Toys that magnify

Quality refers to mechanical integrity and optical performance: 0 = worst, 5 = best. Microscopes, telescopes, and magnifying lenses have excellent potential for educational fun. None of the tested telescopes have sufficient quality for astronomical applications. Unless otherwise noted, check science museum and variety stores for these products.

Logo Imprinted 3 x 25 mm "binoculars" (Galilean telescope), $2.29, ages 3+. Low quality folding opera glasses with fixed interpupillary distance. Molded plastic lenses with significant chromatic aberration. Quality: 1.5.

Telescope Explore (Galilean telescope), $2.75, ages 3+. Extremely low quality. Plastic lenses with severe chromatic aberration, strike, and significant image distortion. Quality: 0.5.


Optic Wonder, $5.95, ages 3+. Medium quality folding opera glasses with fixed interpupillary distance. Lenses fold so that they may be used individually. Comes with compass and a mirror that allows one to see a magnified image of one's pupil. Quality: 3.5.


Phosphorescent stuff


Alpi Glow Dough phosphorescent modeling clay, $3.95, ages 3+. A block of reusable, non-toxic modeling compound about 50 mm x 75 mm x 7 mm. Quality: 3+.


3-D image toys

Both of these items are highly recommended and of high quality.


Tyco View Master 3-D Viewer, $3.99 at Toys "R" Us, ages 3+. The ever popular, classic stereo viewer can’t be beat. Quality: 4+.

Toys that use persistence of vision

Electra Spin Top, $7 at Natural Wonders, ages 3+. Has LEDs that light when spun. Quality: 4.

JusToys Mini Laser Light, $8 at Natural Wonders, ages 3+. Has nothing to do with lasers. Allows doodling patterns on the wall by shaking a spring-mounted mirror. Quality: 3+.


Color and spectra toys


Tecno "The Light Crystal" prism, $4.95, ages 8+. A cheap acrylic prism with a low-quality polish over what looks like saw marks. Quality: 3.

Educational kits

Three nice kits containing basic parts such as color filters, lenses, mirrors, polarizers and instructions for numerous experiments. The OSA kit is the most costly, but also the most extensive. Quality: 4+.


OSA Optics Discovery Kit, $19.95 from Edmund Scientific, ages 6+. Kit contains materials and instructions to perform 11, hands-on optics experiments. Quality: 3.

Other optics toys

Geoffrey Bubbles extra thick bubble soap, $0.99 at Toys "R" Us, ages 3+. Great for illustrating colors due to thin-film interference. Quality: 4.

Disney characters kaleidoscope, $1.59, ages 5+. Quality: 3+.

Accoutrements #9867 “Fly Spy Amazing Optical Sheet,” $2.75, ages 5+. A flexible sheet with a 5 x 5 array of 1.25-in-sq Fresnel lens magnifiers next to a 3 x 6.25-in Fresnel lens magnifier. Quality: 3.


Nevertheless, toy optical instruments are better than no optical instruments. If you haven't already, please buy some for the children you know. If you can afford to spend more, medium-quality monoculars or binoculars, high-power magnifying lenses (such as Hastings triplets), and hand-held compound microscopes can be purchased for $30 to $100 from suppliers such as Edmund Scientific, sporting goods, jewelry making supply, and camera stores.

No kid should be without a good hand-held magnifying lens. I found a nice 3.5-in diameter tri-focal model at Toys “R” Us for $5.99. I tested three hand-held toy microscopes and found them to produce images of reasonable quality. All three units had a magnification of 30x and were intended primarily for looking at objects in reflected light. They differed in physical size, focusing method, type of illumination (built-in light versus ambient light), and provisions for mounting samples. The Geoscope and the Tasco pen-sized microscopes were handy, with the Geoscope’s built-in illuminator and larger optics producing a much brighter image. The Wild Planet Megascope produced acceptable images, had a built-in illuminator, and came with attachments for holding various specimens (such as pond water and insects). I did not test toy microscopes with multiple objectives or magnifications higher than 30x, since virtually all of them looked like junk.

Five of the devices functioned as telescopes; all but one were of Galilean design with two simple lenses (one convex and one concave). All produced erect images, and image quality ranged from miserable to tolerable. All suffered from chromatic aberration to varying degrees. Most had plastic optics, and some had horrendous striae that distorted the image. Two were binocular in form: essentially cheap plastic opera glasses with a fixed interpupillary distance.

My recommendation: if you can afford to do so, please buy a better unit with quality optics. Decent entry-level binoculars or monoculars with achromatic optics can be purchased for less than $30 if you look around in sporting goods stores. If you must buy a toy, the pen-sized Tasco combined telescope & microscope for $2.95 is acceptable, although the images are dim (high f number). Also, the Optic Wonder for $5.95 (a binocular unit) is nice, since it visually demonstrates how a simple telescope can be constructed from a convex and a concave lens. It also includes a compass and a mirror that allows one to see a magnified image of one’s iris.

Please tell me about your favorite optics-related toys. If resources permit, we’ll discuss them in future articles. Have a good time shopping, and remember how much fun exploring the world with a couple of good lenses can be!