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How to Choose a Binocular

So you're thinking of buying a binocular, but have no idea where to start. What do all the numbers mean? Is compact better than full-size? Does more money mean better optics? And is bigger always better?

This is our comprehensive guide to choosing the right binocular for you. It can be a little overwhelming, so we're always available to answer any questions you may have.

Numbering System

Binoculars have numbers printed on them, for example: 8x42, 7 degrees, 367 feet @ 1000 yards. But what does it all mean?

- 8x is the magnification. What you see will be 8 times larger than the naked eye view.
- 42 means the front lens diameter of each barrel is 42mm wide. A wider lens lets in more light.
- 7 degrees means the size, from side to side, of the area that can be seen while looking through the binocular. 7 degrees translates into 367 feet wide at 1000 yards in front of you (see Field of View).

What Size Do You Need?

Small binoculars are easier to carry but do not perform as well as larger models if you are viewing in shadows, tree limbs or lower light. Small models are popular for travel, concerts, and ballgames. Most avid birders and hunters prefer a medium size binocular for a brighter image.

The diameter of the lens determines the light gathering ability of the instrument. Larger lenses let more light into the binocular so you see in greater detail. The absolute brightness of the binocular is a calculation called Exit Pupil (see below).

Magnification (Power)

Power (magnification) is the degree to which the object being viewed is enlarged. Most binoculars magnify 7x, 8x, or 10x. An 8x binocular magnifies an image 8 times larger than it can be seen with the naked eye. The power affects the brightness and the field of view of the image. Generally, lower power is brighter and has a wider field of view than higher power.

Is higher power better? Not always! Following moving targets such as birds in flight or footballs in play may be more difficult at higher (10x and more) powers because you have a narrower field of view. It may be difficult to keep the bird or ball in view.

10 power and higher may be hard to hold steady therefore the images seem blurry or jumpy. The higher the power, the more the instrument magnifies our body movement from heartbeat, breathing or caffeine! Many of our customers find a 10x or higher binocular too difficult to hold still. Tripod adapters are usually available for these high power models.

Higher power binoculars may seem less clear if you are viewing on a hazy day. Heat waves, moisture, dust, or fog will be more visible when viewing through 10x binoculars rather than 7x or 8x models. Remember, binoculars (and spotting scopes) magnify not just your ultimate target but any particles in the air between you and that target!

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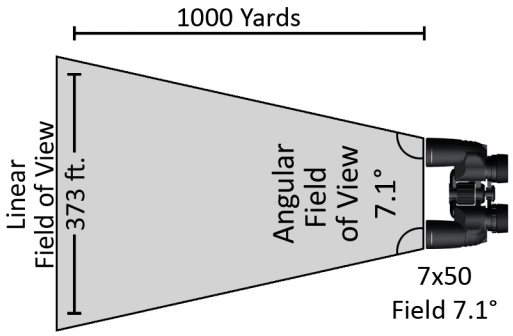
Field of View

The size of the area that can be seen while looking through binoculars is referred to as the field of view. The angular field is indicated, in degrees, on the outside of the binocular. The linear field refers to the area that can be observed at 1,000 feet in front of you. A larger field of view means a wider or larger viewing area. A wide field is desirable when viewing moving objects.



Field of view is related to magnification. Lower power has a wider field of view. Higher power has a narrower field of view. A typical field for an 8x binocular is 6-7 degrees. A typical field for a 10x binocular is 5 degrees.

Multiply the angular field by 52.5' to determine the linear field. A 7.1 degree angular field has a 373' linear field at 1,000 yards in front of you.

Exit Pupil (or Brightness)

Exit pupil is an important consideration. The diameter of the beam of light that leaves the eyepiece and hits your pupil is the exit pupil. The larger the exit pupil, the brighter the image. Large exit pupils are desirable for low light viewing such as dawn, dusk, in the woods, or for binocular astronomy.

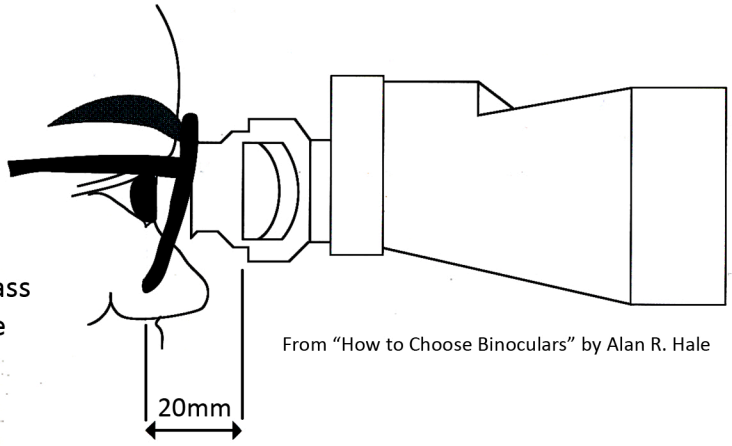
The human eye pupil diameter is about 2mm in bright light, 3-5mm during normal daylight, 5-7mm at dawn or dusk and 7+mm in total darkness. You have good viewing when the binocular exit pupil is greater than or equal to the diameter of your eye pupils. If the exit pupil is insufficient for the lighting conditions, you will see less detail. It is much like walking into a dimly lighted room vs. a fully lighted room: you see more detail in full light.

To calculate exit pupil, divide the size of the objective lens by the magnification of the binocular. The exit pupil of a 7x42 binocular is 42 divided by 7 = 6mm. The beam of light hitting each of your pupils is 6mm wide.

Consider the impact of magnification on exit pupil: 7x50 and 10x50 binoculars are both full size instruments. The exit pupil of a 7x50 is 7.1mm whereas the exit pupil of the 10x50 is 5mm. The 7x50 will provide brighter images, yet less magnification.

Eye Relief

Do you wear glasses for distance? Eye relief is the distance, in millimeters, that a binocular can be held from the eye and the full field of view can still be seen. This is ***important for eyeglass wearers*** because they cannot hold the binocular as closely to the eye as someone without glasses. Eye relief of 14-20mm or more is desirable for eyeglass wearers, but you can also have too much eye relief. If the eye relief is too long, you may see black shadows in the view.



From "How to Choose Binoculars" by Alan R. Hale

Optical Coatings

The coatings on a binocular are very important to the **quality of the image** you see. All optical glass absorbs and reflects light; light transmission through poorly coated glass can be as low as 50%! That means that up to half the available light is not hitting your eyes! The optical elements of the binocular are therefore coated to reduce light loss and glare. This ensures even light transmission, brightness, greater clarity, sharpness and contrast.

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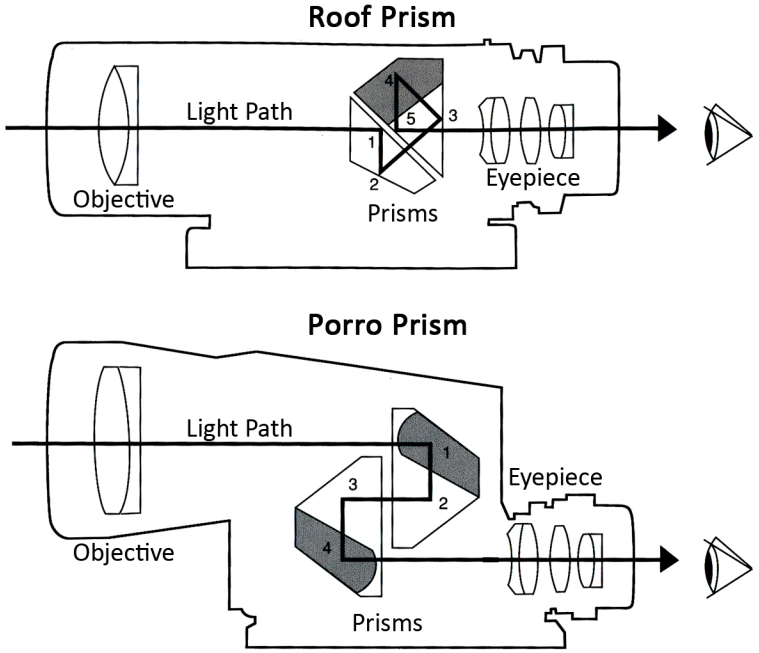
Optical Coatings (continued)

Lens coating levels range in quality as follows: coated, fully coated, multicoated, and fully multicoated. Fully multicoated lenses are the best with as much as 95% light transmission. Terminology may vary from one manufacturer to another; some multicoated lenses may in fact be fully multicoated.

Prisms

There are two basic designs: roof or porro. The straight tube roof prism models are more compact and have become the dominant design in the industry.

Beware: inexpensive roof prisms will look dim compared to the same size porro prism model. We find very few roof prism models under $100 that are as sharp and clear as porro prism models of the same price.



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Near Focus and Depth of Field

The distance between the binocular and the nearest object you can clearly focus on is the near focus. Six to ten feet is considered very good. There are some binoculars on the market with very close focusing ability such as the Papilio series from Pentax with an 18 inch close focus! See butterflies with that model (or your shoe laces)!

Beware of false advertising with close focus numbers: some models claim to have a close focus of 3-4 feet which then can only be achieved by looking through one eye only! Not too comfortable…

Depth of field, or depth of focus, refers to how clear the image is from close to far. Better binoculars and newer models generally have better depth of field meaning you don't have to turn the focus wheel too many times as the bird (moose) moves closer or further from you.

Collimation

The alignment of the optical elements of the binocular is the "collimation". Good collimation prevents headaches and eyestrain. Inexpensive binoculars can have poor collimation. If you see a **double image** when viewing through a binocular, it may be "out of collimation".

If the binocular has been dropped, it may need to be collimated by the manufacturer. You cannot collimate a binocular yourself – quality manufacturers use laser collimation devices to ensure precise alignment.

Interpupilary Distance

When looking through a binocular, you need to adjust the two barrels around the center hinge(s) so that you see ONE image, not two images. That means the binocular oculars are properly centered on your pupils.

If you have close-set or wide-set eyes, not all binoculars will fit you. Roof prism designs have the closest possible interpupilary distance. Contact **DiscountBinoculars.com** for advice if you have eyes that are rather close together (or far apart).

Fit and Feel

There is a subjective aspect to choosing binoculars that cannot be denied! Some binoculars will feel better in your hands or fit your face better than others. Size and weight are factors, as are balance and quality.

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Waterproof vs. Water Resistant

There is a vast difference between waterproof and water-resistant (or weather resistant). Waterproof means the binocular has been purged of all moisture and air then filled with an inert gas and sealed with O-rings. Waterproof binoculars are fog proof and will suffer no internal condensation if immersed accidentally in water for brief periods of time.

"Water resistant" is typically a marketing expression that means the construction has very little protection against moisture. There are, however, some very good quality water resistant models that will afford you good moisture protection because of their superior construction.

It is common misconception that binoculars housed in **rubber** are waterproof. Rubber casing is for grip only and is not a determinant of waterproofing.

Zoom Binoculars

There are many zoom binoculars on the market with changeable magnification. A typical zoom will have powers of 7-20x. Beware of zoom binoculars! Most zooms are of bad optical quality and resolution. Most zooms feature magnifications too high for comfortable handholding (remember: most of us find 10x to be the highest power we can hold without shaking too much). And, don't forget to calculate the exit pupil and field of view on zooms –most have dim, fuzzy images with very narrow fields of view.

There are a handful of acceptable zooms on the market and **www.DiscountBinoculars.com** sells them. The ones we don't sell – well, we highly recommend against buying them! They just don't provide acceptable image quality.

Fixed-Focus or Auto-Focus Binoculars

There are some binoculars sold which claim to have a fixed or automatic focus. These are units with the focus factory preset at infinity and will be **somewhat** in focus from about 40 feet (at 7x) or 80 feet (at 10x) to infinity. You cannot obtain a truly sharp focus and you cannot compensate for a left and right eye vision imbalance with the diopter control available on standard binoculars.

We **do not recommend** fixed or auto focus binoculars. They are a marketing gimmick and provide fuzzy images when compared to a focusing instrument. They feature low-grade prisms and coatings.

Are $2000 Binoculars 20 times better than $100 Binoculars?

Maybe! Top of the line binoculars can be clearer, sharper, brighter and more durable than comparably sized models at a lower price. But in recent years, medium-priced binoculars have improved considerably in quality and features.

Do you like to use the very best?

DiscountBinoculars.com will help you find the right model for your budget. Many good binoculars are available in (almost) all price ranges; we specialize in binoculars, we know the market inside and out and **we do not sell junk**!

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