

The Best Telescopes Under \$1,000

BY THE EDITORS OF SKYNEWS

What's the best telescope for a beginner? Is it a refractor? A reflector? A new computerized model? We present our picks of the best affordable telescopes for Christmas 2002.

WE HAVE BEEN MONITORING THE CANADIAN TELESCOPE MARKET FOR 40 YEARS, FROM THE DAWN OF TELESCOPE TIME IN THIS COUNTRY, AN ERA WHEN A DECENT SCOPE COULD NOT BE PURCHASED AT ANY PRICE. TODAY, TELESCOPE SHOPPERS HAVE AN EMBARRASSMENT OF RICHES FROM WHICH TO CHOOSE THIS HOLIDAY SEASON. MORE AND BETTER SCOPES ARE NOW AVAILABLE THAN EVER BEFORE.

We've selected what we consider to be the best values on today's market, models that provide good optics on solid mounts with quality fittings. You won't find any toys here; these units are suitable for any aspiring astronomer, young or old.

We narrowed our choices using several criteria. First, we've observed with these telescopes and can recommend from experience. Second, all units are readily available in Canada through dealers across the country. Finally, with first-time buyers in mind, we placed a \$1,000 budget limit on our selection, with prices in Canadian dollars. Prices are approximate and will vary. Also note that some dealers carry telescopes virtually identical to the Sky-Watcher models depicted but labelled with their own house-brand names.

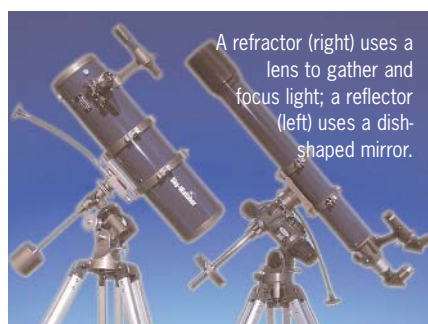
While we do pick some models as outstanding favourites, you can't go wrong with any of our selections.

To narrow the choice of telescope best for you, consider the following.

REFRACTOR VS. REFLECTOR

This is probably the least important decision in a starter scope, as both types of optical systems are capable of providing excellent images. While a refractor (lens type) generally offers slightly sharper images compared with an equivalent-sized reflector, a reflector (mirror type) gives far more aperture for the dollar. Its greater aperture alone provides brighter images, which in turn increases detail seen.

For example, in our selections here, the largest refractor available for our \$1,000 ceiling has a main lens diameter (aperture) of 4.7 inches. Yet a similar sum will take a 10-inch reflector off the



A refractor (right) uses a lens to gather and focus light; a reflector (left) uses a dish-shaped mirror.

showroom floor. An open-and-shut case? Not necessarily. More needs to be considered. Read on.

ALTAZIMUTH VS. EQUATORIAL

In some respects, the type of mount the telescope comes on is more critical than the optical configuration. Altazimuth mounts move up and down and from side to side, as a cannon does. These mounts are easy to set up and aim but,

POLE POSITION: Equatorial mounts have one rotation axis that must be aimed at the north celestial pole—aiming at the North Star is close enough.



THE SHAPE OF THINGS

This NexStar 4 telescope is just one in a series of new designs to hit the market in the past few years.

once on a target, cannot follow the stars using a single motion. Equatorial mounts are a little more complex to set up and move around the sky, but once on target, they can follow an object with one smooth motion, which can be motorized for automatic tracking. The trade-off is tracking convenience versus complexity and cost—equatorial mounts are more expensive than altazimuth mounts.

APERTURE VS. PORTABILITY

Telescopes are rated by the aperture of the main lens or mirror. As a general rule, the bigger the telescope, the brighter and sharper the image. Of course, bigger scopes can be more expensive. And they certainly are bigger! That means harder to carry and more awkward to set up, perhaps making them discouraging to use after a while. A smaller, more portable telescope might be used far more often, especially if you must cart your scope up and down stairs or all around the backyard to avoid trees and buildings each time you re-aim it.

HIGH TECH VS. LOW TECH

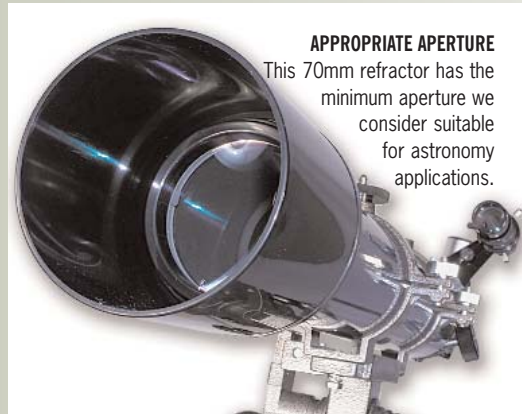
Two or three years ago, this was not even a consideration in a beginner's telescope; high-tech computerized scopes started at \$3,000. But new, relatively low-cost "Go To" telescopes make computerized finding an option for anyone contemplating a good starter scope. By pulsing motors on each axis, the onboard computer makes it possible for these altazimuth-mounted scopes to track objects automatically, without the need for the usual equatorial mount and polar alignment. The trade-off is aperture—for the same money, you can buy a much larger telescope in the low-tech league.



NEW OPTIONS: Relatively low-cost "Go To" telescopes, such as the Meade ETX70-AT (left) and the Celestron NexStar 80, offer computerized finding of sky objects.

No Power Trips

GOOD TELESCOPES ARE RANKED BY THEIR APERTURE. In general, the bigger the lens or mirror, the better. Contrary to what you might expect, magnification is not important. For most viewing, you'll never use powers over 150x. Many star clusters and nebulas are best viewed at no more than 50x. For planets, 100x to 150x is almost always enough. Too much magnification makes an image look faint and fuzzy. In fact, a good rule to follow when shopping for a telescope is to avoid any model advertised solely on the basis of its magnification. That "powerful 650x" model in the local big-box chain store or on the shopping channel is an example of what we disaffectionately call "Christmas trash scopes." They are no more than toys.



APPROPRIATE APERTURE

This 70mm refractor has the minimum aperture we consider suitable for astronomy applications.

A BEST BUY

HERE'S OUR CHOICE FOR THE BEST BUYS ON today's telescope market. These instruments combine generous aperture and solid mounts with good fittings (focusers, finderscopes and eyepieces) and no-fuss simplicity of use—all for a bargain price.

Sky-Watcher Dobsonians

If there is one telescope or series of telescopes we can recommend as a top pick, it is this one. Made in China by Synta, these reflectors offer generous aperture on a vibration-free mount at a bargain price. What makes these telescopes so affordable is their wooden altazimuth mount, known as a Dobsonian for its popularizer, Californian John Dobson. No fancy features here: Just gently push the scope to aim it—simple, reliable performance. The views through the 6-inch far surpass any view through a small 70mm-to-90mm refractor. The main choice is what aperture to get. At \$450, the 6-inch is the most affordable, but the 8-inch (\$600) offers 50 percent more light-gathering power without a big jump in price—or in size and weight. A full review of the 8-inch Sky-Watcher appeared in the Nov./Dec. 2001 issue of *SkyNews*. We highly recommend it.



ASTRONOMY OVERACHIEVERS: Sky-Watcher 6 and Orion XT 6 Dobsonians

The new 10-inch (\$900) model is a more serious commitment, suitable for

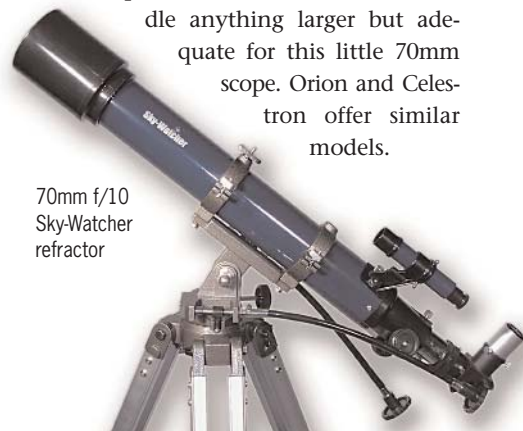
someone who wants to pursue faint deep-sky objects, such as nebulas and galaxies. Similar models are also available from the U.S. mail-order firm Orion Telescopes and Binoculars as its Orion XT series of Dobsonians.

RUGGED AND PORTABLE

A 6-TO-10-INCH DOBSONIAN MAY NOT BE FOR everyone. Depending on how far you have to carry a telescope or how much car space can be used to transport it, you might be better off with a smaller, lighter instrument. Telescopes in this class are also suitable for anyone looking for a dual-purpose instrument for both sky and land viewing.

70mm f/10 Sky-Watcher refractor

This classic 70mm refractor from China has a low price (\$230), fine optics and an adequate altazimuth mount, though some versions come with substandard eyepieces and finderscopes. We suggest the "deluxe" model (\$330) with the AZ3 altazimuth mount, which includes slow-motion controls desirable for ease in centring objects. Another version comes with the EQ-1 equatorial mount, too small to handle anything larger but adequate for this little 70mm scope. Orion and Celestron offer similar models.



70mm f/10 Sky-Watcher refractor

90mm f/10 Sky-Watcher refractor

With a long focal length of 900mm, this classic achromatic refractor offers supersharp optics that provide wonderfully crisp views of the Moon, planets and double stars, just as a refractor should. Versions are available on an altazimuth mount (\$500) or on the small but adequate EQ-2 equatorial mount (\$550). Almost identical units are available from Orion and Celestron. For about \$650, many dealers offer the heavy-duty version shown here—the same optical tube mated to the superior EQ-3 equatorial mount. We recommend this step up if you can afford it. For another \$200 increase, the same mount is paired with a 100mm (4-inch) aperture/1,000mm-focal-length refractor for even brighter, sharper images.

When shopping around, you'll find many compact "short-tube" 80mm and 90mm refractors. These little scopes are fine for daytime land viewing and nighttime wide-angle scanning but are not as suitable for high-power lunar and planetary views as are the longer instruments. (Indeed, that's why the long refractors are long.)



Orion StarMax Maksutovs

Sold by Orion Telescopes and Binoculars, these scopes, as with most entry-level telescopes, are made in China. Virtually identical versions are sold in Canada under the Sky-Watcher brand name. With these instruments, we encounter another type of optical system, the Maksutov-Cassegrain. "Maks" are reflectors, but with the addition of a refractorlike corrector lens to reduce some common optical flaws. The design offers a compact tube that is easy to mount and carry, requires little maintenance and yields sharp images of all types of objects, planets included. A 90mm model is available (\$500), but the 102mm (\$650) is a worthwhile upgrade for the increased aperture and better mount. Better still is the 127mm model (shown, \$999), a solid combination with the EQ-3 mount.

■ GREAT FOR KIDS

WHAT'S THE BEST PICK FOR THE BUDDING young astronomer? Any of the telescopes in this survey are fine choices, but here are a few models that stand out as rugged, kid-sized telescopes ideal for ages 7 to 11.

Sky-Watcher Infinity 76

What can you see with a telescope shaped like a fat rocket? Well, quite a bit. This nifty 76mm reflector from China is new to the market this Christmas. At \$100 in an attractive gift box, it's a dandy scope to place under the tree for young astronomers on Christmas morning. Its principal disadvantage is that it doesn't look like a classic telescope—no long white tube and rickety tripod, no dials and fancy paraphernalia. But the little mirror and decent eyepiece provide bright, sharp images. Place it on a sturdy table, and away you go.

Edmund Astroscan

If the Infinity 76 looks familiar, that's because it is modelled after the classic Edmund Astroscan, which features a 4.3-inch mirror in a rugged plastic housing sealed by an optically flat window at the front. This telescope excels at wide-angle views of the Milky Way but works well on planets, provided you add a Barlow lens to bump up the power. Recent price reductions (now \$350, down more than \$100) have made this venerable telescope more attractive.



Orion XT4.5 Dobsonian

This mini-Dob is physically too short to be used by adults but is great for kids. They can carry it into the backyard, plunk it down anywhere, then swing it around the sky with ease. The aperture is big enough to show oodles of deep-sky objects and good detail on the planets. Fittings are excellent, the mount is solid, and there's little to go wrong. For \$350, what more could you want?

■ GETTING SERIOUS

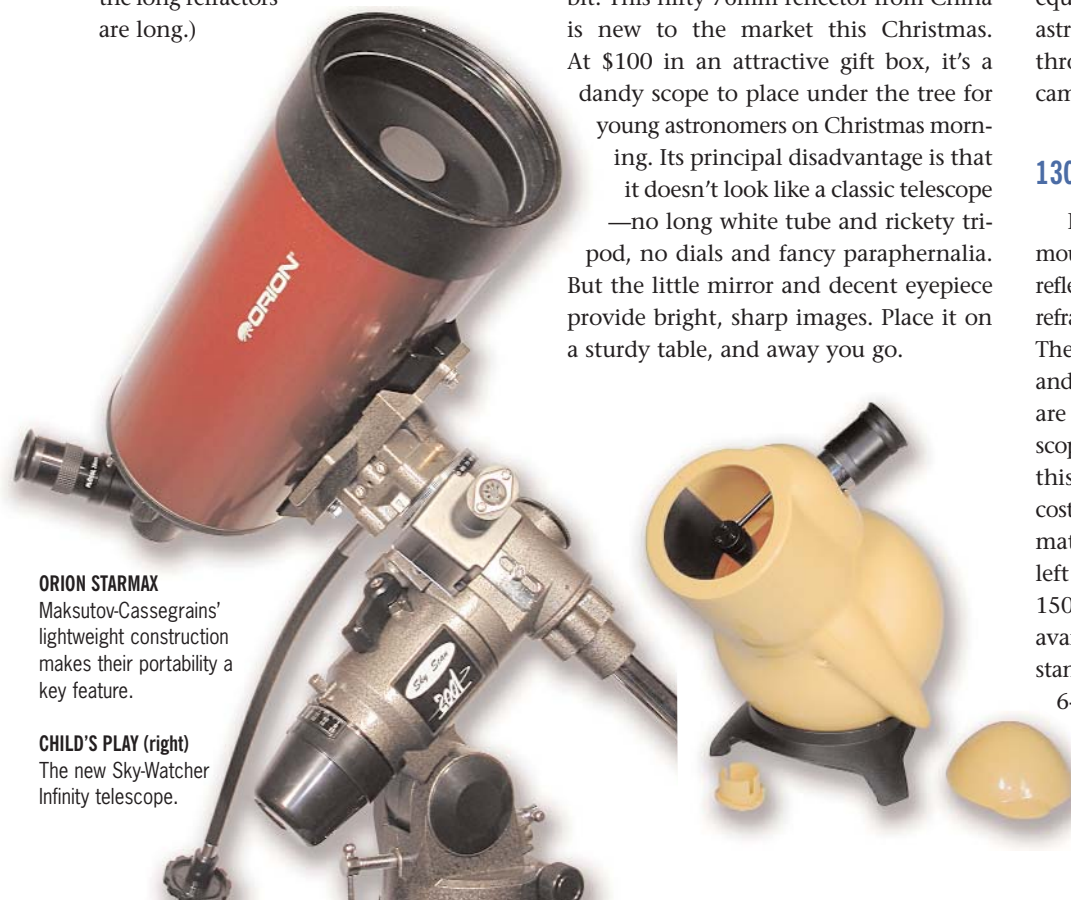
THESE TELESCOPES OFFER GENEROUS APERTURE AND equatorial mounts capable of at least basic astrophotography of the Moon and planets through the scope or with a piggybacked camera for long, tracked exposures.

130mm f/5 Sky-Watcher reflector

For buyers who prefer an equatorial mount to a Dobsonian, this 130mm (5-inch) reflector offers more aperture than do small refractors and for a reasonable \$450 price tag. The parabolic mirror provides crisp images, and the finderscope, focuser and eyepieces are of excellent quality for a beginner's scope. The EQ-2 mount is just adequate for this size reflector. A better, though more costly, combination (\$550) is the same tube mated to the EQ-3 mount, depicted above left with the 90mm refractor. A larger 150mm (6-inch) Sky-Watcher version is available on the more solid EQ-3 mount as standard equipment for about \$650. Similar 6-inch models are sold in the United States by Orion (the AstroView 6) and by Celestron (the C150HD).

ORION STARMAX
Maksutov-Cassegrains' lightweight construction makes their portability a key feature.

CHILD'S PLAY (right)
The new Sky-Watcher Infinity telescope.





120mm Sky-Watcher f/8 refractor

Refractors this large of any type used to be outrageously expensive. But the Chinese-made imports have substantially lowered prices while maintaining quality. The 120mm (4.7-inch) model is a favourite choice of ours and sells for just under our \$1,000 limit (for a detailed review, see *SkyNews* Jan./Feb. 2000). It is a fairly hefty telescope that demands a large and solid mount. In Canada, this telescope is usually sold with the EQ-4 mount, a good combination. In the United States, most versions of 4.7-inch refractors are packaged with the smaller EQ-3 mount, which is too light for this weight of telescope; images bounce around for seven to eight seconds after every touch to the focuser, a detriment to seeing the fine detail this refractor can reveal.



SERIOUS VIEWING:
130mm f/5
Sky-Watcher
reflector

GOING HIGH TECH

PRESS A BUTTON, AND WHIRR, THE TELESCOPE wheels around automatically to find any of hundreds of targets. Raised on video games, kids love computerized telescopes. Adults find the technology seductive as well. When set up and aligned correctly on two stars, these scopes work quite well and can be a lot of fun.

Meade ETX70-AT

This 70mm refractor (\$600) has a focal length of only 350mm. While compact and well suited to computer control, such a short-focus refractor doesn't perform as well optically on the planets as does a more traditional long-focal-length instrument. Nevertheless, under dark skies, the little refractor does a great job revealing star clusters and nebulas, targets easily found with the aid of the Autostar hand controller. A now-discontinued 60mm AT



ON AUTOPILOT: Celestron's NexStar 80 (left) and the Meade ETX70-AT are two entries in the "Go To" category of telescopes.

was selling for the blowout price of \$300 last Christmas, but that stock quickly sold out.

The 2070-AT refractor, a new computerized "Go To" scope from Meade, also features a 70mm aperture, but with a longer focal length more suited to planetary views. Though promising, the 2070-AT had not appeared in Canada as of earlier this autumn.

Celestron NexStar 80

Another entry in the class of short "Go To" refractors is Celestron's 80mm NexStar GT (\$650). It offers more aperture than does the Meade 70mm AT and comes with an integrated tripod included in the price.

Meade ETX-90 (left) and ETX-105



Meade ETX-90

Perhaps the most popular telescope put forward in the past few years, the ETX-90 introduced "Go To" technology to the entry-level class (for a full review, see *SkyNews* Mar./Apr. 2000). The 90mm Maksutov optics in these attractive scopes are excellent, competing with the finest small scopes on the market. The base price of \$900 includes a hand controller for electric slow motions, but the computerized finding requires adding the \$200 Autostar controller, a must-have option that bumps the complete scope over our \$1,000 limit. Since this scope has proved so popular with so many astronomy buffs, however, we include it here for your consideration. (Because the telescope can be used atop a solid picnic table, the tripod is also an optional extra. Meade's Deluxe Field Model #884 is the best, but budget \$400 for the option.)

Celestron NexStar 4

Just hovering on our budget limit of \$1,000 is Celestron's compact 4-inch Maksutov on a single-arm fork mount. This is a fully computerized "Go To" telescope right out of the box. In fact, it cannot operate at all without fully charged internal batteries or a separate power supply. The optics are good, the mount is solid, and the large focus knob is easy to operate with gloves on, no matter where the telescope is aimed, a feature you'll appreciate in cold weather. A worthwhile addition is the optional \$350 tripod. ■



Celestron's
NexStar 4