

New Moon: 5th September (11:40 BST)

First Quarter: 12th September (17:10 BST)

Full Moon: 19th September (11:15 BST)

Last Quarter: 27th September (03:55 BST)

I hope you managed to see a few Perseids last month and see the Earth-Shine on the Moon. As I write this, the storm has not reached peak yet, but I have already seen 5, although my camera was looking at the wrong part of the sky. Such is the life of an astrophotographer!

This month, I want to talk about how far we can see. You might be surprised by the answer.

Lets have a quick review of how we talk about distances. When you are putting up some shelves, you measure millimetres or inches. When you think about driving to London, you measure in miles or kilometres. When measuring distances within the Solar System, we use Astronomical Units (or AU). 1 AU is the average distance of the Earth from the Sun, and works out to be 92,955,807.3 miles or 149,597,871 kilometres, which seems like a long way, but in the scale of our Universe surrounding us turns out to be a tiny distance. When you measure the distances between the stars and galaxies, you measure in Light Years.

So exactly what is a Light Year? As Light travels at 299,792,458 metres per second, or 327,857,019 yards per second, it can be used as a yard stick to measure distances. A Light Second is the distance it takes Light to travel for 1 second. It is fixed at 299,792 kilometres or 186,282 miles in a Vacuum, and is the fastest thing in the universe. Correspondingly, a Light Minute is 60 Light Seconds, or 17,987,520 kilometres or 11,176,920 miles. Our answer for a Light Year is therefore 365.25 Light Days, or 31,557,600 Light Seconds. I'll leave you to work out the kilometres and miles, but I am sure you agree it is a long way!

We can test our measurements very accurately nowadays. For example, we know the exact distance to the Moon. The NASA astronauts left mirrors on the surface of the Moon which we can use to bounce a laser beam back to us. By timing the reflection, we get an exact measurement of the distance. The average distance from Earth to the Moon is 1.282 Light Seconds. Because orbits are elliptical, it varies by 0.141 Light Seconds during its orbit.

So we know understand the scale we will use to measure the distance, but we also need to know how bright something has to be to be visible in the sky. Astronomers measure brightness of things in Magnitude. A lower value is brighter. Our Sun is at Magnitude -26.74 when viewed from Earth. The maximum brightness of the Moon is -12.92 when it is Full. It is reckoned that the average human can see stars to a Magnitude of 5 or 6 in a perfectly dark sky. In Chailey, we can see to about Magnitude 5 for those with good eyesight.

So lets get back to the original question. How far can we see? If we say that we can see something of Magnitude 5, then what is the furthest thing in the sky with the naked eye? The answer is the Andromeda Galaxy, which has a Magnitude of 3.4. This is the nearest of our Galactic neighbours to our own Milky Way Galaxy, and its distance is estimated at 2,380,000 to 3,070,000 Light Years. That is a very long way!

If you would like to see Andromeda, you need to wait for a still, clear night. Go outside and sit in the dark for about 10-15 minutes to let your eyes adapt, and then use the chart below to find the Andromeda Galaxy.



Don't forget that you can learn more about South Common Observatory, see the pictures I have taken from Chailey, or order my Astronomical Greetings cards from my website: <http://nebul.ae>.

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