

Tools of the Trade

You can observe objects in the night sky with your unaided eye. However, with binoculars or a telescope, the images you see will appear brighter and larger.

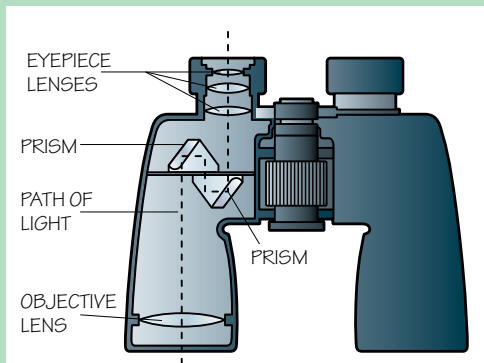
Binoculars

Binoculars are perfect for stargazing. They collect more light than the human eye, so you can see many more stars with binoculars than with the unaided eye. They also improve the clarity and intensify the colors of the stars you see.

Unlike a telescope, binoculars allow you to use both eyes to view. Binoculars show an image the right way up, whereas telescopes show objects upside down. Binoculars are easy to transport and less expensive than many telescopes.

The increased light-gathering power of their wide lenses makes binoculars ideal for astronomy.

Because of their wide field of view, binoculars are perfect for studying the surface of the Moon, scanning the Milky Way, spotting Jupiter's large moons, and viewing star clusters. An ideal size is 10×50 , which means the image is magnified 10 times and the main lenses are 50 millimeters in diameter. The 8×40 and 7×35 are also good choices.



Standard binoculars

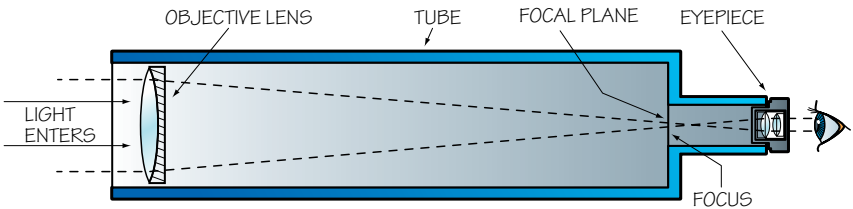


Some giant binoculars have lenses of 70 millimeters or more and magnifications of 15x to 20x. Wider lenses allow you to see more stars, but these giant binoculars are so heavy that they must be mounted on a tripod, like a telescope, for viewing.

Telescopes

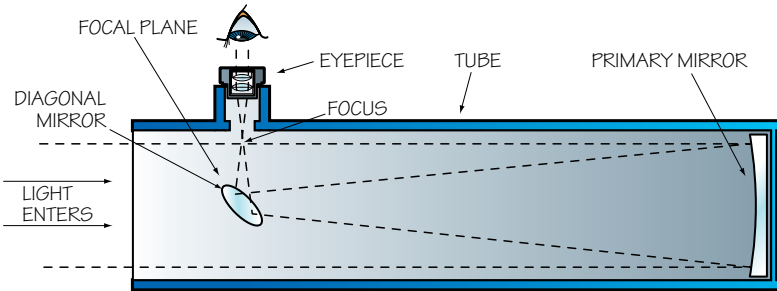
Like binoculars, telescopes gather more light than the human eye. The two main types of optical telescopes—those that collect visible light—are *refracting* and *reflecting*. A third type, the *catadioptric*, combines features of the refractor and the reflector.

Principle of a refracting telescope



Refracting telescope

Refracting telescopes use a system of lenses. At the large end of the telescope, the objective or front lens collects and focuses light. The eyepiece, the smaller lens you look through, is at the other end. Refracting telescopes produce sharp images.



Principle of a reflecting telescope

In the reflecting telescope, a concave (bowl-shaped) mirror at the base of an open tube collects and reflects light to a second, smaller mirror near the top of the tube. The eyepiece magnifies the image that the mirrors have formed. The reflector is the most common type of telescope and a popular choice for backyard astronomers.



Reflecting telescope

Radio and X-Ray Telescopes

Radio telescopes pick up images that astronomers would not be able to see otherwise. Radio waves from space reflect off of the telescope's large bowl-shaped (dish) antenna, and the radio receiver picks up the signals. A computer converts the signals into images. Radio signals reveal details, including temperature and composition, of objects in space that give off radio waves.