

Binocular How To - Getting started

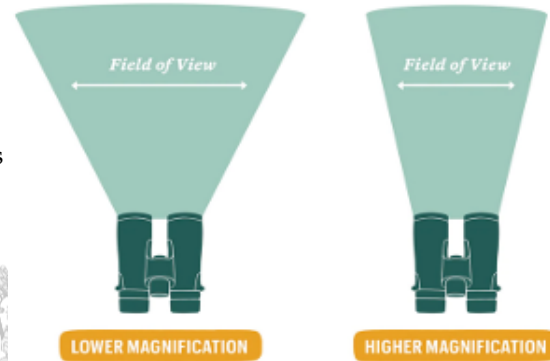
Binoculars - What do the numbers mean? 7x35, 10x50

The binocular nameplate shows a rating, eg... 7x35, 8x42, 10x50, 15x70, etc... What do these numbers mean? We could consider our eyes in the range of 1x4 to 1x7 binoculars. Meaning the eyes have a magnification of 1x with pupils in a range 4 to 7mm across (once dark adapted). As we get older the pupils don't open as far so by middle age they may only open to 4 or 5mm. This explains why young children can see fainter stars than adults are pointing out. Therefore 10x50 binoculars magnify 10x with a 50mm diameter (aperture) lens.

All astronomers need binoculars be it for for a casual look or working through a star hop. Their main use is to track down a faint fuzzy object to direct your telescope at. You can do an awful lot with a just a pair of binoculars, a planisphere or chart, & red torch. You will find the brighter objects in a star atlas are all within reach of average binoculars. Many of us have a pair of binoculars lying around. Often with a sporting or holiday purpose rather than an Astronomy or Birding interest these are perfect for starting out. Use whatever binoculars you have before considering if an upgrade might be required!

Binoculars come in all shapes, sizes & price (quality) ranges.

From a pouch on your hip, a field case on the shoulder, right up to 150mm tripod mounted giants. For Astronomy anything smaller than about 35mm is too small and delivers a dim looking image. 10x50mm or 7x42 models are the classic sweet spot. Not too heavy for hand-held work the 50mm deliver about 100x more light to your eyes, showing fainter stars and bringing out sometimes wonderful colours of the brighter stars.



Ruggedised marine binoculars

- (1) **High Power:** Anything more than 15x cannot be held steady so a tripod is required. While higher power will get you in for a closer look, remember that binoculars are designed for low power and wide fields. Too much magnification can be a blurrrr.
- (2) **Holding steady:** If you have trouble hand holding 10x50 binoculars steady then a smaller lighter 7x42 Marine pair might work better? The lower power to view from a boat deck means the stars move less. Plus they are ruggedised, water & fog proof to keep out dew. Attributes that also make them suitable for Astronomy on the field.

(3) **Larger Aperture:** Grab more light to see deeper into the sky. To deliver the advertised views you need a proper dark sky. Binoculars larger than 60mm require a tripod to hold them steady. Once steadied you'll literally see more stars & finer details.

(4) **Zoom Binoculars:** Unfortunately Zoom models rarely deliver the sharp views of normal binoculars with their optimised design. Compare before you buy!

(5) **Image Stabilised Binoculars:** Press a button & the image freezes still. Nothing else compares for nature watchers on the move. Expensive compared to a sturdy tripod.

(6) **Poro prism vs Roof prism binoculars:** Poro Prisms binos are the older design which can be distinguished by the widely separated barrels with their zig-zag barrels. The future is newer roof prism design with straight through barrels making them lighter & more compact.



Tripod adapter for steady views

PORRO PRISM BINOCULARS



Porro prisms direct the light from the objective lens to the eyepiece via a distinctive zig-zag light path. Despite the straight through roof design both types also need prisms to correct the upside down & back to front image produced by the objective lens. This is what gives all binoculars that upright normal oriented view.

ROOF PRISM BINOCULARS



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Binoculars for beginners?

The main purpose of binoculars for an amateur astronomer is to help find those faint fuzzy deep sky objects to direct your telescope towards. With not attachment to the telescope (like your finder) binoculars are free to move so you will simply find objects quicker. Just peek over the top to see where they're aimed. As telescopes deliver more light & magnification you will typically see a richer and more detailed view through your telescope. However the really large objects (> 2 degrees) often look better through binoculars simply because they don't fit into the eyepiece view of the main telescope. For objects like the Pleiades, the Coat-Hanger, Eta-Carina, Orion Nebulae etc... binoculars give you context by showing the whole object in a single view.

You can argue this is also the domain of small refractors. Yes they really do a superb job. Especially the quality APO refractor for astro-photography are hard to beat, except of course when it comes to their price - \$wow\$. There is a good argument that using both eyes enhances your perception. This is why they make really large (>80mm) Astronomy binoculars. I have a superb 100mm pair myself that require careful setup & pack-up to ensure balance is kept in check.

Price?

Is there a price guide for new binoculars? The \$150 to \$500 should get you a good Astronomy pair. Filter out below \$150 to knock out cheap low quality models. Avoid fixed focus models as this means no focus! If you're thinking above \$500 then I'll repeat myself in saying binoculars are typically used to find faint fuzzy objects to look at through your telescope. If you're going to spend time sweeping the sky with binoculars, then yes that justifies the higher price models? We are spoiled for choice yet lumbered with trying to choose which one.

Focussing for crisp pinpoints stars!

- First adjust the distance between the eyepieces until it feels comfortable for both eyes.
- One eyepiece of binoculars usually has an individual focus (diopter) that allows you to adjust for the focus difference between the left/right eye (everyone has this).
- While looking through the non-adjustable side (other eye closed) turn the centre focus wheel until you see nice sharp stars.
- Now switch eyes & adjust the diopter wheel until the other side shows sharp stars.
- Now open both eyes, w-a-i-t about ten seconds as it takes this long for your eyes/brain sort out the new picture. Finally make fine adjustments if centre & diopter focus until both sides look balanced and sharp.



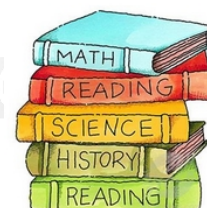
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Using a tripod?

When viewing through binoculars set on a sturdy tripod you'll notice more stars visible & more crater details on the Moon. This is simply because it's hard to hold binoculars steady for more than a minute or two. Just that 7x or 10x magnification is the cause of this problem. Hand held there is always some little dance going on with the stars the brain does its best to compensate for. Tripods are ideal when you want to take your time sweeping the sky with binoculars. Like driving down the road make sure you stop at the occasional scenic look-out to enjoy the starry vistas. Let's discuss a few different tripod types.

- **Camera tripod:** A very familiar option. If you have large (70mm+) binoculars you may need a sturdier model.
Likes: Cheap, easy to transport and set-up, can be easily locked into position, can be left standing between views.
Dis-likes: Awkward to use at high elevations, not free moving with constant unlock & lock which takes practice.
- **Mono-pod:** This option is not so well known but it's a good one for personal viewing. Commercial options are available and can be very good. The DIY option is an extendable paint roller extension pole with a tripod head attached. If you have nothing else you can turn a broom upside down and perch the binoculars on the bristles. As the binoculars are not secured you need to keep that strap around your neck, making the broom a dodgy option.
Likes: Cheaper and less complicated than a tripod, super easy to transport and set-up, very flexible to point in any orientation, even overhead from a seated position is possible if you hold the base between your feet.
Dis-likes: Can't be locked into position for others to view. Have to put down and pick-up each time.
- **Parallelogram tripod:**
The ultimate binocular mounting for its flexibility of uses.
Likes: Simple DIY build if you're handy with tools, can change height from person to person while remaining pointed at the object. Can be used standing, seated upright through to fully reclined which allows for all sky coverage, can be left standing between views.
Dis-likes: A bigger unit to transport that requires counterweights.



Parallelogram tripod

Sky & Telescope have a comprehensive binocular article at:

<https://skyandtelescope.org/astronomy-equipment/binoculars-for-astronomy/>

Binoculars can be very versatile.

With a helper holding a white card the June 2004 Venus Transit was projected at the Office window.

