GETTING STARTED IN
ASTRONOMY

AN EASY GUIDE TO
EXPLORING THE
UNIVERSE

INCLUDES A MOON MAP AND STAR CHARTS

FROM THE
EDITORS OF

Sky&Telescope
SkyandTelescope.com
**Your First Steps in Astronomy**

DID YOU KNOW THAT YOU can see a galaxy 2½ million light-years away with your unaided eye? Or that you can see craters on the Moon with ordinary binoculars? These and countless other wonders await your gaze every clear night. The first step is simply to look up and ask, “What’s that?” And when you do, you’ll take the first step toward a lifetime of cosmic exploration and enjoyment. What’s the best way to get started on this exciting adventure?

**Read It and Reap**
The joy of astronomy comes from finding your way around the starry sky and understanding what you see. A great place to start is your local library or bookstore. Browse the astronomy shelf for beginner’s guides that will teach you about the Moon, planets, and constellations. Check the magazine rack for *Sky & Telescope*, the hobby’s essential monthly magazine. It offers practical tips for observers as well as articles on many fascinating astronomical topics.

Another great resource is the World Wide Web. Start at *Sky & Telescope*’s site, SkyandTelescope.com, or you can use any search utility to look up topics such as “amateur astronomy” or “stargazing.”

**Let the Stars Get in Your Eyes**
Go out on any clear, dark night and familiarize yourself with the star patterns overhead, using the constellation maps on the following pages.

If you live in a brightly lit city or town, find a place where there’s less light pollution (or at least a spot free from the glare of nearby lights) so you can see more stars. The ability to look up and say, “There’s the North Star!” or “That’s Saturn!” will provide pleasure — and a sense of your place in the cosmos — for the rest of your life.

**Start with Binoculars**
Binoculars are an ideal “first telescope” for several reasons. They show you a wide field of view, making it easy to find your way around the sky. They also give you a view that’s right side up and straight in front of you, making it easy to see where you’re pointing. Binoculars are fairly inexpensive, widely available, and easy to carry and store. They’re also versatile; you can switch from terrestrial to celestial viewing in an instant. And their performance is surprisingly respectable. Ordinary 7- to 10-power binoculars improve on the unaided eye about as much as a good amateur telescope improves on binoculars — and at a far lower cost. For astronomy, the larger the front lenses are, the better. High optical quality is important too. But any binoculars already knocking around the back of your closet are enough to launch your amateur-astronomy career.

**Use Maps and Guidebooks**
Once you’ve learned your way around the night sky, binoculars can keep you busy for years. With good maps and reference books, you can identify dozens of the Moon’s craters, plains, and mountains. Binoculars will show you the ever-changing positions of Jupiter’s moons and the crescent phases of Venus. They’ll also reveal most of the 109 “M objects,” the star clusters, galaxies, and nebulae cataloged by 18th-century astronomer Charles Messier. Binoculars will let you split scores of colorful double stars and allow you to follow the fadings and brightenings of numerous variable stars. All this and more is possible — but only if you know where to look and what to look for. Moreover, the skills you’ll develop using maps and guidebooks with binoculars are exactly the skills you’ll need to put a telescope to good use.

**Seek Out Other Amateurs**
There’s nothing like sharing an interest with others. There are hundreds of astronomy clubs worldwide; *Sky & Telescope*’s Web site includes a directory of them. Call a club near you to find out when it holds meetings or all-night observing sessions called “star parties.” These events offer a wonderful opportunity to try out different telescopes, learn new skills, and make friends.

**When It’s Time for a Telescope, Plunge in Deep**
Eventually you’ll be ready for your first telescope. This is no time to skimp on quality. The telescope you want has two essentials. One is high-quality, “diffraction-limited” optics. The other is a solid, steady, smoothly working mount. You may also want large aperture (size), but don’t lose sight of portability and convenience. Remember, the best telescope for you is the one you’ll actually use.

Many telescopes have built-in computers and motors that will point them to any of thousands of celestial objects at the push of a few buttons. These are a lot of fun to use and can help you locate sights you might otherwise overlook. But it’s still helpful to know your way around the sky — especially if your batteries run out! It’s true that telescopes can cost many thousands of dollars, but it’s also true that some good ones can be had for only a few hundred dollars. Can’t afford the scope you want? Save up until you can. Another year of using binoculars while building a savings account will be time you’ll never regret.

**Relax and Have Fun**
Don’t get upset if you can’t find a particular object or because the view in your telescope is less than perfect. Learn to take pleasure in whatever your eyes, binoculars, or telescope can show you. The more you look, the more you’ll see. Set your own pace, and revel in the beauty and mystery of our amazing universe!
Here’s how to use our bimonthly star charts to identify your evening stars and constellations.

Can you spot the Big Dipper? Orion? The Pleiades? Your exploration of the universe begins with learning the stars in your evening sky. But different constellations are visible at different times of year and hours of the night, depending on your latitude and which way the night side of our planet is facing.

The accompanying charts will help you get oriented. They’re designed for sky-watchers in midnorthern latitudes such as the United States, southern Canada, and Europe. Each represents the entire sky at the dates and times printed on it. Find a chart appropriate for your date, and go out within an hour or so of the time listed.

How the Charts Work
The round edge of each chart represents your horizon, with compass directions labeled. Turn the map around so the edge marked with the direction you’re facing (north, east, or whatever) is right-side up. The stars above this horizon on the map will now match the stars you’re facing. Ignore the rest of the map for now.

The map’s center is overhead (the zenith). So a star that’s plotted halfway from the edge to the center can be found about halfway up the sky. That is, it will be halfway from horizontal to straight up.

Dot sizes indicate star brightnesses — the larger the dot, the brighter the star. Example: Let’s try the July/August chart. Turn it so the horizon labeled “Facing West” is right-side up. About halfway from there to the center is the bright star Arcturus. Go outside around one of the dates and times listed, face west, and look for Arcturus. Go outside around one of the dates and times listed, face west, and look for Arcturus.

Finding Your Way Among the Stars

Looking Deeper
Take the maps out often, and try to learn a new constellation each night. You are establishing the landmarks you’ll need for finding your way when you start using binoculars or a telescope.

Once you know at least some constellations fairly well, you can start exploring the sky a lot more deeply with optical aid. For this you’ll need larger star charts that show more close-up detail.

The maps here show stars as faint as magnitude 4.5. This is about as faint as you can see with the naked eye through suburban light pollution. Also plotted are some interesting objects for binoculars or small telescopes: star clusters, nebulae, and galaxies. When hunting for these faint sights you’ll have an easier time if you use larger charts that show stars to at least as faint as magnitude 6. (Higher magnitude numbers mean fainter stars.)

People who get serious about using a telescope will want even more detailed sky charts — ones that show stars as faint as magnitude 8 or so. Sky Atlas 2000.0 by Wil Tirion and Roger W. Sinnott is the set most widely used. The latest edition shows 81,000 stars to magnitude 8.5 and 2,700 galaxies, star clusters, and nebulae.

Clear skies!

Greek Letters on Star Maps
The brightest stars in each constellation are named with lowercase Greek letters. A constellation’s most brilliant star is often called Alpha, the first letter in the Greek alphabet. The letters are used with the Latin genitive form of the constellation name, so the Alpha star of Centaurus is called “Alpha Centauri.”

Here is the lowercase Greek alphabet as used by astronomers:

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Evening Stars in
Jan/Feb

Every issue of Sky & Telescope magazine contains a full-color star chart for the current month.

When to Use This Chart
Early Jan. 10 p.m.
Late Jan. 9 p.m.
Early Feb. 8 p.m.
Late Feb. Dusk

The chart is also useful in early October at 5 a.m.*, early November at 2 a.m., and early December at midnight.

*Daylight-saving time

How to Use This Chart
Go out within an hour or so of the time listed at left. Turn the chart around so the edge marked with the direction you’re facing is right-reading. The stars above this horizon on the map now match the stars in front of you. The map’s center is overhead (the zenith). So a star plotted halfway from the edge to the center can be found in the sky about halfway from horizontal to straight up.

Northern Hemisphere for latitude 40° N.

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When to Use This Chart
Early Mar.  11 p.m.
Late Mar.  10 p.m.
Early Apr.  10 p.m.*
Late Apr.  Dusk

*Daylight-saving time

The chart is also useful in early December at 5 a.m., early January at 3 a.m., and early February at 1 a.m.

How to Use This Chart
Go out within an hour or so of the time listed at left. Turn the chart around so the edge marked with the direction you’re facing is right-reading. The stars above this horizon on the map now match the stars in front of you. The map’s center is overhead (the zenith). So a star plotted halfway from the edge to the center can be found in the sky about halfway from horizontal to straight up.

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Evening Stars in May/Jun

Northern Hemisphere for latitude 40° N.

When to Use This Chart
Early May 1 a.m.*
Late May Midnight*
Early June 11 p.m.*
Late June Dusk

*Daylight-saving time

The chart is also useful in early February at dawn, early March at 4 a.m., and early April at 3 a.m.*

How to Use This Chart
Go out within an hour or so of the time listed at left. Turn the chart around so the edge marked with the direction you’re facing is right-reading. The stars above this horizon on the map now match the stars in front of you. The map’s center is overhead (the zenith). So a star plotted halfway from the edge to the center can be found in the sky about halfway from horizontal to straight up.

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Evening Stars in
Jul/Aug

Northern Hemisphere for latitude 40° N.

When to Use This Chart
Early July  Midnight*
Late July    11 p.m.*
Early Aug.   10 p.m.*
Late Aug.    Dusk

*Daylight-saving time

The chart is also useful in late April at dawn, late May at 3 a.m.*, and late June at 1 a.m..

How to Use This Chart
Go out within an hour or so of the time listed at left.
Turn the chart around so the edge marked with the direction you're facing is right-reading. The stars above this horizon on the map now match the stars in front of you. The map's center is overhead (the zenith). So a star plotted halfway from the edge to the center can be found in the sky about halfway from horizontal to straight up.
When to Use This Chart
Early Sept.  11 p.m.*
Late Sept.  10 p.m.*
Early Oct.  9 p.m.*
Late Oct.  Dusk

*Daylight-saving time

The chart is also useful in late June at dawn, late July at 2 a.m.*, and late August at midnight*.

How to Use This Chart
Go out within an hour or so of the time listed at left. Turn the chart around so the edge marked with the direction you’re facing is right-reading. The stars above this horizon on the map now match the stars in front of you. The map’s center is overhead (the zenith). So a star plotted halfway from the edge to the center can be found in the sky about halfway from horizontal to straight up.
Evening Stars in
Nov/Dec
Every issue of Sky & Telescope magazine contains a full-color star chart for the current month.

Northern Hemisphere for latitude 40° N.

When to Use This Chart
Early Nov. 10 p.m.
Late Nov. 9 p.m.
Early Dec. 8 p.m.
Late Dec. 7 p.m.

The chart is also useful in early August at dawn, early September at 3 a.m.*, and early October at 1 a.m.*.

How to Use This Chart
Go out within an hour or so of the time listed at left. Turn the chart around so the edge marked with the direction you’re facing is right-reading. The stars above this horizon on the map now match the stars in front of you. The map’s center is overhead (the zenith). So a star plotted halfway from the edge to the center can be found in the sky about halfway from horizontal to straight up.

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The Moon is by far the most rewarding celestial object for a small telescope. Even a very small instrument will reveal its bleak, blasted landscape of mountain ranges, plains, hills, valleys, and craters. Even binoculars show many features, and there are enough interesting sites on the Moon to keep a telescopic explorer busy forever.

You’ll notice right away that except when the Moon is full, it is divided by the terminator, the line separating lunar day and night. Here is where detail shows best.

When the Moon is a waxing (growing) crescent, we see the parts on the right edge of the map. At first-quarter phase we see the entire right half, and so on.

To use this lunar map, turn the chart until it matches your view. Note: Some telescopes give a mirror image, which will not match this map no matter how you turn it.

Refractors and Cassegrain reflectors give mirror images when used with a star diagonal; so does any other instrument containing an odd number of mirrors. If you find this to be a problem, take out the star diagonal and view “straight through.” A correct image is much easier to compare with any map.

Once the map is oriented, it will be simple to identify the major craters, mountains, and other features.

In time, the geography of this alien world will become as familiar to you as that of our own.