Acadiana Sky

Buying a Telescope

Thinking about buying a telescope? Remember that it's a piece of specialized equipment, so you need some specialized knowledge to help you select the instrument that's right for you. Here are some hints to think about before you spend your money.

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Think about how you will use it. Why do you want a telescope? For beginning stargazing? Variable star observations? Spectroheliokinematigrams? Bird watching? It'll make a difference in the type of instrument you buy.

What a telescope does. There are three basic functions of a telescope: magnifying power, resolving power and light-gathering power. Most people have heard only of the first one. Magnifying power is just how much bigger the telescope makes an object appear to be. Resolving power measures how close together two objects can be and still be seen separately, and indicates how small a detail can be seen on the moon or planets. The third function, light-gathering power, indicates how faint an object can be seen in a given telescope compared to another telescope. The last two functions, and indirectly the first, get better as the diameter of the telescope increases. Remember this and don't get snowed by a manufacturer's claim of high power!

Astronomical telescopes usually look at only a small part of the sky with each view, and turn the image upside-down or backwards. Both are distinct problems for bird-watchers. If you want the telescope for astronomy don't worry — you'll get used to it and there are good reasons for doing it that way.

What a telescope doesn't do. First, it doesn't turn the stars into blazing suns with circling planets—no telescope does! It also won't give you views of the planets to rival the space probes', or views of galaxies like you see in books. Remember, those are all done with sophisticated techniques and equipment. However, the view of something you found in your own telescope can be more satisfying than the best of pictures in a book.

What to look for. A telescope for astronomy requires a good, solid mount (and tripod) that won't vibrate in the wind and ruin your image. An "equatorial mount" can be expensive, but is worth every penny. If you are *sure* you don't want to take pictures through the telescope, or can’t afford an equatorial mount, or just want simplicity, consider a reflector on a

Dobsonian mount. Get the largest diameter telescope you can afford. Get a telescope with standard-diameter, removable eyepieces and a Barlow lens. Be sure to get (or add) a lensed finder scope or a red dot finder, and reject telescopes with simple spotting tubes. Get a tripod that's not too short (too high can be fixed with a plastic step). As a test, look at how low the eyepiece of the telescope is when the telescope is pointing straight up—could you look through it comfortably? In fact, check to be sure the mount allows the telescope to *be* pointed straight up (and at all parts of the sky). If you buy a refractor or catadioptric telescope (see below), get one with a "star diagonal" lens holder. Above all, buy from a manufacturer or retailer with a good reputation for telescopes!

What to look out for. Watch out for sun filters. They screw into an eyepiece where the sun's energy is most concentrated and tend to crack, which can cost you your eyesight. For small telescopes under 4" (101 mm) in diameter, use a solar projection screen instead ("objective solar filters" may also be safe, but expensive…and don't try to observe the sun unless you *absolutely* know what you are doing). Don't buy an astronomical telescope smaller than 2.4" (60 mm) in diameter; try hard not to buy one smaller than 3" (76 mm). Ignore extravagant claims of magnification. To find out the maximum power for a telescope, multiply its diameter in inches by 50 or its diameter in millimeters by two (so a 60 mm or 2.4" telescope could use about 120 power at most; significantly higher powers would be virtually useless). Remember there are different diameters of eyepieces — get a telescope that uses 1¼" diameter, "standard" eyepieces. Smaller diameter eyepieces work, but are getting hard to find if you want to buy more. Larger diameter eyepieces can be heavy and expensive, and tend to be best with telescopes beyond the "beginner" level. Whichever size you have, be sure to get the right size if you order new ones. In general, avoid telescopes whose names suggest they will actually be useful to children or beginners.

Types of telescopes. There are three basic types of telescopes. Refractors get light to you by bending it through a lens at the front of the telescope and are very effective on solar system objects. Reflectors bounce the light off mirrors, showing galaxies and such nicely. They are generally cheaper than refractors, giving you more diameter per dollar, but require some very simple maintenance in exchange. The third type is called a catadioptric and is a combination of the first two. These are good, highly portable, general-purpose telescopes, but very expensive. For beginners, there's not much difference in performance among the three types.

"Go To" Telescopes. Computerized telescopes with drives designed to point at celestial objects with the press of a button are an exciting new trend in amateur astronomy. However large "go to" telescopes are designed not for beginners but for experienced amateurs, and small "go to" telescopes are still, well, *small*. Simpler "push to" telescopes use an app on your

phone or an included computer to make indications of how you should push the telescope to aim it manually. They are less expensive than quality "go to" instruments, but perhaps a bit less accurate. Beginners may be better off getting a simpler, larger diameter telescope for the same or less money, and using it to learn to find things in the sky. Perhaps wait to step up to a "go to" telescope until you know the sky well, have had the rewarding experience of finding things on your own, and know you can find things even if the computer fails. "Go to" and "push to" telescopes can be of limited usefulness if they don't go to an object accurately, if they point at objects too faint to see, or if you don't know what you should be seeing in the eyepiece!

What about binoculars? You might be surprised at how useful a pair of binoculars can be for astronomy! They won't help much on the planets, but will give very pretty wide-field views of the moon, interstellar gas clouds, some double stars, and the Milky Way. Binoculars can also reveal some of Jupiter's moons, and give perhaps the best views of bright comets. Attach them to a camera tripod if possible. Any binoculars will help, but 7x50s are most useful (in some ways superior to a 2.4" refractor!). A model with "fast focus" will do in a pinch, but one with an old-fashioned rotating knob focuser is much better. Look for a field of view of 350' or more at 1000 yards and a design specified for night use. BaK-4 glass is generally higher quality than BK-7, and lens coatings improve the view but increase the price. A lawn chair with reclining back will make binocular use more comfortable. Get a binocular observing guide to the sky—some list as many as a hundred accessible objects! If you are not familiar with astronomy or telescopes, binoculars and a planisphere star map may be your best entry into observing. Why pay big money for a telescope until you know you will enjoy using it?

What it will cost. Most telescopes under $300 are toys, and work like they are toys. Vastly superior Dobsonian reflectors start around $350; good equatorial reflectors, for about $600. Catadioptrics cost more than $1000, and generally are of high quality. Small, useful, "go to" telescopes begin around $900, and bigger ones range from $2000 to $5000. "Push to" telescopes using an app on your phone start at about $400, and those with included computers cost more. Useful binoculars start around $70 – $150. Decent small, tabletop telescopes can be found from $50 – $200, but be *sure* they are Newtonian reflectors and remember that they have to have a sturdy table (and they can be very difficult to point well overhead). The non-profit Astronomers Without Borders sells a very nice 5" Dobsonian tabletop telescope for $200.

Where to look. Generally speaking (but not always), department store and catalogue telescopes are seldom satisfactory. Check the description and too often you'll find that list of "what to look out for." If you can't find a good telescope in town, go to the library and look at the ads in astronomy magazines to find a telescope that fits your needs. Most reputable

dealers have excellent web sites. You can often get a break on the price if you buy from an independent outlet rather than directly from the manufacturer. Don't buy a second-hand telescope without a nighttime test run first.

Useful accessories. Most reputable manufacturers offer a large number of accessories matching the quality of their telescopes. Since every accessory makes you want more, to avoid going bankrupt you should carefully evaluate each one in terms of your needs, budget, and the above guidelines before you buy it. Two items you will use every night are a good star map or atlas and a red-light flashlight to preserve night vision. Planispheres are best for learning constellations (and there are also some nice phone apps). Read some good library books about amateur astronomy and using telescopes—otherwise you'll have little hope of actually finding interesting celestial objects. You have to do your homework to be successful!

A telescope for the kids. The best way to kill a child's interest in astronomy is to buy a cheap, badly made telescope. Why not strike a deal instead? Try binoculars, a planisphere and library books for 6 – 12 months. If your child's interest remains strong and lots of observing gets done, then spend the money for a real telescope (not a toy).

Where to find help. The three best places to get help are planetariums, public observatories, and local astronomy clubs. Call them if you have questions. Public planetarium shows will give you a better acquaintance with the universe. Watch for telescope and astronomy classes, observing nights and star parties.