Inside this Issue

MAS Committee

President
John Rombi

Secretary
Bob Bee

Treasurer
Dick Everett

Committee Members
Lloyd Wright
Kate Johnston
Daniel Ross

MAS Postal Address

P.O. Box 17
MINTO NSW 2566

Ph: (02) 4647 4335
Web: www.macastro.org.au

Prime Focus Editor
Kate Johnston
cyberpiggy@optusnet.com.au

Presidents Report
John Rombi

Good evening and welcome to our March meeting.
Associate Professor, Geraint Lewis was our guest speaker last month. I have never seen such a positive response to a speaker before.

Geraint kept us all enthralled with his explanation of
"*Galactic Cannibalism*"

Answering a lot of my questions, such as: What happens to smaller galaxies when met by a bigger one. CHOMP!!! At the end of the presentation, our members fired off quite a few curly questions; these were answered in a concise, but easy to understand way. Up until 10.00pm (with us all enjoying a coffee), Geraint gave us a taste of his passion, Cosmology. We were all mesmerized by the information, but unfortunately closing time came too quickly and the meeting had to end.

I have asked Geraint (he has accepted) to return later this year to continue our journey, I can't wait.

Observing nights
Our observing sessions have improved, but unfortunately the cloud has still interfered. Our night at Stargard was visited by 15 members, with a few new additions Michael Clarke and

Debbie Taylor with her monster 16" Lightbridge. The line at Debbie's scope was constant, with a lot of healthy advice flowing.

The Forest had a similar turnout, with our two "out of town members" Wayne and Andrew paying us a visit, unfortunately the clouds ruined what could have been a great sky. Please check in Prime Focus or our website for future observing dates.

New Fees
Unfortunately U.W.S has introduced a room hire fee to M.A.S. I will elaborate at the meeting.

A.G.M
Our A.G.M will be held next month. I would like to encourage the membership to consider taking up a position on the committee. We have three current C.M's that will not nominate themselves for re-election at the A.G.M. That means there are at least 3 positions that need to be filled, I ask that you think seriously about this. The nomination forms are available from the side desk, or from the secretary (Bob Bee)

At the A.G.M the recipients of the 10 year membership badge will be Ursula Braatz, George Cruickshank, Robert Zindler and I.

Campbelltown Show
We have had a great response for volunteers, but…………..we need more!!! This is a great opportunity to showcase our society and astronomy to the general public. So please, if you haven't thrown your hat into the ring contact Bob Bee NOW!!!

Tonight
Our guest speaker will be Dr Miroslav Filipovic from U.W.S Penrith. His topic is "An Introduction to Astronomical Uniqueness"

Clear Skies, John Rombi.

Prime Focus Article Submission

Deadline for article submissions for the April edition of Prime Focus is
Monday 14th April 2008

All Articles can be submitted via email
cyberpiggy@optusnet.com.au
Or via snail mail to the MAS Postal address

Thanks to all the contributors for this month……….

Observing Dates

March
29/03/08 Stargard

April
5/04/08 The Forest
21/04/08 AGM
26/04/08 Stargard

May
3/05/08 The Forest
19/05/08 General Meeting
31/05/08 Stargard

June
7/06/08 The Forest
16/06/08 General Meeting
28/06/08 Stargard

July
5/07/08 The Forest
21/07/08 General Meeting
26/07/08 Stargard

August
2/08/08 The Forest
18/08/08 General Meeting
23/08/08 Stargard
30/08/08 The Forest

September
15/09/08 General Meeting
20/09/08 Stargard
27/09/08 The Forest

October
20/10/08 General Meeting
25/10/08 Stargard

November
1/11/08 The Forest
17/11/08 General Meeting
29/11/08 Stargard

December
20/12/08 Stargard
27/12/08 The Forest
TBA - Xmas Party

Know Your Telescope
Dick Everett

In this series of articles we will take one aspect of telescopes at a time and attempt to explain its use or significance to the user.

Some formulae will be given from time to time, remember to convert all units to the same system of measurement before calculations begin.

For some silly reason telescopes are referred to in a mish-mash of metric and imperial measurements often in the same mouthful. Consider – aperture is usually quoted in inches while focal length is specified in millimeters, also commonly – a 12.5mm 1 ¼" eyepiece! No one calls it a half inch eyepiece and who would expect it to fit into a 32mm focuser?

Bearing this in mind let's look at the first of our telescope parameters, focal ratio.

$$\textbf{FOCAL RATIO} = \frac{\textbf{FOCAL LENGTH}}{\textbf{APERTURE}}$$

Focal ratio is a convenient term that's often used together with the aperture to describe a telescope, *eg* 8"F6, 4"F10 *etc.* It's derived by dividing the focal length of the telescope by its aperture. Telescopes of low focal ratio are sometimes referred to as having "fast" optics, a photographic term related to exposure times. Fast optics work similarly for astrophotography, but don't convey any benefits for visual use. Image brightness at the eyepiece for any given magnification is determined almost entirely by unobstructed aperture. Optics of low focal ratio are more difficult to make well (they have steeper curves) and will exaggerate the aberrations that all optics exhibit to some degree, possibly dictating the use of expensive eyepieces to correct for these faults. For visual use tube length is the main disadvantage to high focal ratios. Next we'll look at magnification. A focal ratio of 5 or less would be considered low.

$$\textbf{MAGNIFICATION} = \frac{\textbf{FOCAL LENGTH of TELESCOPE}}{\textbf{FOCAL LENGTH of EYEPIECE}}$$

To the uninitiated magnification is probably the least understood thing about telescopes. We can obtain almost any numerical value of magnification by simply changing the eyepiece for one of a different focal length, as magnification is given by dividing the telescope F/L by the eyepiece F/L. That said, of course there are limits, higher magnification narrows the field of view and reduces the amount of light reaching your eye. Furthermore it puts greater demands on the optical performance of your telescope and the atmospheric conditions, or "seeing" prevailing. Most experts recommend using the *least* amount of magnification necessary for any observation. As a general guide to high magnification levels the often quoted rule of thumb is "use no more than 50X the aperture in inches". This suggests an upper limit of 400X for 8" telescopes, but in practical terms it is rare to experience sky conditions good enough to support 300X.

In the next issue we will examine some aspects of eyepieces.

Star Hopping to Messiers #2 – M35 & M41.
Bob Bee

I changed my mind. Instead of proceeding numerically, I'll try to cover the Messiers by observable constellations as Prime Focus space allows. That means the Ms will be jumping about a bit numerically.

M35 in Gemini:
Gemini is dead ahead to the north this month – an obvious target with M35, a lovely open cluster, it's only Messier. This is how M35 appears in your telescope.


M35 is 5th magnitude, visible to the naked eye in a dark sky as a faint glowing patch and certainly through binoculars as a sprinkling of stars. Consisting overall of about 200 stars covering a moon-sized area, it is approx. 2,800 light years away. You'll notice in the above picture another fuzzy patch at the bottom right – that's NGC2158, another rich open cluster that is actually a further 10,000 light years away. Now let's find M35.

First, find the constellation Gemini in the sky to the north, readily marked out by the twin stars Pollux and Castor exactly 4.5º apart. These stars represent the heads on the figures of the two twins. Their bodies, arms and legs are found spreading out westwards and upwards. The main stars are easily traced out as 2nd and 3rd mag. stars. See Chart A below.
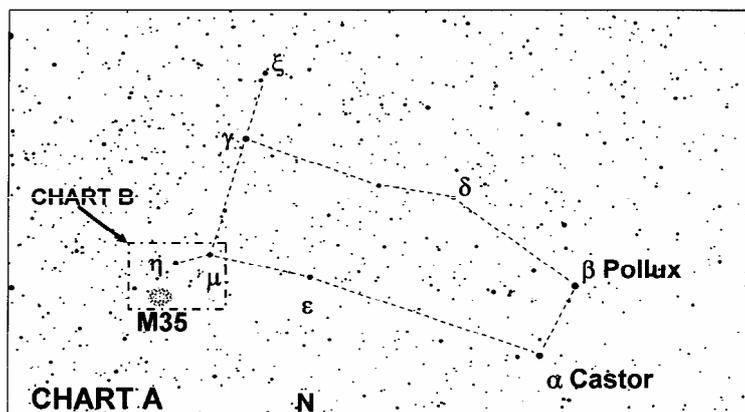
With your naked eye move from Pollux and Castor westwards past ε (mag. 3.1) until you identify μ (mag. 2.9) and η (mag. 3.3) as shown on the chart. You could probably spot M35 relative to them alone by swinging the line from η − μ down and around by 120º, but just to be sure, look at Chart B.
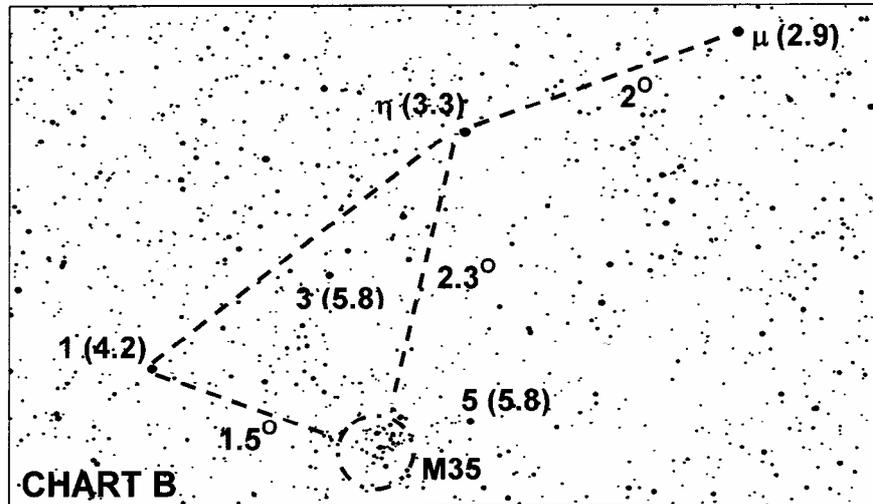
The distance from star 1Gem.(on the left) to μ Gem (top right) is only 4º so the view in Chart B should fit within your finder scope (f/s) FoV. Locate either η or μ Gem in your finder scope and you should also see the stars 1, 3 and 5 Gem in the pattern shown. I have shown their magnitudes. I walked outside the other night and got them first go in my 12x50 binoculars (FoV 5º) which is what you should see in your f/s (only your view will be an upside-down version of Chart B). The star cluster M35 should be visible in your f/s in the location as shown. Centre your f/s on that spot (even if it's not clearly visible) and switch to your telescope eye piece. You should be able to see the cluster very close up (depending on your magnification) and also, look nearby for the more compact cluster 2158. Enjoy!

M35 is actually one of the more obvious Messiers and the directions given above are probably over-kill but it helps to practice the star hopping process for when we get on to the more difficult Messiers.

M41 in Canis Major:

M41 is a large and bright open cluster with about 80 stars. Its overall magnitude is about 4.5. Again, this is a reasonably easily found Messier and very visible in binoculars and probably most finder scopes. See the image of M41 below.

First locate the constellation Canis Major which is currently above and to the east of Orion. You can't miss Sirius, the brightest star in the sky. The dog appears to be standing on its head as shown in Chart A.
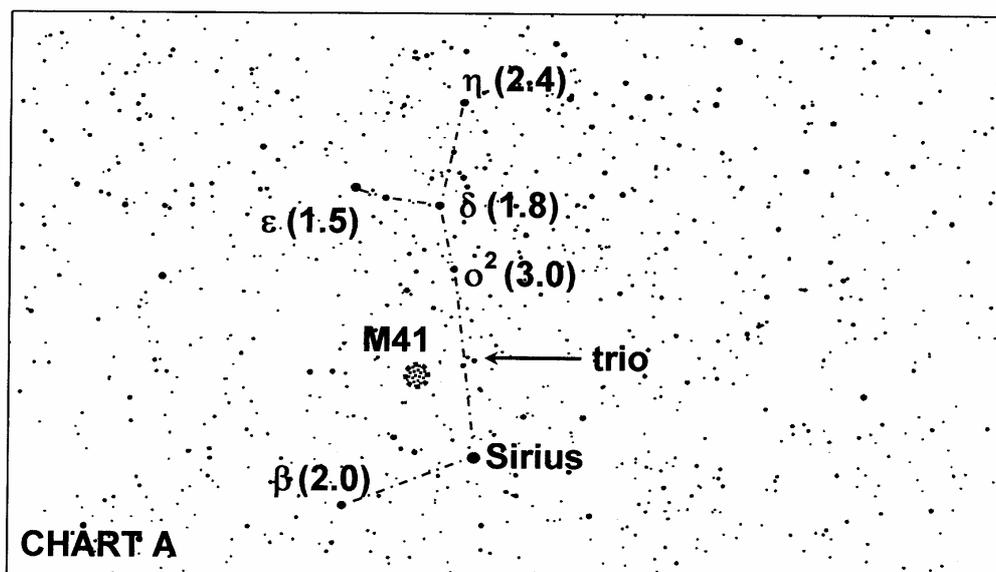
From this you can see M41's general location. Try to locate the star Omicron^2 (o^2 - mag. 3.0) which is 8º above Sirius. You will notice that M41 is located approx. halfway along the line from Sirius to o^2, and about 2º to the left of it. Notice on Chart A that I have pointed out a trio of stars in the form of a regular triangle exactly half way between Sirius and Omicron2. That will be our star hopping strategy. (On a decent sky, that should be all you need, really.)

Chart B below shows the area of sky from Sirius up to Omicron^2 which is larger than the f/s FoV. (Again, this will be upside-down in your f/s.)

CHART B
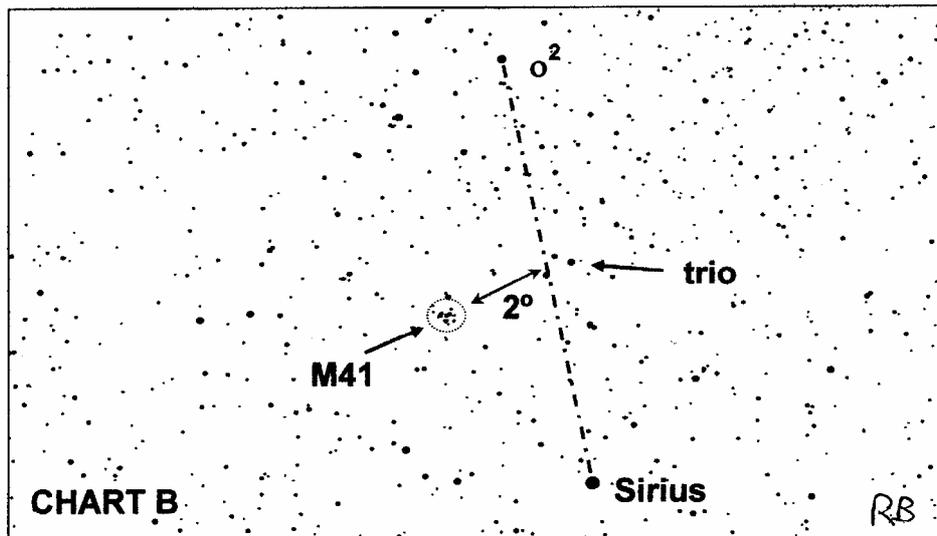
To locate M41 (if you haven't already), place your f/s on Sirius and move it towards Omicron2. You should come across the trio of stars. If your f/s has a FoV of 5º, the trio should be near the edge of FoV when Sirius is at its centre. They form a regular triangle about 0.5º across. Place the f/s on the trio – M41 should be visible 2º to the west. Move the centre of your f/s to that spot and check your main eye piece. You should have a beautiful view of M41.

As an aside, I have provided a separate article in Prime Focus on how to calculate the FoV of an eye piece. This applies just as well to finder scope Field of Views. It really helps in star hopping (following guides as above) to know as close as possible what your finder scope FoV is in degrees. If the finder scope (or its manual) doesn't tell you, you may want to use that method to calculate it. So if it turns out to be, say, 5º, and I say move 2º to the west, you'll know how far to go compared to your finder scope FoV.

Good hopping.

The Cosmic Web
David Jones

In light of Associate Professor Geraint Lewis's fascinating lecture at the February meeting I thought some members might find this Internet article interesting reading.

The Cosmic Web
Observations and simulations of the intergalactic medium reveal the largest structures in the universe - Robert A. Simcoe

Visit http://www.americanscientist.org/template/AssetDetail/assetid/29667 to view the article with illustrations

Knowing your Eyepiece's actual Field of View.

Bob Bee

How often have you looked at a deep sky object such as a nebula, cluster or galaxy and wondered what its angular size is? You often read in the observation articles in the astronomy magazines that such-and-such nebula was 9 arc-minutes (say) across. How did the observer decide that?

In simple terms, that observer had already worked out what the actual field of view in his/her telescope eyepiece was, then what was the ratio of the object's size to that FoV. e.g. If the eyepiece had an actual FoV of 30 arc-minutes (30'), and the nebula was about 30% of that, then the nebula had an actual angular size of 30'x0.3 = 9'. Of course, you need some practice to make the estimate of the % of the eyepiece FoV, or you may have some illuminated guide (reticule) to help.

The point of this article is to help you calculate the actual Field of View of your eyepiece. That is – what is the actual angular size of the bit of sky you are seeing through your eyepiece? This can be calculated in two completely independent ways.

Method 1: This is the easiest way if you already know the apparent FoV of your eyepiece. Most people don't know that – it's not always written on the eyepiece. You also need to know the magnification that eyepiece achieves in your telescope (of known focal length).
Telescope focal length = mirror diameter (in mm) x F number.
Magnification = telescope focal length /eyepiece focal length.
e.g. If you have a 235mm mirror at F10, its focal length is 235x10 = 2350mm. If you have a (say) 40mm eyepiece, its magnification is 2350/40 = 58.75x.

Now suppose that eyepiece above has a known apparent FoV of 50º. Its actual FoV in that telescope would be 50º / 58.75 = 0.85º = 51'.

Method 2: This is the more hands-on experimental approach. It's even worth doing if you have already done the calculation using Method 1 – it gives a good check and some observational practice. The crux of the method is to time (in seconds) how long it takes a star to drift from the centre of your eyepiece FoV to the very edge of the eyepiece FoV when the telescope's motor drive is off. So you'll want either

a stop watch or be able to see your watch's second hand (or digital display in seconds) in the dark.

First, select a star that is either on or very close to the celestial equator that night. E.g. any one of the three Orion Belt stars would be good this month. Place that star in your scope's field of view as close to the centre as you can judge. With your timing device ready, turn off the scope's motor drive and measure the **number of seconds** it takes the selected star to drift to the very edge of the field of view. Call that t_s. See the sketch below. I suggest you do this a number of times and take the average to give a more confident result. There is obviously a degree of error in this method based on your judgement of centre and edge etc.
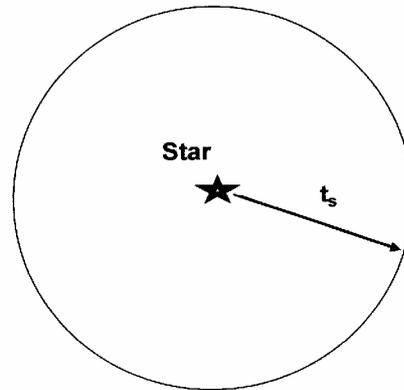
Then it's a simple calculation to find the eyepiece's actual FoV.

FoV (in arc-minutes) = **0.5 x t_s** (in seconds).

e.g. If it took 60 seconds for the star to drift from centre to edge, the eyepiece's actual FoV = 0.5 x 60 seconds = 30 arc-minutes.

It is worthwhile doing this (using either methods, whichever you need) for all your eyepieces and writing this down somewhere handy for your observing. If you can use white ink to write it on your eyepiece all the better. Remember, if you have more than one telescope with different focal lengths, the same eyepiece will have a different actual FoV for each telescope.

Then all you need is to practice estimating the relative size of objects in the field of view. It adds a valuable extra dimension to your observational notes.

GOOD LUCK!!!!