

Astronomy



This booklet will guide you through some simple star gazing and teach you some science about what you're seeing.

Take this booklet with you, find somewhere with an open view of the night sky, and without any bright lights around (the mountain huts around Kandersteg are all very good). Get comfy and see what you can see.

What you'll need

- Patience!
- This leaflet
- Warm clothes
- Blankets or sleeping bags
- Light with a red mode
- Telescope or binoculars

Some Tips Before You Start

Star gazing requires patience. Take your time and don't give up. Be aware that your eyes will adjust to the dark over time. So you will see more the longer you are in the dark. This takes about 30 minutes to come to full effect and will be ruined by looking at a light for even a second. If you need to use a light, use one with a red mode as red light has a much lesser effect on your eyes.

Above all, do not look at your phone. The screen emits blue light which is the most damaging of all and will undo all of your waiting.

If you have access to a telescope or some binoculars then take them along, but your eyes are often enough to reveal some very interesting things. (The Upper Hut has a small telescope and some binoculars which you are free to use if you are staying there).

A Little History

Astronomy is the world's oldest science. For thousands of years people have been looking upwards and attempting to explain what they saw. It began when the ancient myths were linked to the sky by the constellations - pictures in the stars that tell stories. With the advent of the telescope astronomy became a study of the stars themselves, leading to the discovery of planets other than our own, of galaxies and pushing our understanding of the universe forwards to the frontiers of modern physics. Astronomy remains an active science with new and exciting discoveries still being made, and many questions still lacking answers.

The next pages will guide you through locating some different objects. Have a quick read through before you go, and enjoy.



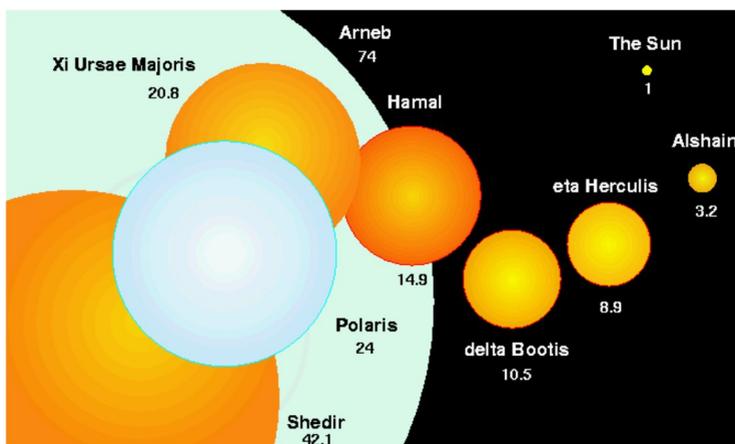
Stars

Where better to begin than with the stars? They may seem a little obvious, but they are actually a lot more varied and interesting than they appear.

Try looking closely at a few bright stars. Notice their colours. Some are red, some blue, some yellow, some white. This colour difference is directly linked to the temperature of a star, which is in turn linked to its age.

The youngest, hottest stars are bright blue. These are brand new stars and reach temperatures of hundreds of thousands of Degrees Celsius. The oldest stars are red. They are only a few thousand Degrees Celsius but are billions of years old, and are approaching the end of their lives. This relationship between temperature and colour is so reliable that scientists can accurately measure the temperature of a distant star using just its colour

In fact, stars range in size from the size of a small city (around 20km) to millions of kilometers. Our own star, the Sun, is about 6000 Degrees Celsius and 1,400,000km across. The image below shows the relative sizes of a handful of stars, including the Sun.



The Milky Way

The milky way is our galaxy. Every star in the night sky exists within the milky way so no matter where you look you are observing the milky way!

However, because it is a disc shape the Milky Way presents itself as a wide stripe across the sky. It is only visible in the absence of unnatural light but it is one of the finest and most often overlooked features of the night sky.

Once your eyes have adjusted to the dark see if you can make out a stripe running North to South across the sky. That is the milky Way.



Most of what you are looking at is huge amounts of dust and grit illuminated by starlight, the darker sections are caused by this dust blocking out the starlight from behind.

The Milky way contains between 2 Billion and 4 Billion stars, and at its centre is a super-massive black hole. The full galaxy is around 100,000 light years across. (That's about 1,000,000,000,000,000 km!)

The Orion Nebula

Next we can try to spot a slightly trickier astronomical object. The constellation of Orion is perhaps the most famous and easily recognized in the northern sky. It represents a hunter with a bow raised to Taurus, the bull.

The three stars of Orion's belt are very easy to spot, and hanging from his belt is his sword. This is represented by three bright blue stars down and left from the belt.

Look at the sword through a telescope or some binoculars. You should see some swirls and clouds wrapping around the three stars of the sword. This is the Orion Nebula.



What is a Nebula?

A nebula is a star forming region. It is formed of very hot dust and gas that has begun clumping together due to gravity. When these clumps get big enough they begin to shine and a star is born. These stars light up the dust surrounding them and make the patterns you can see in the sword of Orion.



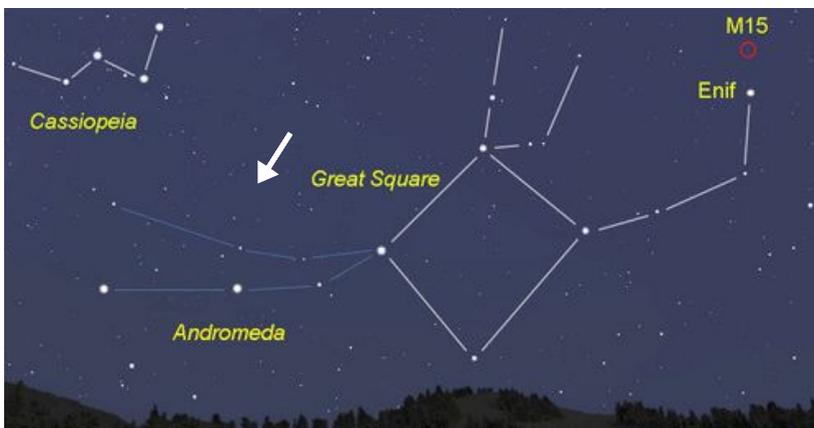
The Andromeda Galaxy

We have already had a look for the Milky Way, our own galaxy which we viewed from within. Next you can try and spot another galaxy.

The Andromeda Galaxy is the only galaxy visible to the naked eye, to which it looks like a pale yellow smear. Through even a cheap pair of binoculars however, the view can be amazing.



Finding it can, however, be a little difficult the first time. It lies in the constellation of Andromeda. This is found by locating Pegasus, which in summer will lie in the Eastern sky, and forms a very big square of four bright stars. In Kandersteg the bottom star may be blocked out by the mountains, especially before midnight. The constellation of Andromeda extends left from the square, and the Andromeda Galaxy is located above this.



The Planets

The planets were first spotted by ancient Greek astronomers who noticed that the position of certain stars changed in the sky over time. The name “planet” comes from the Greek word for “wanderer”.

When the telescope was invented by Galileo, the first thing he did was to observe the planets, and to discover the moons of Jupiter.

Aside from the Moon and the Sun, three planets are the brightest objects in the night sky. These are Venus, Jupiter and Mars.

Venus is easily recognised as it looks like a very bright white star, Mars can be spotted from its very obvious red colour, but Jupiter is by far the most rewarding to observe. It is also the one which moves slowest across the sky. It will consistently appear as a bright star in the south-eastern sky at midnight until around 2022, after which it will begin to rise later in the night. If you can't see it it may be behind the mountains, but it will drift higher in the sky throughout the night, so have patience.



Looking through either a telescope or some binoculars you can easily see several of Jupiter's moons. Typically you can see the four originally observed by Galileo -Io, Ganymede, Europa and Callisto. These moons are orbiting Jupiter meaning every time you look they will have moved, so if you don't see all four it could be that one is behind Jupiter itself. In fact Jupiter has more than 70 moons, but many are far too small to see with any optical telescope.

On a very clear night you might even make out the stripes on Jupiter itself. These are caused by very violent winds in the planet's atmosphere, meaning you are observing the weather on a planet 500,000,000km away!

Jupiter is the largest and heaviest planet in our solar system and is made up of very hot gasses swirling around a super-heated iron core.



With a slightly stronger telescope it is also worth a shot to find Saturn. This is the next planet from the Sun after Jupiter and is famous for its rings.

Until 2022 Saturn will be seen as a bright star between Southwest and Southeast at around 23:00. The way to tell it from the stars is by its "ears" - through an amateur telescope the rings can't be resolved from the planet itself and appear as two bulges on the sides.

Meteor Showers

If you are lucky enough to be visiting us at the right time of year you will be able to watch a meteor shower. These last for periods of a few nights and occur when the Earth drifts through a region with lots of dust and rocks. Some of this falls to earth and burns up in our atmosphere, giving us shooting stars.

During a busy meteor shower you can spot four or five shooting stars per second. Just lie back on a blanket, watch the sky and enjoy the show.

The best summer showers occur at the following times, more accurate dates for each year can be found through a simple internet search - ask a pinkie in Reception to google it for you!

Eta Aquarids - Early May

Delta Aquarids - The end of July

Perseids - Around the 10th of
August

Draconids - Early October

