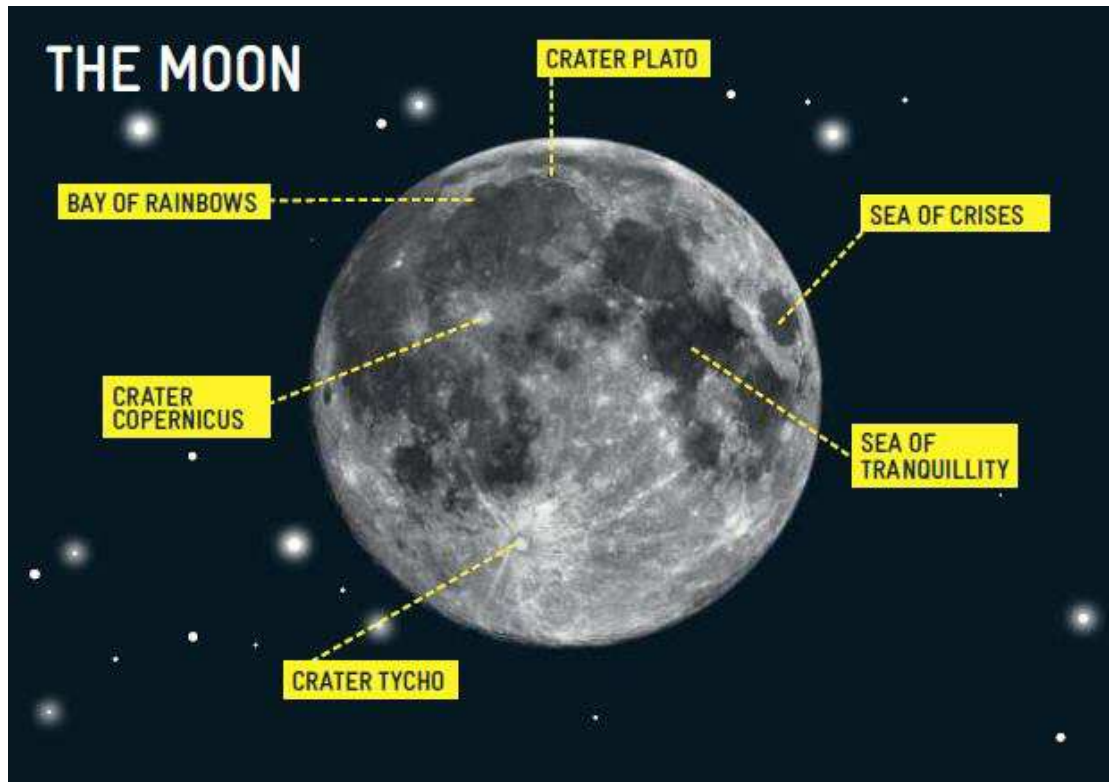


## Observing the Moon



### Getting started.

Looking at the Moon is another great way to start to explore the night sky. You may think that the best time to observe the moon is when it is a full moon. But at this time the shadows on the moon surface are at their shortest, making it harder to pick out individual features.

So it's more fun to wait until the phase of the Moon has changed and a shadow line, called a terminator is visible. A terminator is the boundary between the illuminated section of the Moon and the area in shadow. Observing the terminator is where the Moons mountains and craters are most clearly seen. So why not look for yourself ? Find a clear night and see if you can spot any of the features on the lunar surface. Binoculars are great for such observations. But you need to hold them very steady as your hands and arms naturally shake, especially on a winter night. For a bit of steady support get your broom and place it upside down with the binoculars resting on the brush end. That should steady things up a bit.



## Impact!

The Moon's cratered surface tells a violent story. Bright areas are ancient crust that make up the highlands. Dark areas are newer regions of lava that formed after asteroid impacts.

### Copernicus

This crater (left) is easy to spot. It formed about 800 million years ago, and is 57 miles (92 km) wide. Note central peaks and terraced walls, caused by impact.

## What do you see on the Moon?

Face south and look up in the sky.

Can you find the Moon?

Compare the Moon in the sky to the large Moon map below. The Moon map shows the side of the Moon that is always facing us. How much of the Moon in the sky is lit up right now? You will only see the features on the part of the Moon that is lit up.

Through a telescope, you may need to turn the map to match your view of the Moon in the eyepiece. Some telescopes will flip the image, so the Moon might look like the image to the right through a telescope.



### Aristarchus

Young crater. So bright that Sir William Herschel thought it was an active volcano.

### Kepler

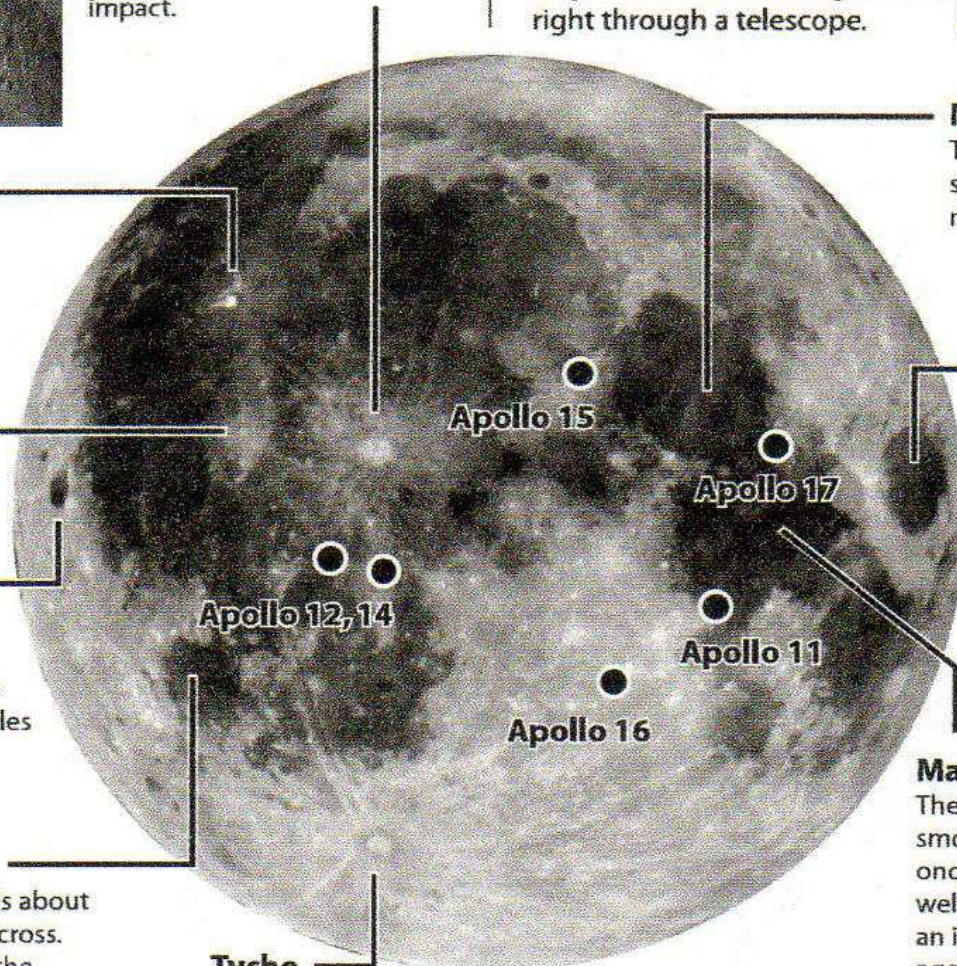
Small version of Copernicus

### Grimaldi

Lava-filled crater is one of the darkest spots you can see on the Moon. It's 145 miles wide (233 km).

### Mare Humorum

The Sea of Moisture is about 220 miles (350 km) across. You can spot it with the naked eye. With a telescope, you might notice two craters along its edge.



### Mare Serenitatis

The Sea of Serenity is solid lava, some 380 miles (610 km) across.

### Mare Crisium

The Sea of Crisis is about 340 miles wide (550 km) and visible to the naked eye.

### Mare Tranquillitatis

The Sea of Tranquility is a smooth plain filled with once-molten lava that welled up from below after an impact billions of years ago. The first humans to walk on the Moon, Apollo 11 astronauts, landed near the edge.

### Tycho

Young crater best seen during a full Moon. Rays of bright material are ejecta blasted out of the crust when a large asteroid struck about 109 million years ago.

## Using a telescope

The most popular first target for any new observer with a telescope is our nearest neighbour in space, the moon. Here are some tips to make your telescopic encounters with the moon more enjoyable

Before looking at the moon with your telescope, take a good look at it with your naked eyes. The most notable thing about the moon is that it is large enough to show some detail without any optical aid. As the moon moves in its orbit around the Earth, the sun's light strikes it from different angles, sometimes illuminating only a thin crescent from behind, at other times shining full on, making it a full moon. We call these the phases of the Moon. They are all listed for 2013 in the Moon Calendar.

You can also see a surprising amount of detail on the moon with your naked eye. Most obvious are the shades of grey: the large bright areas mostly on the southern half, and the darker grey areas mostly on the northern half.

With binoculars you begin to resolve more detail on the moon; mountains, valleys, plains and especially craters. But with even the smallest telescope, a whole new world appears before you, ready to explore. So what you need now is a map.

When's the best time to observe the moon? Most people think it's around full moon, but in fact this is the worst time. At full moon, the sunlight is falling on the moon's surface from straight overhead, and it looks like the desert at high noon. The best times to moon-watch are actually at the two "quarters". The time when the moon is a quarter way around its orbit, and the sun is hitting it from right or left. Again our Moon Calendar will help you out.

## **Focus on the terminator**

Concentrate your observing along the terminator, the boundary between light and dark. The sun is rising along this line, and so the shadows are at their maximum length. In fact, if you watch for a few minutes, you can actually see the shadows change as the sun rises.

A lot of beginners are surprised at how bright the moon is in a telescope. In fact, it is only as bright as a road surface on a sunny day, but it seems much brighter because we're usually observing the moon in a dark sky from a dark location. If the brightness bothers you, try observing before the sky is completely dark, or if you can turn some lights on at your observing location.

As the moon gets closer to a full Moon, the terminator moves closer to the edge of the moon, and it gets harder to see detail. As noted above, the full moon is literally a washout with a telescope. Though perfect for Werewolves.

A few nights after full, the moon starts to get interesting in the telescope again but at this point, many people lose the moon. That's because the moon, in its orbit around the Earth, rises about 50 minutes later each night. By third quarter, the moon rises around midnight and is high in the southern sky at dawn.]

If staying up late to observe the moon doesn't agree with you, you can try observing it first thing in the morning instead. Once again, observing in a blue sky helps kill the glare.

## **Managing magnification**

What is the best magnification to use on the moon? Try all of them; they're all good.

A low magnification of around 50x will show you the whole moon and give you the "big picture." But to see the moon at its best, try a high magnification, at least 150x. The moon can tolerate high magnification better than any object in the sky. This also has the added benefit of reducing the glare from the moon. The only time high magnification can't be used is just as the moon is rising or setting. When close to the horizon, the moon is so blurry it looks like it is deep in boiling water.

With a good map of the moon in hand, try "crater-hopping" your way up or down

the terminator. See how many craters you can identify, noting the variety of their sizes and shapes, what their walls look like, and what they have on their floors. What other topographic features can you see? Look for mountains, both isolated peaks and mountain ranges. Many of these are named for their counterparts on Earth.

There are things on the moon that you never or almost never see on Earth. There are rilles; systems of grooves in the surface, thought to be the remnants of collapsed lava tubes. There are domes; gentle swellings in the relatively flat surfaces of lunar "seas" and flat-floored craters.

### **Apollo landing sites**

Look for the landing sites of the Apollo astronauts. You won't see any of the stuff they left behind, because they are too small to see from this distance, but you can often identify nearby geographic features.]

If you get the chance, try to take some photographs. Because the moon is lit by full sunlight, it is easy to photograph with short exposures just holding the camera to the telescope's eyepiece. If you do send them into me and I will ensure they are displayed in the Gallery section of this website.

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