



Beginner's Guide to Telescopes

The most important word when looking for an Astronomical Instrument may surprise you. It is not "Power" (magnification), but rather it is "Aperture". This is for two very good reasons. The first reason is that most astronomical targets are very dim. They don't give off much light. So, the more light gathering power your instrument has, the better you will be able to see these objects. Light gathering varies with the square of the aperture. In other words, an eight-inch diameter telescope has four times the light gathering ability of a four-inch diameter telescope. A modest increase in aperture will give a large boost to light gathering power.

The second reason to consider aperture is that useable power is directly related to aperture. A general rule on this subject states that you can obtain about 50X (magnification) per inch of aperture under ideal conditions. The claims of some inexpensive telescopes of 600X (magnification) from a 60 mm aperture are misleading at best, but more likely properly characterized as outright lies. While the formula used to compute the power of these instruments is correct. The images generated under these conditions are simply too dim to be of any use at all. Magnification is not what we require, but rather useable magnification. Thus the first rule is, buy as much aperture as you can afford.

While this is titled "Beginner's Guide to Telescopes", it would be short sighted not to say a little about binoculars first. Quite a lot of observing can be done with binoculars. Three of the Astronomical League's observing clubs are binocular clubs, as well as sections of the Lunar Observer's Club.

Binoculars are rated with two numbers, for example 7x50 (seven by fifty). This indicates 7-x magnification and a 50-millimeter aperture. Remember aperture? 50 mm aperture binoculars have over twice the light gathering ability of 35 mm aperture binoculars. Power and weight are important considerations for binoculars. If they have too much power, you can't hold them steady enough, too much weight and you will quickly tire of holding them at all. Either 7 or 8 power is about right for most people. If the

aperture is much above 50 mm the weight becomes too much to hand hold. The above-mentioned 7x50 binocular is a good choice. Larger apertures or greater powers should only be considered if you are planning to use a binocular mount. You can expect to pay at least \$100 for a reasonable entry-level pair or anywhere up to over \$1000 for high-end premium binoculars.

Telescopes come in many sizes and designs. A lot of good astronomy can be done with a six-inch aperture telescope for a very reasonable price. Besides aperture, the other aspect to look for is focal length. This is expressed as a length in millimeters or as an F-ratio times the aperture size. Longer focal lengths allow higher magnifications, while shorter focal lengths allow greater fields of view. Choose higher magnification for the moon and planets. Choose wider field for deep sky objects such as open clusters and galaxies.

Telescopes can range in price from \$329 for a six-inch reflector on a simple mount (called a Dobsonian Mount) up to many thousands of dollars for a large aperture, computer-controlled model on a fork mount or equatorial mount. A low cost reflector is probably the best choice for a person just starting out in the world of astronomy. These telescopes are easy to use, rugged and simple to maintain. A properly cared for 6" reflector can provide a lifetime of service. More expensive (larger) telescopes can be purchased as interest in astronomy grows.

An excellent way to find out what type of telescope is right for you is to join an astronomy club. In any astronomy club there are members with many types and sizes of scopes. Astronomy club members love to share their hobby. It is an excellent place to find out about astronomy and the pros and cons of various telescope designs.

A word about eyepieces. Eyepieces are just as important as the telescope. Magnification is determined by dividing the focal length of the telescope's objective (lens or mirror) by the focal length of the eyepiece. A new telescope usually comes with one or two low power eyepieces. These will suffice for starters, but higher power looks at the moon or Jupiter will require an additional eyepiece or two. Don't skimp too much here. A good quality eyepiece is worth its price. Don't forget, members of your local astronomy club can provide advice on eyepieces as well as telescopes.

So, now you have your scope and a few eyepieces. What are you going to look at? There are a few good resources available. Buy a copy of Sky and Telescope magazine and a copy of Astronomy magazine. Subscribe to the one that you like the best. Both offer articles on things to observe each month as well as monthly maps of the night sky. Sky and Telescope's web site skypub.com has many resources about astronomy including more information on selecting a telescope.

One additional resource to consider is a star atlas. The "Bright Star Atlas 2000.0" is an economical choice for \$9.95. It is available from Willmann-Bell at willbell.com. Another more expensive choice is Sky Atlas 2000. It is available from Sky Publishing at skypub.com. Both companies have many other books available to further your interest in astronomy.

The following companies offer various telescopes and some binoculars.

Meade Instrument Company	meade.com
Celestron International	celestron.com
Orion Telescopes and Binoculars	telescope.com

Books and Charts are available through the following companies.

Willmann-Bell	willbell.com
Sky Publishing	skypub.com

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