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VBAS' First-time Telescope Buyer's Guide 2021

Introduction

The Von Braun Astronomical Society has collected the following information for first-time telescope purchasers. More information can be found on the [VBAS website: Astronomical Links](#)

And don't forget: We are holding Zoom Meetings most Fridays now, details are in our newsletter, Via Stellaris. Links below:

- Friday Special Interest Groups:
- Observer's SIG: First Friday of each month
- Astrophotography SIG: Second Friday
- Monthly Meeting: Third Friday
- SIG Link:
- Monthly Meeting Link:
- VBAS *FREE* Newsletter "Via Stellaris": [Subscribe](#) - [Unsubscribe](#)

With that in mind, we start with:

Vendors

Note that although many of the links point to specific vendor's websites, the same item may be had from several other vendors. If price matters to you, shop around.

These are a few of our favorite suppliers. After you find an item you like, check with each of these vendors.

- www.astronomics.com (Discounts for Cloudy Nights members)
- telescope.com
- agenaastro.com
- meade.com
- celestron.com
- astronomics.com
- amazon.com
- telescopesplus.com
- HighPointScientific.com
- Optcorp.com

Furthermore, **VBAS/Astronomical League** members receive discounts from the following vendors:

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Astronomics 800-422-7876	2.5% - 10%	https://www.astronomics.com
Camera Concepts & Telescopes 631-475-1118	10%	http://www.cameraconcepts.com
Galaxy Optics	10% Optical Coating Services	http://www.galaxyoptics.com
Got Grit	10%	http://gotgrit.com
Mr. Star Guy	10%	http://www.mrstarguy.com
Seymour Solar 435-826-4241	10%	https://www.seymoursolar.com
Spectrum Telescope 805-419-4956 info@spectrumtelescope.com	15%	https://spectrumtelescope.com/shop/
Telescope Adapters	10%	http://www.telescopeadapters.com
Thousand Oaks Optical 928-692-8903	10%	http://www.thousandoaksoptical.com
Vixen Optics 949-429-6363	10%	http://www.vixenoptics.com

Websites

Here are some resources for researching products:

- Cloudy Nights Forum (FREE)
- The Sky Searchers (FREE)
- Sky And Telescope Magazine
- Astronomy Magazine
- The Sky At Night Magazine

Brands

Some of the top (but affordable) brands are:

- Apertura / Zhumell
- Celestron
- Explore Scientific/Bresser
- Meade

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- [Orion \(telescopes.com\)](http://telescopes.com)
- [SkyWatcher](#)
- [Stellavue](#)
- [Televue](#)

Resources

Books

Most of these are available for free loan from the VBAS Library for VBAS Members.

1. *Turn Left at Orion* by Guy Consolmagno and Dan M. Davis
2. *50 Things To See With A Small Telescope* by John Read
3. *Binocular Highlights: 99 Celestial Sights for Binocular Users* by Gary Seronik
4. *The Stars* by H. A. Rey (author of the *Curious George* children's books)
5. *365 Starry Nights* by Chet Raymo
6. *Seasonal Star Charts*, a large scale comb binding book, branded by many companies, such as Celestron and Discovery Channel

Star Charts

It cannot be overstated: the best thing for a beginner is to learn the constellations. This is what it's really all about: knowing your way around the night sky well enough to appreciate what you see.

This means a star chart, and maybe a pair of binoculars. Even a GoTo telescope requires you to identify and align on two or three stars. If you don't know the brightest stars, your GoTo won't go anywhere. Start with one of these:

\$22 Celestron Sky Maps These same charts have been sold under several other names, like *Seasonal Star Charts*. We have a copy in the planetarium you can look through. There are eight maps. Each chart shows 1/2 of the sky - one North-facing, one South-facing - for each season. [[Amazon](#)]

Included for each chart is a list of objects to look for, appropriate for unaided eye, binoculars, or small telescope.

\$12 The Night Sky 30°-40°, By David Chandler. This is a planisphere, sometimes called a star wheel. You align the date and the time, and it displays the stars visible at that time. [[Amazon](#)]

VBAS sells a less expensive version at the ticket counter for **\$5**.

Apps

There are numerous **FREE** apps. Get one that allows you to hold up your phone/tablet and shows you the stars you are looking at. It follows your motion so that as you pan around the sky, the view changes, displaying the night sky in your line-of-sight, like a window into space. Displays the brighter Messier objects and other prominent objects in the sky.

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Some of these are quite sophisticated, and will show **millions - no exaggeration - of galaxies.**

These are just a few; there are many more.

FREE Star chart, Escape Velocity Limited

\$1 - \$20 Sky Safari 6

\$3 Star Walk 2

PC/Mac Software

Consider computerized (and FREE!) options:

FREE Stellarium

This is perhaps the most spectacular **FREE** program you will ever see. The night sky is rendered beautifully, allowing you to zoom in and pan around the sky. It also shows nebula, galaxies, clusters, etc.

Get this - this is the one.

FREE Cartes du Ciel (SkyChart)

This program is not as beautiful as Stellarium, but you can use it to control your goto scope, with an interface much better than that little keypad. When you get it set up properly, you can look at an object on the chart, click it, and your telescope will goto the object automatically. (You must have a GoTo scope to utilize this capability)

\$60 - \$300 StarryNight

Elaborate program suitable for planning a night at the telescope; allows control of the telescope.

\$5 - \$30 Sky Safari 6

Allows planning a viewing session and controlling your telescope.

Binoculars

Everybody wants a powerful telescope so they can see what Hubble sees, but it doesn't work like that. The reality is much more humbling. My personal recommendation is to get a good set of sky charts and learn the major constellations - get the big picture. Then zoom in a little with a good book on binocular objects, such as Gary Seronik's *Binocular Highlights*, or Guy Consolmagno's *Turn Left at Orion* - and one of these:

\$42 Celestron UpClose G2 10x50 Binoculars

\$46 Meade TravelView

\$95 Celestron Cavalry 10x50

Telescope Types

Overview

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There are three types of telescopes commonly used by amateurs: Reflector, Refractor, and catadioptric (a hybrid of Lenses and Mirrors).

Reflector

The term, “reflector” means that the primary ‘lens’ is a mirror. These are far less expensive than other types, but still deliver high quality. There are many premium telescopes that are reflectors, as are most professional telescopes.

Reflectors don’t ‘look’ like telescopes to some, because the eyepiece is at the top, sticking out of the side.

The advantage here is that you get a larger telescope for the same price, which will show fainter astronomical objects.

The disadvantage is that they need to be optically aligned, or ‘collimated’, frequently. While this is not difficult, it may confuse you at first.

Reflectors typically have f/ ratios of f/4 to f/8.

Refractor

Refractors are the classic telescope you see in cartoons and old sci-fi movies. The primary lens is, well, an actual lens, and it looks like what people expect a telescope to look like.

The advantages are that the images can be exceedingly sharp. You can find some who are convinced that refractors produce absolutely the best image possible. The best ones are excellent for astrophotography. They don’t need to be collimated.

The disadvantage is that good refractors are very expensive. *Really, really* expensive.

You can buy cheap refractors, but don’t. They are *Really, really* cheap, and will disappoint.

They typically have f/ ratios of f/4-f10.

Catadioptric

These telescopes utilize both mirrors and lenses. They are a more modern and more complicated design, known as a Schmidt-Cassegrain. You can recognize them easily because they have short stubby tubes, and the eyepiece is sticking out the back end. They are very compact telescopes, suitable for travel.

These can have fairly large apertures, up to 18” for stock products, larger for custom applications. Their f/ ratio is nearly always f/10, but there are new offerings of f/8.

Astrographs

These are “not really” telescopes - you can’t use an eyepiece to look through them. They are essentially high-grade telephoto lenses. The term, “high-grade” means “high-priced”. If you are addicted to astrophotography, this is what you want.

The f/ ratios are typically short: f/2+.

Suggested products (Prices updated Oct 2021)

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Under \$300

- \$60 [Celestron FirstScope](#)
- \$65 [Celestron Cometron FirstScope](#)
- \$70 [Meade LightBridge Mini 82 82mm f/3.7 Dobsonian](#)
- \$150 [Meade LightBridge Mini 114mm f/4 Dobsonian](#)
- \$160 [Celestron PowerSeeker 114 EQ](#)
- \$200 [Orion GoScope 80mm TableTop Refractor Telescope](#)

\$300-500

- \$300 [Orion StarBlast 114mm AutoTracker Reflector Telescope](#)
- \$370 [Orion StarMax 90mm Mak-Cass Telescope and Tripod Bundle](#)
- \$420 [Orion SkyQuest XT6 Classic Dobsonian Telescope Kit](#)
- \$400 [Orion StarBlast 6 Astro Reflector Telescope](#)
- \$450 [Zhumell Z8 Deluxe Dobsonian Reflector Telescope](#)
- \$690 [Apertura 8" Dobsonian Telescope with Accessories - AD8](#)
- \$490 [Sky-Watcher EvoStar 72mm f/5.8 ED Doublet Apochromatic Refractor](#)

\$500+

- \$580 [Celestron NexStar 127SLT Computerized Telescope # 22097](#)
- \$610 [Takahashi Starbase 80 Achromatic Refractor Telescope w/ ALT/AZ Mount](#)
- \$800 [Apertura 10" Dobsonian Telescope with Upgrades & Premium Accessories - AD10](#)
- \$700 [Zhumell Z10](#)
- \$850 [EXPLORE FIRSTLIGHT 10" F/5 DOBSONIAN TELESCOPE](#)
- \$990 [Sky-Watcher EvoStar 100ED 100mm f/9 Ed Doublet Apochromatic Refractor](#)

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What to Look For When Buying

Optical quality

This means buying a reputable brand. **Come up to VBAS and discuss with members any Saturday night, or the third Friday Monthly Meeting.**

Mount

A good mount can be a significant expense, and can cost \$500 to \$10,000 dollars. Most beginner's scopes will be a telescope, a mount and a couple of eyepieces.

Brands are: Losmandy, Ioptron, Celestron, Meade, Vixen, Paramount, Explore Scientific.



Digital Setting Circles (Push-to) / Go-to

It's common to add position sensors (digital setting circles, or DSCs) to a telescope to allow you to find objects easily. **Push-to** means there is a small hand-held display with a catalog of objects. You can select the object you want, then manually move your telescope until the object is in view.

These work with both equatorial and altazimuth/Dobsonian telescopes.

Some, like the Nexus II, have no display, and instead connect to a tablet and use digital star maps, like SkySafari or Cartes du Ciel, to show



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graphically where the telescope is pointing.

Brands: SkyEng.com (Sky Commander); AstroDevices (Nexus DSC, Nexus II); [WildCard Innovations](http://WildCardInnovations) (ArgoNavis)

Go-to adds motors and automates the process.

Additional Features to Consider

Two inch focuser

Strongly Recommended

This will allow you to use larger-barreled eyepieces, typically the low-power, wide-field eyepieces with longer focal lengths. An adapter allows the use of standard 1-1/4" eyepieces.

Two-speed Crayford focuser

Luxury

This is particularly useful for short focal length reflectors, and allows for precision focusing. The small black knob is 10x more accurate than the larger silver knobs.



50mm RACI finder

Recommended

RACI = Right Angle Correct Image. **Right-angle** means that the finder is not a 'straight through' finder, which would require you to get on your knees, or bend over in a contorted position, but is instead a 'right angle' finder, so you can stay on your feet to use it. **Correct-image** means that the image is correct up-down and right-left: if you look at a street sign it will be right-side up and readable left-to-right. This is important when star-hopping from paper charts, when RA is reversed right-to-left, but Declination is correct - which can be confusing.



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Refractors

Prices shown are for the Optical Tube Assembly only - you'll need to buy a mount separately.

Astronomics

- \$300 ASTRO-TECH AT70ED 2.8" F/6 ED REFRACTOR OTA
- \$1,650 ASTRO-TECH AT125EDL REFRACTOR OTA FCD-100 AND LANTHANUM F/7.8 DOUBLET
- \$4000 ASTRO-TECH AT152EDT F/8 TRIPLET APO REFRACTOR OTA

Explore Scientific

- \$750 EXPLORE SCIENTIFIC AR127 5" F/6.5 ACHROMATIC DOUBLET REFRACTOR
- \$2000 EXPLORE SCIENTIFIC ES127 127MM F/7.5 "ESSENTIAL SERIES" FCD-1 ED TRIPLET REFRACTOR
- \$6,000 EXPLORE SCIENTIFIC 140MM F/6.7 FPL-53 CARBON FIBER APO TRIPLET REFRACTOR WITH 3" HEXAGONAL FOCUSER
- \$12,000 EXPLORE SCIENTIFIC 165MM F/7 FPL-53 CARBON FIBER APO TRIPLET REFRACTOR WITH 3" HEX FOCUSER

StellarVue

- \$2200 Stellarvue SVX080T-25FT
- \$3000 Stellarvue SVX127D
- \$17,995 Stellarvue SVX180T

Takahashi

- \$6,040 TAKAHASHI FSQ-106EDX4 4.2" F/5 DUAL ED/FOUR ELEMENT OPTICAL TUBE
- \$1,920 TAKAHASHI FOA-60Q ORTHO APOCHROMATIC REFRACTOR

Televue

- \$2,125 TELE VUE TV-85 3.35" (85MM) F/7 EVERGREEN TUBE/BLACK TRIM APO
- \$1,700 TELE VUE TV-76 3" (76MM) F/6.3 EVERGREEN TUBE/BLACK TRIM APO
- \$7,000 TELE VUE NP127IS 5" F/5.2 NAGLER-PETZVAL APOCHROMATIC REFRACTOR

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Astrographs

These are mostly custom built, so fixed prices are a guide only. Delivery can be up to 10 months.

Plane wave

\$10,000 CDK12.5 OPTICAL TUBE ASSEMBLY

\$22,500 CDK17 OPTICAL TUBE ASSEMBLY

AG Optical

\$9,700 10" Imaging Dall Kirkham

\$33,690 20" Imaging Dall Kirkham

Explore Scientific

\$680 EXPLORE SCIENTIFIC 8" F/3.8 ALUMINUM TUBE NEWTONIAN BR-N20839

Celestron

\$3700 CELESTRON 11" F/2.2 ROWE-ACKERMANN SCHMIDT ASTROGRAPH (RASA) VERSION 2 OPTICAL TUBE

Sky-Watcher

\$1725 SKY-WATCHER STARLUX 190 190MM MAKSTOV-NEWTONIAN F/5.3 OPTICAL TUBE

Takahashi

\$1725 TAKAHASHI EPSILON E-130D ASTROGRAPH

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Eyepieces

Beginners under-rate eyepieces, but this is one-half of the telescope. You can save money by buying starter kits with a few eyepieces, a Barlow and filters with an eyepiece box as well.

Celestron

- \$190 CELESTRON KIT OF 1.25" PLÖSSL EYEPIECES AND VISUAL ACCESSORIES
- \$340 CELESTRON KIT OF 2" EYEPIECES AND VISUAL ACCESSORIES
- \$90 CELESTRON 18MM X-CEL LX SERIES 1.25"
- \$185 CELESTRON 19MM 2" 82° LUMINOS

Explore Scientific

- \$120 EXPLORE SCIENTIFIC 20MM 52° SERIES WATERPROOF EYEPIECE
- \$220 EXPLORE SCIENTIFIC 20MM 68° FIELD ARGON-PURGED WATERPROOF 1.25" EYEPIECE
- \$230 EXPLORE SCIENTIFIC 14MM 82° FIELD ARGON-PURGED WATERPROOF 1.25" EYEPIECE
- \$680 EXPLORE SCIENTIFIC 14MM 100° FIELD ARGON-PURGED WATERPROOF 2" EYEPIECE

Televue

- \$115 TELE VUE 20MM PLÖSSL
- \$320 TELE VUE 13MM NAGLER TYPE 6
- \$630 TELE VUE 13MM 1.25"/2" 100° FIELD ETHOS
- \$853 TELE VUE 21MM 2" 100° FIELD ETHOS

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Premium High-end Dobsonian Telescopes

Maybe you're dreaming, or maybe you've decided that this is the hobby for you. Here are the high-end dreamscopes; prepare for sticker-shock. Most links are to astronomics.com. You'll get a discount for including your CloudyNights.com Username - free to obtain.

High End Dobsonian Telescopes



Obsession Telescopes

\$4500 12.5"

\$20,000 25"



Webster Telescopes

\$7,000 14.5" f4.5

\$27,000 32" f3.6



Hubble Optics

\$2,000 12"

\$10,000 24"

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