

# Using Binoculars



OSU EXTENSION  
4-H YOUTH DEVELOPMENT

## Objectives

- Participants will learn to identify types of binocular
- Participants will learn to identify binoculars parts
- Participants will learn to use binoculars

## Background

Binoculars are the most important tool for a bird watcher to own. Binoculars magnify anything you view through it, giving you a much better look at objects than you would get with the unaided eye. For birders this helps them to see the field marks on birds so they can identify what species of bird it is.

Binoculars have left and right side barrels linked to each other by an axle. Every binocular has prisms. Prisms are what let you see a correctly oriented image when you look through a pair of binoculars.



The two most frequently used prism systems are porro and roof. **Porro Prism** binoculars are characterized by the eyepieces being offset from the objective lenses. These also tend to be bulkier but less expensive. **Roof Prism** binoculars feature lenses positioned in line providing for a more compact design but are usually more expensive than porro prism binoculars.

## Materials:

- Handout
- Binoculars

## Life Skill:

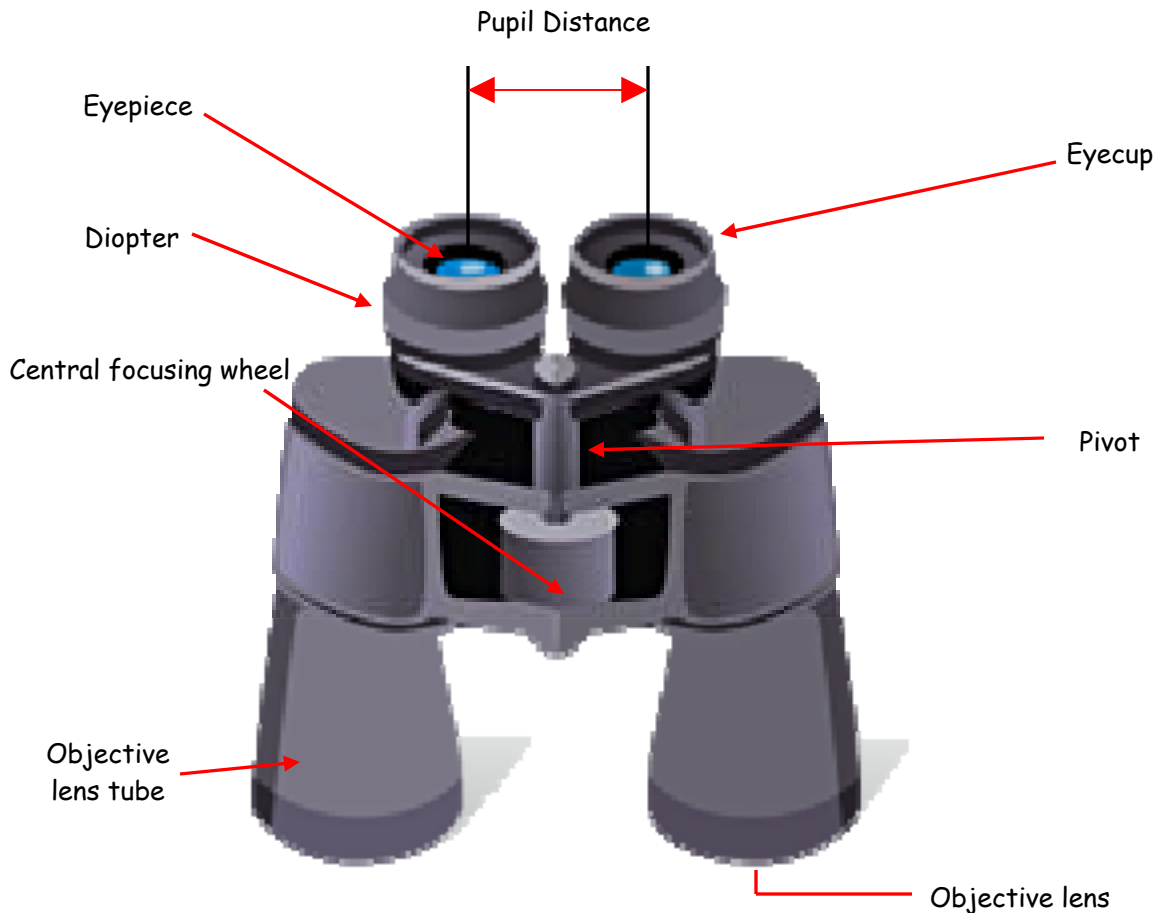
- Critical Thinking
- Problem Solving
- Decision Making
- Learning to Learn
- Communication

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared at no cost to the taxpayer.

## Binocular Nomenclature

Binoculars are made up of a lot of parts, but you only need to know a few to have a basic understanding of them. The eyepiece (or ocular lens) is the lens closest to your eye. The objective lens is the lens closest to the object you are viewing. The focusing wheel, usually located along the center hinge, adjusts the image into focus so that objects at various distances can be viewed. The diopter setting is usually located on the right eyepiece, but can also be along the center hinge. The diopter allows for an individual to correct for differences in their eyes so that an object is in focus for both eyes.



There are a lot of numbers associated with optics. The numbers written on the body of the binocular tell you much of what you need to know when shopping and comparing binoculars. For our example we will use: 8x42, 6° or 8x42, 315' at 1000 yards.

The first number is the size of the binocular's **magnification**. With a 8x42 binocular the image is 8 times larger than what you see with the naked eye. Good birding binoculars range in power from 7x to 10x. Magnification generally has little influence on image quality. The image simply appears smaller with a 7x than with an 8x or 10x. The amount of detail you see is determined by many other factors. Often beginning birders look only at magnification at the expense of other features.

The second number (42) refers to the **diameter of the objective lens** in millimeters. A larger objective lens takes in more light improving brightness and resolution of the image. The larger the diameter of the objective, the more light that is allowed into the binoculars and the more detail you can see, but at the expense of increased bulk

The other numbers (6° or 315') represent the **field of view**. This is the width of the area that you can see through binoculars at 1000 yards. It may be expressed in degrees or in feet. In this example if you were looking at a fence line 1000 yards away, you could see 315 feet of the fence through your binoculars. One degree is equal to approximately 52.5 feet at 1000 yards. To convert an angle to feet multiply the angle by 52.5 ( $6 \times 52.5 = 315$ ). Generally the size of the field of view decreases as magnification increases.

For birding and wildlife viewing **close focus** is very important. This is the distance from which a object in close proximity can be observed and still remain in sharp focus. Ideally a pair of binoculars will focus on objects at 10 feet or even closer. Compact models usually have a good close focus, but you may sacrifice brightness, power, and field of view. Many binoculars now are manufactured with the birder in mind and can focus down to 6 feet.

The maximum distance your eye can be from the eyepiece and still see the complete field of view is termed **eye relief** and it is usually expressed in millimeters. If you wear eyeglasses or sunglasses almost all binoculars come with eyecups that fold down or screw in to allow eyeglass wearers to get as close as possible to the eyepiece.

The human eye is able to focus on near or far objects without a conscious effort. When using binoculars we have to manually focus on objects as we or they move. With binoculars the area in which your eye can perceive a satisfying impression (without refocusing) of an object as it moves slightly back and forth is called the **depth of field**. It can become annoying to continually adjust the focus wheel while viewing birds sitting close together, one behind the other. Depth of field usually decreases with increased magnification, but a wide angled eyepiece can increase the apparent depth of field. Manufacturers can design the eyepiece to give a wider field of view or change the design and shape of the binocular's lenses to create "wide angle" binoculars. A wide angle binocular can be useful for beginners or children since it's much easier to find an object when you can view more of its surroundings.

### **How to Correctly Focus your Binoculars**

- Start by adjusting the distance between the two barrels of the binocular so that they are the correct width for your eyes (pupil distance). If they are too far apart or too close together you will see black edges in your field of view. If you have the spacing right, your view will be a perfect circle.
- Next, locate a distant stationary object on which to focus.
- With your right eye closed (or with your hand over the right objective lens), focus your left eye on the object with the center focus wheel until the targeted object is in sharp focus.
- Now adjust for your right eye. To do this, close your left eye (or place your hand over the left objective lens) and focus your right eye at the same object. Focus using the diopter (not the center focus wheel) adjustment ring until the object is sharply focused.

- Now open both eyes and see if your focus is crystal clear. If the image is not clearly focused, repeat these steps, making small adjustments using one focus wheel or the other.
- Once you have obtained maximum focus, remember the setting for your diopter adjustment (if symbols or numbers are provided).

How can you tell if your focus is correct? First of all, the view through your binoculars, with the diopter adjusted, should appear three-dimensional and be crystal clear. Also, your eyes should not have to work hard when using your binoculars.

**NOTE:** Never look directly at the sun through binoculars. The magnification of sunlight can seriously damage your eyes. Always be aware of the sun's position so you do not accidentally swing your binoculars into the sun.

### **Cleaning Your Binoculars**

No matter if your binoculars cost \$50 or \$1,000, they will need to be cleaned regularly. Cleaning them the wrong way can permanently damage them. Wiping your shirtsleeve across your lenses may seem like the easiest way to clean them, but you may be putting tiny scratches on the glass or lens coatings. Over time these scratches will reduce the clarity of the image your binoculars can provide.

The best way to clean binocular lenses is:

- Use a soft brush or compressed air to blow away particles.
- Once the particles are removed, wet a lens cloth or lens tissue with cleaning solution (solution made for use on coated lenses, available at camera shop).
- Softly wipe the lenses with the wet cloth.
- Dry the lenses with a dry portion of the lens cloth.
- Hold the binoculars up in the light and look for smudges or smears. Repeat the wet cleaning as needed.

Lens-cleaning kits available from many optics stores and manufacturers. Most experienced birders carry a cleaning kit to the field to help keep their binoculars clean.

### **Cost:**

Binoculars range in price anywhere from \$25.00 to over \$1000.00. When looking to purchase a pair of binoculars keep two things in mind:

1. Buy the best pair that you can afford. Usually the more you pay, the better the quality you receive.
2. Make sure they are comfortable to use. They should feel good in your hand, be easy to focus raise and lower easily, are waterproof, shockproof, do not make you dizzy and have a warranty.

Many people who purchase inexpensive binoculars tend to do one of two things: 1) give up bird watching because they can't see the birds good enough or 2) buy a better pair the first chance they get.

## Can't find the bird?

OK...so now you know the basics of binoculars. The next trick is locating birds with your binoculars so you can get a better view. Finding birds in trees, shrubs or a field with your binoculars can be challenging at first. By using the following tips this process can be made easier.

Use your eyes and ears first! Look for movement and focus on sound to help find a bird

Once you see the bird, stay focused on the bird! Bring your binoculars up to your eyes to get a better look. Try not to look down at your binocular but stay focused on the bird.

It is helpful to note a point of reference or landmark that will help you find the bird with your binoculars. Some examples might be a branch that forks, a fence post, a rock, etc. By doing this, when you raise the binoculars to your eyes and you don't have the bird in view, you can use these reference points which will make the finding the bird easier.

**Remember:** FIRST find the bird — THEN use the binoculars.

A good way to practice is to find birds with your binoculars in your backyard. As with most skills, practice will help develop your ability to quickly locate the bird in your binoculars.

## Helping others find birds

You are out with a friend and you spot a new bird for the first time. You are *quietly* telling your friend all the cool things about this bird. They get excited and want to see this bird. They respond "Where is it?" The easy reply is "Up there in that tree!" While this may seem like a good direction, it would be more helpful to provide them with a specific location description.

Hopefully you have been using the reference point instructions described above. Since you used a reference point to locate the bird, you can now use these points to help them find the bird. Begin by describing large reference point and then provide more detail. Be sure that they have located the points described before moving on! Example:

"Do you see the large oak tree to our left? (it may be helpful to point)

"Yes".

"Look four trees to the left".

"OK".

"The bird is in that tree".

Once the person is looking at the correct reference point, it may be useful to think about how a clock is designed and use that to provide more detail. Using a tree as an example: 12 o'clock would be the top, 6 o'clock the bottom, 9 o'clock would be the left center, and 3 o'clock would be right center.

You might say "The bird is sitting near the end of a branch at 9 o'clock where the second branch forks from the tree". Keep giving them reference points until they can locate the bird. It may be helpful to think about how you would like to receive directions and provide them information in that way.

**Contributing Authors**

Kevin Allen, Ph.D.

State Extension Specialist — 4-H Environmental and Natural Resources

Department of Natural Resource Ecology and Management

Dwayne Elmore, Ph.D.

State Extension Specialist — Wildlife

Department of Natural Resource Ecology and Management