



NO TELESCOPE DOES EVERYTHING PERFECTLY

CHOOSING YOUR TELESCOPE

The night sky is vast with a huge array of near and far objects to explore.

While some objects such as the moon and planets are bright, they are small. For those interested in these objects, the goal is to observe detail - Jupiter's cloud bands and moons, Saturn's rings and Mars' surface features.

By contrast, nebulae and galaxies are very faint and so are difficult to observe. Many newcomers' first attempt at observing these objects ends in disappointment we have become used to seeing the amazing images produced by the Hubble and James Webb Space Telescopes. If nebulae and galaxies are your goal, it's best to consider telescopes that are also suitable for astrophotography.

BUYING GUIDE #1

Every telescope has positives and negatives, and so we must make trade-offs.

This buyers guide is designed to help you understand how to evaluate key telescope design and performance characteristics and what they tell you about the suitability of different telescopes for different targets of interest.



REMEMBER ...

THE BEST TELESCOPE
IS ONE YOU'LL USE
MOST FREQUENTLY

CRITERIA

- 1. LIGHT GATHERING ABILITY.** The aperture, the diameter of the primary lens or mirror, determines how much light is captured. Larger apertures collect more light and reveal more detail, although it also increases the size, weight and cost of the telescope.
- 2. FOCAL LENGTH.** The focal length is the distance light travels inside the telescope before it comes into focus, forming a sharp image. Focal length is important because it determines the field of view (FOV). In other words, how much of the sky you see through the telescope. A short focal length (less than 600mm) shows a wider area of the sky, making it easier to fit large objects like open star clusters such as Pleiades or the Andromeda Galaxy into a single view. A long focal length (more than 1000mm) shows a smaller area of the sky, making objects like Jupiter or Saturn appear larger and easier to study. A selection of quality eyepieces can help you tailor the field of view to the object you are observing, although the telescope's focal length still sets the overall character of the system.
- 3. MAGNIFICATION.** Magnification is often the first specification newcomers look at, but it is one of the least useful when comparing telescopes. Magnification is determined by the focal length of the telescope and the focal length of the eyepiece being used, so changing the eyepiece changes the magnification. In practice, a sharp image at moderate magnification is far more enjoyable than a blurry image at very high magnification. Again, a collection of eyepieces helps manage the trade off between FOV and image scale. For example, a low-power eyepiece provides a wide view for large star clusters, while a high-power eyepiece is better suited to studying the rings of Saturn or the cloud bands of Jupiter.



CRITERIA

4. CONTRAST. Contrast is the ability of a telescope to distinguish faint details from the background sky. High contrast helps reveal subtle features on the Moon and planets, while also making faint nebulae and galaxies easier to detect. Telescope design and optical quality are important factors, with higher quality optics generally producing better contrast. As you might expect, better optics also tend to be more expensive. Finally, contrast is strongly influenced by observing conditions, particularly the darkness of the sky and the steadiness of the atmosphere.

5. PORTABILITY. The best telescope is the one that gets used. A large telescope may show more detail, but if it is too heavy or cumbersome to transport and set up in the dark sky area, it may spend more time in storage than under the stars.

6. COST. Your budget should cover the complete observing or astrophotography system, not just the telescope. A good mount, a couple of quality eyepieces, and a few essential accessories will often contribute more to your enjoyment than spending your entire budget on the telescope alone.

REMEMBER, ...

**DARK SKIES AND STABLE ATMOSPHERIC CONDITIONS
BEAT BIG TELESCOPES**

TARGETS OF INTEREST

Before choosing a telescope, it helps to understand the different types of objects you may want to observe.

The best telescope is the one that matches your observing goals and has the potential to grow as your interests expand.

LOOK UP AT THE STARS AND NOT DOWN AT YOUR FEET

Stephen Hawking



OUR SOLAR SYSTEM

- **The Moon:** Bright, Large and Detailed
The Moon is one of the easiest and most rewarding targets. Extremely bright, rich in fine detail. Visible even from light-polluted locations. While all telescopes should enhance your view and enjoyment of the moon, telescopes with high-quality optics and good contrast - particularly refractors and Maksutov-Cassegrains - are especially well suited to lunar observing. A large aperture is not essential, although more aperture can help reveal smaller details.
- **Planets:** Small but Bright
Planets are fascinating targets, but they are much smaller in the sky than newcomers often expect. A telescope with a long focal length (>1000mm) can be very effective for planetary observation because the target is bright enough to support higher magnification. While good optical quality helps, a stable mount and good atmospheric conditions ("seeing") are equally important to obtain the best views.



THE MILKY WAY & BEYOND

- **Star clusters:** Bright and Large

Star clusters are among the most beautiful objects in the night sky, and they demonstrate why longer focal lengths and high magnification is not always better.

With a large apparent size, astronomers benefit from telescope / eyepiece combinations offering a wide FOV. Too much focal length may make a beautiful cluster appear cramped because only part of the cluster fits in the view. By contrast, globular clusters are generally smaller and benefit from greater aperture and somewhat longer focal lengths, which help resolve individual stars.

- **Nebulae:** Large, Faint and Challenging

Nebulae are some of the most impressive objects in the night sky, while frequently misunderstood and the hardest to see. Very large in angular size and extremely faint, visual observation is strongly affected by light pollution and so requires dark skies.

Choose a telescope / eyepiece combination giving a wide FOV and good contrast.

Astronomical filters can help. To capture the spectacular colours and detail seen in magazines or online, an astrophotography setup is required. Long-exposure photographs capture more light, revealing colour and detail that are simply not visible to the human eye.

- **Galaxies:** Distant and Difficult

Galaxies are also challenging visual targets given their distance from earth which can make them very faint. Small in angular size with low surface brightness, again dark skies are essential. Aperture is king, making larger reflectors and catadioptric telescopes popular choices for visual observers. Even large telescopes rarely show galaxies like photographs. Most appear as subtle structures, and seeing detail requires excellent conditions. Patience and observing experience will reward newcomers.

ABOUT NSO

Our Vision

We envision a world where anyone with an interest in astronomy can begin their journey with confidence and enjoy rewarding first light experiences. Where choosing equipment is exciting rather than overwhelming, expert guidance is always within reach, and every astronomer has a trusted partner throughout their journey under the stars.

Our Commitment

We believe our responsibility doesn't end with a sale. We are committed to supporting our customers throughout their astronomy journey.

- Expert Guidance
- Carefully Selected Stock
- Accessible Value
- Long-Term Partnership

