

Astronomy's first annual STAR PRODUCTS

Amateur astronomers take note: You might want to add these 35 products to your holiday wish list. by Phil Harrington

Each year, companies from around the world introduce telescopes, binoculars, and other gear for amateur astronomers. Some of the equipment that we can buy today was unimaginable just a few years ago. The 21st century is, indeed, a golden age for amateur astronomy.

Of course, that also made trying to decide which products to include in our first annual *Astronomy* Star Products all the more difficult. But after surveying the market, *Astronomy's* staff and I selected 35 outstanding products. Some demonstrate innovative design. Others represent a breakthrough in technology. Still others offer an amazing bang for your buck. In this list, products appear in alphabetical order.

Astronomy Technologies AT8IN 8-inch f/4 imaging Newtonian

Fast-focal-ratio Newtonians are famous for their wide fields of view, making them perfect for photographing and viewing large-scale deep-sky objects. Astronomy Technologies has optimized the AT8IN for astroimaging, but the scope is just as adept for backyard viewing. For a relatively low price (\$449), you get mirrors with 91 percent enhanced reflectivity, a tube optimized with internal baffles for improved image contrast, a built-in cooling fan, a 2" dual-speed Crayford focuser, and an 8x50 finder scope. Add a suitable mount and you have a versatile instrument that will take you into the depths of the universe in style.



Astromist software

Astromist, one of the most versatile software applications for Palm-based computers, shrinks the full power of PC-based planetarium programs into pocket form. *Astromist* plots up to 2.5 million stars and more than 18,000 deep-sky objects, displaying them on charts that range from all-sky to eyepiece close-ups. It also shows the locations of the Moon, planets, and myriad comets. Beyond its display attributes, *Astromist* also lets users maneuver telescopes with Bluetooth or infrared control.



Astronomy Technologies AT10RC 10-inch Ritchey-Chretien telescope

Ritchey-Chrétien Cassegrain reflectors are the most common professional telescopes, but some amateurs avoid them because of their high cost. Now, Astronomy Technologies breaks the price barrier with three affordable Ritchey-Chrétiens. The largest, the 10-inch f/8 AT10RC, is a superb photographic telescope. It offers premium features including quartz mirrors, a dual-speed Crayford-style focuser, dielectric mirror coatings, two dovetail mounting rails, and three built-in cooling fans.



Phil Harrington is an *Astronomy* contributing editor and author of *Star Ware: The Amateur Astronomer's Guide to Choosing, Buying, and Using Telescopes and Accessories* (Wiley, 2007).

Astronomy Technologies AT106LE 4.2-inch apochromatic refractor

One trend in amateur astronomy over the past decade has been the introduction of moderately priced apochromatic refractors. Among the finest in the 4-inch class is the 4.2-inch f/6.5 AT106LE from Astronomy Technologies. Outstanding optical performance characterizes this refractor thanks to its triplet objective. Inside, an FPL-53 ED (Extra-low Dispersion) glass element reduces false color while increasing contrast. In addition, the dual-speed 2" Crayford focuser, retractable dew shade, and aluminum storage case all create a first-rate telescope without the sticker shock.



Astronomy Technologies Voyager alt-azimuth mount

Astronomy Technologies' all-metal Voyager alt-azimuth mount is perfect for anyone who practices grab-and-go astronomy. Simply place your telescope's Vixen-style dovetail bar into the matching cradle on the Voyager's altitude axis, tighten the thumbscrew, and you are ready to observe. The mount's axes move smoothly in all directions, even when carrying telescopes weighing up to 20 pounds (9.1 kilograms). Adjustable slip clutches will let you aim the telescope anywhere in the sky and then manually track a celestial target with dual slow-motion controls.



AstroTrac TT320X-AG tracking mount

Guided wide-field astrophotography almost always means dragging out a heavy telescope mount, even if it's just for supporting a lightweight camera and lens — unless you use a compact tracking platform like the AstroTrac TT320X-AG. The 2.4-pound (1.1 kg) AstroTrac measures just 17 by 3 by 1.5 inches (432 by 76 by 38 millimeters) — small enough to tuck into a camera gadget bag. But once unfolded, mounted onto a camera tripod, and aligned with the celestial pole using the optional polar scope, the TT320X-AG will follow objects precisely. The manufacturer states that the tracking error is approximately 5

arcseconds peak-to-peak over a period of 5 minutes, ideal for most wide-field shots.



Baader 8–24mm Hyperion Clickstop Zoom Eyepiece

The saying “zoom is doom” applies to many low-end zoom eyepieces. In the past several years, however, a few companies have introduced premium-quality zoom eyepieces that produce exceptional images. One of the most recent is the Hyperion 8–24mm Zoom from Baader Planetarium in Germany. The seven-element Hyperion Zoom is continuously variable across the focal-length range but has click-stops at 8mm, 12mm, 16mm, 20mm, and 24mm. And like Baader's fixed-focal-length Hyperion eyepieces, the Zoom can accept an optional adapter for coupling any T-threaded camera or accessory to the eyepiece.



Canon EOS Rebel T1i DSLR camera

Digital single-lens reflex (DSLR) cameras have been a boon to astroimaging. And while many brands and models flood today's market, one of the best — in terms of both quality and value — is Canon's EOS Rebel T1i. Retailing for about \$800, the T1i boasts a 15.1-megapixel CMOS sensor and a 3-inch

Clear View liquid crystal display (LCD). The T1i can take high-definition video. You can also compose shots on the LCD monitor instead of just through the viewfinder like many other DSLRs. Put all these features together and you have a versatile astroimaging tool.





Celestron CGE Pro Mount

Without a sturdy mount, even the finest optical tube assembly will yield low-quality performance. But most heavy-duty mounts also come with a heavy-duty price. One of the best values is Celestron's CGE Pro German equatorial mount. The CGE Pro is light enough to easily transport, and it can carry up to a

90-pound (40.8 kg) payload. Plug it into a 12-volt DC power source and the onboard polar-alignment routine lets you accurately align the mount even if something is blocking the celestial pole from view. Once initialized, the CGE's go-to performance makes finding and tracking celestial objects easy tasks.



Celestron CGEM Computerized Mount

If you don't need as heavy duty a mount as the CGE Pro, then Celestron's CGEM go-to equatorial mount might be for you. With a capacity of 40 pounds (18.1 kg), it carries instruments up to 11 inches in aperture. And Celestron also designed the CGEM for portability using 12-volt power.

Celestron EdgeHD Series Schmidt-Cassegrain telescope

Celestron's new 8- to 14-inch EdgeHD telescopes improve the company's popular Schmidt-Cassegrain telescopes (SCTs) introduced 50 years ago. Described as "aplanatic," EdgeHD telescopes have a built-in field flattener/coma corrector in the instrument's baffle tube. This eliminates the "star bloat" that plagues photos taken through conventional SCTs. An improved focuser also reduces image shift, a common complaint among SCT owners.



Celestron FirstScope

Just about every child has an innate interest in space. How can you turn that fascination into a lifelong love? Celestron's FirstScope might be just the ticket. At only \$49.95, this 3-inch reflector comes with a standard 1¼" rack-and-pinion focuser, 20mm and 4mm eyepieces (which magnify 15x and 75x, respectively), and an amazingly steady tabletop mount. Weighing

just 4.5 pounds (2 kg), the FirstScope can be carried by even 5- and 6-year-olds as they enjoy the Moon, bright planets, and dozens of deep-sky treasures.

We recommend purchasing the separate accessory kit, which includes a finder scope, two eyepieces, a Moon filter, and a CD-ROM planetarium program, for about \$20.



Explore Scientific 20mm 100° Series Nitrogen-Purged Waterproof Eyepiece

Explore Scientific may be a new company, but the 20mm eyepiece from its 100° Series is sure to increase the company's recognition. Like its 9mm and 14mm versions, the 20mm eyepiece features enhanced optical coatings inside a barrel that Explore Scientific seals and purges with nitrogen. The watertight barrel prevents internal fogging as well as contamination by dust and fungus.



Explore Scientific 80mm f/6 Triplet ED Apochromatic Refractor

In addition to their wide-field eyepieces, Explore Scientific offers several fine telescopes, including a 3.15-inch (80mm) f/6 apochromatic refractor. Built around a triplet objective, the lightweight ED 80 features a 2" dual-speed Crayford focuser, an 8x50 correct-image finder scope, a 2" star diagonal with a 1¼" adapter, and a dovetail mounting plate to secure the scope onto many of the most popular alt-azimuth and German equatorial mounts sold today.



Focus-Mask Bahtinov mask focusing aid

Those readers who have never tried astrophotography may be surprised to learn that achieving sharp focus is one of the most difficult things to do. Rather than rely solely on trial and error, photographers in the know use special focusing tools, including various masks placed over the front of their telescopes. One of the most ingenious is the Bahtinov mask sold by Focus-Mask. To use, aim toward a reasonably bright star, take a 3- to 5-second exposure, and then examine the three diffraction spikes. Adjust focus, take another picture, and again examine the diffraction spikes. Tweak the focus again and take subsequent exposures until the middle diffraction spike lies directly between the other two.



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Garrett Optical Signature 20x110 HD-WP Binoculars

Two of the best buys in giant astro binoculars today are the 20x110 monster (shown here) and its higher magnification 28x110 cousin. These units make up Garrett Optical's Signature Line. Both boast 4.3-inch objectives for wonderfully expansive views of the night sky. The 20x100 squeezes 2.7° of sky into a single field of view, making it ideal for such striking targets as the Pleiades (M45) and the Double Cluster (NGC 869 and NGC 884). And although the eyepieces are not removable, both Signature binoculars can have standard 1¼" astronomical filters threaded into each eyepiece.



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HOTECH SCA Laser Collimator

While laser collimators are useful tools for aligning a telescope's optics, one of their inherent weaknesses is that the collimator may not be square to, or centered in, the focuser. No matter how precisely the machining of the collimator's barrel, a small gap may exist between it and the focuser's drawtube. HOTECH's laser collimators come with the company's Self-Centering Adapter (SCA), which eliminates the problem. When the adapter sits in a focuser, rubber compression rings expand evenly against the drawtube, centering the collimator. It's a clever idea that works well.

iOptron MiniTower go-to mount

Weighing just 9 pounds (4 kg), the iOptron MiniTower is a self-contained go-to mount that sets up in minutes. Carry it outside in its hard case, attach it to the matching stainless steel tripod, and power it on. After a quick alignment routine, your telescope is ready to "go-to" any of the 130,000 objects programmed into the included SmartStar hand controller. Despite its small size, the MiniTower can hold up to 25 pounds (11.3 kg), making it perfect for refractors and catadioptric telescopes.



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Kendrick Astro Instruments Stargate Observer Tent

Measuring 10 feet wide by 15 feet long and 6.5 feet high at the center (3 by 4.6 by 2 meters), the Kendrick Stargate Observer Tent is a new and improved incarnation of the company's Observatory Tent first introduced more than 10 years ago. Like the original, this clever design has two rooms separated by a polyester wall. Telescopes get the roomier side (10 by 9 feet [3m by 2.8m]) while bleary-eyed astronomers can sleep the day away in the smaller area (10 by 6 feet [3m by 1.8m]). Once you assemble the tent, bring the telescope inside and unzip the 6-foot-wide (1.8m) observing flap to enjoy the sky. When the night is done, simply close the flap, cover your telescope, and head to the next room for a well-deserved sleep.



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Meade LS-6 go-to telescope

Incorporating the industry's most advanced go-to system — which integrates GPS satellites, internal leveling sensors, a magnetic north compass, and a built-in CCD imager — Meade's LS-6 offers truly hands-free sky alignment. Simply place the scope on its tripod, flip the switch, and sit back. Within minutes, the telescope is ready not only to take you to thousands of objects in the current sky, but also to tell you all about them. Whether you choose the Schmidt-Cassegrain or Advanced Coma-Free optical design, the LS-6 is both telescope and teacher rolled into one.

Orion BT100 Binocular Telescope

Orion's BT100 Binocular Telescope offers the best of both worlds. On one hand, you have a 4-inch refractor that accepts standard 1¼" eyepieces. On the other, you get the benefit of using both eyes for viewing. The BT100 features an all-metal body, fully multicoated achromatic objective lenses, Porro prisms made of BaK-4 glass, and removable eyepieces. Mount on a heavy-duty tripod, pop the included 24x eyepieces (or any matched pair of standard eyepieces) into the integrated 90° prism assemblies, and get ready to experience the beauty of the universe through two eyes.



Orion Parsec 8300C Astronomical Imaging Camera

Built around Kodak's 8.3-megapixel KAF-8300 CCD sensor, Orion Telescope's Parsec 8300C is one of today's most advanced one-shot color astroimagers. Each of those 8.3 million pixels measures 5.4 x 5.4 microns, which translates to high-quality image resolution. At the same time, dual-stage cooling reduces thermal noise. The imager is compatible with Windows XP and later operating systems, and it connects to your computer's USB 2.0 port with the included cable. Power to the Parsec 8300C is via the 12-volt DC power cable that plugs into a car accessory jack.



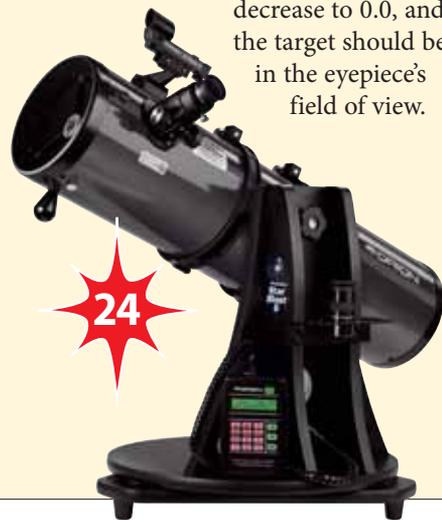
Orion SkyQuest XX14i IntelliScope Truss Dobsonian

We tested Orion's XX12i shortly after the company introduced it in 2009. Building on its success, Orion recently unveiled the 14-inch f/4.6 XX14i. Like the 12-inch model, the XX14i features a truss-tube optical assembly perched atop a Dobsonian base outfitted with the IntelliScope object-locator system. The telescope is a joy to use thanks to important refinements, such as a smooth two-speed Crayford-style focuser, bearings made from Teflon and Ebony-Star laminate, and an 8x50 finder scope. The XX14i offers a large aperture at a remarkably low price.



Orion StarBlast 6i IntelliScope Reflector

When Orion introduced the 6-inch f/5 StarBlast 6 a couple of years ago, we gave it high marks. Now, Orion is back with a new, sophisticated version it calls the StarBlast 6i. The "i" stands for IntelliScope, the company's successful computerized locator system. After selecting one of the sky objects in the computer's memory, two directional guide arrows with numbers appear on the hand controller's illuminated LCD screen. Push the telescope in the direction of the arrows until both numbers decrease to 0.0, and the target should be in the eyepiece's field of view.





Orion StarShoot Solitaire AutoGuider

You own a digital SLR camera and a telescope mount equipped to accept an SBIG ST-4-compatible auto guider, and you want to try your hand at deep-sky photography. But you don't want to drag a computer outside to run the auto guider. Well then, Orion's new Star-

Shoot Solitaire AutoGuider is for you. The StarShoot Solitaire is completely self-contained. Plug it into a standard 1¼" focuser, connect it to a 12-volt battery, and you're ready to shoot. A small hand-held control box operates the Solitaire.

Santa Barbara Instrument Group SG-4 auto guider

The ST-4 auto guider, a small CCD camera introduced more than 15 years ago by SBIG, forever changed astrophotography by eliminating the backbreaking chore of having to guide and check a telescope's tracking rate manually. Last year, SBIG unveiled their latest auto guider, the SG-4. Unlike the ST-4, which you must connect to a computer to use, the SG-4 is a stand-alone unit. The initial calibration to a telescope mount requires a computer, but after that, the SG-4 will work autonomously with the touch of a button. This makes it perfect for any astrophotographer who wants to keep gear to a minimum when traveling to remote sites.



Santa Barbara Instrument Group ST-8300C High Resolution CCD Camera

SBIG continues its role as innovator with its ST-8300C high-resolution imager. Featuring Kodak's KAF-8300C, 8.3-megapixel, full-frame CCD chip, the ST-8300C offers the convenience of single-shot color imaging. The imager's body, machined from solid aluminum and then hard anodized for durability, accepts both C-mount and standard 35mm Nikon camera lenses. The ST-8300C includes a 15-foot (4.6m) USB 2.0 cable for fast downloads and works with current Windows and Mac operating systems. It also comes with an AC power supply, as well as a 12-volt DC power cable.



Sky-Watcher Pro 120ED APO Refractor

The largest apochromatic refractor in this year's Star Products selection is the 4.7-inch f/7.5 Sky-Watcher Pro 120ED. The attractive black tube and white focuser and dew shield create a handsome instrument. But telescopes are not to look at; they are to look through, and the Pro 120ED does not disappoint. Sharp, high-contrast images free of spurious color do not hint at the telescope's surprisingly low price. Add a dual-speed 2" focuser, 20mm and 5mm Plössl eyepieces, a 9x50 finder, tube rings, a standard dovetail mounting bar, and a hard-side carrying case, and you have one of the best bargains in the economy APO market today.



Sky-Watcher 12-inch Collapsible Dobsonian reflecting telescope

When it comes to deep-sky observing, size matters: Big optics = bright images. But in this light-polluted world, how can urban or suburban dwellers transport large telescopes from home to field? The Sky-Watcher 12-inch Collapsible Dobsonian may be their salvation. Rather than rely on traditional truss tubes, which you have to piece together every

time you set up the telescope, the SW-12 uses a unique three-pole design that allows the instrument's upper and lower cells to collapse together with the support poles still in place. The simplicity and elegance of this telescoping telescope makes assembly quick and painless. Collimation holds well even after several setups and tear downs.



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Software Bisque *TheSky X* planetarium software

Software Bisque's *TheSky X*, the latest version of the popular software package, is one of the most advanced planetarium programs sold today. Available in three editions for Windows or Mac OS X — Student, Serious Astronomer, and Professional — *TheSky X* shows the sky on any date in the past, present, or future. From

the comfort of your desk or armchair, you can learn the constellations, watch the planets move centuries at a time, witness solar and lunar eclipses, explore the depths of deep space, and plan your next observing session. *TheSky X* can control your go-to telescope if you choose or produce detailed charts to use at the eyepiece.



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Starmap software

Programmers are introducing iPhone and iPod Touch applications at a fast and furious rate these days. One of the coolest for amateur astronomers is called *Starmap*. For \$11.99, you get a full-featured planetarium program that will display up to 2.5 million stars, as well as the Sun, the Moon, planets, and thousands of deep-sky objects visible from anywhere on Earth. Users may either input their selected time, date, and location manually or let their iPhone's GPS feature do it for them. *Starmap*, from France, comes in eight different languages.

Starry Night Pro Plus 6.3 planetarium software

One of today's most popular planetarium programs, *Starry Night* comes in several levels. The Pro Plus level has a feature not found in the other versions: a photographic mosaic of the entire sky. The all-sky image weaves together some 20,000 images to create a seamless tapestry that captures stars to magnitude 15. Beyond this, *Starry Night Pro Plus 6.3* will take you on animated trips between the planets and let you view millions of stars and deep-sky objects. *Starry Night Pro Plus 6.3* can control most popular go-to mounts, as well as process images using a plug-in for *Starry Night* and *MaxIm DL* software (sold separately).



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Tele Vue 21mm Ethos eyepiece

The first view you have through a Tele Vue Ethos, regardless of the focal length, will be one of those astronomical moments of a lifetime. Capitalizing on the company's success with earlier focal lengths, Tele Vue recently introduced a 10mm Ethos, as well as the 21mm model we single out here. Like the others, the 21mm Ethos offers an incredible 100° apparent field of view. One look and you're hooked for life. For the true connoisseur of fine eyepieces, the 21mm Ethos offers panoramic views of large-scale objects in unprecedented crispness and clarity.



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TMB Optical 9mm 100° 1 1/4"/2" Eyepiece

An eyepiece with a 100° apparent field of view that fits into a standard 1 1/4" focuser? That's exactly what TMB Optical's 9mm 100° eyepiece does. Leave the 2" skirt in place if your telescope has a 2" focuser, or unscrew it to reveal a hidden 1 1/4" barrel. That lets the TMB 9mm 100° fit nearly all telescopes both large and small, making this one of the most versatile wide-field eyepieces sold today.

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TMB Optical TMB-92L refractor

Whether it's a weekend camping trip or traveling to see a total solar eclipse, many amateurs enjoy astronomy on the go. To pull it off, however, you need a telescope that is small and lightweight, yet sharp enough to deliver the goods when you finally get to your destination. TMB Optical's TMB-92L (the L stands for "light") apochromatic refractor is just such a scope. Inside, the heart of this little powerhouse — a 3.6-inch f/5.5 triple objective — is optically superb, while the dual-speed 2" Crayford focuser brings everything into razor-sharp view. ☛

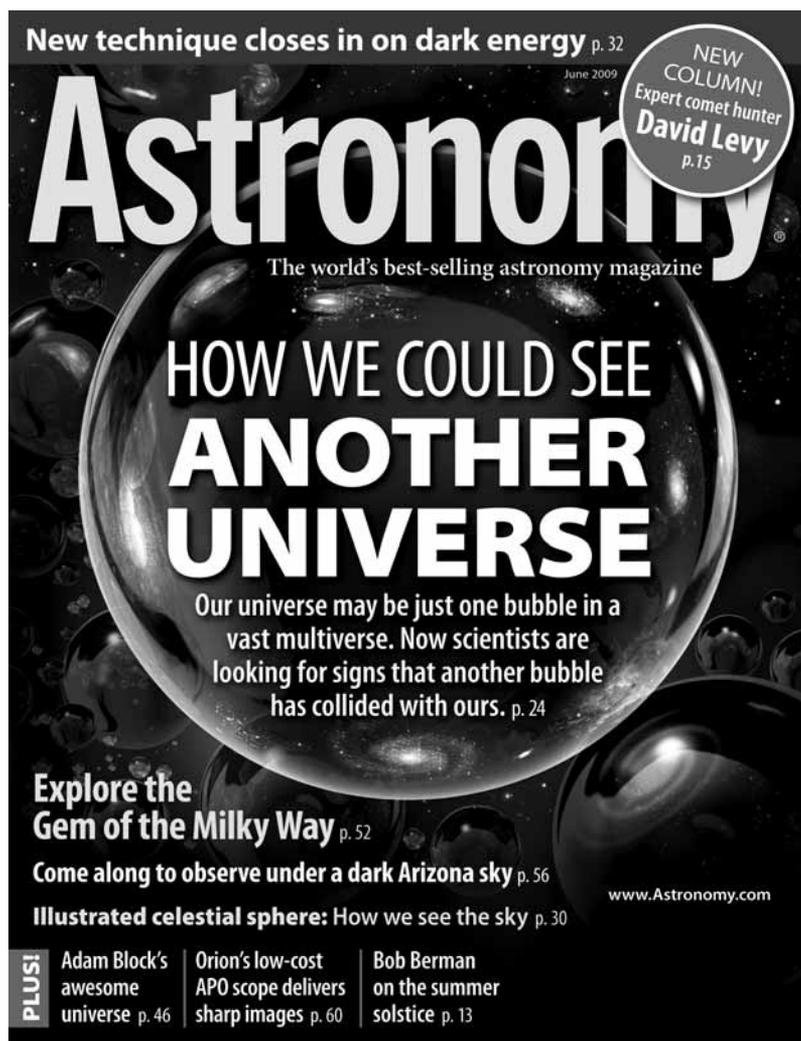


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Astronomy's Star Products

#	COMPANY	PRODUCT	PRICE	WEBSITE
1	Astromist	<i>Astromist</i>	\$39	www.astromist.com
2	Astronomy Technologies	AT8IN	\$449	www.astronomytechnologies.com
3	Astronomy Technologies	AT10RC	\$2,695	www.astronomytechnologies.com
4	Astronomy Technologies	AT106LE	\$1,495	www.astronomytechnologies.com
5	Astronomy Technologies	Voyager	\$299	www.astronomytechnologies.com
6	AstroTrac	TT320X-AG	\$525	www.astrotrac.com
7	Baader Planetarium	8–24mm Hyperion Clickstop Zoom Eyepiece	\$198	www.baader-planetarium.com
8	Canon	EOS Rebel T1i	\$799.99	www.canon.com
9	Celestron	CGE Pro Mount	\$4,999	www.celestron.com
10	Celestron	CGEM Computerized Mount	\$1,399	www.celestron.com
11	Celestron	EdgeHD Series 8- to 14-inch Optical Tube Assembly	\$1,299 to \$5,799	www.celestron.com
12	Celestron	FirstScope	\$49.95	www.celestron.com
13	Explore Scientific	20mm 100° Series Eyepiece	\$599	www.explorescientific.com
14	Explore Scientific	80mm f/6 Triplet ED Apochromatic Refractor	\$799	www.explorescientific.com
15	Focus-Mask	Bahtinov mask	\$18.95–54.95	www.focus-mask.com
16	Garrett Optical	Signature 20x110 HD-WP Binoculars	\$649.95	www.garrettoptical.com
17	HOTECH	SCA Laser Collimator	\$89.95	www.hotechusa.com
18	iOptron Corporation	MiniTower	\$799	www.ioptron.com
19	Kendrick Astro Instruments	Stargate Observer Tent	\$795 Can.	www.kendrickastro.com
20	Meade	LS-6	\$1,399–1,499	www.meade.com
21	Orion Telescopes and Binoculars	BT100 Binocular Telescope	\$1,099.95	www.oriontelescopes.com
22	Orion Telescopes and Binoculars	Parsec 8300C	\$1,999.95	www.oriontelescopes.com
23	Orion Telescopes and Binoculars	SkyQuest XX14i	\$1,799.95	www.oriontelescopes.com
24	Orion Telescopes and Binoculars	StarBlast 6i	\$399.95	www.oriontelescopes.com
25	Orion Telescopes and Binoculars	StarShoot Solitaire AutoGuider	\$499.95	www.oriontelescopes.com
26	Santa Barbara Instrument Group	SG-4 autoguider	\$995	www.sbig.com
27	Santa Barbara Instrument Group	ST-8300C High Resolution CCD Camera	\$1,995	www.sbig.com
28	Sky-Watcher	Pro 120ED APO Refractor	\$1,695	www.skywatcherusa.com
29	Sky-Watcher	12-inch Collapsible Dobsonian	\$995	www.skywatcherusa.com
30	Software Bisque	<i>TheSky X</i>	\$60–329	www.bisque.com
31	Starmap	<i>Starmap</i>	\$11.99	www.star-map.fr
32	Starry Night	<i>Starry Night Pro Plus 6.3</i>	\$249.95	www.starrynight.com
33	Tele Vue	21mm Ethos	\$815	www.televue.com
34	TMB Optical	9mm 100° 1¼"/2" Eyepiece	\$299	www.tmboptical.com
35	TMB Optical	TMB-92L	\$1,495	www.tmboptical.com

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