MA 02140-3264  
E-mail: [jbeckerdite@SkyandTelescope.com](mailto:jbeckerdite@SkyandTelescope.com)  
Phone: 617-864-7360

*Astronomy* magazine also has a little guide called "Welcome to Amateur Astronomy," which they can send you in quantity upon request, along with other publications. Go to [www.astronomy.com/donations](http://www.astronomy.com/donations).

Don't forget about your local library. It might be willing to produce a flyer for Astronomy Day that lists all its available astronomy books and videos.

## Astronomy versus Astrology

A display pointing out the difference between astronomy and astrology is important, but we don't recommend that you make a big deal of this part of your exhibit. Since many astronomy club members have strong feelings against astrology (and with good justification), this is actually a difficult exhibit to do. Remember, Astronomy Day is for fun and smiling, not heated arguments.

Maybe you can devise a game that will cause people to start questioning the validity of astrology. One possibility would be to cut the current horoscope out of a newspaper, removing the astrological "signs" and arranging them in random order. Then ask people

to choose the one horoscope that most closely fits the day they are having so far. It should soon be very obvious that just guessing would produce equally valid results. Give it a try!

The Astronomical Society of the Pacific

([www.astrosociety.org/education/astro/act3/astrology.html](http://www.astrosociety.org/education/astro/act3/astrology.html)) also has some very useful resources on astrology.

Some interesting facts about astrology:

- More money is spent on astrology in the United States each year than on the space program.
- There are about 10,000 professional astrologers in the US. That's more than the number of professional astronomers (maybe people go where the money is).
- The earliest known horoscopes dates back about 400 BC.

Here are some interesting thoughts to ponder about astrology:

1. If two babies were born in the same hospital five minutes apart, would you expect
  - Their horoscopes to be so similar that their lives would feature substantial parallels?
  - Their horoscopes to be so different that their lives would have few parallels?
2. Consider the above for
  - Twins born a few minutes apart
  - Non-related babies born at the same time in the same or nearby delivery rooms
3. In great battles, tens of thousands of people died on the same day. Would you expect their horoscopes to be similar?
4. What would the horoscope of a child born on Mars be like? How would Earth influence the life of that child?
5. Since the astrological "sign" rising at the moment of birth is so important, what happens to a child born at Earth's North Pole where no "sign" would be rising?
6. Is the mass of celestial objects important in a horoscope? If it is, why isn't Jupiter the most effective planet? If not, why aren't each of the thousands of asteroids and comets in the solar system considered in the horoscope?
7. Should horoscopes be based on the moment of birth or conception?
8. Are the astrological signs or the constellations more fundamental? If it is the sign, why was it when astrology first "got its start" (about 2,000 years ago) that the signs and the constellations just happened to line up?

### Light Pollution

A big poster showing North America or the entire Earth at night (available from Spaceshots, [www.spaceshots.com](http://www.spaceshots.com)) could showcase the growing problem of light pollution. An even more effective way would be to display a before-and-after set of photos (1930 and 1990, for instance) of your city at night to show the dramatic change that had occurred. Making this environmental issue a big thrust of your Astronomy Day exhibit is a good one, for it could point out ideas for safe, glare-free outdoor lighting that will benefit everyone.

One of the greatest amateur observers of his generation, Leslie Peltier wrote the following words in his classic book *Starlight Nights* in 1965:

“A short time after the new observatory had been completed, I was returning home after dark from a lecture in a nearby town. At the crossroads where the highway spans the river I turned off on the old country road and drove the quarter mile north with a sudden desire to see what the home farm still looked like late at night. A couple of minutes later I stopped the car on the deserted road in front of the house. I turned off the motor and the car lights and then just sat there, for a time, utterly bewildered by what I saw. Night no longer came to the farm!

“Not two hundred yards from the spot where my old observatory once stood a powerful light atop a high pole flooded the surrounding acres with a bluish glare. I got out of the car and looked around. From where I stood I could see five other lights on other farms, all spilling out their garish glow. Here at my pasture observatory, during the years when it was the center of my little universe, this midnight sky was seldom shattered by a single ray of man-made light. Today, as evening falls, a sinuous constellation of farm floodlights, like some incandescent Hydra, wraps its coils about the skyline, and glows with baleful eyes throughout the night.

“I recalled that years ago I sometimes drove past these same farm homes late at night. To me each seemed like a tiny village with its house, its barn, and all its odd array of smaller buildings. But whether I saw it by starlight or underneath the Moon, it always impressed me how gently and how peacefully each village slept.

“The Moon and the stars no longer come to the farm. The farmer has exchanged his birthright in them for the wattage of his all-night sun. His children will never know the blessed dark of night.”

The next three sections are courtesy of the International Dark-Sky Association ([www.darksky.org](http://www.darksky.org)), which encourages you to make copies of them for distribution during Astronomy Day:

## Theft of the Night

International Dark-Sky Association Information Sheet No. 18

[www.darksky.org](http://www.darksky.org)

By David L. Crawford

A priceless part of our human heritage is fading into the night sky.

Most Americans are growing up unable to see the stars their grandparents knew so well. They see the night sky only in pictures or at planetariums. This is true not only in cities, but also in many suburbs where street lamps and other sources of “light pollution” have obscured our view of constellations, meteor showers, and planets.

Indeed, many youngsters may now say, after viewing the night sky in a rural area for the first time, that “it looks just like in the planetarium.”

Light pollution is not a matter of life and death. Yet it is important nonetheless, profoundly so. We human beings lose something of ourselves when we can no longer look up and see our place in the universe. It is like never again hearing the laughter of children; we give up part of what we are.

Such a loss might be acceptable if light pollution were the inevitable price of progress, but it's not. Most sky glow, as scientists call it, is unnecessary. The light that obscures our view of the night sky comes mainly from inefficient lighting sources that do little to increase nighttime safety, utility, or security. It produces only glare and clutter, costing more than \$1 billion annually in wasted energy in the United States alone.

For science, the impact has been even more tangible and adverse. Astronomers require observations of extremely faint objects that can be made only with large telescopes at sites free of air pollution and urban sky glow. For example, scientists interested in how the universe was formed may study the light of galaxies and quasars at incredibly vast distances from Earth. These images offer information about faraway corners of the universe, helping us understand how our own world was formed. Yet, after traveling countless light-years, the light from these objects can be lost at the end of its journey in the glare of our own sky.

Space-based telescopes, such as Hubble, offer one way around the problem. However, large telescopes on Earth will always be used, if only because they are accessible, cost much less than orbiting devices, and can do many jobs more cheaply.

In fact, our experience over the past two decades has shown that space-based astronomy, far from reducing the need for ground-based observations, actually increases the demand for these facilities. New telescopes now planned or under construction on Earth will complement the knowledge we gain from telescopes in space — but only if they are not compromised by encroaching light pollution, as has occurred at Mount Wilson, near Los Angeles, and several other older observatories.

Reducing light pollution is not difficult, but it does require that public officials and ordinary citizens be aware of the problem and act to counter it. Low-pressure sodium

lights, for example, can replace existing fixtures for most streets, parking lots, and other locations. They reduce glare and save money.

Another fairly painless way to reduce light pollution is with outdoor lighting control ordinances, over 50 of which have been enacted throughout Arizona and in several key cities and counties in California and Hawaii. These measures typically require communities to prohibit inefficient, low-quality lighting. Not only do they help preserve dark skies, but they also enhance energy efficiency. An outdoor light system recently installed at a prison in Arizona, for example, improved security and reduced light pollution while cutting energy costs by 50 percent. There is no reason why all communities should not have such efficient lighting.

On an individual level, people can help reduce sky glow by using night lighting only when necessary, choosing well-shielded fixtures and turning off lights when they are not needed.

Curing light pollution saves money while reducing glare. Unlike other issues involving pollution, it presents us with a rare case where we should strive to be kept in the dark. The stars above us are a priceless heritage — not only for scientific knowledge, but also for our identity as human beings.

More of our children — and their children — should be able to look up at night and see that the Milky Way isn't only a candy bar.

*David L. Crawford, Astronomer Emeritus at Kitt Peak National Observatory in Tucson, Arizona, is executive director of the International Dark-Sky Association (IDA).*

## How to Get Started

International Dark-Sky Association Information Sheet No. 40

[www.darksky.org](http://www.darksky.org)

There are probably many people who would like to do something to help combat light pollution. Many feel that the problem is overwhelming and too large to tackle. Many others would like to get started but don't know where to begin. This information sheet addresses that question. The key thing to remember, perhaps, is that the problem will not get solved, anywhere, locally, nationally, or internationally, in a short period of time. We will get there one step at a time. Bit by bit. As individuals working alone or together. We hope and expect that the International Dark-Sky Association will be able to be a help to those who want to do something, by being an information source and an inspiration.

Remember the bumper sticker that says: Think globally, act locally. We can share experiences and information and resources, but we must act as individuals as well in order to solve the problem of light pollution, one step at a time. Here are some specific advice:

1. Read the key IDA Information Sheets. Relate the information to your own experience and to your own community. Read any other reference sources you can find in libraries.
2. Look over your own area, by night and by day. Identify the best and the worst lighting installations. Write down the location and the type of installation. Take photographs. Take foot-candle readings, if possible. Compare. Learn what makes for good lighting.
3. Tell those with good lighting that you appreciate it. Ask who did the design.
4. Identify those involved in your area: Lighting designers, city and county staff and elected officials, environmentalists, utility company staff and officials, and/or energy saving organizations.
5. Find what resources are available in the local libraries. Do they have the Illuminating Engineering Society of North America (IES or IESNA) handbooks? What else?
6. Is there a local astronomy club or society? Who are the members? Are they active? Are they active in the light-pollution issue? Can you help them? Can they help you? Are they an IDA organizational member? Likewise, get to know local reporters and media people.
7. Who else can help? Who knows who that may be useful or helpful? Again, the media are allies.
8. Check out the local stores, lighting suppliers, discount shops. What lighting do they have? Do they have anyone on their staff that understands lighting? Are they interested in selling good lighting? Collect information on what they have.
9. What is the electricity rate locally? Does the local utility have a conservation program? Who is involved? What are they doing? Do they understand about good lighting?

10. Begin to talk to individuals and to groups. Get out on the “rubber-chicken circuit,” talking to local social and service clubs. Talk to school groups, to retirees, to anyone you can get to invite you to share your knowledge with them. Word will spread and you will get many invitations. It is a new and interesting issue. One in which “We All Win.” Distribute the IDA Information Sheets. Use the IDA or the IDA/ASP slide sets; they are well tested and are very useful for talks about the issues. Collect clippings from local papers (and elsewhere). Start your information files.

11. Don’t forget the astronomy issue too. People like astronomy! If you can, show people the sky, with the naked eye, with binoculars, and with telescopes. Almost everyone likes the experience and likes the vista of a really dark sky.

12. Finally, share your experiences and your new knowledge with the IDA. We can learn from your experiences and share that with members and others. Together we can accomplish more than we can alone. Light pollution is truly both a local and a global issue.

## Some Lighting Myths

International Dark-Sky Association Information Sheet No. 42

By Tim Hunter

[www.darksky.org](http://www.darksky.org)

**1. The more light the better.** This is the same type of reasoning as saying the more salt on your food the better, or the more fertilizer the better, or the more medicine the better. Obviously, there comes a point where you can have too much of a good thing. Eventually, it becomes wasteful or even harmful. Nighttime lighting is the same way. We all need well-lit main streets, security lights, and parking-lot lighting. However, we do not need glare, clutter, confusion, light trespass, light pollution, and energy waste. Excessively bright, numerous, unshielded lights cause exactly these things.

You only need enough light to perform the task at hand. For example, you use low-watt colored bulbs for Christmas-tree lights, and a 100-watt bulb for a porch light. If more light were better, why are nightlights in a bedroom dim instead of bright? The next time you are at an airport at night look at the brightness of the tarmac's taxi lights (blue color) or the runway lights (white color). They are relatively dim so as to not harm the pilot's night vision and cause confusion. Even the rotating airport beacon is not especially bright. The strobe lights on tall chimneys and radio towers are of low wattage, yet visible for miles. Those who claim the more light the better often are salesmen or manufacturers more interested in sales than effective, safe, environmentally sound lighting.

**2. Light pollution only affects astronomers.** Light pollution affects all of us. It robs the professional astronomer of his or her livelihood and hinders the amateur's enjoyment of his or her hobby. It deprives us all of one of nature's grandest wonders -- the night sky. Many persons who claim this is of no importance have never gone far out of town to see what they are missing. Those who grow up in an urban environment may never see the Milky Way. How can someone miss something he has never seen?

The loss of this part of nature desensitizes us to other insults upon the environment. It's the same as saying the loss of a virgin forest is of no concern because most people don't get to see it anyway, and there are plenty of trees for lumber. The loss of wildflowers, polar bears, wolves, whales, and other threatened species, to be honest, don't affect the average person. Their loss only directly impacts biologists. After all, mankind has done very well without mammoths, mastodons, and passenger pigeons. However, no one supports the extinction of magnificent animals.

Why should we permit the loss of our skies? Not only does light pollution dim the stars for the astronomer, but it dims them for all persons. Everyone has a right to the stars. Light pollution takes away one of mankind's oldest heritages. And it represents visible destruction of the environment in several ways: the dome of light hanging over most cities blots out the stars; electricity is generated and wasted to light the night sky -- light needs to be on the ground, not up in the sky; the wasted electricity represents wasteful burning of coal, oil, and natural gas; the byproducts of these wasteful burnings show up as acid rain, smoke, and carbon dioxide emission; strip mining and underground mines ravish the land to produce the coal for the wasteful burnings; runoff from this mining pollutes rivers and streams. Thus, light pollution is far more than some astronomers

being inconvenienced. It is a most harmful assault on the environment. It affects us all, and all of us ought to be concerned about it.

**3. Just go out of town away from the lights.** This is equivalent to saying why worry about the loss of trees and flowers in our cities. Why have urban parks? Just go out of town to see some grass, flowers, or trees. It shouldn't be necessary to go out of town to see these. If we can't have enough sense to plant trees, shrubs, and flowers all around our cities, we can at least have enough sense to plan for parks and preserve those green areas left. Why not have the same attitude toward dark skies? We are not asking people to turn off their lights. We are asking them to shield the lights, use proper wattage for the task, and turn off unneeded lights.

In any event, it is no simple task to get away from the lights. Urban sky glow, the dome of light hanging over all cities of any substantial size, extends for miles and miles. For example, it is easy to see the sky glow of Phoenix, Arizona, from more than 100 miles (160 km) away. The sky glow from Los Angeles, California, is visible from an airplane 300 km away. How many dark spots are left in the urban corridor in the northeastern part of the United States? Even in the most remote portions of North America, there are dusk-to-dawn lights blaring into the darkness. The light from one of these causes significant light trespass a mile or more away. I challenge anyone reading this column to find a mountaintop or plateau in the continental United States where there is no trace of light pollution visible somewhere on the horizon.

**4. It's too late to do anything about light pollution; there are too many lights.** This is a frequent response when I ask people why they are not more active in the light-pollution struggle. It's a tough response to answer adequately. Yes, the problem is enormous, growing in many areas, and very difficult to grasp fully. This doesn't mean it isn't worthy of effort.

We have barely begun to fight. Just because we have a very big problem on our hands and presently few resources to bring to bear doesn't mean we can't ultimately win. It's way too early in the struggle to say it's impossible to do anything about light pollution. Only recently has a small fraction of the public and astronomical community awakened to the problem. Only recently have we realized there are solutions to most lighting difficulties. There are now excellent fixtures available for all lighting needs. This is one of those few problems whose solution is eminently sensible, available, and saves money in both the short and long terms. If you expect to rid a city of its sky glow in the next year, then you will be very disappointed. If you want to get rid of local sources of light trespass, such as a dusk-to-dawn light next door or an unshielded streetlight on the corner, then you have a very good chance of accomplishing your goals with persistent but not obnoxious effort. You also have a reasonable chance for changing laws and instituting proper lighting techniques in your community.

Over a long period good lights will replace the bad and the ugly ones. There will be a gradual slowing of the loss of dark skies and then an actual darkening of skies in some areas. This will not happen quickly, but it is possible. It will take incredible amounts of work and determination, but it can be done.

**5. Low Pressure Sodium (LPS) lights cause headaches.** This is just one of hundreds of ill-founded rumors about LPS lighting. Low-pressure sodium is the most energy-efficient lighting available. LPS is favored by professional astronomers because it is an essentially

monochromatic light source, more easily filtered than other light sources. It produces a bright, yellow light to which the eye is very sensitive. Therefore, it is very good for streetlights, parking-lot lighting, and security lighting. Ask those in San Diego, San Jose, Long Beach, and Glendale, Arizona, where it is used extensively.

Why isn't it used more often? The answer is complex. Several large lighting manufacturers do not make LPS fixtures or bulbs and campaign against them. LPS has no color rendition, which bothers many persons, especially when they first see it, and it should not be used for any lighting application that needs good color. LPS fixtures and ballasts are expensive and not readily available, even though LPS use quickly saves money. LPS lighting does not produce headaches any more than any other type of outdoor lighting. In fact, it tends to produce lesser glare than mercury-vapor or high-pressure sodium (HPS) lights and is probably less likely to give headaches. LPS bulbs are no more dangerous to dispose of than any other type of light bulbs.

In fact, consider the toxic substances that are found in other bulbs. Mercury-vapor lighting contains mercury. In the metallic form, mercury is not especially toxic, but many of its salts are quite poisonous. HPS bulbs contain metallic sodium just like LPS bulbs; therefore, they have the same disposal problems as the LPS bulbs -- mainly the metallic sodium, which is highly reactive. If HPS or LPS bulbs are carefully broken under water, the sodium reacts with the water to give sodium hydroxide, everyday lye, the same substance as in drain cleaners. How about all the glass? Well, this is a problem with disposing of any light bulb. Metallic halide bulbs contain all sorts of toxic metallic salts. The bottom line is that the disposal of a large number of light bulbs is an environmental problem no matter the bulb type.

**6. Security lights prevent crime.** Does outdoor nighttime lighting prevent crime? The answer is that nobody knows. In some cases, lighting seems to deter crime and make people feel more secure, even if they are really no more secure than without lighting. In some cases, it probably increases crime because it draws attention to a house or business that could otherwise escape attention. Most crimes, violent and otherwise, take place during the day. After all, criminals need light to do their work. A dusk-to-dawn light shining all night in a rural area probably is an inducement for robbery and vandalism. A passerby would not otherwise know the farmhouse was even there.

An infrared motion sensor security light that comes on only when someone steps into the sensor's field of view makes a lot of sense. It is only on when needed, thereby conserving energy. Its sudden illumination serves to frighten away the criminal. These lights are now beginning to replace dusk-to-dawn 170-watt mercury-vapor lights. This makes good sense from the economical, environmental, and crime-prevention points of view. The motion security lights can cause light pollution and light trespass if too high a wattage spotlight is used and if they are not aimed down toward the ground. They should also have some shielding.

Do streetlights, parking-lot lights, and security lights prevent crime? Maybe yes, maybe no. If they are overly bright and glary, they actually make it easier for a criminal to hide in the shadows and encourage crime rather than discourage it. Well-lit streets with even lighting, low glare, and fully shielded fixtures probably have lower vehicle and pedestrian accident rates. How about bright lights in a parking lot? How many people do you know whose car has been broken into during the day? One speaker at a recent lighting

symposium recounted how his car was robbed at a local mall. It sat near a store entrance and was directly under a bright light!

There are simply no good scientific studies that convincingly show the relationships between lighting and crime. Our cities are far more brightly lit than ever. Yet, the crime rate soars. Maybe lights directly lead to crime. One study at a small eastern college showed that almost all violent nighttime crimes took place in well-lit places. This study, while informative, cannot be generalized to other locales because of the somewhat unique nature of the college and the surrounding town. Crime is a very complex sociological phenomenon controlled by many factors, and it will vary considerably from place to place.

Our own personal opinion is that crime is little affected by nighttime lighting for better or worse. Main streets should be well lit to reduce automobile and pedestrian accidents. Busy malls should have good lighting to reduce accidents and perhaps deter crime. After business hours this lighting can be reduced or even turned off. Security lighting can be relatively low level. This saves money, and not much light is needed to find your way to a door or find your way out to your car. Not much light is needed to see a suspicious looking person loitering around. No matter the lighting situation, the proper wattage, not overkill, should be used, and all lighting should come from full cut-off shielded fixtures. LPS lighting is ideal for many of these applications because of its economic nature.

**7. Only astronomers care about light pollution (those persons fighting light pollution are just crazy idiots).** This is the right diagnosis for the wrong reason! Many of the friends, relatives, working associates, and acquaintances of IDA's executive director (Dave Crawford) and president (Tim Hunter) have considerable evidence we are "crazy idiots." Nonetheless, this is only true because of our personal idiosyncrasies. It is not true because we (and many others as well) are concerned about light pollution, light trespass, radio pollution, and space debris. After all, the night sky is part of everyone's environment, enormous amounts of energy are wasted lighting the night sky, radio astronomers have to struggle to find useful portions of the electromagnetic spectrum for their work, and space debris is a rapidly growing problem.

Why should someone be considered a nut because he or she is concerned about the environment? However, persons involved in environmental causes must carefully define the problem they want to solve, learn the facts, appreciate the legitimate perspective of their opponents, and offer people solutions rather than complaints. This is IDA's philosophy and modus operandi. Light and radio pollution can be controlled if the facts are properly conveyed to the public. Light pollution is the one form of pollution whose solution immediately saves money. Not just astronomers care about light pollution and light trespass.

IDA's Board of Directors consists of a professional astronomer, a physician and amateur astronomer, a lawyer and amateur astronomer, a businesswoman, a science writer, a public-relations expert, and a lighting engineer. Many IDA members are not astronomers or particularly interested in astronomy. They are concerned about energy conservation, preservation of our environment, and proper nighttime outdoor lighting. They include housewives, scientists, lawyers, pilots, doctors, engineers, retired persons, and so forth. Much of IDA's strongest support comes from professional lighting engineers, lighting suppliers, and lighting manufacturers.

## Astronomy Day for Children and Teachers

More than anything else, Astronomy Day is for children. You will get a lot of children at your displays and star parties. They should be encouraged with enthusiasm and patience and their questions answered with clarity and sincerity, for it is vital that their generation catch the astronomy bug early on. Most of the children attending your events will have their families with them, so your displays should be appropriate for all ages. You could have a special session for children, in which you offer them talks about the sky, using club members with a special disposition for working with children.

The Royal Astronomical Society of Canada's Kingston Centre had a special telescope — a folded refractor housed in a speaker box — to greet children. “Hello,” the telescope welcomed them, “my name is Mintaka, and I am a talking telescope.” The voice explained how telescopes work and then went on, in a one-minute astronomy and history lesson, to show how to use a telescope to find Jupiter:

“And now let's search for a bright object like Jupiter. First, use my finder, which is mounted beside my eyepiece focuser. Sight along the finder and then center Jupiter in the finder's eyepiece. Now look through the eyepiece of the main telescope. Jupiter should be there, along with its four brightest moons. You are looking at a planet 10 times the size of Earth and at least 400 million miles (600 million km) away. The moons you see were discovered by an Italian astronomer named Galileo in 1609, almost 400 years ago, and because they go around Jupiter, they helped persuade Galileo that Earth was not the center of the universe. Because he expounded on these beliefs, Galileo was threatened with torture and forced to recant. Take a good look at these moons. They take us back to an earlier, darker time in our history, and yet a modern spacecraft, also named Galileo, had explored Jupiter and its moons in great detail.”

It's difficult to get a child excited about astronomy in one day. For children in elementary schools, every day should be Astronomy Day. If you can, take advantage of a teacher's interest by offering to come to his or her class to talk about the stars for a half hour.

In 1990 Larry and Nancy Lebofsky ([lebofsky@lpl.arizona.edu](mailto:lebofsky@lpl.arizona.edu)) of the University of Arizona started an astronomy program for elementary and middle-school teachers. Called Project ARTIST (for Astronomy-Related Teacher In Service Training), the program's highlight is a four-week workshop for educators. The program's goal is not really to educate teachers about the stars and planets; rather it is to inspire them to spread the word to their fellow teachers that astronomy is an exciting, worthwhile classroom subject. The program has a set of telescopes — a refractor, a reflector, and a Schmidt-Cassegrain — so that teachers can get an idea of which type would be best suited for their students.

Perhaps most important, Project ARTIST is not an information machine; its sessions don't flood teachers with megabytes of knowledge. Instead, it aims to point out a way for teachers to make astronomy exciting and alive. Even topics such as the motion of the Moon are handled delicately; units like the width of a fist held at arm's length are used for measuring angular distances as students chart the Moon's path across the sky from night to night.

The Astronomical Society of the Pacific (ASP) conducts Project ASTRO ([www.astrosociety.org/education/astro/project\\_astro.html](http://www.astrosociety.org/education/astro/project_astro.html)), a program designed to get

amateur astronomers into classrooms. Project ASTRO has been so successful that the ASP has designed another similar program for the families, called Family ASTRO ([www.astrosociety.org/education/family.html](http://www.astrosociety.org/education/family.html)). Both projects have a wealth of information and activities that can be useful not only in the classroom but also for Astronomy Day.

Meanwhile, the Harvard-Smithsonian Center for Astrophysics started a program called SPICA (Support Program for Instructional Competency in Astronomy), <http://cfa-www.harvard.edu/cfa/sed/resources/spica.html>. After that program ended, the American Astronomical Society initiated a very similar program called AASTRA (American Astronomical Society Teacher Resource Agent), <http://www.aas.org/~aastra/bystate.html>. Both programs trained resource agents to assist astronomical instruction at all levels by providing resources to teachers in every state in the US. If there is an agent nearby, he or she could be a resource for Astronomy Day events. SPICA and AASTRA are both modeled after the highly successful Physics Teacher Resource Agent program operated by the American Association of Physics Teachers.

Astronomy Day is an opportunity to tell teachers about how scintillating astronomy can be in a classroom. If they bite, offer to go to their classes for more.

Remember, your presence and enthusiasm could offer an alternative to the following “Five Easy Steps to Kill Interest in Astronomy.” Adapted from David Levy’s *The Universe for Children* ([www.everythingintheuniv.com](http://www.everythingintheuniv.com)), these steps represent things with which you might be familiar.

Things not to do:

1. In school, try to include astronomy as a 10-minute segment during a geography class. Many schools have done and continue to do just this, leaving generations of children thinking that the universe is a minor offshoot of Earth.
2. During a solar eclipse, lock the children inside a room with the curtains drawn. This will keep the evil eclipse spirits away from them.
3. Make the children observe through a telescope that has a wobbly mount and inferior optics. This will form the impression that all astronomers ever do is look at weird things that aren’t attractive and mean nothing. (A corollary: You have no idea what the telescope is pointing at in the first place.)
4. Put tiny holes at one end of a shoe box and shine a flashlight through it. Make sure the shoebox is painted black inside to simulate night, and then explain that this is what constellations look like. If the kids don’t develop a dislike of observing, at least they might acquire allergies to paint.
5. Keep astronomy in the vacuum of space, as an entity unrelated to the everyday joys and cares of children. Especially try to resurrect the 1960s image of the “mad scientist” or the absent-minded professor that caused so many laughs and so many people to turn away from careers in science.

These steps are designed to show teachers and parents how bankrupt the traditional school approaches to astronomy are. Astronomy Day is the antithesis of this approach. Levy's website, in fact, contains other ideas that might help bring the universe to the children. For example, you can describe the prevailing surface conditions on other planets in the form of weather reports. "This is radio station M-A-R-S," you might say, "with the forecast for today. A high of about 60 degrees, pretty warm, but windy. However, make sure you're leaning on the ground, because that warmth is only on the equator, and if you are taller than a foot or so the temperature drops rapidly. And it will get to well below freezing tonight, though there is no water here to freeze!"

More than any other people, children will benefit from the events you plan for Astronomy Day. Think of special ideas for them as you envision your events. There is even a special magazine on science (including astronomy) just for children, called Odyssey ([www.odysseymagazine.com](http://www.odysseymagazine.com)).

The Astronomical League has downloadable masters that you can duplicate for children to color and/or construct as part of your Astronomy Day activities:

Jupiter	<a href="http://www.astroleague.org/al/astroday/jupiter.jpg">www.astroleague.org/al/astroday/jupiter.jpg</a>
Saturn	<a href="http://www.astroleague.org/al/astroday/saturn.jpg">www.astroleague.org/al/astroday/saturn.jpg</a>
Mars	<a href="http://www.astroleague.org/al/astroday/mars.jpg">www.astroleague.org/al/astroday/mars.jpg</a>
Solar System Mobile	<a href="http://www.astroleague.org/al/astroday/solsystem.jpg">www.astroleague.org/al/astroday/solsystem.jpg</a>

Other suggested on-site children's activities include a Solar Bingo, Astronomical Cookie Making, Astronomical Bean Bag Toss, and face painting. Having some space toys ([www.spacetoy.com](http://www.spacetoy.com)) for children to play with might be another opportunity to capture and sustain their attention.

# **PART III: Your Volunteers**

## Introduction

Planning an Astronomy Day event requires a considerable amount of advance planning. For one thing, getting on a shopping mall's schedule is something that needs to be done months in advance. The better such planning is, the fewer last-minute hang-ups you'll encounter. Everyone should have a written list of responsibilities.

Some malls might view an Astronomy Day event as publicity for their business and might even pay for it. But this is more of an exception rather than the rule, as many malls feel that they are doing you a favor. To make them see things the other way around requires some negotiating skill. At the very least, you have to show the mall that you can do the job; usually one year's experience will do that. They also have to see a benefit for them — hopefully, Astronomy Day will bring more people into their mall. In Grand Rapids, Michigan, for example, one mall provided \$500 for posters and radio ads, in addition to all the free publicity the local astronomy club generated.

Your publicity should be professional in appearance. In this computer age, hand lettering is generally not recommended. But if there's an artist or draftsman among your members, why not give it a try?

A common problem is that your volunteers might forget why they are at the Astronomy Day booth in the first place. Animated personal conversations among your members about the latest astronomical news or discoveries are fine, so long as they don't neglect to pay attention to the general public. You don't need to hound or harass shoppers as they pass by, but if they stop to look at the display, smile and wave at them. Know the individual talents and abilities of your volunteers. Make sure each person wears a name tag at all events all the time so that the public can tell who is who. You could also don Astronomy Day hats, shirts, or aprons. Astronomy Day aprons are quite useful as they can hold flyers and brochures for handing out.

## **Committees for Astronomy Day**

For your program you will need people for some or all of the following tasks:

### Astronomy Day Chairperson

This is a very demanding position, with the ultimate responsibility for everything. Being a good manager of people as well as being good at making public contacts is important. He or she needs to be on top of the details of all events going on and be cognizant of the duties of all the volunteers. The chairperson should walk around all events, making sure they are running smoothly and safely and being prepared to fill in temporarily when someone needs to leave or take a break.

Possibly most important, the chairperson should know how to delegate. We know of one Astronomy Day chairperson who glanced through an earlier edition of this book and was appalled to find that she was doing virtually all the tasks of every member of the

committee. Depending upon the situation, duties can be combined or held by the same person.

Specific duties:

1. Select other committee members.
2. Secure the location for each event.
3. Set up a written timetable for when arrangements have to be completed, and make sure they are completed on schedule.
4. Put all commitments (whether for a particular task, items to display, or working at a certain event, etc.) in writing. This ensures that everyone knows what is expected from each person.
5. Make sure that everyone has the materials they need to do their tasks.
6. After the event, meet to review what worked and what didn't, and take notes for next year's Astronomy Day.
7. Enter the *S&T* Astronomy Day Award competition.

#### Secretary-Treasurer

This person must be good at taking notes and managing money. (Funds/donations could "run" through a cosponsor with an existing nonprofit status, or he or she may wish to open a checking account specifically for Astronomy Day.)

Specific duties:

1. Prepare minutes of each Astronomy Day committee meeting.
2. Prepare a budget based on information from other committee members (i.e., the cost of printing, postage, name badges, etc.)
3. Make sure that all members know how much money they have left to spend.
4. Pay the bills.
5. Write thank-you notes to the volunteers and other participants.

#### Event Coordinator

This person can also be called "Assistant Astronomy Day Coordinator."

Specific duties:

1. Make contact with the facilities (malls, zoos, museums, etc.) to arrange specific requirements for space, security, electricity, hours of operation, lighting control, and parking.

2. State all agreements in writing, being specific and noting the names and phone numbers of facility people who can be contacted if there is a problem.
3. Select assistants to supervise various events (if there is more than one event).

### Volunteer Coordinator

Specific duties:

1. Recruit volunteers to build the displays, operate the projectors, set up and take down the exhibits, and handle a variety of other tasks.
2. Schedule each volunteer according to where the needs are and the skills of that volunteer. Make sure that each volunteer has a written copy of the schedule.
3. Contact each volunteer in advance to remind them of their duties.
4. Be prepared with replacements if needed.

### Safety Officer

Specific duties:

1. Examine all risk areas. For example, check to make sure that pedestrians will not trip over power cords or potholes and that all unsafe areas are cordoned off.
2. Make sure that telescope operators are conscious of any dangers to viewers, such as protruding tripod legs or loose counterweights.
3. Know whom to contact in an emergency.
4. Inform all volunteers where the first-aid kits and fire exits and extinguishers are, and for star parties, where the emergency shelters are.

### Security Officer

This person is responsible for making sure that expensive displays, such as telescopes, computers, models, photographs, and meteorites, are properly protected during the day and at night.

### Media Relations

Specific duties:

1. Make sure that the public is informed about the upcoming Astronomy Day events. This is accomplished through press releases and following up with phone calls and arranging for interviews.
2. Design posters, flyers, and/or brochures and making arrangements to distribute them.

3. Prepare public-service announcements (PSA) for the local radio, television, and cable TV. Stations should not charge for PSAs. Remember that sending a news release doesn't mean that the right person, or the most interested person, will receive it. If you know of a media person who is especially interested in science, send him or her a special copy of the release.
4. Send postcard announcements to community-activity calendars.
5. Follow up with increased news coverage the week before and the day of Astronomy Day. Some radio stations might do live remote broadcasts without charge, or the local PBS stations might do an astronomy special the week of Astronomy Day. One of your club members could appear on a local call-in radio (or TV) program during the week prior to Astronomy Day (of course, be sure to mention your upcoming events on the air).
6. Photograph everything for your club's archives, for next-year's media packet, and for entering the *S&T* Astronomy Day Award competition.
7. Invite a local political figure to speak on Astronomy Day.
8. Ask the mayor or governor to issue an Astronomy Day proclamation (some examples are included in the Appendix).

### **How to Compose a News Release**

- a. It should be no more than two single-sided pages, double-spaced.
- b. Write down when the news should be released (e.g., FOR IMMEDIATE RELEASE).
- c. Include your name as contact person so that the news media can reach you during normal business hours.
- d. If your release is longer than one page, write "more..." at the bottom center of the first page. At the end of the release put the symbol "# # #" at the bottom center.
- e. Include photographs of club events and astronomical objects. Lick Observatory in California, for example, has granted permission for Astronomy Day hosts to use any of its photographs for the purpose of promoting the event (see below).
- f. Don't forget to include the "five Ws" (who, what, where, why, and when) in the release.

Adding astronomical photographs to any news release helps capture attention. If you have some good photos from previous Astronomy Days or astrophotos of objects that are going to be visible during the event, be sure to include them. You might find photographs on the Web (be sure you have permission to use it), but be careful not to mislead the public. If you use a Hubble Space Telescope photo, the public might think they will be able to see the object in the photo though the telescopes you have set up.

Lick Observatory (<http://web.ucolick.org>) has granted any Astronomy Day site permission to use Lick Observatory photographs in promoting Astronomy Day. You **MUST**, however, credit each photo used as “Lick Observatory Photograph.” To obtain a catalog of Lick photographs, write to:

Lick Observatory  
University of California  
Santa Cruz, CA 95064

You still must purchase the photograph you are interested in using. Lick Observatory would appreciate a copy of anything containing their photographs.

### Fundraising

The person in charge of fundraising solicits financial support from the local community. He or she would contact the local businesses, asking them to donate small sums of money to help cover Astronomy Day expenses. Some businesses might be willing to pay for ads that also advertise their business (examples are included in the Appendix). One club sold sponsorships — one for each exhibit. In return, the exhibits had large signs stating that they were sponsored by these particular businesses. Companies should certainly be more receptive if you plan to hold one of the events at their place of business.

Fundraising experts know that if an organization looks professional, it might have a better chance of getting funds. If possible, compose your solicitation letter with a word processor and print it on a letterhead using a laser printer. Give background information on what you are planning. State exactly what you want from the people to whom you are writing, and explain how helping you will also help them.

### Major Display Supervisor

This person takes charge of a particular major exhibit, such as in a mall. He or she makes sure that all the display components are staffed, that the mall’s rules are followed, and that overnight storage of the exhibit materials have been arranged.

If the mall display is particularly large, the supervisor might wish to appoint people to be in charge of specific sections, like the poster area, the telescopes, and the VCR. For displays that last a full day, he or she would need shifts, changing perhaps every few hours.

### Display Designer

The complicated task of designing a display and laying out the placement of telescopes, posters, photographs, and video or slide displays falls to this talented person.

Specific duties:

1. Work with the people at the venue to understand the layout of the space assigned to the club.

2. Allocate space to each display area, considering both the needs of each display as well as the general flow of people through it.
3. See to it that the exhibits are built, bought, or borrowed, and that they are properly stored or returned afterward.
4. Sketch or photograph the displays once they have been set up so he or she would have a record of what worked and what didn't for next year.
5. Assemble a team to set up and dismantle the display. This is best done when the mall or museum is closed; in fact, many malls insist that setups be done after public hours.

### Star-Party Supervisor

Specific duties:

1. He or she makes sure that no one observes the Sun without proper precautions (see the section on Sun Safety on page 23).
2. Watch for people who might trip over telescopes, ladders, chairs, cables, etc.
3. Secure electrical cords with straps or duct tape.
4. It might be a good idea to have a portable megaphone to let people know what object a telescope is looking at and to make specific announcements (“Attention Sky Shoppers! No line, no waiting at Telescope No. 3 right now. Enjoy great views of Saturn through Telescope No. 3.”)
5. Assign volunteers to run specific telescopes, training them on appropriate objects.

### Legal Concerns

It's hard to imagine that having fun on Astronomy Day can land you in court. But we do live in a litigious society, and small, unincorporated clubs can put their members at risk. If one of your Astronomy Day sponsors already carries liability insurance, they might be willing to include your event under its umbrella. Shopping malls or zoos might have special insurance arrangements for events taking place on their property. Some malls require groups using their facilities to carry their own liability coverage. One million dollars of coverage is typical. The Astronomical League, a large federation of astronomy clubs in the United States, offers an insurance policy for its member clubs. For more information about the League, go to its website, [www.astroleague.org](http://www.astroleague.org). If your club is not a League member, it might be worth it to join just to have access to reasonable liability insurance.

Your club should consider incorporating itself. This way, your members will no longer be individually liable for guests who trip over your exhibit table. Another advantage is that incorporated, not-for-profit groups can accept tax-deductible donations. However, getting incorporated is a big endeavor, requiring lots of government forms and an annual report.

In any event, we do suggest that your club appoint a Safety Officer, whose job would be to check the exhibits for safety, with no dangerous metal corners or chairs in bad places. Additionally, everyone helping out at Astronomy Day should keep an eye open for potential problems. Before the event is opened to the public, double-check for any possible hazards.

## PART IV: Miscellaneous

### Related Events

Astronomy Day is just one of several annual events designed to promote awareness of the sky and outer space. It might be possible to host a joint event with Astronomy Day and one of the events listed below if the dates happen to coincide. Or you could do separate events, using the first one to occur to promote the succeeding events. At the very least, the events below may have materials that could be useful in hosting Astronomy Day, so it might be very beneficial to check them out.

### Space Day ([www.spaceday.org](http://www.spaceday.org))

Since 1997 the Space Day educational initiative, which takes place on the first Thursday of each May, has evolved into a massive grassroots effort that highlights the extraordinary achievements, benefits, and opportunities in the exploration and use of outer space. Space Day's ultimate goal is to promote education in the fields of mathematics, science, technology, and engineering, by nurturing young peoples' enthusiasm for the wonders of the universe and inspiring them to continue the trailblazing work of today's space explorers.

### World Space Week ([www.spaceweek.org](http://www.spaceweek.org))

This event is an international celebration of science and technology and their contributions to the betterment of humankind. The United Nations declared in 1999 that World Space Week would be held each year from October 4-10. These dates commemorate two important events:

- October 4, 1957, the launch of the first artificial Earth satellite, Sputnik 1, which paved the way for space exploration.
- October 10, 1967, the signing of the "Treaty on Principles Governing the Activities of States in the Exploration and Peaceful Uses of Outer Space, including the Moon and Other Celestial Bodies."

(World Space Week used to be held in July, during the week encompassing Apollo 11's first Moon landing, but in 1999 the UN changed the dates to October.)

### National Science & Technology Week ([www.nsf.gov/od/lpa/nstw/start.htm](http://www.nsf.gov/od/lpa/nstw/start.htm))

Administered by the National Science Foundation (NSF), the purpose of this event is to increase public awareness on the importance of science in our lives and to promote education and careers in science. Its late-spring date often coincides with Astronomy Day. A "how-to-participate" brochure is available from the NSF.

### Sky Awareness Week (<http://www.weatherworks.com/skyawareness.week.html>)

This grassroots movement began in 1990 to encourage people to observe the sky, but the main emphasis is on meteorology, not astronomy. It falls during the same week as the National Science and Technology Week.

Sun-Earth Day (<http://sunearthday.nasa.gov>)

Lunched in conjunction with Astronomy Day 2001, this event is administered by NASA's Sun-Earth Connection Forum and is now celebrated each year near the vernal equinox. Sun-Earth Day's goal is that participants in the program will benefit from the following key understandings:

- That the Sun is a dynamic, magnetic star that impacts Earth and other planets in the solar system.
- That understanding the mysteries of the Sun has been a primary motivator for Sun watchers over time.
- That human beings use technology (past, present, and future) to understand the Sun and the universe beyond.
- That light has always provided a means of investigating the universe.
- And that human beings from diverse cultures have viewed the Sun as the source of life.

More Information About Astronomy Day's Past Events and History

More ideas about Astronomy Day activities can be obtained by reading articles that appeared in the back issues below:

*Sky & Telescope*

July 1978, p. 35-39	May 1991, p. 536-37
December 1978, p. 527	May 1992, p. 573-75
August 1979, p. 167-69	April 1995, p. 91-92
August 1980, p. 149-153	April 1996, p. 84-86
December 1980, p. 524	April 1997, p. 99-100
September 1981, p. 265-67	May 1998, p. 74-75
September 1982, p. 272-74	May 1999, p. 92
December 1983, p. 551	May 2000, p. 92
March 1985, p. 259	April 2001, p. 82
March 1986, p. 297-98	April 2002, p. 68-72
August 1988, p. 191	May 2003, p. 78-79
January 1989, p. 89-90	October 2004, p. 114
April 1990, p. 431-33	

*Astronomy*

May 1981, p. 59 (the presidential proclamation never came to pass)  
March 1991, p. 26  
May 1992, p. 30  
May 1993, p. 23  
April 1994, p. 22

*Mercury:*

May/June 1976, p. 28-29  
March/April 1981, p. 45

## Part V: Appendix

*Note: All addresses given are in the US unless otherwise noted.*

Abrams Planetarium (Sky Calendar)  
Michigan State University  
East Lansing, MI 48824  
[www.pa.msu.edu/abrams/Index.html](http://www.pa.msu.edu/abrams/Index.html)

American Association for the Advancement of Science  
1200 New York Avenue NW  
Washington, DC 20005  
[www.aaas.org](http://www.aaas.org)

American Association of Physics Teachers  
One Physics Ellipse  
College Park, MD 20740  
[www.aapt.org](http://www.aapt.org)

American Association of Variable Star Observers  
49 Bay State Rd.  
Cambridge, MA 02138  
[www.aavso.org](http://www.aavso.org)

American Astronomical Society (resource people, booklet on astronomical careers)  
2000 Florida Ave. NW, Suite 400  
Washington, DC 20009  
[www.aas.org](http://www.aas.org)

American Lunar Society  
c/o Eric Douglass  
[ejdftd@mindspring.com](mailto:ejdftd@mindspring.com)  
[www.amlunsoc.org](http://www.amlunsoc.org)

American Meteor Society  
c/o Robert Lunsford  
1828 Cobblecreek St.  
Chula Vista, CA 91913  
[www.amsmeteors.org](http://www.amsmeteors.org)

AMSAT (Radio Amateur Satellite Corp.)  
850 Sligo Ave., Suite 600  
Silver Spring, MD 20910  
[www.amsat.org/amsat-new/index.php](http://www.amsat.org/amsat-new/index.php)

Association for Astronomy Education  
c/o Tim Slater  
University of Arizona

Department of Astronomy  
Tucson, AZ 85721  
[www.astroed.org](http://www.astroed.org)

Association of Lunar and Planetary Observers  
c/o Richard W. Schmude, Jr.  
Gordon College  
Division of Natural Sciences and Nursing  
419 College Dr.  
Barnesville, GA 30204  
[www.lpl.arizona.edu/alpo](http://www.lpl.arizona.edu/alpo)

Association of Science-Technology Centers  
1025 Vermont Ave. NW, Suite 500  
Washington, DC 20005  
[www.astc.org](http://www.astc.org)

Astronomical Association of Northern California  
c/o Carter Roberts  
5 Highgate Ct.  
Berkeley, CA 94707  
[www.aanc-astronomy.org](http://www.aanc-astronomy.org)

Astronomical League (book discounts, liability insurance, observing programs)  
9201 Ward Parkway, Suite 100  
Kansas City, MO 64114  
[www.astroleague.org](http://www.astroleague.org)

Astronomical Society of the Pacific (resources for educators, books, videos, magazine)  
390 Ashton Ave.  
San Francisco, CA 94112  
[www.astrosociety.org](http://www.astrosociety.org)

*Astronomy* (monthly astronomy magazine)  
P.O. Box 1612  
Waukesha, WI 53187  
[www.astronomy.com](http://www.astronomy.com)

Astronomy Day Coordinator (one-stop shop for Astronomy Day information)  
Gary Tomlinson  
30 Stargazer Lane  
Comstock Park, MI 49321  
616-784-9518  
[gtmlins@sbcglobal.net](mailto:gtmlins@sbcglobal.net)  
[www.astroleague.org/al/astroday/astroday.html](http://www.astroleague.org/al/astroday/astroday.html)

Astronomy to Go (educational outreach and astronomy products)  
1115 Melrose Ave.  
Melrose Park, PA 19027  
215-831-0485  
[www.astronomytogo.com](http://www.astronomytogo.com)

Challenger Center for Space Science Education  
1250 North Pitt St.  
Alexandria, VA 22314  
[www.challenger.org](http://www.challenger.org)

CORE (NASA material for purchase)  
Lorain County JVS-CORE  
15181 Route 58 South  
Oberlin, OH 44074  
<http://core.nasa.gov>

Everything in the Universe (unusual and hard to find items)  
413 Poinsettia Ave.  
San Mateo, CA 94403  
[www.everythingintheuniv.com](http://www.everythingintheuniv.com)

*Exhibit Builder* (monthly magazine on building exhibits)  
P.O. Box 4114  
Woodland Hills, CA 91364  
[www.exhibitbuilder.net](http://www.exhibitbuilder.net)

Robert A. Haag (meteorite dealer/supplier)  
Box 27527  
Tucson, AZ 85726  
[www.meteoriteman.com](http://www.meteoriteman.com)

International Amateur-Professional Photoelectric Photometry  
c/o Douglas S. Hall  
Dyer Observatory  
1000 Oman Dr.  
Brentwood, TN 37027  
[www.iappp.org](http://www.iappp.org)

International Dark-Sky Association  
3225 North First Ave.  
Tucson AZ 85719  
[www.darksky.org](http://www.darksky.org)

International Meteor Organization  
c/o Robert Lunsford  
1828 Cobblecreek St.  
Chula Vista, CA 91913  
[www.imo.net](http://www.imo.net)

International Occultation Timing Association  
c/o David Dunham  
7006 Megan Lane  
Greenbelt, MD 20770  
[www.lunar-occultations.com/iota/iotandx.htm](http://www.lunar-occultations.com/iota/iotandx.htm)

International Planetarium Society  
c/o Shawn Laatsch  
Imiloa Astronomy Center of Hawaii  
600 Imiloa Place  
Hilo, HI 96720  
[www.ips-planetarium.org](http://www.ips-planetarium.org)

Learning Technologies, Inc. (portable planetariums and educational supplies)  
40 Cameron Ave.  
Somerville, MA 02144  
[www.starlab.com](http://www.starlab.com)

Lick Observatory (source of photographs for Astronomy Day publicity)  
University of California  
Santa Cruz, CA 95064  
<http://web.ucolick.org>

MMI Corporation (lots of astronomy-education materials)  
2950 Wyman Parkway  
Baltimore, MD 21211  
[www.mmicorporation.com](http://www.mmicorporation.com)

*Mercury* (see the Astronomical Society of the Pacific)

The Meteoritical Society  
3635 Concorde Parkway, Suite 500  
Chantilly, VA 20151  
[www.meteoriticalsociety.org](http://www.meteoriticalsociety.org)

NASA CORE (see CORE)

NASA Centers by US State(s) served (for international, see CORE)

NASA Ames Research Center  
Moffett Field, CA 94035  
*Serves: AK, AZ, CA, HI, ID,  
MT, NV, OR, UT, WA, WY*

NASA Goddard Space Flight Center  
Greenbelt, MD 20771  
*Serves: CT, DE, DC, ME, MD,  
MA, NH, NJ, NY, PA, RI, VT*

NASA Jet Propulsion Laboratory  
4800 Oak Grove Dr.  
Pasadena, CA 91109

NASA Johnson Space Center  
Houston, TX 77058  
*Serves: CO, KS, NE, NM, ND, OK, SD, TX*

NASA Kennedy Space Center  
Kennedy Space Center, FL 32809  
*Serves: FL, GA, Puerto Rico,  
US Virgin Islands*

NASA Langley Research Center  
Hampton, VA 23665  
*Serves: KY, NC, SC, VA, WV*

NASA Lewis Research Center  
Cleveland, OH 44135  
*Serves: IL, IN, MI, MN, OH, WI*

NASA Marshall Space Flight Center  
Huntsville, AL 35807  
*Serves: AL, AR, IA, LA, MO, TN*

NASA National Space Technology Laboratories  
NSTL, MS 39529  
*Serves: MS*

National Association of Rocketry  
P.O. Box 407  
Marion, IA 52302  
[www.nar.org](http://www.nar.org)

National Science Teachers Association  
1840 Wilson Blvd.  
Arlington, VA 22201  
[www.nsta.org](http://www.nsta.org)

National Science & Technology Week  
National Science Foundation  
4201 Wilson Blvd.  
Arlington, VA 22230  
[www.nsf.gov/od/lpa/nstw/start.htm](http://www.nsf.gov/od/lpa/nstw/start.htm)

National Space Club  
2025 M Street NW, Suite 800  
Washington, DC 20006  
[www.spaceclub.org](http://www.spaceclub.org)

National Space Society  
1620 I Street NW, Suite 615,  
Washington, DC 20006  
[www.nss.org](http://www.nss.org)

North American Meteor Network  
[www.namnmeters.org](http://www.namnmeters.org)

*Odyssey Magazine* (science magazine for children)  
Cobblestone Publishing Company  
30 Grove St., Suite C  
Peterborough, NH 03458  
[www.odysseymagazine.com](http://www.odysseymagazine.com)

The Planetary Society  
65 N. Catalina Ave.  
Pasadena, CA 91106  
[www.planetary.org](http://www.planetary.org)

Project STAR/SPICA (resource people)  
Harvard-Smithsonian Center for Astrophysics  
60 Garden St.  
Cambridge, MA 02138  
<http://cfa-www.harvard.edu/cfa/sed/resources/spica.html>

Royal Astronomical Society  
Burlington House  
Piccadilly  
London W1J 0BQ  
United Kingdom  
[www.ras.org.uk](http://www.ras.org.uk)

Royal Astronomical Society of Canada  
136 Dupont St.  
Toronto, ON M5R 1V2  
Canada  
[www.rasc.ca](http://www.rasc.ca)

Sky Awareness Week  
2979 Mona Lisa Blvd.  
Naples, FL 34119  
[www.weatherworks.com/skyawareness.week.html](http://www.weatherworks.com/skyawareness.week.html)

*Sky & Telescope* (monthly astronomy magazine, books, posters, etc.)  
Sky Publishing Corporation  
90 Sherman St.  
Cambridge, MA 02140-3264  
[SkyTonight.com](http://SkyTonight.com)

Society of Amateur Radio Astronomers  
c/o Tom Crowley  
42 Ivy Chase  
Atlanta GA 30342  
[www.qsl.net/SARA](http://www.qsl.net/SARA)

Space Frontier Foundation  
16 First Ave.  
Nyack, NY 10960  
[www.space-frontier.org](http://www.space-frontier.org)

Space Studies Institute  
P.O. Box 82  
Princeton, NJ 08542  
[www.ssi.org](http://www.ssi.org)

World Space Week  
[www.spaceweek.org](http://www.spaceweek.org)

Trippensee portable desktop planetariums  
1st Stop Travel Store  
101 W. Kirkwood Ave., # 105  
Fountain Square  
Bloomington, IN 47404  
[www.1ststoptravelstore.com/trippensee.html](http://www.1ststoptravelstore.com/trippensee.html)

Space Foundation  
310 S. 14th St.  
Colorado Springs, CO 80904  
[www.spacefoundation.org](http://www.spacefoundation.org)

Visual Satellite Observers  
[www.satobs.org](http://www.satobs.org)

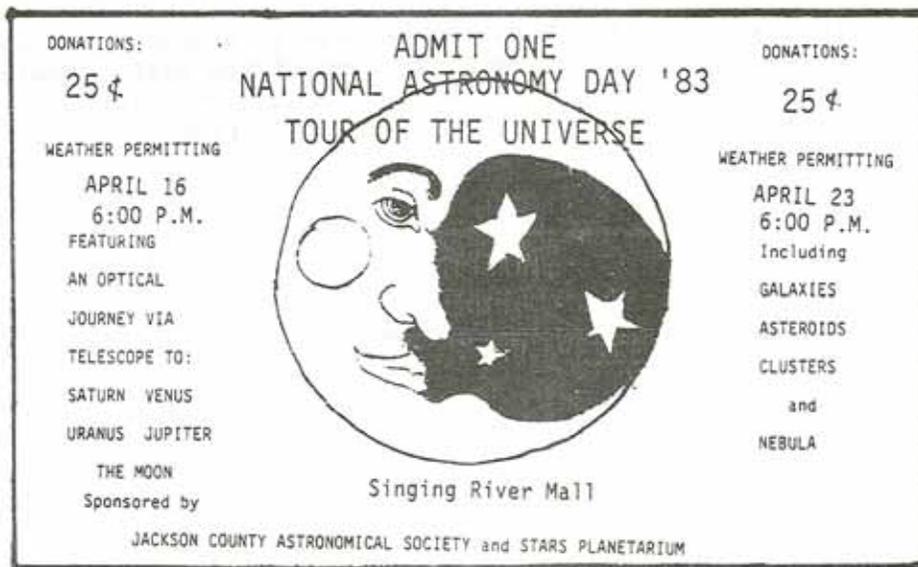
Western Amateur Astronomers  
P.O. Box 412  
Lafayette, CA 94549  
[www.waa.av.org](http://www.waa.av.org)

Young Astronaut Council  
5200 27th St., NW  
Washington, DC 20015  
[www.youngastronauts.org/yac](http://www.youngastronauts.org/yac)

# Sample Graphics and Proclamations



Astronomy Day Name Tag



Astronomy Day Ticket



**GALLERY-QUALITY SPACEWEEK '81 PRINT**

— A Collector's Item —

Features Space Shuttle, Earth, and Moon — deep blue on silver print of high quality, airbrushed art, suitable for framing — each print individually signed by artist Pat Rawlings. . . . . \$7.95

**SPACEWEEK '81 COMMEMORATIVE T-SHIRT**

Spaceweek '81 logo, silver on deep blue — sizes S, M, L, XL. . . . . \$6.95

**SPACEWEEK '81 COMMEMORATIVE BUMPER STICKER**

Show the world you support the U.S. space program — Spaceweek '81 logo, blue on silver mylar. . . . . \$ .95

**AVAILABLE AT THE FOLLOWING LOCATIONS**

- SPACE CENTER SOUVENIRS, 110 Nasa Rd. 1, Webster
- SUN REALTY, 17633 El Camino Real
- JOHNSON SPACE CENTER EXCHANGE STORE, JSC Bldg. 11

**ATTEND SPACEWEEK '81 EVENTS AND FIND OUT WHY**

**"Space is America's New Wealth"**

space for this ad donated by

**SUN Realty**  
**488-4700**

17633 El Camino Real  
Clear Lake City



Commercially sponsored ad



City of Grand Rapids  
Michigan

OFFICE OF THE MAYOR

ABE L. DRASIN  
MAYOR

P R O C L A M A T I O N

WHEREAS, Astronomy, the scientific study of celestial bodies and phenomena, is one of the oldest sciences known to humanity, and

WHEREAS, nationally, astronomy has become a fascinating pastime, as well as a crucial key to the discovery of the origins of the universe, and

WHEREAS, Grand Rapids' Chaffee Planetarium and Veen Observatory serve as the major facilities for astronomy interests in West Michigan, and

WHEREAS, a special week has been designated for the coordination of various activities by the local astronomical community aimed at educating the public;

NOW, THEREFORE, I, Abe L. Drasin, Mayor of the City of Grand Rapids, Michigan, do hereby proclaim April 26 through May 2, 1982 as

ASTRONOMY WEEK

in Grand Rapids, and urge all citizens to learn more about Astronomy through the various programs available through the Chaffee Planetarium and Veen Observatory.



Abe L. Drasin  
MAYOR

Mayoral Proclamation

William G. Milliken  
Governor of the State of Michigan

presents this

Executive Declaration

in Observance of

April 26, 1980

as

ASTRONOMY DAY

Astronomy, the science of the celestial bodies, is one of the oldest sciences known to humanity. Although it is a pure science, research in pure science often leads to practical benefits.

The state of Michigan is blessed with many natural areas which are ideal for astronomical observations. At the professional level, many of our colleges and universities are recognized nationally and internationally for their scientific research in the field of astronomy.

Amateur astronomers and their organizations throughout the state contribute significantly to public education in astronomy. Michigan has many professional, university and amateur observatories and a large number of museums and planetariums which offer programs and courses for students and the public throughout the year.

On Saturday, April 26, 1980, many of our state's astronomy clubs, educational institutions, planetariums, museums, parks and recreation centers will offer programs designed to interpret the sky for the public and to make our citizens more aware of this often overlooked aspect of Michigan's natural environment.

Therefore, I, William G. Milliken, Governor of the State of Michigan, do hereby declare April 26, 1980, as Astronomy Day in Michigan, and urge all our citizens to become aware of the many programs and activities relating to astronomy which are available in our state.

Given under my hand on this twentieth day of February in the year of Our Lord one thousand nine hundred eighty and of the Commonwealth one hundred forty-fourth.



*William G. Milliken*  
GOVERNOR

Gubernatorial Proclamation



STATE OF MICHIGAN

MICHIGAN LEGISLATURE

**Senate Concurrent Resolution No. 120**

Offered by Senators Sederburg, Corbin, McCollough and Welborn  
(Representative Jondahl named as co-sponsor)

A CONCURRENT RESOLUTION COMMEMORATING  
APRIL 18 THROUGH 24, 1983, AS MICHIGAN ASTRONOMY WEEK  
AND APRIL 23, 1983, AS ASTRONOMY DAY IN THE STATE OF MICHIGAN

WHEREAS, It is a special pleasure to commemorate April 18 through 24, 1983, as Michigan Astronomy Week and April 23, 1983, as Astronomy Day in the State of Michigan. This time of celebration highlights the importance of astronomy in our modern world. We encourage all Michigianians to become better acquainted with this ancient and thought-provoking science; and

WHEREAS, Astronomy is a popular pastime as well as being a crucial key to discovering the origins of the universe. Michigan is particularly blessed with many areas which are ideal for astronomical observation and many colleges which are dedicated to promoting this fascinating and increasingly more important science; and

WHEREAS, Michigan's amateur astronomers and astronomical organizations are particularly adept at expanding the public's awareness about astronomy. Moreover, Michigan is privileged to have many professional, university, and amateur observatories as well as museums and planetariums which offer programs in astronomy for the public. During Astronomy Week and Astronomy Day such programs will be offered to expand people's horizons about astronomical science. May this good work continue to prosper; now, therefore, be it

RESOLVED BY THE SENATE (the House of Representatives concurring), That Michigan Astronomy Week, April 18 through 24, 1983, and Astronomy Day in Michigan, April 23, 1983, be highly commemorated; and be it further

RESOLVED, That a copy of this resolution be transmitted to members of the astronomical community in Michigan as a reflection of our regard for astronomy and with our encouragement for all Michigianians to participate in events celebrating astronomy.

Adopted by the Senate, March 30, 1983.

Adopted by the House of Representatives, March 30, 1983.

*Thomas S. Kuehnd*  
Clerk of the House of Representatives

*Willa C. Jondahl*  
Secretary of the Senate

# *Sky & Telescope Astronomy Day Award*

The Astronomy Day award began in 1980 and is award to the group that best exemplifies the concept of Astronomy Day, “Bringing Astronomy to the People,” through its special event program. The award is judged by the Astronomical League. For a list of past winners, go to [www.astroleague.org/al/astroday/astrowinners.html](http://www.astroleague.org/al/astroday/astrowinners.html).

The rules are simple. They are:

1. All entries must be postmarked by June 13th of each year and received by June 19th (if via postal mail) or received electronically by June 13th.
2. One primary prize winner will be chosen.
3. Secondary awards may be given as follows:
  - Best new idea
  - The organization that did the most for its size
  - The organization that does quality events year after year (determined by previous entries)
4. Honorable Mention(s) may be awarded to those groups in final contention for the award.
5. Not all awards may be presented each year.
6. All entries will be judged on the following:
  - a. Originality and effort
  - b. Effectiveness of the sponsored events
  - c. Most productive use of local resources
  - d. Uniqueness of local events
  - e. Carrying out the primary theme of Astronomy Day (“Bringing Astronomy to the People”)
  - f. Carrying out any secondary annual theme that may exist
7. Eligibility is open to any nonprofit organization that promotes astronomy or space science. Planetariums and science museums, astronomy clubs, universities, and observatories or combinations thereof are all eligible. Organizations may not enter as part of a larger group and individually.
8. If submitting an electronic entry, ALWAYS check the Astronomical League’s web site for the correct e-mail address [www.astroleague.org/al/astroday/award\\_app.pdf](http://www.astroleague.org/al/astroday/award_app.pdf). Electronic entries must be formatted in the same order as the entry form. Attachments must be able to be opened by MS Word and/or MS Photo Editor

The winners will be notified by July 31st, and awarded at the Astronomical League’s summer convention. The primary award winner will receive a plaque plus a \$250 gift certificate from *Sky & Telescope*, good toward magazine subscriptions or the purchase of books or other products from *S&T*’s parent company, Sky Publishing Corporation. Secondary award and honorable-mention winners will receive a certificate.

## Helpful Hints for Entering the Award

1. Involving all astronomy-related groups in the area is viewed as very positive, as well as promoting any special theme for the year (There won't always be a special theme).
2. Previous primary award winners must be extraordinary to win the same award again in subsequent years. However winning one award doesn't preclude an organization from winning a different award in the same or a different year.
3. Compose your photographs. Look through back issues of *Sky & Telescope* to judge what kind of photo it will publish. There is nothing wrong with posing a picture. Include a labeled hard copy (2 inches or larger) of any mailed digital image(s) and label all media with name of entrant.
4. Edit videotapes. Label the length of the video pertaining to Astronomy Day (especially if there are other non-related video on the tape). Also, if the Astronomy Day portion is not at the beginning of the tape, indicate how far into the tape the Astronomy Day portion starts. VHS is preferred but DVDs (DVD Video format only) are also acceptable.
5. You will receive an acknowledgement of your entry (either by postal mail or e-mail). If you do not receive an acknowledgement, contact the Astronomy Day Coordinator.
6. You don't have to use the accompanying official entry form, but you must format and order your entries the same, i.e. your entries do not have to fit into the space provided but you must use the same headings as in the entry form and answer all the questions. You may include additional information at the end of your entry if it doesn't fit within one of the categories given. This could include a summary. For electronic entries, scan (if necessary) and attach the required flyers to your entry.
7. Hosting the event on a different day than the "official" date will not preclude you from winning.
8. The contest will be judged by the Astronomical League and not *Sky & Telescope* (i.e. you can mention *Astronomy* magazine).
9. A cosponsor is an organization that helped in set up and planning. A participant is an organization that used space at your Astronomy Day event to promote themselves.
10. Postal mailing from outside the USA may take several days to arrive.

Good luck! If you don't win this year, please try again next year.

## Entry Form for the *Sky & Telescope* Astronomy Day Award

Before filling out this form, ALWAYS check [www.astroleague.org/al/astroday/award\\_app.pdf](http://www.astroleague.org/al/astroday/award_app.pdf) for the latest entry form.

Date of Entry:

Organization(s), institution(s), club(s), etc. entering the award:

Contact person:

Address:

City:

State/Province:

Zip/Postal Code:

Country:

Telephone:

Fax:

E-mail:

Website:

### **Preliminary Information.**

(This will not affect the judging of the award; we are just curious.)

Did you list your event(s) in the Astronomy Day website?    YES            NO

Did you hold your event on a day other than the “official” date of Astronomy Day? If so, why?

How can the Astronomy Day Headquarters assist you in your Astronomy Day events? Do you have any suggestions?

What was the weather like during your Astronomy Day events (e.g. rainy, completely cloudy, very clear, etc.)?

Are any of your sponsoring organizations a member of the Astronomical League? (This does not affect the judging of the award.) If so, which one(s)?

## Background Information

What is the population of your metropolitan area?

Have you won any Astronomy Day Awards (including secondary awards and honorable mentions) in previous years? If so, list each award and the year it was received.

How many annual Astronomy Days have you sponsored?

When did the planning for this event begin?

What was your approximate budget (in US dollars) for this event?

Did you charge fees for any of your events? If so, which one and for how much (in US dollars)?

List any other local organizations/institutions that were involved in your event (e.g. the local planetarium, mall, telescope store, etc.); if not, just write "NONE."

List any other local astronomical organizations/institution NOT involved (e.g. the local planetarium chose not to participate, the other local astronomy club wanted to do their own event, etc.); if not, just write "NONE."



