

GETTING STARTED IN STAR GAZING

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The fact you are here in this introductory session says you have an interest in the hobby of astronomy, but please note that the title of this session is not “Getting Started in Astronomy.” You do not have to know much about astronomy to get real enjoyment out of star gazing. Maybe an analogy will help. Have you ever gone snorkeling and enjoyed the beautiful fish, corals, turtles, etc, etc? I think you would agree that you can do that without knowing much about oceanography. The analogy is pretty close.

One of the reasons we wanted to offer these ideas this evening is to give you an organized way of approaching this great hobby. Hopefully you will not become one of the approximately 90% of people who begin the hobby and then give up in frustration, sometimes after buying the wrong telescope. Those 90% were never told a simple truth - you cannot learn the night sky using a telescope - it is impossible. The field of view in any telescope is so limited that even under the lowest power eyepiece you will not see a complete constellation.

Astronomy, even at our amateur level, has the capacity to challenge and fascinate the mind like almost nothing else. Luckily for most of us astronomy can be enjoyed at many levels, from simple star gazing to delving into it as deeply as our time will allow. To enjoy star gazing we don't need to comprehend distances beyond our understanding or sizes beyond any adequate description. We don't need to understand black holes, quasars, pulsars, time-space warping or

the newest thing - gravitational waves. There are innumerable terms that we will gradually pick up, but we don't need them to go outside and enjoy looking up and recognizing quite a number of objects. As time passes the more terms you know, the more you will want to know and soon your level of knowledge will surprise you.

But just for fun let's talk about just one term you will hear over and over as we talk about basic star gazing. It is one of the most common terms for measuring distances and size in space. The words "light year" describe both distance and size. A light year is the distance a photon of light travels in one year at a speed of 186,000 miles per second. If you multiply that out, a light year is about 6 trillion miles - a number that is not possible to understand. Would it be easier if I said a trillion is 1000 billions or that a billion is 1000 millions? Not really. But it does give you a glimpse of an idea about distance when you hear that Alpha Centauri, the closest star to us, is "only" 4 light years away, or that the closest galaxy to ours is Andromeda, about 2 million light years away. The term light year also describes size. Our Milky Way galaxy, which contains our little solar system, is over 100,000 light years from one side to the other. Good thing for us that enjoying star gazing does not depend on a comprehension of those distances or sizes.

Star gazing at our introductory level is about beginning to understand the night sky. It is essentially about being able to look up and experience the joy and fun of identifying several constellations and bright stars. For many, the best part of it is being able to take others out and share what they know.

Fortunately for us there is an easy and logical way to approach getting to know the night sky. The first step is to learn a few major constellations - of which there are only 88 in total. One

basic tool for many is the planisphere - a simple, inexpensive device that visually shows the location of the constellations and major stars for any given date and time. Later in this handout there is a page which will walk you through the use of the planisphere. Another tool is the smart phone or tablet app which electronically shows the same information.

The brightest stars are located in constellations, reinforcing the idea that we need to learn the names and locations of a few constellations at first. Two of the most identifiable constellations are Ursa Major (Big Dipper) in the northern sky and Orion in the southern sky, during the winter months. Using these two constellations as guideposts you can find up to a dozen of the brightest stars in the winter/spring sky. Almost instantly the night sky goes from an overwhelming number of points of light to some recognizable patterns and identifiable stars. One thing to remember about constellations is that they move from month to month throughout the year. If you look for Orion in the summer, you won't find it. Ursa Major, on the other hand, is circumpolar. It rotates in a counterclockwise fashion around Polaris, the North Star, and is visible all year. On the other side of Polaris from Ursa Major is another constellation, Cassiopeia, which is shaped like a large "W" and is also circumpolar and visible all year.

For many people star-gazing begins with our own solar system, No one has any problem finding the moon! The moon is an amazing celestial body that many professional astronomers spend a career studying. There are over a hundred easily found craters, mountains, and plains (maria) that we can see with our naked eyes, binoculars or small telescopes. With our telescopes we can see the rings of Saturn and Jupiter with its four largest moons. We can see other planets as well, but generally speaking we are seeing what appears to be a star - no real observable features.

SOME EQUIPMENT DO'S AND DON'TS

The first bit of advice is to invest \$15 or \$20 in a planisphere, whether or not you have an app. I have both and use the planisphere the most. If I look up and can't remember the name of a star, I can find it instantly with a planisphere. I also use it every time I go out to observe. I look at the constellations that will be visible at the time I will be observing and I make a list of things I want to look at. You can obviously do the same kind of thing with an app.

The second bit of advice is not to rush out and buy a telescope, even if you can afford a good one. There are several types of telescopes and some are better than others for different kinds of viewing. Read, study and talk with current telescope owners before buying. Visit a store that sells astronomical quality optics like Starizona or StellarVision which are both here in Tucson. You should also consider buying a pair of binoculars, but not before doing some research. Like telescopes, there are issues to be considered to keep from making a purchasing mistake. In another session, or perhaps in writing, we will discuss things to consider in more detail when buying binoculars and telescopes. For many teachers of basic astronomy, binoculars are a must. With the right binoculars you can see dozens of objects on the moon. With them you can see several planets, and while you are unlikely to see the rings of Saturn, you can easily see Jupiter and all four of its largest moons. You can see the entire "7 sisters" of the Pleiades and the entire spiral galaxy Andromeda. Hey, it may only look like an oval smudge, but it is still a thrill knowing you are looking at something that is over 2 million light years away.

Astronomy is a hobby that can be relatively inexpensive, endlessly challenging and can give you a lifetime of fun and learning. Come to our club meetings, perhaps take out a subscription to “Sky and Telescope” magazine or “Astronomy” magazine, go to our club website and look through the many links to great information, come to a star party or two and then you will probably be hooked. We hope so!

Appendix A

HOW TO USE A PLANISPHERE

Note: the following description is intended to be used while holding a planisphere

A planisphere is a circular device comprised of two discs which are joined in the center and can rotate independently from one another. The top disc shows all 24 hours of the day around the outside, much like a clock shows 12 hours around the outside. The bottom disc shows the 12 months of the year around the outside, and it also shows the days of the month for each of the 12 months. In the center of the planisphere there is a sky map which is a depiction of all the constellations and major stars that are visible in the northern hemisphere. No matter what direction you hold the sky chart, the bottom will represent the horizon.

Using the planisphere:

First, begin by rotating the top disc until you align the current time of day with the current month and day. For example, if the time is 8pm and it is the 15th of March you would rotate the top disc until the 8pm arrow is lined up with the month of March and the 15th day.

Next, notice that printed on the planisphere are four directions. One says "Face South", one says "Face North" and to the sides of the star map are the words "East" and "West." Normally you will be in an area where you know where each of the four cardinal directions are. For example, if you standing in Sun City, the Santa Catalina mountains are to the East and the city

of Tucson is to the South. If you are in an unfamiliar area, you may need a compass unless you can see the North Star and orient yourself that way.

To read the planisphere you will turn and face the direction where you want to observe and hold the planisphere out in front of you, slightly above your eye level. If you want to observe the southern sky, you turn and face the south. Next, you turn the entire planisphere (without changing the time, month or day) until the words “Face South” are at the bottom of the planisphere. Now you are facing the same direction as the planisphere is facing. Looking at the sky map you will see all the constellations and brightest stars visible at that time and date. The depiction will be a relatively accurate picture of what the actual sky looks like. For example, if you look at the sky chart and Orion is off to the right of center (toward the West), when you look at Orion in the sky, you should find it slightly to the Southwest of center.

The bottom of the sky chart, no matter which direction you are facing, is the horizon. Therefore, if you are looking for Orion and the sky chart shows that it is closer to the horizon than it is to the zenith, that is what it will look like in the sky.

Finally, take a look at any planisphere and you will see a gray band representing the path that is followed by the sun, the moon and all the planets. This band is called the “ecliptic.” When you encounter a bright object that does not appear on your planisphere, it will be a planet. If you compare the location of that bright object to your planisphere, you will see that it is lying on or very near the ecliptic.