



# Choosing Binoculars

Binoculars make good gifts for any nature lover, but can also be useful to gardeners. The construction of binoculars involves many compromises. Making the right purchase choice means finding which compromises best suit your needs. There are many items to consider, but none is necessarily more important than any other.

Many beginners feel they want the most powerful binocular they can find. The first number in denoting a binocular (such as 7x35 or 10x50) is always the magnification. A bigger number means that the objects viewed will look that many times closer. The compromise is that it will also magnify any movements caused by your own hands or even heat waves by that same amount. Higher magnifications also tend to decrease the field of view and decrease how much light gets through to your eyes. For most people, a higher magnification than seven or eight often makes it harder to see.

The number after the 'x' in the 7x35 designation is always the diameter of the objective lens in millimeters. The objective lens is the one on the end of the binocular closest to the object. Just as the iris of our eye opens wider to gather more light in dimmer locations, a bigger objective lens gathers more light than a smaller one. A big lens that gathers more light is very useful, but is compromised by making the binocular bigger and heavier.

The diameter of the beam of light that comes out of the binocular to your eye is called the exit pupil. The bigger it is, the more light that reaches your eyes. The diameter of the exit pupil is determined by the size of the objective lens divided by the magnification. A 7x35 binocular has an exit pupil of 5mm because 35 divided by 7 is 5. A 7x20 binocular has an exit pupil of 2.8mm (20 divided by 7 is 2.8), which is about half the diameter of the exit pupil of the 7x35 binocular. Cutting the exit pupil in half reduces the amount of light coming out to one fourth, so it makes a big difference.

Smaller binoculars are easier to carry, but (as mentioned above) for the same magnification, the smaller objective lens results in a smaller exit pupil. Less light getting to your eye may not be a problem in well-lit locations, but can be a problem in the early morning, late evening or indoors at a concert. The pupil of our eye opens 2 to 3mm during the day and as much as 5 to 7mm during the evening. A larger objective lens is very useful in dimmer situations.

The farther the exit pupil focuses past the end of the eyepiece the easier it will be for eyeglass wearers to use the binocular. Some manufacturers will mention how far back the focus point is, such as: 15mm. Long rubber eyecups on a binocular indicate a binocular designed for eyeglass wearers. The rubber eyecups are folded down and out of the way when the user is wearing glasses. Non eyeglass users leave the cups extended, to keep the focus point in range.

Most binoculars have several lenses and a pair of prisms for each eye. Some light bounces off the surfaces of each piece of glass instead of going through it. To reduce this loss of light the glass can be made denser by adding minerals to it or it can be coated with reflection reducing chemicals. Denser glass is harder to shape and polish but gives a good reflective surface like lead crystal. The more pieces of glass that are coated or if multiple coatings are put on a piece of glass, the harder it is to make. A binocular with denser glass and many coatings gives better color quality and light transmission with the compromise being higher cost, sometimes a very much higher cost.

All binoculars of good quality have an adjustment for each eye that allows people who have eyes that do not see the same, near to far, to be able to quickly adjust the binocular for their use. Binoculars that do not require you to focus them usually also do not focus on things close up. They can be useful for cruises where things are not close by, but are not useful for much else. Binoculars that have image stabilizers are good for people with shaky hands, but do cost more than regular binoculars. They use gyroscopes just like some camera lenses. My Canon camera image stabilized lens make a very big difference in my ability to take pictures.

Some binocular models are water resistant or waterproof. Binoculars that do not have to be coddled are more useful for people who will use them in the outdoors. People using them for concerts and sporting events probably do not need this option. An extra benefit to waterproof binoculars is that they don't fog up when you come in from outside in the winter. When the prisms inside the binocular fog up, you cannot wipe them off to clean them. The inner lenses can be ruined by water spots from fogging up too often.

Binoculars under fifty dollars can be of okay quality and are good for kids or leaving in the car so there is always a pair handy. Binoculars in the fifty to one hundred fifty dollar range are good for most beginners. The next price range goes up to three hundred or so and is good for serious bird watchers and sports people. The next price range is closer to one thousand dollars and is for people who really want to see good color renditions of birds in lower light conditions.

Most binoculars from any brand in each price range are very comparable for most people, but the best way to choose a binocular is to actually use it to see if it works for your eyes. Does the focusing knob turn smoothly and easily for your finger length? Does it come with a comfortable wide and cushioned strap or one of those tiny neck-breaking straps? A good strap style is one that crisscrosses the back instead of the neck. Gift binoculars are best given if the receiver has tested them or are accompanied by a gift receipt.

Besides spotting things a long distance away, how can binoculars be useful to gardeners, you ask? I am sure most people know that if you look in the wrong end of a binocular, things will seem tiny. However, if you look at something only a half-inch or so away from the wrong end, it will look huge. It will be magnified about the same power as the binocular. So carrying a 7x35 binocular is also like having a seven-power magnifying glass. You can now look at bugs and flowers with a new view.