Astronomy
La Société Guernesiaise

Choosing a Telescope

We are frequently asked for advice on the acquisition of an astronomical telescope, either for personal use, or as a gift. A telescope can indeed make a good Christmas present. However, there must be many instruments, given as presents, which are seldom, if ever, used, so careful selection is important. There can be several reasons for lack of use: some telescopes can be cumbersome to carry or difficult or to set up, some may not work as well as expected, or the recipient may just lack sufficient interest.

I usually suggest that unless a real interest in seeing more of the night sky has already been shown, it may be more advisable to buy a good pair of binoculars. A lot can be seen with them, and if after a year there still interest in pursuing the subject, then is the time to consider buying a telescope. If not, then you still have the binoculars for other uses, such as bird watching.

An astronomical telescope is not a cheap item – expect to pay at least £200. Many are available for well under £100, but I have yet to see one that is really satisfactory. The aperture (diameter) and quality are usually insufficient for seeing much more than can be seen with binoculars.

Often the problem lies with a flimsy mount, making it difficult to point the instrument, and then, when the object is finally found, the telescope too easily moves off it or shakes about, resulting in considerable frustration.

Particularly avoid any telescope advertised as able to produce huge magnifications of several hundred times. The choice of eyepiece can result in almost any magnification, but the maximum useful magnification depends on the telescope's aperture and optical quality. So, for example, a 90mm telescope can be useful for up to 160 times magnification, and a 120mm for 200 times.

Low magnifications are often better, especially for faint objects, because they produce clearer images, with better contrast. High magnifications are only useful for bright objects such as the moon or planets, and then only in excellent sky conditions, which we rarely get.

Simple reflecting telescopes, using mirrors, are generally better value than refracting telescopes, using lenses, as a bigger telescope can be bought for the same amount of money. A large aperture means that more light is collected, enabling fainter objects and more detail to be seen. Faint objects, such as gaseous nebulae (the birthplaces of stars), comets, asteroids, stellar remnants and star clusters, are often the most interesting to look at.

The minimum useful size of a refractor is 90mm (3.5 inches), whereas the minimum useful size of a reflector is 100mm (4 inches). But do get the largest size you can afford.

Make sure that the telescope has a sturdy mount, and that it is not too heavy or complicated to set up and use. Research the various kinds of telescopes. Look for detailed advice on web sites and in astronomy magazines.

So-called “Go To” or “Smart” telescopes made by Meade or Celestron, for example, are compact and relatively easy to use, being designed to find objects automatically. Prices start at about £250, including a sturdy tripod, and larger sizes are available for prices rising above £1000. They can be bought from local shops, and there are many suppliers in the UK and on the Internet.

Once you have the instrument, read the instructions carefully, try it out on easy targets such as the moon and bright planets, especially Saturn and Jupiter, and then fainter objects. If you keep using it until you are thoroughly familiar with its operation, it is less likely to be left in the cupboard.

And what kind of telescope do I have? I don’t own one at all, and never have done. But simply by being a member of the local astronomical society I have access to instruments much larger than any I could afford.

Remember

- Consider binoculars.
- Seek advice from magazines and web sites.
- Avoid telescopes advertised with huge magnifications.
- Expect to spend at least £200.
- Get as large an aperture as you can afford.
- Reflectors are generally better value than refractors.
- Ensure the tripod and mount are really sturdy.
- Read the instructions carefully, and practice!

Choosing binoculars

A sensible alternative to a telescope is a pair of binoculars. Even if you already own a telescope it makes sense to have binoculars as well. They are easy and quick to use, and are good for observing many astronomical objects, such as the Moon, the Pleiades star cluster, and the Andromeda galaxy. But they can also be applied to other purposes, such as bird-watching.

There is, however, a bewildering array of binoculars available, with a confusing range of specifications and a wide variety of prices, from £20 to £2000.

In selecting binoculars it is important to choose a pair which is easy to use. They should not be too big or heavy. Having said that, for astronomical use the larger the aperture to magnification ratio the better. All binoculars are marked with a pair of numbers, such as 7x35. The first number is the magnification and the second is the aperture (diameter) in millimetres. Look for a large aperture but not too big a magnification. This will let you see faint objects, with enhanced contrast, as well as a wide field.

I use a pair of 7x50 binoculars. 7x35 is acceptable; they are lighter and easier to hold. Many people favour 10x50. There are much more massive binoculars, but they are very heavy to hand-hold. The larger the binoculars the more likely they are to wobble. They really need to be tripod-mounted, which means that they will be used less often.

Even with the smaller binoculars stability is important, so it is best to lean your arms on something like a wall or a car roof, to keep the binoculars steady. For objects high in the sky use a garden lounger to lie back on. The option of mounting them on a tripod should be borne in mind. That way you can point them to an object, and then other people can have a look. Many binoculars have built-in tripod screw threads. The ultimate is image-stabilized binoculars. They have the advantage of giving a steady image, even at a high magnification, but are considerably more expensive.

A reasonable quality is, of course, also important. There are many binoculars on the market that are inferior. A reliable shop should have something appropriate. There are also specialist UK suppliers of astronomical equipment, some of whom stock binoculars which are particularly suitable for astronomy, and which can supply by mail order. Whatever the source, expect to pay at least £100 for a good pair of binoculars. If purchasing by mail order choose a specialist supplier, and speak to them about your requirements before placing an order.

However, there is no substitute for actually holding and trying before buying. Compare binoculars by looking at a distant outdoor scene, not just within the shop, and by holding them up, as if looking at the sky (but not at the sun, which can cause instant blindness).

What to look at with binoculars

Once you have a pair of binoculars what can you see with them? Generally, people immediately think of telescopes in relation to observing the night sky, but using any optical aid will greatly increase the number of objects which can be seen. For example, with the naked eye less than 2000 stars can be seen at any one time, but binoculars can easily increase that number to over 10,000.

It is important to hold the binoculars as steady as possible, and this is best achieved by mounting them on a tripod, or at least resting one’s elbows on a wall or car roof.

Many objects are better viewed through binoculars rather than telescopes. The narrow field of view of a telescope makes it difficult to discern some extended objects, and certainly it is often easier to find them with binoculars. For example, naked-eye comets can be large and diffuse, and the wider field and greater contrast provided by binoculars enable them to be picked out from the star background.

Eclipses of the moon also make a fine sight in binoculars, especially if the moon happens to be surrounded by prominent stars. It looks like a mysterious, dark red ball hanging amongst the bright celestial bodies. Indeed, the moon looks well in binoculars, even when it is not eclipsed, and it is surprising how much detail one can see of its craters and mountain ranges.

The sparkling Pleiades star cluster, also called the Seven Sisters, looks much better in binoculars than in a telescope. It is a group of young stars, about 100 million years old, of which some half dozen are visible with the naked eye and a few tens visible with binoculars. It is 400 light-years away. Four times farther is a small, cloudy area known as the Orion Nebula, clearly visible in binoculars. It can be found in the sword of Orion the Hunter, and hangs from the three stars making up his belt. It is a stellar nursery - a birthplace of new stars. The bright young stars within it can be seen lighting up the hydrogen gas from which they have just been born, together with dark areas of dust obscuring the light behind them.

In the constellation Perseus can be seen a double cluster of stars, about 7000 light-years distant, which are only 5 million years old. They too, generally look better in binoculars than in a telescope, and can easily be picked up.

It is instructive to look at the Milky Way, especially in the northern hemisphere's summer months when it arches overhead during the evenings. Scan the binoculars across it, and see the myriads of stars it contains, compared with the relatively sparsely populated areas either side of it. It is our own Galaxy, in which our Solar System is located, and we are, of course, seeing it from the inside. In fact, all of the stars that we can see with the naked eye are within the Galaxy, but its disc-like structure appears to us as the beautiful Milky Way.

The farthest object visible with the naked eye is also a galaxy – a beautiful spiral-shaped object containing possibly a trillion stars, visible as a cloudy area in the constellation Andromeda. Any good star chart will show its location. It is over two million light-years away.

Binoculars are useful for viewing many other objects in the night sky, such as the planets Mercury, Uranus and Jupiter, whose four brightest moons can just be made out, and satellites such as the International Space Station.

These are just examples of the myriads of things that can readily be seen with such useful instruments.

For more information

http://skytonight.com/ (click on Choosing Your Equipment)
http://www2.wwnorton.com/college/astronomy/astro21/sandt/choosingbinocs.html http://www.lightandmatter.com/binosky/binosky.html

There are several books that describe objects visible with binoculars, such as Binocular Astronomy by Crossan and Tirion.