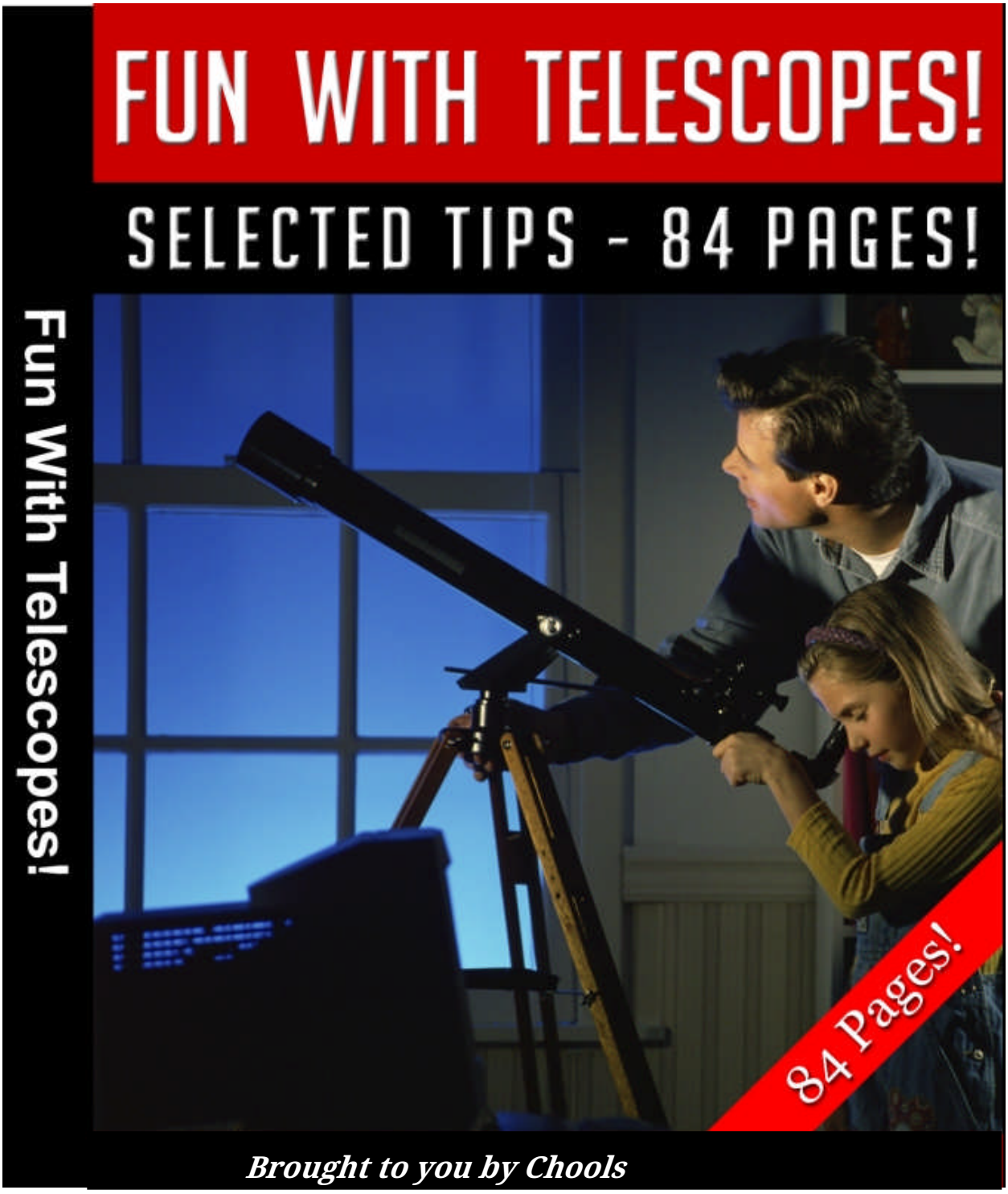
FUN WITH TELESCOPES!
SELECTED TIPS - 84 PAGES!
Fun With Telescopes!
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Contents

History Of Telescopes

In 1609, an Italian mathematician named Galileo Galilee peered through an odd new device he had invented to look at the stars in the night sky. Suddenly, this well known and familiar place revealed itself as a barely exposed mystery. It was then that Galileo knew this was a ground breaking device.

The moon is a gray-white orb to the naked eye. Looking through this new instrument, Galileo was able to see shadows and bright spots on the surface of the moon. He could see that the moon also had mountains and valleys.

At the time, the planets were thought to be odd stars that “wandered” the sky. Through Galileo’s device, he could see that the planets were accompanied by moving pinpoints of lights which were moons of their own!

Galileo quickly published his discoveries in a bulletin he titled “Message from the Stars”. His claims, at first, were met with wonder and excitement. He presented his new device to the leaders of the time including the Catholic Church in Rome.

Eventually this device would be named “telescopio”. In Greek, telescopio means “to see at a distance”. This would eventually evolve into the word telescope, but it certainly was an apt name for this new invention.

Galileo’s telescope was a simple instrument compared with the ones we use today. It was a tube with two lenses: the convex primary lens that curved outward and the concave eyepiece lens that curved inward. He built the device after hearing about the newly invented spyglass which was an instrument used by the military to peer into enemy camps.

This first telescope used the same principle that all telescopes would eventually rely on. That principle held that the combination of the two lenses gathered more light than the human eye could collect on its own. The lenses would focus that light and form an image. Because the image was formed by the bending of light, or refraction, these telescopes came to be known as refracting telescopes, or simply, refractors.

Galileo's best telescope magnified objects about thirty times. Because of flaws in its design such as the shape of the lens, the images tended to be blurry and distorted. However, the early telescope was good enough for Galileo to explore the sky.

Even though the introduction of the telescope was met with excitement, as his investigations progressed, Galileo began to make enemies. Some people argued that the telescope made people see illusions. Others claimed that the planets' details couldn't be seen with the naked eye and therefore didn't matter.

The hostility arose from a dispute about the way the universe worked. After all, this was a radical new concept that refuted the accepted norm of how people looked at the world. Remember at one time, people thought the world was flat until Christopher Columbus provided proof that it wasn't!

At the time, one belief about the universe was outlined by the astronomer Ptolemy a long time prior. His belief was that the Earth was the center of the universe and that everything revolved around it. Another astronomer, Copernicus, put the sun in the center of the universe.

The politically powerful Catholic Church promoted the belief that the Earth was the center of the universe. They also believed that the celestial bodies were perfect spheres – smooth and round devoid of any mountains or valleys. You can imagine the controversy the telescope generated with the new theories Galileo was putting forth.

In fact, Galileo was uncovering evidence supporting the Copernican theory. For instance, he saw that Venus has phases just like the moon which showed that the planet was moving around the sun and not the Earth. Also, he could see that Jupiter's moons were clearly moving around Jupiter and not Earth.

The Evolution Of The Telescope

Back in the early 17th century, a mathematician in Italy called Galileo Galilee devised a new instrument which he used to peer at the night-time sky and found that he could make far-away objects like stars and the moon seem much closer with this new device. Galileo realized that his invention - which we now know as the telescope - had the ground-breaking potential to reveal the secrets of the universe by revealing things not apparent to the naked eye. This was the origin of our modern-day telescopes.

Even the crude telescope created by Galileo is based on the same scientific principle our modern telescopes use - which states that two lenses can collect more light than that gathered by the naked eye, then focus the collected light onto one point so that an image can be seen through the lenses. Since light is "bent" or "refracted" to show this image, such telescopes were eventually named refracting telescopes (or just refractors, for short.)

Refracting telescopes are not the only types of telescopes that have evolved from Galileo's prototype. Telescopes slowly evolved as the technology behind them became more advanced. You may discover that telescopes were made into bigger versions since astronomers wanted to peer more deeply into the mysteries of the night-time universe. At one point, telescopes were even made to somewhat ridiculous proportions as part of this developmental trend. Modern advancements in telescopes can be attributed to the growing needs of professional astronomers, and the government of many countries, as well as commercial users for better telescopes. For instance, the Hubble telescope of NASA is so strong that you can see images that are actually many hundred light-years away from the earth.

Telescope manufacturers then took development one step further by incorporating cameras into new telescope designs. You can attribute the up-to-date pictures of other galaxies you can see nowadays to this advancement. Try looking at the Milky Way as captured by these new telescopes and you will find yourself bowled over with the sight.

Even if you are simply a hobbyist who just likes to look at the stars at night, you will be glad that Galileo stumbled upon the principle of making telescopes. And since telescopes also allow us to study the universe surrounding us as if we were in the midst of it all because of the advancements of telescope technology, we now know much more than ever before.

Historical Timeline For Telescopes

It seems all the technology for telescopes started back in 2560 BC. Artisans in ancient Egypt polished rocks, glass, and semi-precious stones to make eyes for the sarcophagi. What follows is some major points in the history of how telescopes came to be today.

In 470 BC, Mozi, a Chinese philosopher, focused the sun's rays by using concave mirrors.

In 4 BC, Seneca the Younger used water to magnify letters and words.

In 23, Pliny the Elder discovered doctors using a crystal ball with the sun's rays beaming through it to cauterize wounds.

In the ninth century, telescopes were possibly made from Visby lenses, a Middle Eastern glass.

In 1520, Leonard Digges, an English mathematician, invented two telescopes – Reflecting and Refracting.

In 1608, A Dutch lens maker, Hans Lippershey, applied for a patent on a design for a telescope.

In 1609, Galileo improved on Lippershey's design and renamed it “perspicillum” - An Italian word for telescope.

In 1616, Niccolo Zucchi invented a reflecting telescope.

In 1663, James Gregory, a Scottish mathematician, produces a telescope with a parabolic primary mirror and an elliptical secondary mirror.

In 1668, Isaac Newton designed a telescope using a parabolic primary mirror and a flat diagonal secondary mirror.

In 1733, Chester Moore Hall created the achromatic lens.

In 1880, Ernst Abbe invented the first orthoscopic eyepiece.

In 1910, The Ritchey-Chretien telescope that is used in many of the large astronomical telescopes is invented by George Ritchey and Henri Chretien.

In 1930, The Schmidt camera is created by Bernhard Schmidt.

In 1937, Grote Reber developed a telescope for wavelengths ranging from radio to Xrays.

In 1944, The Maksutov telescope is designed by Dmitri Maksutov.

In 1962, The UK launched an orbiting solar telescope.

In 1990, the Hubble Telescope was launched into space.

In 2013, the James Webb Space Telescope will be launched and take the place of the Hubble.

And this all started with the polishing of a few stones.

How Telescopes Work

A telescope is a device that allows us to bring distant objects closer to us so that we can study them. A good example is the many planets, galaxies, and stars in outer space. Some range from $1 at the toy store to the $1.2 billion Hubble Telescope. There are two types of telescopes. Refractors use a glass lens. Reflectors use mirrors instead of a lens.

Let's take the different pieces of a microscope and see how they work. The objective lens in a Refractor or primary mirror in Reflectors gather incoming light and brings it to a focus. The eyepiece takes that same light and magnifies it to take up a large part of the retina of the eye. Thus, it takes a small image and spreads it out to make it look bigger.

There are two general principles to any telescope. One is how well it can collect light. The other is the magnification of the image you are viewing. Collecting light is related directly to the diameter of the lens. The more light collected, the brighter the image.

Magnification is the ability to take an object as a far distance and enlarge it so you can see it clearly. Any magnification can be obtained by using different eyepieces depending on the object you are trying to view.

Here is a simplified explanation. Obtain two magnifying glasses and a piece of paper. Hold one of the glasses between you and the paper. At this point, the image will be blurry and unreadable. Take the second glass and place between your eyes and the first glass. Moving the second glass up or down should bring the piece of paper into view. It will be larger and upside down though. Give it a try and see what happens.

Buying A Telescope

There are actually some technicalities that go into buying your first telescope. Many times what people think they want and what they really want are two very different things. Just like with any other large purchase, you have to ask yourself two simple questions:

1. **What do you really want to do with your telescope?**
2. **How much money do you want to spend?**

It's often a good idea to start out small and work your way up to "bigger and better". If you don't have much money to invest, you may want to start out with a pair of binoculars. Even the cheap ones will amaze you with how much you can see of the night sky.

Binoculars are classified according to their optics (7 x 10 for example). The first number is the magnification factor and the second number is the size in millimeters of the objective lens. Obviously, the larger the first figure is, the larger the magnification is, but you will have a smaller field of view. The larger the second figure, the more light is gathered by the binoculars and therefore fainter objects become visible.

Seven to ten times magnification is the optimum you should look for in a pair of binoculars for general use. The objective lenses should be between 40mm and 50mm. If there is anything less then the light grasp may be insufficient, anything greater and (apart from the additional expense) the binoculars will start to become too heavy to easily hold by hand.

Many binoculars suitable for astronomical use start in the 7 x 40 to 10 x 50 bracket. If you do decide to buy something larger, say 10 x 70, you will almost certainly have to consider mounting them on a tripod - they will be difficult to hold by hand. Up to 20 times magnification may be considered in a set of binoculars but again, a tripod will become a necessity. In any event do find out if the binoculars have the facility to be tripod mounted - not all of them can!

Binoculars will bring into view the brighter star clusters, galaxies and nebulae. They can be used to help locate an object with a telescope, identifying the chosen target before bringing the telescope to bear on it. Bright variable stars, comets, satellites and large scale night sky features are all well suited to observation with binoculars. The bright planets can also be spotted

in twilight with binoculars so overall they are a useful instrument for both the beginner and the experienced astronomer.

A good pair of binoculars will run you anywhere from $50 to $250. Of course, this will depend on where you buy them and your area, but this is a good general number to expect to pay.

Finding The Telescope That Meets Your Needs

There are so many choices of telescopes out there. What do you buy and what do you really need? Here are a few things to keep in mind so you don't buy a telescope that won't meet what you need or want it to do.

High power magnification is not always the primary consideration. You should have 40-60x magnification per 1 inch of aperture. The scope's ability to enlarge an image is dependent upon the lenses used and the focal length within the scope itself. Most objects can be seen at the lowest magnification because there is more light being focused.

The most important feature to think about when buying a telescope is aperture. Buy as much as you can afford. Remember, though, the biggest telescope is not always the best one. The aperture sizes that follow are usually sufficient: Refractors – 3 inches or 80 mm, Reflectors – 4 to 8 inches or 10 to 20mm, and Compound Telescopes – 6 to 8 inches or 16 to 20 cm.

A focuser can move the eyepiece up and down helping to adjust the focus for each observer. There are two types of focusers – Friction Focusers and Rack and Pinion Focusers. Your telescope should never shake once while you are using these. In some telescopes, you may not get a choice.

Check out the eyepieces that come with your telescope. Some don't come with any. Make sure you have a couple so you can vary the magnification of the object you are viewing. You also need to be sure that the eyepiece will fit the eyepiece holder in your telescope as not all fit all telescopes.

The type of mount you use is extremely important. Ensure it has a low center of gravity so it doesn't tip over. It should not vibrate and it should be held in place at a comfortable height for you.

Factors To Consider When Purchasing A Telescope

When you go to purchase your first telescope, there are many things you should consider before buying it. Among them are portability, Maintenance, Storage Space, and Price. The goal is to get the most viewing ability for what you can afford.

If you live in the city and long for some clear skies at night to view, you may have to move the telescope to a better seeing area. Usually in the country or rural area, you can get a beautiful expanse of sky in which to use to view your objects. Make sure your telescope is easy to carry and will fit in your car. Another good rule is to make sure you know how to assemble it in the dark.

Maintenance is upkeep of the telescope and its pieces. Probably the most common maintenance will be keeping the mirrors or lenses aligned properly. Also, the open ended telescopes are famous for collecting dust and debris. You may have to clean the mirrors and then realign them.

When you are not using your telescope, find a safe place for it to stay. You need a space that is dust and moisture free as possible. Cover your telescope, when not in use, to prevent dirt and dust from getting into it.

The prices for telescopes vary these days from inexpensive to expensive and everything in between. They can range from the $2 toy store model to a few thousand dollars. So know what you are looking for before you buy. You may even try a used one to see if the type is really what you want. Depending on the type, here are some average costs for a few common telescopes: Small Reflectors - $250 to $1000, Achromatic Reflectors - $250 to $1000, Large Reflectors - $300 to $2000, Compound Telescopes - $1000 to $3000, and Apochromatic Refractors - $2000 to $10,000.

Terminology

Beginners often have trouble describing distances on the sky. The problem is that distances on the sky can't be expressed in linear measures like feet or inches. The way to do it is by angular measure. Astronomers might say the two stars are 10 degrees (10°) apart. That means if lines were drawn from your eye to each star, the two lines would form a 10° angle at your eye.

Hold your fist at arm's length and sight past it with one eye. Your fist from side to side covers about 10° of sky. A fingertip at arm's length covers about 1°. The Sun and Moon are each ½° wide. The Big Dipper is 25° long. From the horizon to the point straight overhead (the zenith) is 90°.
There are finer divisions of angular measure. A degree is made up of 60 arc minutes, and each arc minute is made up of 60 arc seconds.

If two objects appear a quarter degree apart, astronomers might note that as 15 arc minutes (abbreviated 15'). The brightest planets usually appear just a few dozen arc seconds across as seen from Earth. A 5-inch telescope can resolve details as fine as 1 arc second (1") across. This is the width of a penny seen at a distance of 4 kilometers (2½ miles).

Seen from Earth, the night sky looks like a huge dome with stars stuck on its inside surface. If the Earth beneath us vanished, we'd see stars all around us — and we'd have the breathtaking sensation of hanging at the center of an immense, star-speckled sphere. Astronomers designate the positions of stars by where they are on this celestial sphere.

Picture the Earth hanging at the center of the celestial sphere. Imagine the Earth's latitude and longitude lines ballooning outward and printing themselves on the celestial sphere's inside. They now provide a coordinate grid on the sky that tells the position of any star, just as latitude and longitude tell the position of any point on Earth. In the sky, "latitude" is called declination and "longitude" is called right ascension. These are the standard celestial coordinates.

Declination is expressed in degrees, arc minutes, and arc seconds north (+) or south (–) of the celestial equator.

Right ascension is expressed not in degrees, but in hours (h), minutes (m), and seconds (s) of time, from 0 to 24 hours. Astronomers set up this arrangement long ago because the Earth completes one turn in about 24 hours. So the celestial sphere, with its coordinate grid permanently printed on it, appears to take about 24 hours to complete one turn around Earth.

There's a slight complication. A star's celestial coordinates gradually change over the years, due to a slow shift of the Earth’s orientation in space called precession.

When right ascension and declination are given in books and atlases, you'll often see them accompanied with a year date such as 2000.0. (The ".0" means the beginning of the year: midnight January 1st.) This is the moment for which the coordinates are strictly correct. For most amateur purposes this refinement is too small to matter.

The brightness of a star (or anything else in the sky) is called its magnitude. You’ll encounter this term often.

Astronomy 101

If you want to learn the basics of the night sky, the first thing you should get is a planisphere or a rotating star finder. Be sure to get one for the right latitude zone where you will be observing from. With the help of this planisphere you will be able to identify the constellations on any night during the year. Use this planisphere together with beginner's books on the subject for easier identification of constellations and planets.

When going outside with your planisphere and beginner's book, the only additional equipment you need is a red LED flashlight. This will enable you to read in the dark and preserve your dark adaptation. With these three basic tools you will not only learn to recognize the constellations, you will also learn about planets, comets, the moon, asteroids, meteors, stars and all the different types of deep sky objects.

You will also want to join some astronomy clubs, newsgroups, or Internet chat boards. A great one I've found is on Yahoo called Starry nights. Here you can chat with other astronomy buffs and find the locations of some things you may have never even considered. The camaraderie you can find in these groups can be very helpful and help you meet new people.

Another good idea is to spend some time with maps and guidebooks. They'll reveal dozens of star clusters, galaxies, and nebulae. They'll show the ever-changing positions of Jupiter's moons and the crescent phases of Venus. You can identify dozens of craters, plains, and mountains on the Moon. You can split scores of interesting double stars and follow the fading and brightening of numerous variable stars: IF you know what to look for.

Plan indoors what you'll do outdoors. Spread out your charts and guides on a big table, find things that ought to be in range of your equipment, and figure out how you'll get there. Plan your expeditions before heading out into the nightly wilderness.

You will also need to gain a bit of knowledge about celestial coordinates, what they mean, and how to find them. Newcomers to astronomy can get thrown for a loop when they first encounter declination and right ascension, the terms astronomers use to define coordinates in the sky.

Why are the positions of stars that are light-years away in the depths of space stated in a system that's tied to latitude and longitude here on Earth?

The celestial coordinate system, which serves modern astronomy so well, is firmly grounded in the faulty world-view of the ancients. They believed the Earth was motionless and at the center of creation. The sky, they thought, was exactly what it looks like: a hollow hemisphere arching over the Earth like a great dome. What about the stars? They're like fireflies stuck to that big, blue-black thing up there according to Timon from The Lion King.

The celestial dome with its starry decorations had to be a complete celestial sphere, early sky watchers realized, because we never see a bottom rim as the dome tilts and rotates around the Earth once a day. Part of the celestial sphere is always setting behind the western horizon, while part is always rising in the east. At any time half of the celestial sphere is above the horizon, half below.

Zodiac Constellations

According to astrology, the period of the year which each sign of the zodiac dominates is determined by the time in which the Sun is "in" its corresponding constellation. For that reason, it is not actually possible to observe a zodiacal constellation in the night sky during the time its sign is dominant.

Instead, look for your constellation in the exact opposite time of the year. For example, Sagittarius is designated as from November 22 to December 21. However, if you want to observe Sagittarius, you will have to wait until summer to see it. Instead, spend your observing time viewing Taurus.

Aries

Aries the Ram is an autumn constellation, and can be best viewed in the night sky during the month of November. Aries marks the beginning of spring or the Vernal Equinox.

This constellation dates from Greek and Roman times, and depicts the Golden Ram that was sacrificed by Phrixus to bring fertility to his homeland in Thessaly. The Golden Fleece of the sacrificed ram was given to Jason and the Argonauts to return it home. It is visible between latitudes 90 and -60 degrees.

Taurus

Taurus the Bull is an autumn constellation, and can be best viewed in the night sky during the month of December. The constellation of Taurus lies along the winter Milky Way, and therefore contains many objects (primarily open clusters) of interest to the amateur astronomer. Some are large enough to be seen easily with the naked eye, while others need moderate telescopic apertures to appreciate.

As for the myth behind Taurus, it goes like this. The delightful daughter of Agenor, Europa, was so beautiful that Zeus immediately fell in love with her. Determined to win Europa's heart, Zeus

assumed the form of a milky white bull, whose horns were crowned with flowers, and mingled with the herds of Agenor.

Gemini

Gemini the Twins is a winter constellation, and can be best viewed in the night sky during the month of January. Gemini lies right along the Milky Way, and the ecliptic (the region in which the Sun and planets are constrained) passes through it.

Mythology tells the story like this. After Zeus, disguised as a graceful swan, visited Queen Leda of Sparta, she gave birth to twin sons, Castor and Pollux. The two were devoted and loving brothers who later became as different in nature as they appeared alike as twins.

The mortal Castor developed into a master horseman, while the immortal Pollux became a famous boxer. Together, The Twins grew to become skillful warriors.

Andromeda

The constellation of Andromeda contains many galaxies, most of which are relatively faint. They challenge the observer not only to find them, but to detect detail in them. Andromeda lies away from our galaxy's plane, and lets us see the inhabitants of intergalactic space. Some of the finest objects of their respective classes reside in these constellations, and it is well worth braving cold weather to observe them.

In mythology, the story is as follows. As the frightful sea monster, Cetus, ravaged the Ethiopian coast, Cassiopeia pleaded with Zeus, the all-powerful King of Gods, for his help in driving Cetus from her shores. Zeus ruled that Queen Cassiopeia and King Cepheus must sacrifice their only daughter, Princess Andromeda, to soothe the anger of Poseidon.

After much hesitation a tearful Cassiopeia gave up Andromeda, who was chained to a rocky ridge at the edge of the sea so that Cetus might come and devour her. As Andromeda awaited her sorrowful fate, the brave champion Perseus miraculously appeared and disposed of the sea monster for all time. Perseus then released Andromeda, and the princess sailed away with the hero to become his bride. The two went on to live a long and happy life together.

Pegasus

A snow white, winged horse with a mane of glittering gold, Pegasus was the son of Poseidon and the Gorgon Medusa. As Perseus beheaded Medusa, Pegasus was born from its blood which fell into the sea, creating frothing foam.

One fated day, Athena gave Pegasus to the warrior Bellerophon to aid him in defeating the Chimaera, a dreadful monster which was part lion, part serpent and part goat. Bellerophon was so proud after his successful conquest that he boldly attempted to ride Pegasus to Mount Olympus, home of the Gods, where mortals do not dwell.

Zeus became infuriated at Bellerophon's self importance and caused the flying horse to throw his rider. Alone, Pegasus soared to the heavens where he became the Thundering Horse of Zeus and carrier of the divine lightning.

Build Your Own Telescope

It is important to understand how a telescope functions if you intend to build one yourself. A telescope can magnify images of objects at a distance by using lens to bring them into clear focus. There are various ways you can use to make your own telescope.

Try perusing online sources that teach you how to make telescopes. Many amateurs are experts at building telescopes, and their work meets the same standards of the commercially-built telescopes sold by retailers today. You can also just buy or borrow books about building telescopes.

Here are some instructions you can follow to build a simple telescope. **You will need the following things:**

- A piece of paper that has printing on its surface
- One ruler
- A pair of scissors
- A colored marker
- Tape (you should use duct tape for best results)
- A long tube made of cardboard (you can get these from your aluminum foil or paper towel rolls in the kitchen)
- A pair of magnifying lens, with one of stronger magnification strength than the other - you can use lens from old reading glasses or from magnifying glasses for this

1. Get the lens of stronger magnification or that is bigger. Place your printed paper on top of that lens. You should then lay the smaller or weaker lens over the printed paper - your paper should be sandwiched between either lens. You will see blurred printing so you need to gauge the distance when the printing becomes a clear image by shifting the distance of the lenses from the paper until a clear image is achieved. (Get someone to measure the distance for you.)

2. Now take your cardboard tube and slash a large enough slot about one inch from its end which will allow the larger lens to be fitted within it. From that slot, measure the distance you got from Step One above - then cut a slot in which the smaller lens can fit in snugly.

3. Insert the lenses in their slots in the cardboard tube as specified. You can keep them in place by using duct tape (or other tape) to fix them in the slots. If necessary, you may shorten the tube by around two inches from the small lens' slot to make the telescope easier to handle. Peer through your telescope tube to check if your printed paper can be seen clearly through the two lenses. If you need to, adjust the lens.

And now guess what? You have created your own simple yet functional refracting telescope.

Learn How To Build Telescopes

For some people, making telescopes can be quite easy because they make simple telescopes based on basic magnification principles. But for others, the project gets more difficult because they want a telescope that can allow them to peer at stars at night and that type requires more money, energy and time to create. It mostly depends on what you want.

You first need to choose whether to build a refracting telescope or a reflector telescope. This will tell you what supplies you require to buy for making your type of telescope. Both refracting and reflecting telescopes are functional enough for star gazing, but require different types of materials to build.

To start off, look for websites which teach you how to build homemade telescopes. On those sites, you will find instructions for the project as well as what types of supplies you need for it. Those who prefer to consult books can check their local library or bookstores (probably in the do-it-yourself section.)

Supplies for your project can be found at hobby stores. You can consult the staff at these stores about which products are the best supplies you can get. If you prefer the online stores, you will find many specialty sites which offer good quality telescope parts' supplies**. Look for the following sites** which have good reputations as parts suppliers:

*** www.telescope.net**
*** www.photonics.com**
*** www.atscope.com**
*** www.universityoptics.com**

The more creative types of hobbyists will use ordinary materials as parts for their telescope project. For instance, you could try making your own telescope out of simple materials like wood, cardboard, duct tape and PVC pipes and see how well you do. Surprisingly, many amateur hobbyists find that these materials are pretty good to use as parts for their home-made telescopes. And they don't look too bad either.

As in any project, it is the actual construction of the telescope that is often the difficult part. But if you do your research thoroughly then follow the instructions closely you will probably be able to build a reasonably-functional telescope for your personal use. Just don't get frustrated if the process seems to take much longer than you initially expected, and maybe require some trial and error effort.

If the instructions you got for building the telescope seem rather complex, you will find it easier if you use a notepad to jot down the steps you are following as you go along. You avoid getting confused this way.

Make Your Own Telescope

A telescope really isn't a very involved piece of equipment. You can make your own telescope with just a few items and little bit of know-how. In this section, we'll show you how to illustrate the concept of a telescope.

Basic

This device shows the basic concept behind a telescope and would be great to use in a classroom as it can show the children just how a telescope can be used. It is only for the concept of telescopes, and probably not for looking at the stars. Although I guess you could try it if you wanted!

The materials you will need include:

- A pair of "drugstore" reading glasses ("Weak" glasses—those with low numbers—will work the best)
- A magnifying glass
- A flashlight
- Masking tape
- A piece of waxed paper or thin typing paper
- A friend

The reading glasses serve as your objective lens and you will want to keep them steady. Use the tape to secure it someplace where one of the lenses is taped down and the other is sticking out. This could be a chair leg, a coat rack, or anyplace else you can think of, but one of the lenses must be sticking out into space.

Set the flashlight on a table four meters (thirteen feet) or more from the glasses. Turn the flashlight on and shine it at the lens.

Hold the paper in front of the lens on the side opposite from the flashlight. Then walk away from the lens, perhaps as far as a meter, until you see a small image of the flashlight on the paper.

Normally, this image is formed inside the tube of the telescope and can't be seen directly. This is the focal point of the objective lens.

Have your friend hold the paper at the focal point. Face the back side of the paper and look at the image through your magnifying glass. Adjust the position of the magnifying glass until the flashlight image is magnified.

Have your friend take the paper away, but continue looking through the eyepiece of your telescope. The image should be a lot brighter since the paper won't be diffusing the light.
Try looking at other objects that are near the flashlight by slightly moving the eyepiece up, down, and from side to side.

And that’s it!

You can make your own fully functional working telescope and there are places on the Internet as well as in books that can teach you how to do this. It can be very complicated if you choose to do it on your own, so you might want to consider buying a kit that comes with everything you need.

Of course, if you’re lazy like me, I’d much prefer to shop around for one already made professionally so I don’t spend a lot of money for something I might mess up! However, you can get a lot of personal satisfaction by showing people you are savvy enough to actually make your own working telescope!
I say more power to ya!

Eyepieces For Telescopes

Beginner astronomers need to be careful with these items as they tend to go way overboard. There are various designs and different lenses for different viewings. You need to figure out what you will be looking at and go from there. You may need two to three different eyepieces, but no more than that. Here is a simple guide to the different eyepieces and cost involved.

The most popular is the Plossl. It uses four to five elements and have a wider field of view than Orthoscopic lenses. It usually ranges from 50-52 degrees. They run between $50-$150.

For general use, **the Orthoscopic lenses** were considered the best. They use four elements and are good for planetary viewing. They have a 45 degree field of view. They run between $40-$100.

The Kellner is a general purpose lens. It has a three element design and a 40-45 degree field of view. They run between $30-$50.

The Ramsden and Huygenian are good solar lenses. They have two element designs. They are supplied with the least expensive telescopes and have very narrow fields of view. They cost between $25-$40.

Barlow lenses are a great piece to have. They can double or triple the magnification of your eyepiece. They run between $60-$100.

Erfles are not as favorable today. They use six elements and a 60-65 degree field of view. They run between $75-$150.

Televue has come out with some designs for eyepieces. The six elements Panoptic has a 67 degree field of view. It runs between $200-$400. The other is a seven to eight element Naglers. This lens has an 82 degree field of view and runs between $175-$425.

Pentax also makes a seven element lens, the SMC-XL, that runs around $250 each. It is thought that these exceed what the Televues can do.

Why Using A Telescope Building Kit Is Convenient

Anyone who wants to try building a home-made telescope has two choices. You can either scrounge around for the right set of instructions and materials to use or you can buy a telescope building kit which has all the instructions plus telescope parts already pre-packaged for you when you buy it. Obviously, buying a telescope building kit is the more convenient option.

You may find that the telescope kits being sold nowadays will help you build a Dobsonian telescope. Such kits will contain a finder scope, the eyepiece, the focuser, a "spider" (which acts as the support system for the secondary mirror), and the primary and secondary mirrors. However, these telescope kits lack the mirror cell, the external tube which acts as the body of your telescope, and the base which keeps your telescope upright.

Some people buy telescope kits because they are a cheaper alternative to buying the expensive telescopes that may cost you hundreds of dollars per telescope. It is possible to buy telescope kits which are priced from $200 to $300 apiece, both from the regular hobby stores and the online merchants.

Teachers might ask their students to buy telescope kits so that the youngsters can learn how to build their own telescopes and start becoming junior astronomers at a young age. The basic type of telescope kit can be used by students for night-time star-gazing and is pretty good for letting students get confidence in their crafts-building skills while learning more about astronomy.

Telescope kits are ideal for beginners since they were designed to be assembled by even ordinary people. Though the awesome power of the end product - the telescope - may not be that strong, they are good enough to let budding astronomers get a decent look at the moon and stars.

You will probably require 15 to 20 hours to put together your own telescope using a telescope building kit. That means the entire process may take from two to three days per kit. Better check your kit as soon as you buy it to make sure that all the parts were included - if not, you can always ask for replacement parts or a completely new kit from your supplier.

True, it is always possible to make your own telescope from scratch without a kit. But a telescope kit may wind up being less costly in terms of time and money used in the final analysis.

Learn About Our Universe Using Telescopes

The first telescope was created by Galileo because he wanted to see planets and stars closer than is possible with the naked eye. If you want to experience watching the stars, planets, and constellations at night, then you can buy your own telescope too - or make one if you know how. Modern-day telescopes are more powerful than their earlier counterparts and permit us to do better research about the night sky than was earlier possible.

People have been fascinated with these heavenly bodies for as long as people have walked the earth. But with most telescopes, you will be able to see details about our moon, and the stars that will amaze you. This may explain why so many people have invested into buying telescopes for themselves - so that they can be amateur astronomers too like many others around them.

Looking into the lens of high powered telescope and you will be able to spot the various craters and crevices on the moon surface. Stars millions of miles away may seem almost close enough to touch. And you will finally be able to figure out which constellations are which, so you can bone up on the ancient mythology regarding the stars.

The great thing about telescopes is that they allow us to discover facts about our universe that were not apparent in the past, like the existence of other moons and planets outside our small solar system. If you want to learn more new things about the universe yourself, then you will enjoy using your telescope in that respect.

Since telescopes come in varying sizes and degree of magnification, their prices also vary accordingly. For die-hard fans of astronomy, there are pretty strong telescopes that will really grab your attention. But if you just like looking up at the sky, then an inexpensive and smaller telescope will probably do.

If you like a challenge, make a personal telescope for yourself. You can use the readily-available hobby kits, or find a supplier of telescope parts so you can assemble one from step one onwards. If you succeed, you can be proud of using something you made yourself.

Another nice thing about telescopes is that age doesn't matter. Everyone - from toddlers to the elderly - can take part in this fascinating hobby. And since the pattern of the night-time sky changes every night, you will never get bored. There is always something new to see in our universe, if you care enough to look.

Basic Tips For Using Telescopes

Telescopes tend to come in two different types – Reflectors and Refractors. A Reflecting telescope is good for looking at galaxies and star clouds, and they allow the observer to see sharp images. They are also less expensive than refractors because they usually have just one surface that helps to focus the light.

Refracting telescopes can be used to view stars and planets, but they are quite expensive. These types of telescope at the other end.

Perhaps the best way to start is with a pair of binoculars. They are quite portable and have a wide field of view. They are also less expensive than a telescope and they can be used for other purposes as well. Comets have been discovered by people using binoculars. In fact, did you know the binoculars you have packed away in the closet at home are more powerful than Galileo's first telescope?

You don't need motors to drive the telescope either. After a bit of playing with it, you will be able to guide the scope by hand to where you want to look. You only need a motor if you are trying out astrophotography.pes are usually in the form of a long tube with an eyepiece on one end and the lens a

Make sure your tripod is mounted firm. You don't want it falling over while you're focusing on a particular star. The simplest telescope out there is called a Dobsonian Reflector telescope. It sits on a “Lazy Susan” type of mount and is very affordable.

Finder scopes are good to have on your telescope as well. This is a smaller telescope that is mounted next to the eyepiece. This piece of telescope equipment will make finding your specific object easier.

Try out different telescopes and equipment and see what works best for you. If you want to try it before you buy a complete set, consider buying a used telescope. There are all kinds of options out there for your particular viewing pleasure.

Understanding The Value Of Telescope Lens

In your standard refracting telescope, the telescope lens is important to have if you want to see distant objects clearly. This lens "refracts" or bends the light that enters so that the image seems closer than it really is. A refracting telescope will have one lens which is bigger than the other lens but you need both to get optimal magnification of any object.

You can also say that the eyepiece of your telescope functions as a type of telescope lens too. That is the area of the telescope which you position your eye to, to look through the tube with. Some might say the eyepiece is very important for proper functioning of your telescope.

A low power telescope will have only one eyepiece though some have absolutely no eyepiece at all. You might have to buy other eyepieces just to change the magnification power of the telescope. You will find eyepieces are made in varying designs plus degrees of magnification. Just choose one which meets your need.

An eyepiece design changes based on how many and what type of lenses are used - these are called the elements. **The quality of your eyepiece are based on**:

*price
*barrel size (measuring either 2 inches, 1.25 inches, or 0.965 inches)
*distance between your eye (the focal point) and the lens - this is a vital concern for eyeglass users
*absence of aberrations (ghost images, or chromatic aberrations)
*sharpness
*brightness
*field size
*optical quality

Try to get better lens if you are presently using the Huygens and Ramsden type of telescopic lenses. This type of lens has problems, like chromatic aberrations. These lens are used with the less costly telescopes sold by department stores for amateur astronomers.

Try to get telescope lens that have an orthoscopic design because these are good for use by both amateur and experienced astronomers. The orthoscopic design lens have an eyepiece with four lenses, and a rather 45-degree narrow field of vision. The advantages of such a design is that you get a crisp perspective and good eye relief. Thus, star-gazing is made less stressful with this type of lens.

The Barlow lens is a practical choice for those willing to pay between $30 to $70. This lens can improve magnification while offering improved eye relief with any existing eyepiece.

Lastly, it is best to use an adjustable lens for your telescope, or a lens that can be used for gazing at both planets and stars.

When looking at telescopes for purchase , look for the lens that adjusts or can be adapted for both star gazing or planet viewing.

Achromatic Versus Apochromatic Lenses In Telescopes

In 1733, an Englishman, Chester Moore Hall, created the Achromatic refracting lens. His design limited the color aberrations by using two pieces of glass that were both ground and polished. These lenses usually were employed to see red and blue light. However, the design does not block out the entire rainbow of color around the images.

Achromatic lenses are made from a convex and a concave lens. The concave lens is usually made out of Flint glass, and the convex from Crown glass. They form a weak lens together and can bring two wavelengths of light into a single focus.

Apochromatic refracting lenses are made to view red, green, and blue light wavelengths. The first ones were designed by the German physicist, Abbe. Some type of fluorite or extra low dispersion glass is also used and the ending result is a crisp clear image free of the rainbow of color around it. These types of refracting lenses are more expensive than the achromatic lenses.

Apochromatic lenses require lenses that can handle three color crossings. They are usually made from expensive fluoro-crown glass, abnormal flint glass, or transparent liquids that are used in the space between the glass. These newer designs allowed for the objects to be free of color around the edges, and they produced way less aberrations than achromatic lenses.

Prices on these types of refracting lenses can run high depending on the size aperture you need. Two to three inch apertures for Achromatic refractors can run between $250 to $1000. Three to five inch apertures for Apochromatic refractors can run between $2000 to $10,000. Decide which kind you will be using before you buy one. You may just want to look at the night sky or you may want to gaze into the next galaxy.

Why You Should Consult A Telescope Review

The telescope review of a telescope has value for those who want to know the reputation of telescopes prior to buying one. Fortunately, there are many reviews of telescopes have been published in magazines and sites geared for astronomers, created by people fond of telescopes.

Look for a telescope review which concerns itself about a specific telescope model by examining both its positive attributes and bad points. It would be great if the review gauges the telescope's features from two points of view - that of amateurs and experienced astronomers, at the same time.

You should read telescope reviews on the well-known astronomy websites that are comprehensive and written by experts well-versed about telescopes. These reviews are better because the opinions expressed are from recognized authorities on the subject.

If you want data about new telescopes and those that have been available for some time, then seek out the telescope reviews listed in astronomy magazines.
Even the old models of telescopes probably have been reviewed at some point in such magazines. If not, then why not ask the magazines to do a review about the model you have in mind? Most likely the magazine will consider your request and have a review done about that telescope soon enough.

It is cool too that the Internet now features multiple blog sites that talk about telescope reviews online. But the reviews on such blog sites are usually created by ordinary consumers who just happened to take a liking (or dislike) to a certain telescope model and wanted to write about it. So you need to be cautious about accepting what they say at face value.

This is because even though amateurs who create telescope reviews may be correct in their assessment, you need to stay focused on getting objective and factual data and not just a biased opinion. It is possible that the telescope review could be skewed towards a certain bias, so complement your blog post reading with your own research on the telescope model. So read blog posts about telescopes but maintain an open mind anyway.

Reading telescope review help immensely if you intend to purchase your first telescope, or if you plan to buy a better and stronger telescope. If so, then you need the best reviews that you can get from the best experts in the industry. It would be advisable to get information from both experienced and credible experts so that you wind up buying a product based on opinions expressed by reputable sources.

Read About The 14" LX200R Through A Telescope Review

If you are fan of quality telescopes, then maybe you have heard of the Meade company which has come out with a great telescope called the Meade 14" LX200R. This telescope model from Meade has earned multiple positive reviews since it was introduced to the telescope market. The Meade company itself has a great reputation among astronomers which may explain why its 14" LX200R has also garnered positive feedback from consumers.

A North Carolina user named Robert claims that the Meade 14" LX200R is good enough to be used by astronomy researchers. Robert says he's a bit of an authority about Meade telescopes because he bought the 80mm, the 125ETX, and the 10" LX200 models from Meade before. The 14" LX200R is a transportable telescope that features an enhanced RA drive (the equivalent of the RCX drive.) Robert noted that the special appearance of the 14" LX200R at an MASP star party brought additional recognition to this telescope model from Meade.

Though astronomers are probably glad that the 14" LX200R came into the astronomy market and has been getting great reviews, ordinary consumers might balk at the average price tag of $6,500 it commands. That makes this instrument from Meade rather expensive but a worthwhile investment for astronomers out to get the best star-gazing experience they can.

A Virginia-based user named Lana notes her astronomer friends hold the Meade company in high esteem which influenced her decision to purchase the 14" LX200R despite the high price tag. And Lana says she doesn't regret doing so because the 14" LX200R was able to provide very clear images despite being relatively user-friendly. Lana stated that she was also convinced about the features of this telescope model from Meade since her astronomy club acquaintances have also bought their own Meade 14" LX200R telescopes and are sold on its quality features. Lana believes she will probably use this Meade telescope model for years to come.

These are just two samples of the types of telescope reviews the 14" LX200R from Meade have gotten. The price you pay is well worth it because its functionality is trustworthy. Some users noted that the price is just equivalent to the quality service it renders to the owner, which is why

current owners of this telescope model say they will cherish using their 14" LX200R for as long as possible.

Learn Why That Telescope Review Of LX200R Raves About It

Users are all agog over the LX200R, a new telescope produced and sold by Meade which has been known for making quality telescopes for many years now. In fact, you may have heard about the LX200R from a telescope review or two, most of which probably rave about its great features. With the Meade reputation in astronomy to back it up, it is not surprising that users claim the LX200R is the best telescope yet ever produced by the famed company.

One loyal Meade telescope fan from North Carolina who calls himself Robert made a telescope review saying the LX200R is really one great telescope. Robert noted he has been using Meade telescopes (specifically model 80mm, model 125 ETX and model 10" LX200) for some time now, but this new transportable telescope is truly one fine astronomy instrument, especially since it features an enhanced RA drive (which is just like the RCX drive.) The telescope was widely applauded during one MASP star party he attended.

One thing that newbies in astronomy might balk at is the $6,500 average price that you will be charged when buying the LX200R telescope. But the more experienced astronomers know you have to pay to get quality telescopes and the wonderful reviews the LX200R has gotten makes them all the more willing to invest big money to get such a valuable instrument that can enhance their sky-gazing experience.

Someone from Virginia named Lana who purchased her own LX200R says she was motivated to buy this costly telescope to replace the cheap model she used to own because her astronomer friends gave positive comments about the Meade company and its telescopes. Lana was pleasantly surprised to find the LX200R quite user-friendly though the images that she saw via the eyepiece were very clear indeed. Lana expects she'll be using her new Meade telescope for a long time as a result.

If you can afford the hefty price tag of the LX200R, you may become so attached to this telescope that meets professional standards that you will find your investment to be money well spent indeed. The telescope reviews of the product are quite convincing, especially to experienced astronomers who know that quality telescopes come from trustworthy companies like Meade. And if you can trust the manufacturer, then you can expect the telescope to last for years to come.

Tasco 48t Telescope

Astrophotography is a field of study dealing with analysis and photography of the stars in the sky. To do this well, your child may need the Tasco 48t Telescope to start with. You might find the Tasco 48t being retailed along with other educational toys since it offers basic magnification functions, is easy to put together, and easy for a child to handle and comprehend because it is smaller than the big professional-type telescopes geared for adults.

One problem with using this telescope is that they are not so easy to come by in stores anymore because it is an older model of a manual telescope so you may have to look for used models at auction or e-commerce websites on the Internet. This telescope is ideal for parents to buy if they themselves are inexperienced about buying telescopes or delving into astronomy, plus if your child really wants a telescope for himself.

Get to know the Tasco 48t up close by learning that it has an Alt-azimuth Mount which serves as a stable platform for your telescope. You can adjust your Alt-azimuth Mount both horizontally and vertically, so that your child won't have a hard time looking up at the sky with it. Once you have identified the heavenly object you want to study, you can then fix your telescope in place on the mount itself.

A Barlow Lens is also appropriate for your aging Tasco 48t, because it can be fixed over the eyepiece to improve your ability to see objects in the sky. The Barlow Lens can be purchased with magnification of at least 2x (or twice as large), upwards.

For novices in astronomy like your child (and maybe you too), the Tasco 48t can be very useful anyway since you get a clear view of the sky, stars and moon with it. Even a basic telescope can still be useful when you don't need to see that deeply into space with it.

You can scout around for a used Tasco 48t from the yahoo or eBay auction sites to start with. If you get lucky, a nearby flea market, hobby shop or even garage sale will have one on sale for you to find. Since your child doesn't need a super high tech telescope for his initial foray into astronomy, this model will be sufficient at the start. Once your child gets a sampling of what our universe is all about, maybe eventually you can get a better telescope for him.

How The Hubble Telescope Was Almost Never Launched Into Space

The Space Telescope by Hubble was successfully launched into outer space in 1990 but there were times when it seemed it would never get off the ground. Considering this powerful telescope had been conceptualized in 1946, it seems a miracle it made it into outer space 44 years later after numerous incidents threatened to derail the entire project completely.

Congress unanimously voted for funding to be provided for creation of the telescope in 1977, paving the way for its construction. The telescope was finished in 1981, but the final job, polishing of its mirrors had to be conducted too. The launch of the telescope into space was originally scheduled for October 1984. However, the company tasked with working on the mirrors did not seem to be performing up to par so NASA no longer trusted that company. As work on the telescope continued, the launch date had to be re-set for April 1985 since the telescope had to meet approval standards.

A new launch date was then scheduled for October 1986 since the telescope needed to pass final approval screening by NASA. It was actually all ready to launch into space, but the Challenger space shuttle tragically exploded in January 1986. So formal shut-down of the space shuttle program lasted for some years after the explosion.

Though the people backing the Telescope project had misgivings about ever getting it launched into space, they stayed hopeful that somehow its launch would become reality eventually.

Another launch date for the telescope was set for 1990 once the shuttle flights re-commenced in 1988. NASA had to have the mirrors of the telescope sprayed with nitrogen streams to remove accumulated dust. All the systems of the telescope also underwent thorough testing to make sure they were still completely functional.

Finally, after encountering so much hardship and troubles, the Hubble Space Telescope was successfully launched into its planned space of orbit from the Discovery space shuttle on April 24, 1990.

Once the telescope's cameras started working and transmitting images back to Earth, the pictures of previously unseen planets, nebulae and galaxies showed that those backing the launch of the Hubble Space Telescope project were justified in their faith in the project. Up to this date, researchers are still getting valuable data from the telescope even though it is showing signs of wear and tear, with certain systems even breaking down.

Telescope Photos

Telescope photographing cameras have a feature that is built in to your telescope for great photographs of what you see in the sky. If you are out enjoying the telescope and the stars you will find that this camera will even take pictures at night.

It is great that modern telescopes now allow us to take photographs of the things we see through the telescope at night. You can try buying the various telescope models which have cameras built into their system, yet it is equally possible to simply use a regular camera or a digital camera to take photos through your existing telescope.

The basic rule when using an ordinary telescope and camera to take photos is for you to get a clear focus on the object to be photographed, before you start clicking away.

That is why the modern telescopes feature built-in cameras - the opportunity to see some night-time visions may happen in a blink of an eye so it would be great if you could capture it for posterity with a camera. So if you learn how to use ordinary cameras to take pictures of what your telescope is focused on, then you wind up with a better astronomy experience.

Constellations are a favorite with amateur astronomer-photographers armed with cameras and telescopes. Another image you may want to capture is the Milky Way. Just set your camera to setting "B" then move the lens to the least F stop number. By doing so, your lens will fully open so that the lens can allow in the most amount of light possible. If you have lenses ranging from 28 to 50mm, you may find most use the F number starting at 1.7 up to 2.8 as the fastest setting.

You can then center the area you intend to photograph, with the star in focus so that it seems at its sharpest and smallest degree. You are allowed to capture up to the 30-second exposure level using your 50mm lens before you find the stars leave trails because the Earth continuously rotates. And try not to move the camera as exposure lasts so that you avoid blurry photos and image doubling.
So, you need not invest in pricey and sophisticated equipment just to take a great photo through your telescope. Just learn to follow instructions and be willing to wait to get that perfect photo you were looking for. If you like, you can also consult websites or blog sites where you can post your amateur photos for the world to admire.

Space Telescope Photos

The nice thing about modern telescopes and modern cameras is that it is possible to capture images that you can see through your telescope with even the most basic camera. Though you can always get a telescope with its own built-in camera, those are rather expensive. If you can't afford those types of telescopes, then settle for your less expensive telescope and current camera for now.

To start, be sure that the telescope is showing a very clear and stable image because it is steadily focused on the object you want to photograph. Move the eyepiece so that your camera is aligned with it. Then, just start taking pictures.

There are some aspects to this type of photography that you have to learn. First, be sure that the camera will be able to handle the highest resolution you can set it for. If you use a digital camera, set it to the biggest pixel size setting. Though the number of photos you can take will be limited, their quality will still be very good though.

A high quality camera needs to be placed to the lowest numeric setting on its "F Stop" command. This allows your camera shutter to get optimal pictures when you start taking pictures through the telescope. You may find that the still images produced will be of sufficient quality to show off to family and friends.

One side effect of seeing pictures of outer space is to feel rather small in a way, because you will realize that the universe is so much bigger than you and you are just a tiny component of it. At the moment, no one knows if outer space has an end to it. Perhaps not.

Others might feel - when they see these pictures of outer space taken through your telescope - that they are an important part of this great, vast universe who has a part to play in all of it. People react differently from one another even when they see the same photograph.

One thing is for sure, the whole universe is a wonderful creation in itself whose beauty may surpass our individual capacity to comprehend. The nice part is you can experience some of that beauty when you look through a telescope.

If you haven't tried taking photographs of outer space yet, then it might be worthwhile to try even a few just this once. If you like the results, who knows? You might start taking more and more photographs and sharing them with others. Even inexperienced astronomers may get amazing pictures on their first attempt.

Hubble Telescope Photos

Ever since the Hubble Telescope was officially sent out into space, it has been able to take and send back dramatic photos of outer space to Earthly audiences. We can attribute this to the high quality cameras that were part of the Hubble Telescope system that have been steadily taking pictures for astronomers since 1986.

If you have seen some of these images, you may have found them to be very amazing purely because no other telescope has been able to take photos of the same quality as the Hubble Telescope has done. This is why astronomers have been discussing the content of such photos for years now.

But one problem developed this 2007 - the main camera of this telescope broke down completely. Thus, another manned space mission is necessary to repair the Hubble Telescope can be functional again (before the new James Webb Space Telescope takes its place.)

It is not surprising that a new telescope has to take its place though. The Hubble Telescope was conceptualized back in 1946 and it has been working steadily since it was launched into space, delivering high quality photographs of different galaxies and their components for a long time. Thus, researchers and scientific experts have been able to gain more knowledge about space than was possible before the project.

At the time it was launched, the Hubble Telescope was considered a ground-breaking technology that revolutionized astronomy. Schools all over the world have been able to use photos captured by the telescope to teach students about the amazing and vast universe that we live in. No other photo ever taken can rival the Hubble Telescope images when it comes to mind-boggling scope and concepts tackled.

Though the Hubble Telescope is old now and breaking down, when its camera was installed the camera technology used was meticulously designed for years. We know that modern-day cameras here on Earth have also evolved a lot all these years. That was one reason the proponents of the Hubble Telescope delayed installation of the camera, so that they could install only the latest camera technology available when the telescope system was ready to be launched into deep space.

If you have never seen even one image from the Hubble Telescope, then now is the time to initiate a Google search and find one (or many, as you like.) Just one look and you will be amazed that mankind has been able to keep this telescope functioning all this time in deep space, to give us photographs that can teach and amaze all at the same time.

Telescope Accessories

People who own a telescope may want to buy accessories so they can enhance the powers of their current telescope to optimal level. But what are the accessories you should look for to improve your telescope's functionality?

One important part you could invest in is an eyepiece (or interchangeable eyepieces) so that you can change your perspective as seen through the eyepiece. It would be nice if your telescope features an adjustable eyepiece, but if it comes fitted with a static eyepiece, you may need additional lenses to look through the telescope with better or varying clarity.

Another vital accessory you could invest in would be the telescope mount. Even if you buy a pricey telescope, the images you get will be compromised by the shaky cheap telescope mount you place it on. Most likely your inexpensive telescope mount will be so unstable that the images it gives you will be just as shaky. That is why this part is considered the second-top part you should invest in when it comes to accessories.

If you are upgrading to a completely brand-new telescope, there are also some accessories that ought to come with a reasonably-priced product. For one thing, your new telescope ought to have a good case in which you can store your telescope for easy transport between places. You may find a hard case to be more reliable than a soft telescope case if you need to travel some distance with your telescope and its accessories.

Filters are also good to invest in because filters allow you to reduce the chromatic aberration that sometimes afflicts some refracting telescopes. Filters can be bought at inexpensive prices from various sources which retail telescope accessories. If you find your present telescope tends to give blurry images, then it is ideal to have filters with you.

You might be surprised at the last necessary telescope accessory on this list - a star chart. This paper-based accessory helps you identify which stars you should be looking at and which star is which so you don't get confused when you are watching the night sky for bright patterns. A good star chart has coordinates which help you guide your telescope to the right spot in the sky to look at, and eliminates frustrating, time-wasting trial and error.

Meade Telescope Accessories

If you're looking for a history of finely crafted, superb telescopes, there is no better source than the Meade Company, who manage to balance quality with budget that even the most amateur astronomer can afford. With a plethora of accessories, even those who have gone at the activity for some time will find themselves benefiting from their available product.

The Mead Company brings with it an entire catalogue of high quality accessories that will help you get ahead as a beginner or even veteran stargazer.

For example, the eyepieces that are created by Meade are rated as the highest in the industry, utilizing a variety of techniques and apertures that guarantee absolute high visuals in almost any form of housing. If you are looking for an eyepiece, you certainly don't want to find yourself settling for less than the best, and with Meade, you can have the best, at a reasonable price to boot.

Another popular accessory is a lens known as a "Barlow lens". When mixed with the aforementioned eyepiece, it gives you unrivaled visuals, cutting through any form of interference to give what's described as absolute clarity. Naturally, the same low prices from Meade are also guaranteed for the lenses as well.

In addition to these, you may be interested in acquiring a filter, which can be all the difference when considering a distorted or clear image. Recognizing the need for filters, Meade offers these at a discount price. These are invaluable assets that help cut back on aberrations in the reflecting optical telescopes. By cutting back on the haze, blur, and other astral factors, you are guaranteed the highest level of satisfaction in your star watching.

There are also carrying cases available by Meade, that are invaluable when it comes to storing your unused scope. This can become crucial if you ever want to explore the heavens outside of the reach of your own home. There is a wide variety of cases available to you by Meade, which, in addition to acting as a container for your scope, can also hold any accessories you've bought in the mean time.

Most interestingly, many of Meade's scopes come with cameras that allow you to take snapshots of your favorite stargazing moments. It may be a worthwhile investment to find a USB cable that will allow you to attach your digital camera to your PC or laptop, that way you can transfer any photos to your hard drive, which will both back them up and act as a place from which you can share them. Once more, Meade is available with these types of accessories, all at reasonable, discount prices.

Celestron Nexstar 80 Telescope Accessories

Both amateur astronomers and the experienced ones know Celestron brand name because the Celestron company has been making great telescopes for many years. If you own their Celestron Nexstar 80 telescopes, you will probably want accessories that meet the same level of quality as this telescope model.

Celestron makes telescopes that perform well and yet are still affordable for the general public. That is why the quality accessories you need for the Celestron Nexstar 80 must also perform excellently and have reasonable prices. This would allow even the hobbyist astronomers to buy such accessories and jazz up their telescope.

Do try to buy a Barlow lens for your Celestron Nexstar 80 telescopes as the first accessory you can use to enhance this telescope model. The Barlow lens can be placed within your telescope eyepiece so that you can get more dramatic results when you go star-gazing. The images will be more startlingly clear than before you put in the Barlow lens.

You might want another accessory known as an A/C cable for the Celestron Nexstar 80 since a camera is integrated into the telescope's design. The A/C plug-in cable will provide you additional power for the Celestron Nexstar 80. It costs less than $20 per A/C cable.

If you're the type who likes to save images captured from your telescope to a personal computer so you can send the images to other people, then you'll need another accessory known as a PC cable. If you use your Celestron Nexstar 80 as your main telescope, then the PC cable will be an essential component of your telescope system.

To some people, the Celestron Nexstar 80's accessories are essentials that they cannot do without, though for others they may seem unnecessary. Since astronomy is one hobby that necessitates having a very good telescope system, these different accessories have grown in importance lately.

The nice thing is that almost all astronomers will find the accessories of the Celestron Nexstar 80 to be fairly reasonably priced within their reach. Just as the Celestron Nexstar 80 is one of the best telescopes in the market, it makes sense to buy the best accessories for it too. This

means you will be upgrading your telescope system so that it can rival those of even experienced astronomers and hobbyists alike.

Different Types Of Telescopes

From the Greek tele which means far and skopein which means to see, a telescope helps us to see the remotest of objects. Whether they be 50 feet away or in another galaxy, telescopes have been around since the 1600's to aid us in viewing the fascinating space all around us. There are as many different telescopes as there are reasons to use them. The most common ones are mentioned here.

Parabola shaped radio antennae are called Radio Telescopes. They are built from large groups of dishes that are made of a conductive wire mesh. As of 2005, the array sizes is many times larger than the width of the Earth.

Optical telescopes focus light mainly from the visible end of the Electromagnetic Spectrum. They can increase the size of distant objects as well as their brightness. These scopes employ mirrors or certain types of lenses to gather light and focus it. A good example would be a pair of binoculars.

X-ray or Gamma-Ray telescopes have rays that go through many glasses and metals. The mirrors involved in these scopes are usually parabolic in shape. Gamma-ray scopes don't even try to focus, they use a specific code to tell them what the shadows they are looking are. These scopes are usually found orbiting the earth.

Refracting telescopes are the ones that are most common. They are usually made out of a long tube that has a piece of glass at one end and he eyepiece at the other. These were what the pirates used when looking out into the distance.

Reflecting telescopes were developed by Isaac Newton. Where refracting telescopes used a lens, reflecting telescopes used a mirror to capture light that was placed in the very back of the telescope. These scopes offer a bigger view and bright wide view of comets and star clusters.

Optical Telescope

The most common type of telescope available is the one known as an optical telescope, which utilizes a technique whereby light is gathered and focused through the visible portion of the electromagnetic spectrum. This allows you to look ahead straight into an image that is being magnified from a great distance. This is the name most commonly applied to single lense, or monocular, telescopes that are mounted on bipods or tripods.

The optical telescope is broken into three distinct types:

1. Reflectors, which harness the power of mirrors.
2. Refractors which utilize lenses.
3. A combination of lenses and mirrors.

The intelligent design behind telescopes is one based almost entirely around light. It uses either a concave mirror or what's known as an objective lens to centralize and focus light from a far off object into a single plane, which projects itself as an image onto your eyes. To add to the benefit, you can very easily use a camera to record the images taken with your optical telescope by simply putting the recording device, be it photographic or video, into the eyepiece, which will in essence by like a super magnifying glass. When looking in the scope, you are not actually looking at the image itself, but an increased and enhanced image of something that exists a great distance from you.

There are some telescopes that actually use two convex lenses, and this results in the image coming in upside down. However they also are packed with prisms or other lenses that are intended to invert the image one more time, and give you the right side up view whatever it is you are trying to look at.

Historically, these scopes have not always given the best or clearest images. A common problem in the past was that the enhanced view would come in extremely blurry with a distortion of color or even an addition of rings around the object of choice, which could fundamentally damage the way an astronomer interpreted the information. Fortunately, as technology has

advanced, these drawbacks have lessened considerably - and you are able to enjoy your astronomy largely undistorted.

The most common form of professional telescope used in labs for research are the optical telescope, using the mirrored reflector technique. Because of the wider light spectrum made available to reflectors over refractors and the less imperfections seen on the image, for the purpose of research these types of scopes are virtually priceless for astronomers.

The etymology of the term "optical telescope", though seeming redundant, is actually an important part in explaining the specific usage and purpose of scope. While optical means to use the eyes, and a camera can be used on such a scope, there is usually a distinction made between the two. When a camera is affixed, it is referred to as a "photographic telescope", but it is optical when you exclusively use your eyes.

Optical telescopes are the best way for an amateur astronomer to leap forward into viewing the night sky - and a little research into the various types to determine which best suits you will do wonders get you ahead in your hobby.

Galileo's Telescope

Rumors of a Dutchman creating a device that would bring objects closer so you could see them more clearly reached Galileo in 1609. He started using the device after he refined it to a 10-power telescope and made some amazing discoveries with it. In 1610, he looked around Jupiter to find three satellites all in a straight line. When he looked back, they were in all directions. He surmised they were orbiting Jupiter and that, if this were true, then the Earth wasn't the center of the universe. This theory went against what the church taught.

The church believed Galileo to be quite wrong. They said everything he could see in his new telescopic device went against everything the Bible said. Galileo argued that even the interpreters of the Bible could have made a mistake in the interpretation. He was accused of heresy, but proclaimed innocent and told not to teach any of the Copernican belief system.

Unbeknowst to the church, Galileo continued to study Jupiter and the movements of its moons. He also started working on a paper about the ocean's tides. He was brought before the court for trying to teach the Copernican system after being told not to. He was placed on house arrest and until his death in 1642, he investigated even more areas of science.

He made even more fascinating discoveries with his telescope. He found there companion stars next to Saturn which were actually the edges of the rings that encircle the planet. He found spots on the sun's surface, and watched Venus go through its many phases from a planet down to a sliver of light.

He published his findings in a book called “The Starry Messenger” in 1610. People were quite excited about some of the theories found within the book. Imagine finding for the first time that the Earth was round, and not flat. What would you think?

Large Binocular Telescope

The LBT or Large Binocular Telescope is the world's most powerful optical telescope. It will allow scientists to view planets and stars in our galaxy. It is housed in Arizona's Mount Graham International Observatory. The telescope is housed in a sixteen story structure, and the top ten floors of the structure rotate.

A fifty-five ton mirror and its steel transport box were recently transported 122 miles to get to Arizona. There is the eighteen ton mirror which is made like borosilicate honeycomb. The mirror was transported in November of 2003 to its final home. It took three days and plenty of planning for it to arrive unscathed.

The journey actually began when the mirror was spun cast in the giant rotating furnace back in 1997. The team at the Mirror Lab have been creating new mirror technologies for the past twenty years. After casting, it was polished using a stressed-lap technique. The parabolic face of the mirror is precisely one millionth of an inch over the entire mirror. The mechanical parts were tested in Italy and shipped to Arizona. Partnerships all over the world helped to bring this telescope into being. The Arizona State University, Observatories in Milan, Padua, Rome, and Florence, Ohio State University, University of Notre Dame, and the University of Virginia all own a part of this Large Binocular Telescope.

The LBT's second primary mirror is 8.4 meters and polishing began soon after the first mirror was done. Together, the two mirrors cost approximately twenty-two million. The twin 8.4 meter mirrors are on a single telescope mount. The images they receive are nearly ten times sharper than the Hubble. The LBT is capable of seeing planets beyond our solar system and will allow scientists to look deeper into the universe.

Reflecting Telescopes

In 1680, Isaac Newton developed one of the first reflecting telescopes. There was a problem wit the images having a rainbow of color surrounding them. So instead of using a lens to focus light, Newton tried a small curved metal mirror in the back of the telescope. He also made a discovery in 1666 about the light of colors. Newton figured out that the scope's problems were due to the color spectrum much more than the shape of the mirrors. He also concluded that refraction of light couldn't be replicated without color. John Hadley developed a telescope that used parabolic mirrors in 1722.

These types of telescopes are great for viewing comets, nebulae, star clusters, and other galaxies. They offer a wider field of view than refracting telescopes do. These have short focal ratios and lower magnification.

They are relatively cheap to make at home. The only problem is you have to keep the mirrors clean and in line. If you grind the mirror wrong, it will distort your images. Since the scopes will have a huge light focusing ability, you will be able to view deep sky objects as well as take pictures of what you are seeing.

There are many designs that you can choose from for your telescope, but the original Newtonian is the easiest. You will need a parabolic mirror, a spherical mirror, and a flat mirror. The focal ratio should be around f/8 or longer. This number refers to the brightness and width of the field of view. For example, the ratio of f/8 is good for all around viewing.

Have fun with your creation and see what you can find in the space around you. There are so many interesting sights to view out there and many beautiful pictures to take.

Refracting Telescopes

While we have no physical evidence, we have very strong documentation that refracting telescopes were used in England as early as the sixteenth century. The use of telescopes became widespread in the early seventeenth century in the Netherlands.

Hans Lippershey and Zacharias Janssen of the Netherlands claim the invention of the original telescope. This original scope had both concave and convex lenses so that the image would not be inverted. After the Netherlands started producing them, they were rapidly found all over Europe.

In 1609, Galileo was visiting Venice and claims to have solved the problems with the telescope by using a convex lens in one end and a concave in the other end. Thus, moving the two pieces of glass further away from each other. This led to better image viewing with less rainbow effects around the distant object. Galileo spent much of his time to perfecting the telescope after that. His first telescope magnified at a power of three diameters, and the best one he made magnified at a diameter of thirty-three diameters. These last telescopes were so great that in 1610, he discovered the satellites of Jupiter, the spots on the sun, and the hills and valleys on the moon.

These telescopes are common today. They are made out of a long tube of metal or wood. They have a glass lens at the front and back ends as well as an eyepiece at the back. The tube helps to keep moisture and dust away from the lenses for a better image. The two lenses help focus light and refract it to the back of the tube where the eyepiece magnifies it so that you can see it clearly.

Refracting scopes have a resolution high enough to see details in binary stars and planets. They are expensive and less useful for looking at other galaxies or nebulae. You can see a plethora of stars and other heavenly bodies with them though.

Smaller Telescopes

Smaller telescopes are called refracting telescopes. They have a big lens at the front and an eyepiece in the back. Some say they are useless for astronomy, but it is possible to do some viewing with these special telescopes.

A telescope also needs certain features in order for it to be helpful in viewing objects. One is it must have a well-aligned and intact mirror. It must have at least one eyepiece, two are better. The scope must have a mount that firm and secure. Unstable mountings is a problem for beginner astronomers. You should also have a finder that rides beside the main telescope. It makes your field of view wider and makes it easier to find objects.

The first thing you should look for is the moon. You probably won't need to use the finder as the moon is so big and bright. However, you may need to move the telescope every few minutes to keep the moon in view due t the earth's rotation. You should find many craters and bright spots where the sunlight covers one side of the moon.

Small telescopes are great for viewing the planets. The rings of Saturn, the phases of Venus, and the moons of Jupiter are a few of the spectacular images you might happen across. You must use a lower power setting because higher power makes your images dim. Usually 80-120x is good to start out.

Deep sky objects such as nebulae, galaxies, and star clusters will be faint when compared to the planets. The brighter the deep sky object, the better you will see it. You can certainly observe these when you find them.

Small telescope are inexpensive. You can still learn a lot about them and the universe in the process. Take yours and see what you can find in the night sky.

The Best Telescopes Out There

This will be a big surprise. Can you tell me what the best telescope out there today is? There are actually two of them. If you said your eyes, you are correct.

You were born gifted with two telescopes that can focus from one inch to infinity and beyond. They have a field of view of about 110 degrees, and they have built in lens covers. They open and close at about 1/40 of a second. Eyes can detect subtle color changes as well as any variance in color. They also send three dimensional depth information to your brain. No telescope could ever do all these things.

Go out before you start with the telescope and look at where you will be pointing it. Pick out several constellations by sight and look for the moon and a planet. Make a mental picture so you know where t go to come back to the object when you want to. Just relax and go out in the warm night air and look up. It really is that simple.

To get the most from learning astronomy, you must have a lot of patience. You may go several nights without seeing anything new. This is what frustrates beginners. Start with the moon and look at its brightness. Look for craters and mountains. There is so much to the moon that you could find something new every night for the next year.

Don't give up though. Even though you didn't find what you were looking for doesn't mean it's not out there. It just means you haven't been able t see it yet. Keep looking each night. You may find something else you weren't looking for and that will lead to other new objects as well. Look around star clusters and the planets. You may even spot some comets or meteors.

Optical Features Of Telescopes

The ability of a telescope to focus light is related to the optical features you use. Considerations to make when purchasing optical equipment – Aperture, Magnification, Focal Length, Focal ratio, Wave Number, and Resolution. If you purchase low quality merchandise, you won't be able to see what you are looking for as well.

The most important consideration is the Aperture. This is the ability to focus light and is related to the size of the lens or mirror that is used. In other words, the bigger the lens or mirror, the brighter the final image. The biggest telescope, however, is not always the best.

Magnification is dependent upon the lenses used and the distance to the eyepiece. A general rule of thumb to follow is 40-60x per 1 inch of aperture. Usually low magnification gives the best light.

Focal length is defined as the optical length of the telescope lens. Long focal lengths usually mean higher magnification. Don't mistake the length of the telescope for focal length though. Some compound telescopes light paths are folded and become longer in a short tube.

The focal ratio tells us about he brightness and width of the field of view. They are divided into three sections. F/10 or higher is good for viewing the moon, planets, or stars. F/8 is great for all around viewing. F/6 and lower is meant for viewing deep sky objects.

The wave number is also known as the wave error. It tells us how good the mirror or lens was ground to an almost perfect surface. The smaller the number, the better the lens or mirror. The minimum number that is acceptable is one fourth. The performance is in the accumulation of the numbers of each optical piece.

Resolution is the ability to find the details in the moon or a planet. It is dependent upon how well the telescope can separate two close objects. It also rests on the aperture and the observing conditions that are present.

Telescope Mounts

Mounts for telescopes are used for several different reasons. You don't have to hold the scope yourself while you are trying to focus on an object. It helps to steady the scope. It frees you hands up so you can make sketches of what you are viewing or adjust the scope for better focus.

There are two types of telescope mounts you can employ for better viewing. One is the Alt-Azimuth. This mount is similar to a camera tripod. It uses the vertical (altitude) axis and a horizontal (azimuth) axis to help you locate your object. This type of telescope mount has two variations. The Ball and Socket which has a ball shaped end that can move freely. The second type is called a Rocker Box. This is usually made of plywood and has a low center of gravity. It has a horizontal circular base and Teflon ball bearings for the altitude axis. These are great mounts for a heavier telescope.

The second type of telescope mount is called the Equatorial. This mount uses two axes that are lined up with the poles to keep track of the motion an object takes across the sky. The axes can be Right Ascension, Polar, or Declination. Instead of moving up and down on its axes like the Alt-Azimuth, this particular mount is tilted toward the Earth's axis of rotation. There are two varieties of this particular mount. One is the German Equatorial Mount. This mount is shaped like a T. The longer axis of the T is lined up with the pole of the Earth. The second variety is the Fork Mount. This is amount that is aligned with the Earth's pole but is like a two-pronged fork that sits on a wedge. The prongs are one axis and the base of the fork is the other. You can use the Equatorial Mounts for taking pictures of the objects you find.

Homemade Telescope Roof Mount

Sometimes, astronomers get the urge to want to see the sky a bit closer than is possible when they are on the ground staring up at the sky. At times like these, you may want to clamber up on your roof and use your telescope there. Yes, that would work.

But there's still a better way to improve your sky-gazing powers, and that is to construct a roof mount for the telescope so that clearer images can be seen. It is easy to make a home-made roof mount if you can follow directions.
The nice thing about home-made roof mounts is that they may be even better than the store-bought ones.

For this project, you will first need to buy or root around for some spare lumber, some nails, a hammer and a keen eye for detail.

The most important thing about home-made roof mounts for telescopes is that they have to be as stable as possible. You need not tear up your roof just to change its shape - actually, you're just supposed to make a stable roof mount that tends to hug the shape of your roof. That makes it more stable.

It is best to invest in quality materials when constructing a roof mount yourself. A cheap roof mount may give way so choose good quality material to make a good quality roof mount. But this doesn't mean you will keep your telescope out there 24/7. Far from it, you need to keep your pricey telescope indoors until its time to use it on a clear, starry night. It is also important that you can easily get to your roof mount when necessary.

There are pre-designed plans you can use when you plan to construct a roof mount by yourself. Such roof mount plans can be accessed from websites, or found in various books concerning the topic. It is advisable to know a bit about constructing things with lumber and nails though, so that the roof mount you make will be strong yet stable.

And of course, the final reward when you set foot on your new custom-made roof mount is being able to set your telescope on it and look up at the shiny objects in the sky. Both the construction

of a stable and safe roof mount and being able to use it for star-gazing are bound to be very fulfilling for you in the end.

Telescope for Kids

Some adults may want to improve the education of their children about outer space by letting them peer through their own telescope up at the night-time sky, and watch the stars and moon up close. Most likely though, you will find the telescopes for children being marketed out there to be of the most basic type which are just functional enough to let them see the stars and other nearby objects closer than usual.

It is really unnecessary to spend big bucks on expensive telescopes for children. You can always upgrade to better telescopes as they grow older. The basic types of telescopes may be sufficient for their first year of examining the basics of astronomy such as stars and their constellations. Still, once the astronomy bug hits them, they may want much better telescopes of their own.

A telescope for beginners should just have the basic functionality and is very user-friendly. It should allow your kid to examine the moon and ooh and aah over the craters they spot on its surface, so that they become curious about what other things outer space has to offer. Actually, your child probably won't notice the difference between a standard telescope and the higher-end ones at this point.

If you can afford the $169.95 price tag, you can invest in a child's beginner telescope sold by the Discovery Kids website which even very young children can appreciate for star-gazing. You might also be able to spot other sites and stores that offer discounted basic telescopes perfect for children. The point is that the telescope should at least be functional enough to let them see the stars on a starry, starry night up close and personal.

If your children can follow directions closely, you can try to get them to construct a telescope for themselves. You might be surprised that everyday items like the lens from your old reading glasses (or perhaps from an old pair of binoculars), duct tape, and a cardboard paper tube rescued from the kitchen trash are the components of a home-made refracting telescope. This is an easy project your kids can do by themselves, with some guidance from you.

Fun With Telescopes!

The world of space has been discovered by adults who create telescopes but appreciating that world can be passed on to children even at a young age. With their telescopes in hand, you can lay a blanket on the grass of your yard so they can gaze up at the night-time sky. The stars and moon will never seem the same again to these young eyes after they have looked through a telescope.

Telescope Advice For Beginners

You have taken the plunge and purchased a telescope. Now what do you do with it? Astronomy can be a wonderful hobby, but here are some tips to make sure you get started on the right foot, or star as the case may be.

Look up the night sky without the aid of a telescope. Can you spot and name any constellations? Can you spot the moon or the planet Venus or Jupiter? If you can't do this, you might have some trouble spotting other heavenly objects.

There are many magazines out there that follow astronomy and can give you sample pictures and sky charts to go buy. The most common are SKY, TELESCOPE, or ASTRONOMY.

Join an astronomy group or a star watching society. These groups usually have telescopes you can borrow for a look to see if it is really what you want. They also have advanced members who can teach you where to look for certain objects.

As any experienced astronomer will tell you, a pair of good binoculars can become your first telescope. They are relatively affordable, and if you decide astronomy isn't for you, there are a dozen other uses for the binoculars. If you get a good pair the first time, you may not have to buy anymore, they last for a lifetime.

The biggest telescope is not always the best. Most amateurs like to use the six inch Dobsonian reflector type telescope. It is cheap, simple to use, and you can learn a lot from it before you move on. Instead of having to play around with controls, you will spend most of your time trying to aim and focus with this telescope. A six to eight inch aperture is large enough to view bright images of heavenly objects.

Using A Telescope

So you have gone out and bought a telescope and have no idea what to do with it. Go out into the night sky and look for the brightest objects you can find. They are the best to start with because they are easy to find. Then after that, the sky, quite literally, is the limit.

With a special filter, you can see the sun and count sunspots. Observe the Milky Way or the moon. The moon has many large craters and you may see “rays” coming out from them. These are from when a crushed rock exploded from meteor impact. Streaks are formed in a radial pattern out from the crater itself.

Jupiter can be quite interesting to observe at night. It is one of the easiest to find besides the sun and moon. Some small telescopes might even get a good picture of Jupiter's small satellite moons. They are usually in a straight line and appear as very bright stars. Given Jupiter's rapid rotation, you can view nearly all the planet in a single night.

The simplest thing you can do is look at the stars. Sometimes, you may see a “double-star.” What looks like a single star becomes two when using a telescope. These are quite popular because of the explosion of color you will find between the two of them.

Charles Messier was a comet hunter. One day, he noticed some fuzzy objects that didn't appear to be moving. These were actually the nebulae of today. Some people think it is fun to take a single night and see how many deep sky objects you can find on Messier's list in a single night. There are 110 you can find.

The important thing is to have fun and spot the brightest stars first and go from there. This can be a rewarding hobby after you have had time to get used to the telescope and what it can do.

What Your Telescope Can Do

The reason you bought a telescope is to view the night sky in all its glory. Telescopes can bring those objects closer and give you an idea of what is out there in the universe. Some of the objects you may see are the moon, planets, and the sun. With a little practice, you may be able to spot some comets, stars, nebulae, and maybe even other galaxies.

The Moon is the best object to view at first because of its prominence and brightness in the night sky. You can follow its phases and get a different view ever night. You might see its mountains, craters, or its terminator line. This is the line between light and dark where you can see a big contrast everywhere.

The Sun is one of the few objects in the sky that you can actually observe in the daytime. A word of warning here – NEVER look directly at the sun through a telescope lens. The light can cook your retinas in seconds. ALWAYS make sure you have the proper solar filter on the telescope before you gaze at the sun.

Beginning astronomers like to count the sunspots. If you start sketching the spots and where they are each day, you will begin to see the pattern of the sun's rotation. Another fun thing to do is watch during a solar eclipse when the moon passes between the earth and sun. This is the only time you will get to see the sun's corona.

Viewing planets requires a dry atmosphere and good seeing conditions. Jupiter is the largest planet in the system, so you should be able to find it easily. Mars is difficult to focus on because of its small size. Venus is the brightest planet and also easy to spot. Saturn is always a neat planet because of the rings that change their angle as the planet orbits the sun. Unfortunately, Neptune, Uranus, and Pluto are very hard to locate and may only appear as tiny discs.

Viewing The Night Sky With A Telescope

Depending on the type of telescope you have purchased, you should be able to see many wondrous images with it. You might see the moon's surface, the moons of Jupiter, or even Saturn's rings. With some knowledge of the sky and constellations, you may be able to pick out some star clusters.

The best way to get your hobby going is to join your local astronomical society. They will sometimes have telescopes you can borrow to get the hang of using one before you buy. They also meet in the evenings so you can learn how to observe the night sky. It is truly fascinating to see the images with your own eyes instead of just looking at pictures on the web or in books.

Telescopes are used for two reasons. One is to see fainter objects and the other is to magnify images far away. You must discern which focal ratio is the best for what you are trying to see. A focal ratio is the ratio of the focal length to the aperture. Usually starting around f/8 is good for beginners. Going below f/8 will give you wider, brighter views, but image quality will be lower. Going above f/8 is usually saved for viewing the moon and planets and deep sky objects such as galaxies or nebulae.

To get started, just set up your telescope and start looking into the night sky. There is no telling what you might see. You can look at the moon every night for a year and still not see everything it has to offer. The same is true for the entire Milky Way galaxy. There really is no limit to what you can find. Another neat thing to do is to count sunspots which provide a gauge of solar activity. Be sure to have the proper filter. Just have fun and see what you can find.

Viewing Deep Sky Objects And Comets

Deep sky objects are usually located outside our solar system. The listing includes star clusters, nebulae, galaxies, and multiple stars. There is also a list of 110 objects on Messier's list that you can try to locate. The key to viewing all these heavenly bodies is to go outside on a really dark night and you must have a large telescope (one which an aperture that is greater than six inches). Light pollution filters may also help improve your view.

What looks like one star in the sky actually becomes two or three when looking through your telescope. There is a four part star in Orion's Nebula. There are also stars that brighten and dim as you watch them over time. These are called Variable Stars.

Star clusters are thousands of stars grouped together. They create a spectacular view when looking through a small telescope. An example of this is the Pleiades. This is a group of seven bright stars in the Taurus constellation that can be seen with the naked eye. But once you view them through the telescope, you will find there are thousands of stars in the cluster.

Large gas and dust clouds in space are called Nebulae. An emission nebula will produce light where a dark nebula will absorb the light. They can be a challenge to find.

Galaxies have massive numbers of stars that are held together by gravity and are usually found in clusters. They come in many shapes and sizes – spiral, barred, elliptical, and sometimes irregular shaped. They appear as faint, fuzzy patches of dust.

Comets are fascinating to watch as they travel across the sky. They develop tails and can change brightness as they get closer to the sun. Not all comets will look the same either. They may brighten or darken depending on where in the sky you locate them.

Looking at Globular Clusters

Globular clusters are defined as a dense grouping of thousands to millions of stars. They are comprised of young stars at millions of years old to older stars at billions of years old. The stars in these clusters are usually very tightly bound together.

They are considered deep sky objects. They are easily found in the night sky in the hours before midnight in the months of April through September. They appear in your telescope as concentrated patches of gray mist. The amazing part is the average distance between any of the given stars is between ¾ to 1 ½ light years.

The most spectacular of all is the NGC 5139. You can see it with your naked eye because it is three times the moon's diameter. There are millions of stars that take up your viewfinder. It is truly a wondrous site to behold. If you live in or around North Carolina close to the latitude of +36 degrees, you will be able to spot it easily in the night sky.

Clusters such as these are very common. In the Milky Way, there are 150 known clusters. The Andromeda galaxy could have upwards of 500. The giant elliptical galaxies, such as M87, have as many as 10,000. The neat thing is the globular clusters contain some of the first stars that were created when time began. Their origins are still unclear.

The major part of these clusters are found near the galactic core. And another large majority lie on the celestial sky side. Clusters contain a high density of older stars but they are not great locations for planetary systems. The orbits of the planets become unstable in the dense clusters. These clusters can be dated by viewing the temperature the coolest white dwarf stars are in the group. Common results say some of these stars are 12.7 billion years old or older.

Astrophotography

Astrophotography can be a rewarding pastime for some beginner astronomers. Conventional 35mm cameras, Schmidt cameras, and CCD or Digital cameras can be used to take your spectacular pictures.

The right pieces are needed to make this a success. You will need a shutter cable for the 35mm, an equatorial telescope mount to help with tracking your object for up to an hour sometimes. A “T” mount to help align the camera with the eyepiece holder, and a guider eyepiece to help keep your object in the center of your frame.

There are many ways to pursue this hobby. One is by using a camera mounted to the side of the telescope. Another is having the camera on the back of the telescope, using the scope as a guide. The last is to use a camera that is attached to a movable mount on a tripod. If you use these, please make sure your camera is steady and firmly attached with no vibrations or shaking.

If you are just starting out, take your digital camera and select some constellations to snap. To set your digital camera up, check your aperture and sensitivity settings. Also check your shutter speed. All of these should be set to where more light can be focused especially when taking pictures at night.

Focusing means doing the manual focus on the camera or digging through the many menus until you find the right one and set it to what you want. Then try to shoot something far away to see if the setting you programmed works.

White balancing is usually by default. At night, the default setting will the sky to a brown-reddish color. If you are going to incorporate long exposures of the night sky, try setting the balance to Tungsten.

After you take several pictures, transfer them from the camera onto the computer. Sometimes they come up grainy, try reducing the size down by increments and you should soon have a clear picture.

Current Astronomy News For The Sky And Telescope

If you're interesting in staying up to date in all things astronomy you will suffer from no shortage of resources that will allow you to look into the heavens with the telescope of your choice. Every day brings about new discoveries and knowledge about astronomy, so you are certainly going to want to stay up to date on all the latest information so you can make your own valuable contributions and get the most out of your telescope hobby.

One of the best ways to keep up to date on information on astronomy is to use that wonder source: the Internet. Websites are springing up all over that devote themselves to keeping their readers up to date on any headway made in the form of technological advancement in telescopes, or the latest revelations that have come from the celestial bodies above. Here's a list of some of the better websites to keep bookmarked for astronomy information and updates:

1. **www.skytonight.com** - A wonderful website that gives you frequent updates on discoveries, web journals, and advice on where best to aim your telescope so that you can get the most out of your time looking at the sky. In addition, it also offers a variety of articles on news and other key information about this hobby.

2. **www.stargazing.net** - A departure from skytonight.com, this website acts as a form of image gallery that gives you a library of telescopic pictures of astronomy. In addition, it also gives key details on shuttle launches and other data about the heavens.

3. **www.nightskyobserver.com** - A great supply of blogs, articles, news, and other information on astronomy that will help any beginner or advanced sky watcher get what they want or need in order to continue their practice with the most possible information at their finger tips.

This is not to say that these are the only websites available to you, as there are literally thousands more springing up across the web that can bring you news and other updates to get your amateur astronomy enthusiasm properly fomented. Any basic search engine query should net you many more results.

Further, a number of magazines pander to the astronomy enthusiast, and should not be overlooked. When you factor in the cost of a subscription, they are actually not very expensive at all:

1. **Sky and Telescope** is a great magazine that is actually a sponsor of the aforementioned Sky Tonight website. They will give you the opportunity to try their services with a free trial, and you can subscribe for only $42.95.

2. **Astronomy Magazine** - The blunt and direct title does a wonderful job of explaining just exactly what you'll be getting: an excellent source of information for beginners and those interested in staying up to date on astronomy news. They even offer sky charts, which are an excellent way to pin point the sky's best sights. Like Sky and Telescopes, it costs $42.95 for a one year subscription to this magazine, which sends out an issue monthly.

These are just a few of the ways that you can take advantage of your telescope, and dive into the world of amateur astronomy.