The Messier Observer's Logbook

The Astronomy Logbook Project

February 17, 2013

Contents

Preface

This is a log book for amateur astronomers intending to observe the Messier objects.

The book's content and structure is inspired by the Bangalore Astronomical Society's (http://bas.org.in) Messier certification program.

This is a compilation of observation log forms for each of the 110 Messier objects accompanied by useful information about the object, a star chart, and an image from the Digitized Sky Surveys. It may gain more features as time progresses

Note that the magnitudes displayed for the nebulae M 43, M 78, M 20, M 8 and M 17 are blue magnitudes (as opposed to visual magnitudes) from Dr. Wolfgang Steinicke's revised NGC/IC catalog, so the objects may appear brighter to the eye than the magnitudes actually indicate.

Also note that the DSS image for M 37 is broken. It looks like it is broken in all three POSS2/UKSTU bands. The infrared images of M 42, M 43 and M 16 are more representative of what is seen through a telescope, and hence were replaced although blue plates and red plates are available. The blue plate for M 106 had a defect, so the red plate was used instead.

Hope you have fun observing these objects!

–Akarsh Simha

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Most Importantly

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  - *Hipparcos* and *Tycho 2* were obtained from the Astronomical Data Center run by the NASA. While the data center is now closed, at the time of download, the website said:

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  The data has been made freely available for **non-commercial use**.

  Data for non-NGC/IC objects is not from Dr. Steinicke's catalog, and was collected manually by hand from various sources, most notably SIMBAD and the SAC database.

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The Digitized Sky Survey

The images used in this compilation come from the Digitized Sky Survey plates, in particular, those from the POSS-II and UKSTU surveys.

The Digitized Sky Survey was produced at the Space Telescope Science Institute under U.S. Government grant NAG W-2166. The images of these surveys are based on photographic data obtained using the Oschin Schmidt Telescope on Palomar Mountain and the UK Schmidt Telescope. The plates were processed into the present compressed digital form with the permission of these institutions.

The Second Palomar Observatory Sky Survey (POSS-II) was made by the California Institute of Technology with funds from the National Science Foundation, the National Aeronautics and Space Administration, the National Geographic Society, the Sloan Foundation, the Samuel Oschin Foundation, and the Eastman Kodak Corporation. The Oschin Schmidt Telescope is operated by the California Institute of Technology and Palomar Observatory.

The UK Schmidt Telescope was operated by the Royal Observatory Edinburgh, with funding from the UK Science and Engineering Research Council (later the UK Particle Physics and Astronomy Research Council), until 1988 June, and thereafter by the Anglo-Australian Observatory. The blue plates of the southern Sky Atlas and its Equatorial Extension (together known as the SERC-J), the near-IR plates (SERC-I), as well as the Equatorial Red (ER), and the Second Epoch [red] Survey (SES) were all taken with the UK Schmidt telescope at the AAO.

The images themselves were downloaded from the Mikulski Archive for Space Telescopes (MAST; http://archive.stsci.edu/).

The makers thank the DSS for making sky imagery freely available for non-profit activities, and also thank MAST for the excellent web service provided by them.

Deep-Sky Object Data

The makers thank Dr. Wolfgang Steinicke for providing the Revised NGC / IC catalog under terms making it free for non-commercial use.

The Dreyer and SAC descriptions, and some of the data for non-NGC/IC objects, come from the Saguaro Astronomy Club database. The makers thank the Saguaro Astronomy Club for providing their compilation for free non-commercial use.

KStars and other open-source tools

The makers particularly thank, the developers of KStars, (http://edu.kde.org/kstars) the software that made the rendition of star maps used in this compilation possible and made available, in an easy form, the data used in this compilation. KStars was also used to fetch appropriate DSS URLs for the objects. KStars is a cross-platform astronomy software licensed under the GNU General Public License v2 (https://www.gnu.org/licenses/gpl-2.0). It qualifies as free software.

The typesetting of the charts was done using LaTeX. `xmlstarlet` was used to parse XML for object descriptions generated by KStars. Inkscape and ImageMagick were used to convert between graphics formats. Inkscape was also used to generate several of the graphics used here. Several tools from the standard GNU suite, such as `bash`, wget, `sed` and `awk` proved very useful.

This compilation was generated using only free and open source software.

Credits

This is a list of people who contributed to this project, in no order of significance (except possibly chronological). (Feel free to add your name to the list if you forked this / made a derivative work!)

- Akarsh Simha ⟨akarshsimha@gmail.com⟩ – **original idea**; also responsible for creating the script that generates logbooks
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- Terry Phillips – Messier Marathon order suggestion.
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- Jim Spiegelmire – Current AAS logo
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1

Glossary of Technical Terms

Some of the technical terms used in the compilation are explained *in brief* here. Many resources that offer more detailed explanations and further information are available on the internet. You could alternatively also use KStars' AstroInfo project, accessible from the KStars Help Menu. See http://edu.kde.org/kstars for more.

- **Right Ascension** and **Declination** together constitute the **Equatorial Geocentric Coordinates** used in astronomy. It is a *coordinate system* used to designate positions in the sky.

  Just like the location of a point on the earth is specified by the latitude and longitude, the location of a point in the sky is specified using the Right Ascension (RA) and Declination (Dec). Usually, these are denoted by the symbols α and δ.

  The declination is simply a projection of the earth's latitudes onto the sky. For example, the north celestial pole lies at a declination of $+90°$, and is in the direction vertically above when standing at the north pole of the earth, which has a latitude of $+90°$. Southern declinations are considered negative. Declination is usually measured in degrees.

  Unlike longitude, RA is measured in hours. Just like an arbitrary longitude is chosen to be zero degrees (namely the prime meridian), a point called the *First point of Aries* (usually denoted γ) is chosen to be the zero for RA. 1 hour corresponds to 15 degrees.

- **Precession; Epoch; J2000.0:** The axis about which the earth rotates is not stationary. Just like a spinning top, the earth wobbles causing the axis itself to move. This wobbling of the axis of the earth is described by motions called *precession* and *nutation*. Precession is the dominant of the two. As a result of precession, the pole star of today, Polaris, will no longer be near the pole several centuries later.

  The earth's axis traces a circle in the sky over a period of 26000 years. This might sound like a small effect over a couple years, but astronomical positions are measured with rather high precision. Thus, precession effects must be taken into account.

  Most catalogs of stars and deep-sky objects list the RA and Dec of objects, but the RA and Dec of these objects actually vary because of precession. To remedy this, the catalogs provide RA and Dec at a specific instant in time, called an *epoch*. Once the RA and Dec are known at this epoch, the RA and Dec at any other time may be calculated.

  A very common epoch is *J2000.0* which ocurred at the beginning of the year 2000. Most catalogs specify the RA and Dec at this instant of time. Already in the year 2013, we can see noticable differences in the current coordinates when compared to the catalog coordinates at 2000.0

- **Units of Angular Measure** are important, because distances and sizes in the sky are measured as an angle subtended at the earth.

For instance, the moon and the sun are both about $\frac{1}{2}^\circ$ in (angular) diameter – they subtend an angle of $\frac{1}{2}^\circ$ at the center of the earth.

The degree is the most common unit of angular measure. A degree is subdivided into 60 arcminutes. Arcminute is often denoted with a small apostrophe-like marking: $1^\circ = 60'$. An arcminute is further divided into 60 arcseconds. An arcsecond is often denoted with a double apostrophe: $1' = 60''$. Thus $1^\circ = 3600''$.

The earth rotates through 360° about its axis in 24 hours of time. Thus every hour of time corresponds to 15° of rotation of the earth. Thus, often in astronomy, the *hour* is used as a measure of angle, exactly equal to 15°. The sky, as viewed from earth, actually goes back to the same position in about 23 hours and 56 minutes, a duration known as the *sidereal day*, because the revolution of the earth adds to the rotation of the earth. However, when hour is used as a measure of angle, it is exactly equal to 15°. 60 minutes (of time) comprise an hour, and 60 seconds (of time) comprise a minute.

Angles are sometimes quoted as decimal values in degrees or hours (eg: 31.25°). The same angle may be quoted as a combination of integer degrees, (arc)minutes and (arc)seconds (eg: $31^\circ 15' 0''$) or hours, minutes (of time) and seconds (of time).

In this compilation, RA is usually specified in the hours-minutes-seconds system, whereas Declination is usually specified in the degrees-minutes-seconds system.

- **Magnitude scale** is almost always used in astronomy to express the brightnesses of astronomical objects. It's a logarithmic scale of brightness, which means increments in magnitude actually amount to multiplicative factors in brightness. In particular, in the magnitude scale, a difference of 5 in magnitude corresponds to 100× in brightness. The other important thing to note – the higher the magnitude of a star / object, the *fainter* it is! A magnitude 6 star is a $100x$ fainter than a magnitude 1 star.

  If two stars have magnitudes m_1 and m_2, the ratio of their brightnesses is given by

  $$\frac{I_2}{I_1} = 10^{0.4(m_1 - m_2)} \tag{1.1}$$

  Even if the object is an extended object (unlike a star, which almost always appears like a point through telescopes), the magnitude includes all the "light" (flux) from the object, no matter what the size of the object is. For extended objects, a definition of **surface brightness** is more convenient. Surface brightness, often measured in "magnitudes per square arcsecond" is a measure of how bright an object's surface is. So a large object "A" with the same magnitude as a small object "B", will still have a much larger (i.e. fainter) surface brightness than object "B".

2

Understanding and Using the Log Form

2.1 Description of the form

- **The title** carries the common name of the object (if any) and the primary catalog number
- **The subtitle** specifies the *type* of the object (eg: Planetary Nebula, Galaxy etc) and the constellation in which it lies.
- **Icons indicating observability** are shown on the right of the page.

Objects that are expected to be visible from dark sites with small binoculars (eg: 10×50) are indicated with this binocular icon.

Objects that are expected to be visible to the naked eye from dark skies ($\sim$ Bortle 3) are marked with this eye icon.

Objects that are expected to be visible from city sites with smaller telescopes (eg: $4'' \sim 6''$) are indicated with this city skyline icon, accompanied by a small telescope icon.

If the object is also expected to be visible in binoculars from city skies, a tiny version of the same binocular icon is displayed just above the telescope icon, next to the city skyline icon.

If the object is also expected to be visible with the naked eye from city skies, a tiny version of the same eye icon is displayed next to the city skyline icon.

—

If no icon is displayed, it indicates that the object most likely requires a telescope from dark skies, or data is unavailable about its visibility. Note that this should not discourage more advanced observers to attempt the object from city skies or with binoculars. Please consult various online forums for more information. Cloudy Nights (http://www.cloudynights.com/ubbthreads/ubbthreads.php) is one such forum.

- **The data table** lists some useful data about the object.

  The first two rows list the RA and Dec, first current as of the date of compilation, and then J2000.0.

  The "Size" field lists the size of the object in arcminutes. Imagine fitting the object into a rectangle in the sky. The larger (usually first) dimension, called the *major axis* specifies the length of the rectangle. The smaller dimension (*minor axis*) specifies the breadth of the rectangle. For example, $8' \times 3'$ means that the object will roughly fit into a rectangle with a length of 8 arcminutes and a breadth of 3 arcminutes in the sky.

  The "Position Angle" field specifies the orientation of the major axis of the object (the "length" of the rectangle mentioned above). It is measured in degrees, from North towards East. If it says 90°, it usually is invalid / unknown.

  The "Magnitude" field specifies the magnitude of the object. Usually, this is the visual magnitude and not the blue ("photographic" magnitude), except for some objects, usually indicated in the preface. Note this carefully, because the visual and blue magnitudes may differ somewhat substantially.

  The "Other Designation" field carries an alternate catalog designation of the object when available.

- **The sky chart** shows a map of the sky around the object.

  North is upwards in the map.

  The circle in the center represents a **circle of** 1° **diameter** on the sky.

  The black dots are stars. The green / red symbol in the center of the 1° circle represents the object. An effort is made to represent the size of the object accurately.

  The lines connecting stars are constellation lines, and help you visualize the constellations. Note that these are not standard and may differ across star charts. Always look up the name / designation of the star (or the RA/Dec of the object) to match against other charts.

  The fainter jagged, but solid, lines are the boundaries of constellations as defined by the IAU.

  The broken / dashed lines running up-down are lines of constant right ascension, just like longitudes on a map of the earth.

  The broken / dashed lines running left-right are lines of constant declination, just like latitudes on a map of the earth. If you see a thick horizontal line that extends through to the ends of the map, that represents the celestial equator. The celestial equator line has numbers marking hours of right ascension.

  The text in all block capitals (dark green) are the name of the constellation. Many a time you may see the text crossing a constellation boundary line – the **name always refers to the constellation to the right side** of the name.

- **A DSS image** is provided to give you a rough idea of what the object looks like. The appearance through your equipment, of course, could be drastically different depending on its capabilities! The DSS Image is an actual photo of the object taken with a fairly large, professional astronomical telescope. It is usually good to get a rough idea of what features may be visible and what may not be. Of course, it takes practice to realize which features in a DSS image you may actually expect to see through your telescope!

The dimensions of the region of the sky in the image (in arcminutes) are specified below the image (eg: $30' \times 15'$). The first dimension is the width.

Most of the time, blue POSS2/UKSTU DSS images are used. Red DSS images are used when the blue plates are unavailable. Blue plates will usually provide a better estimate of the observability of objects than red plates, as the eye is more sensitive to blue when in night-vision mode ("scotopic" vision). However, it should be borne in mind that DSS images are not really calibrated. The letters 'B', 'R' and 'I' in the caption of the DSS image, alongside the dimensions, indicate that the image is blue, red and infrared (respectively).

In the DSS images, **north is upwards**, as with the map.

- **The Observation Log** is where you log your own observations. Fill out the details as per your wishes. If you are using this logbook to earn a certification from some organization, please look up the organization's guidelines for logging. Sometimes, the log form may indicate fields that are required by the certifying organization – but please double check the organization's guidelines to be sure.

2.2 Using the form

2.2.1 Wide-field Charts

To use these forms, you will need to have wide-field star charts showing the constellations handy. Preferably the chart should have RA and Declination markings.

If you do not have a star atlases, you may purchase several commercially available star atlases, or print out the Free Mag 7 Star Atlas hosted at http://www.cloudynights.com/item.php?item_id=1052.

You could also use the wide-field star charts for the month, generated by this website: http://skymaps.com/.

Note that some of the wide-field star charts are designed to be held above your head and used – the cardinal points on the map may align up correctly only if you hold them above your head.

You may alternately also use computer software to obtain wide-field views. There are several free, open-source options, the most recommended for this purpose being Stellarium. Stellarium may be obtained for a variety of operating systems at http://www.stellarium.org. Other recommended options include KStars – http://edu.kde.org/kstars and SkyChart – http://www.ap-i.net/skychart/start, which also run on a variety of operating systems.

2.2.2 Visibility of Objects

To check if an object is visible at your latitude, you could find the lowest declination you can see by the formula

$$\text{Lowest Observable Declination} = 90^\circ - \text{Observation Latitude}. \tag{2.1}$$

Substitute your latitude without the sign, irrespective of whether it is northern or southern. In the southern hemisphere, you'll get the lowest northern declination visible. In the northern hemisphere, you'll get the lowest southern declination visible.

If the object is in the opposite hemisphere to where you are observing, check that its declination is closer to zero than the Lowest Observable Declination you calculated above.

Often, you cannot observe objects that are too close to the horizon. The atmosphere itself limits your observations somewhat to about 5°above the horizon (this is a very ballpark figure). Light-pollution domes can make things worse. Just subtract the number of degrees you lose near the horizon from the Lowest Observable Declination you calculated, to make your estimate more practical. High altitudes can sometimes help lower the horizon, so observing from a high altitude could add a few degrees to the Lowest Observable Declination.

Objects that do not qualify the criterion you calculate above can never be seen from your latitude, unless you fly pretty high above the ground! So you can eliminate such objects from your observing list, or save them for a cross-continental trip to the other hemisphere (or a long trip to a more tropical region).

Other objects, while visible from your latitude, may not be visible at the given time of the year etc. The best way to determine whether an object is visible at a given time from a given latitude is to use astronomy software. That is why knowing constellations is very helpful – so you can quickly figure out if a certain object is visible by checking if the constellation in which it resides is visible. Wide-field star charts generated for a given night (you need one for the evening and one for the early morning next day) will be able to help you quickly check up on visible constellations, so you can plan your observation.

If you like rough estimates, you can make one by knowing the RA of the sun. Block off 1 hour after sunset and before sunrise. 1 hour of time (almost exactly) corresponds to 1 hour of RA so if the object's RA lies outside this twilight zone, you are likely to be able to observe it. This kind of an estimate does not work well at high latitudes, at times away from the equinoxes. The use of computer software is strongly recommended.

2.2.3 Locating the Constellations, finding a reference star

First, make sure you are aware of the cardinal directions around you.

In the northern hemisphere, an easy way to identify north is to look for the Big Dipper, a famous asterism of 7 stars, that is part of the constellation Ursa Major. If the Big Dipper is not visible, Cassiopeia is a good alternative. The constellation has the shape of an M, Σ, W or Ƹ depending on the orientation.

In the southern hemisphere, you may look for the Southern Cross (Crux) to identify south.

Once you have identified north / south, also identify east / west and find out if your wide-field chart is designed to be held above your head and used.

Use your wide-field star atlas to identify the constellation patterns in the sky. Remember that the constellation patterns differ across various sky maps.

Prominent patterns that are easy to identify are the Great Square of Pegasus, Cassiopeia, Orion, the head of Taurus the bull, Auriga, the Southern Cross, the Big Dipper, Corvus, Scorpius, the Teapot in Sagittarius. Use these as landmarks to find your way around the sky.

Identify a bright star (the bigger the circles, the brighter the stars they represent), which we will refer to as the *reference star*, within the finder chart embedded in the log. Locate the star in your wide-field charts, and thereby locate it on the sky.

2.2.4 Finding the object

Once you have located the reference star, recalling that the sky maps have north on the top, orient the book correctly to map what you see in the sky with the sky chart in the logbook.

Then, a variety of options are at your disposal. One is to try to find the location of the object in the sky precisely, by using a bunch of stars, and point the telescope / binoculars to that location. For example, if you see on the chart that the object is exactly between two stars, you could just point your telescope exactly to that location on the sky, using the two stars for reference. Another technique is *star hopping* – work a route from the reference star to the object using various other stars as landmarks.

Many an internet resource can help explain these techniques better.

Finally, you may need to pan the telescope a bit, or move your binoculars around a bit to actually locate the object.

Remember that many telescopes and some finder scopes produce inverted or mirrored images. Some people often find it useful to identify unambiguous patterns that have directionality to them of stars and just position relatively. Others like to orient the map correctly, and then account for the reflection or inversion

of their telescopes in their head. If you would rather have an erect field, there are erecting prisms available from many vendors for standard (1.25" and 2") telescope focusers.

If the object is rather faint, you may need to precisely zero in on it by using the star field around the object. To see the star field around the object, the easiest way is to use software. The DSS images may occasionally help you in this regard.

2.2.5 Observing the object

Averted vision, also known as *peripheral vision* is an important observing technique. Use internet resources to understand and master this technique.

Note that the magnitude is not a true indicator of the brightness of the object as seen with a telescope. A large object "A" with the same magnitude as a fainter object "B", will appear much fainter than "B" because the light is spread over a larger area.

In the description provided in the logging form, for some objects, you may notice a number of abbreviations specified. These constitute J L E Dreyer's description of the object, and these descriptions are very helpful to get a feel for what the object actually looks like. Note that J L E Dreyer had larger telescopes and was observing from dark skies when making these descriptions. However, the descriptions are more apt than magnitudes when determining how bright an object is. Many resources on the internet have explanations for the abbreviations used in Dreyer's descriptions. Here is one such resource: http://spider.seds.org/ngc/des.html.

3

List of Objects by Constellation

NOTE: Numbers in square brackets are page numbers

Draco

M 102 [121]

Gemini

M 35 [54]

Hercules

M 13 (Hercules Cluster) [32]
M 92 [111]

Hydra

M 48 [67]
M 68 [87]
M 83 [102]

Leo

M 105 [124]
M 65 [84]
M 66 [85]
M 95 [114]
M 96 [115]

Lepus

M 79 [98]

Lyra

M 56 [75]
M 57 (Ring Nebula) [76]

Monoceros

M 50 [69]

Ophiuchus

M 107 [126]
M 10 [29]
M 12 [31]
M 14 [33]
M 19 [38]
M 62 [81]
M 9 [28]

Orion

M 42 (Orion Nebula) [61]
M 43 (De Mairan's Nebula) [62]
M 78 [97]

Pegasus

M 15 [34]

Perseus

M 34 [53]
M 76 (Little Dumbell Nebula) [95]

Pisces

M 74 (The Phantom) [93]

Puppis

M 46 [65]
M 47 [66]
M 93 [112]

Sagitta

M 71 [90]

Sagittarius

M 17 (Swan Nebula, Omega Nebula) [36]
M 18 [37]
M 20 (Trifid Nebula) [39]
M 21 [40]
M 22 [41]
M 23 [42]
M 24 (Delle Caustiche) [43]
M 25 [44]
M 28 [47]
M 54 [73]
M 55 [74]
M 69 [88]

M 70 [89]
M 75 [94]
M 8 (Lagoon Nebula) [27]

Scorpius

M 4 [23]
M 6 (Butterfly Cluster) [25]
M 7 (Ptolemy's Cluster) [26]
M 80 [99]

Scutum

M 11 (Wild Duck Cluster) [30]
M 26 [45]

Serpens Caput

M 5 [24]

Serpens Cauda

M 16 (Eagle Nebula) [35]

Taurus

M 1 (Crab Nebula) [20]
M 45 (Pleiades) [64]

Triangulum

M 33 (Triangulum Galaxy) [52]

Ursa Major

M 101 (Pinwheel Galaxy) [120]
M 108 [127]
M 109 [128]
M 40 [59]
M 81 (Bode's Galaxy) [100]
M 82 (Cigar Galaxy, Ursa Major A) [101]
M 97 (Owl Nebula) [116]

Virgo

M 49 [68]
M 58 [77]
M 59 [78]
M 60 [79]
M 61 [80]
M 84 (Markarian Chain) [103]
M 86 (Markarian Chain) [105]
M 87 (Virgo A) [106]
M 89 [108]
M 90 [109]

Vulpecula

M 27 (Dumbbell Nebula) [46]

4

List of Objects by Type

NOTE: Numbers in square brackets are page numbers

Catalog Star

Galaxy

Gaseous Nebula

Globular Cluster

M 56 [75]
M 5 [24]
M 62 [81]
M 68 [87]
M 69 [88]
M 70 [89]
M 71 [90]
M 72 [91]
M 75 [94]
M 79 [98]
M 80 [99]
M 92 [111]
M 9 [28]

Open Cluster

M 103 [122]
M 11 (Wild Duck Cluster) [30]
M 16 (Eagle Nebula) [35]
M 18 [37]
M 21 [40]
M 23 [42]
M 24 (Delle Caustiche) [43]
M 25 [44]
M 26 [45]
M 29 [48]
M 34 [53]
M 35 [54]
M 36 [55]
M 37 [56]
M 38 [57]
M 39 [58]
M 41 [60]
M 44 (Praesepe, Beehive Cluster) [63]
M 45 (Pleiades) [64]
M 46 [65]
M 47 [66]
M 48 [67]
M 50 [69]
M 52 [71]
M 67 [86]
M 6 (Butterfly Cluster) [25]
M 73 [92]
M 7 (Ptolemy's Cluster) [26]
M 93 [112]

Planetary Nebula

M 27 (Dumbbell Nebula) [46]
M 57 (Ring Nebula) [76]
M 76 (Little Dumbell Nebula) [95]
M 97 (Owl Nebula) [116]

Supernova Remnant

M 1 (Crab Nebula) [20]

5

List of Common Names

The following table is ordered alphabetically by common name.

Table 5.1: Objects by common name

Common Name	Catalog Designation	Page
Andromeda Galaxy	M 31	50
Black-Eye Galaxy	M 64	83
Bode's Galaxy	M 81	100
Butterfly Cluster	M 6	25
Cetus A	M 77	96
Cigar Galaxy, Ursa Major A	M 82	101
Crab Nebula	M 1	20
Delle Caustiche	M 24	43
De Mairan's Nebula	M 43	62
Dumbbell Nebula	M 27	46
Eagle Nebula	M 16	35
Hercules Cluster	M 13	32
Lagoon Nebula	M 8	27
Little Dumbell Nebula	M 76	95
Markarian Chain	M 84	103
Markarian Chain	M 86	105
Orion Nebula	M 42	61
Owl Nebula	M 97	116
Pinwheel Galaxy	M 101	120
Pleiades	M 45	64
Praesepe, Beehive Cluster	M 44	63
Ptolemy's Cluster	M 7	26
Ring Nebula	M 57	76
Sombrero Galaxy	M 104	123
Sunflower Galaxy	M 63	82
Swan Nebula, Omega Nebula	M 17	36
The Phantom	M 74	93
Triangulum Galaxy	M 33	52
Trifid Nebula	M 20	39
Virgo A	M 87	106
Whirlpool Galaxy	M 51	70

Cont. on following page

Table 5.1: Objects by common name

Common Name	Catalog Designation	Page
Wild Duck Cluster	M 11	30

6

Checklist of Objects

Use this checklist to look up page numbers, to look up essential information, and to make entries of the dates of your first and subsequent observations.

Table 6.1: Checklist of Objects

Sl. No.	Object	Type	Constellation	Mag.	Size	Page	Obs. Date	Second Obs.
1	M 1 (Crab Nebula)	Supernova Remnant	Taurus	8.4	$6' \times 4'$	20		
2	M 2	Globular Cluster	Aquarius	6.6	$16' \times 16'$	21		
3	M 3	Globular Cluster	Canes Venatici	6.3	$18' \times 18'$	22		
4	M 4	Globular Cluster	Scorpius	5.4	$36' \times 36'$	23		
5	M 5	Globular Cluster	Serpens Caput	5.7	$23' \times 23'$	24		
6	M 6 (Butterfly Cluster)	Open Cluster	Scorpius	4.2	$33' \times 33'$	25		
7	M 7 (Ptolemy's Cluster)	Open Cluster	Scorpius	3.3	$75' \times 75'$	26		
8	M 8 (Lagoon Nebula)	Gaseous Nebula	Sagittarius	5.8	$45' \times 30'$	27		
9	M 9	Globular Cluster	Ophiuchus	7.8	$12' \times 12'$	28		
10	M 10	Globular Cluster	Ophiuchus	6.6	$20' \times 20'$	29		
11	M 11 (Wild Duck Cluster)	Open Cluster	Scutum	5.8	$11' \times 11'$	30		
12	M 12	Globular Cluster	Ophiuchus	6.1	$16' \times 16'$	31		
13	M 13 (Hercules Cluster)	Globular Cluster	Hercules	5.8	$20' \times 20'$	32		
14	M 14	Globular Cluster	Ophiuchus	7.6	$11' \times 11'$	33		
15	M 15	Globular Cluster	Pegasus	6.3	$18' \times 18'$	34		
16	M 16 (Eagle Nebula)	Open Cluster	Serpens Cauda	6	$8' \times 8'$	35		
17	M 17 (Swan Nebula, Omega Nebula)	Gaseous Nebula	Sagittarius	6	$20' \times 15'$	36		

Continued on the following page

Table 6.1: Checklist of Objects

Sl. No.	Object	Type	Constellation	Mag.	Size	Page	Obs. Date	Second Obs.
18	M 18	Open Cluster	Sagittarius	6.9	$7' \times 7'$	37		
19	M 19	Globular Cluster	Ophiuchus	6.8	$17' \times 17'$	38		
20	M 20 (Trifid Nebula)	Gaseous Nebula	Sagittarius	8.5	$20' \times 20'$	39		
21	M 21	Open Cluster	Sagittarius	5.9	$16' \times 16'$	40		
22	M 22	Globular Cluster	Sagittarius	5.2	$32' \times 32'$	41		
23	M 23	Open Cluster	Sagittarius	5.5	$25' \times 25'$	42		
24	M 24 (Delle Caustiche)	Open Cluster	Sagittarius	4.6	$15' \times 15'$	43		
25	M 25	Open Cluster	Sagittarius	4.6	$26' \times 26'$	44		
26	M 26	Open Cluster	Scutum	8	$10' \times 10'$	45		
27	M 27 (Dumbbell Nebula)	Planetary Nebula	Vulpecula	7.4	$6.7' \times 6.7'$	46		
28	M 28	Globular Cluster	Sagittarius	6.9	$13.8' \times 13.8'$	47		
29	M 29	Open Cluster	Cygnus	6.6	$10' \times 10'$	48		
30	M 30	Globular Cluster	Capricornus	6.9	$12' \times 12'$	49		
31	M 31 (Andromeda Galaxy)	Galaxy	Andromeda	3.4	$189.1' \times 61.7'$	50		
32	M 32	Galaxy	Andromeda	8.1	$8.5' \times 6.5'$	51		
33	M 33 (Triangulum Galaxy)	Galaxy	Triangulum	5.7	$68.7' \times 41.6'$	52		
34	M 34	Open Cluster	Perseus	5.2	$25' \times 25'$	53		
35	M 35	Open Cluster	Gemini	5.1	$25' \times 25'$	54		
36	M 36	Open Cluster	Auriga	6	$10' \times 10'$	55		
37	M 37	Open Cluster	Auriga	5.6	$15' \times 15'$	56		
38	M 38	Open Cluster	Auriga	6.4	$15' \times 15'$	57		
39	M 39	Open Cluster	Cygnus	4.6	$31' \times 31'$	58		
40	M 40	Catalog Star	Ursa Major	8.4	$0' \times 0'$	59		
41	M 41	Open Cluster	Canis Major	4.5	$39' \times 39'$	60		
42	M 42 (Orion Nebula)	Gaseous Nebula	Orion	4	$65' \times 60'$	61		
43	M 43 (De Mairan's Nebula)	Gaseous Nebula	Orion	6.8	$20' \times 15'$	62		
44	M 44 (Praesepe, Beehive Cluster)	Open Cluster	Cancer	3.1	$70' \times 70'$	63		
45	M 45 (Pleiades)	Open Cluster	Taurus	1.6	$70' \times 70'$	64		
46	M 46	Open Cluster	Puppis	6.1	$20' \times 20'$	65		
47	M 47	Open Cluster	Puppis	4.4	$25' \times 25'$	66		
48	M 48	Open Cluster	Hydra	5.8	$30' \times 30'$	67		
49	M 49	Galaxy	Virgo	8.4	$10.2' \times 8.3'$	68		
50	M 50	Open Cluster	Monoceros	5.9	$15' \times 15'$	69		
51	M 51 (Whirlpool Galaxy)	Galaxy	Canes Venatici	8.4	$11.2' \times 6.9'$	70		
52	M 52	Open Cluster	Cassiopeia	6.9	$16' \times 16'$	71		

Continued on the following page

Table 6.1: Checklist of Objects

Sl. No.	Object	Type	Constellation	Mag.	Size	Page	Obs. Date	Second Obs.
53	M 53	Globular Cluster	Coma Berenices	7.7	$13' \times 13'$	72		
54	M 54	Globular Cluster	Sagittarius	7.7	$12' \times 12'$	73		
55	M 55	Globular Cluster	Sagittarius	6.3	$19' \times 19'$	74		
56	M 56	Globular Cluster	Lyra	8.4	$8.8' \times 8.8'$	75		
57	M 57 (Ring Nebula)	Planetary Nebula	Lyra	8.8	$3' \times 2.4'$	76		
58	M 58	Galaxy	Virgo	9.7	$6' \times 4.8'$	77		
59	M 59	Galaxy	Virgo	9.6	$5.4' \times 3.7'$	78		
60	M 60	Galaxy	Virgo	8.8	$7.6' \times 6.2'$	79		
61	M 61	Galaxy	Virgo	9.7	$6.5' \times 5.9'$	80		
62	M 62	Globular Cluster	Ophiuchus	6.4	$15' \times 15'$	81		
63	M 63 (Sunflower Galaxy)	Galaxy	Canes Venatici	8.6	$12.6' \times 7.2'$	82		
64	M 64 (Black-Eye Galaxy)	Galaxy	Coma Berenices	8.5	$10' \times 5.4'$	83		
65	M 65	Galaxy	Leo	9.3	$9.8' \times 2.9'$	84		
66	M 66	Galaxy	Leo	8.9	$9.1' \times 4.1'$	85		
67	M 67	Open Cluster	Cancer	6.9	$25' \times 25'$	86		
68	M 68	Globular Cluster	Hydra	7.3	$11' \times 11'$	87		
69	M 69	Globular Cluster	Sagittarius	8.3	$7.1' \times 7.1'$	88		
70	M 70	Globular Cluster	Sagittarius	7.8	$8' \times 8'$	89		
71	M 71	Globular Cluster	Sagitta	8.4	$7.2' \times 7.2'$	90		
72	M 72	Globular Cluster	Aquarius	9.2	$6.6' \times 6.6'$	91		
73	M 73	Open Cluster	Aquarius	8.9	$1.4' \times 1.4'$	92		
74	M 74 (The Phantom)	Galaxy	Pisces	9.4	$10.5' \times 9.5'$	93		
75	M 75	Globular Cluster	Sagittarius	8.6	$6.8' \times 6.8'$	94		
76	M 76 (Little Dumbell Nebula)	Planetary Nebula	Perseus	10	$3.1' \times 3.1'$	95		
77	M 77 (Cetus A)	Galaxy	Cetus	8.9	$7.1' \times 6'$	96		
78	M 78	Gaseous Nebula	Orion	8	$8' \times 6'$	97		
79	M 79	Globular Cluster	Lepus	7.7	$9.6' \times 9.6'$	98		
80	M 80	Globular Cluster	Scorpius	7.3	$10' \times 10'$	99		
81	M 81 (Bode's Galaxy)	Galaxy	Ursa Major	6.9	$24.9' \times 11.5'$	100		
82	M 82 (Cigar Galaxy, Ursa Major A)	Galaxy	Ursa Major	8.4	$11.2' \times 4.3'$	101		
83	M 83	Galaxy	Hydra	7.5	$12.9' \times 11.5'$	102		
84	M 84 (Markarian Chain)	Galaxy	Virgo	9.1	$6.5' \times 5.6'$	103		
85	M 85	Galaxy	Coma Berenices	9.1	$7.1' \times 5.5'$	104		
86	M 86 (Markarian Chain)	Galaxy	Virgo	8.9	$8.9' \times 5.8'$	105		
87	M 87 (Virgo A)	Galaxy	Virgo	8.6	$8.3' \times 6.6'$	106		

Continued on the following page

Table 6.1: Checklist of Objects

Sl. No.	Object	Type	Constellation	Mag.	Size	Page	Obs. Date	Second Obs.
88	M 88	Galaxy	Coma Berenices	9.6	$6.8' \times 3.7'$	107		
89	M 89	Galaxy	Virgo	9.8	$3.5' \times 3.5'$	108		
90	M 90	Galaxy	Virgo	9.5	$9.5' \times 4.4'$	109		
91	M 91	Galaxy	Coma Berenices	10	$5.2' \times 4.2'$	110		
92	M 92	Globular Cluster	Hercules	6.5	$14' \times 14'$	111		
93	M 93	Open Cluster	Puppis	6.2	$10' \times 10'$	112		
94	M 94	Galaxy	Canes Venatici	8.2	$14.4' \times 12.1'$	113		
95	M 95	Galaxy	Leo	9.7	$7.4' \times 5'$	114		
96	M 96	Galaxy	Leo	9.3	$7.8' \times 5.2'$	115		
97	M 97 (Owl Nebula)	Planetary Nebula	Ursa Major	9.9	$2.8' \times 2.8'$	116		
98	M 98	Galaxy	Coma Berenices	10	$9.8' \times 2.8'$	117		
99	M 99	Galaxy	Coma Berenices	9.9	$5.3' \times 4.6'$	118		
100	M 100	Galaxy	Coma Berenices	9.4	$7.5' \times 6.1'$	119		
101	M 101 (Pinwheel Galaxy)	Galaxy	Ursa Major	7.9	$28.8' \times 26.9'$	120		
102	M 102	Galaxy	Draco	9.9	$6.5' \times 3.1'$	121		
103	M 103	Open Cluster	Cassiopeia	7.4	$6' \times 6'$	122		
104	M 104 (Sombrero Galaxy)	Galaxy	Corvus	8	$8.6' \times 4.2'$	123		
105	M 105	Galaxy	Leo	9.3	$5.3' \times 4.8'$	124		
106	M 106	Galaxy	Canes Venatici	8.4	$18.6' \times 7.2'$	125		
107	M 107	Globular Cluster	Ophiuchus	7.8	$13' \times 13'$	126		
108	M 108	Galaxy	Ursa Major	10	$8.6' \times 2.4'$	127		
109	M 109	Galaxy	Ursa Major	9.8	$7.5' \times 4.4'$	128		
110	M 110	Galaxy	Andromeda	8.1	$19.5' \times 11.5'$	129		

7

Logging Forms

This section contains the actual logging forms.

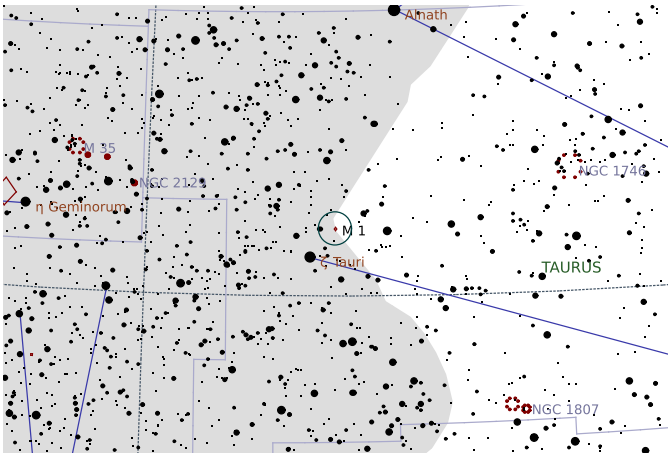
Note that the page numbers for each chart are listed in the Checklist section.

M 1 (Crab Nebula)

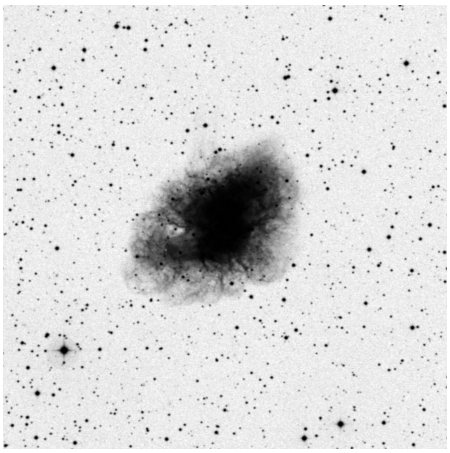
Supernova Remnant in Taurus

Right Ascension (current)	$05^h\,35^m\,20^s$	Declination (current)	$22°\,01'\,15''$
Right Ascension (J2000.0)	$05^h\,34^m\,31^s$	Declination (J2000.0)	$22°\,00'\,52''$
Size	$6' \times 4'$	Position Angle	90°
Magnitude	8.4	Other Designation	NGC 1952

Description: A somewhat faint nebula. This is the remains of the supernova explosion that Chinese astronomers recorded in 1054 A.D.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

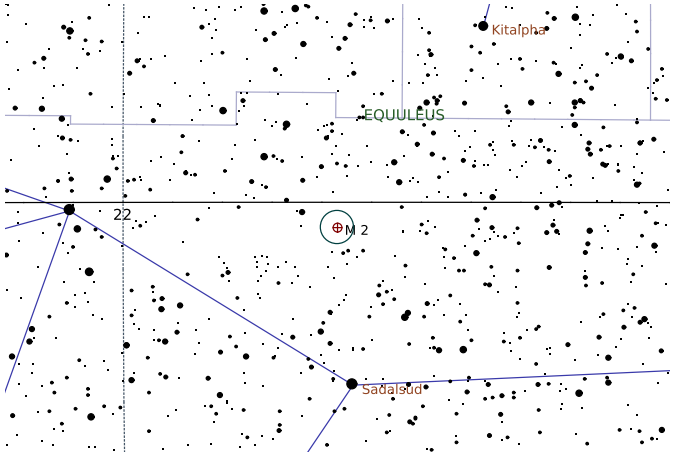
* Description: _____

_____

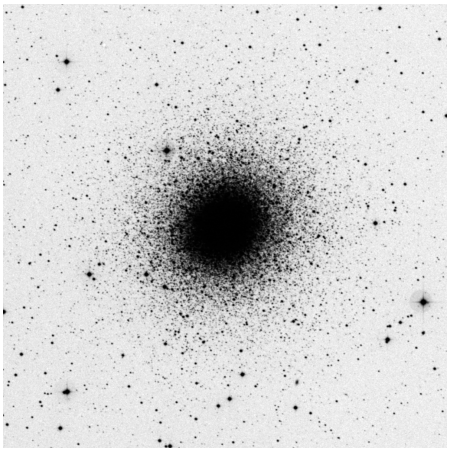
M 2

Globular Cluster in Aquarius

Right Ascension (current)	$21^h\,34^m\,07^s$	Declination (current)	$-0°\,45'\,49''$
Right Ascension (J2000.0)	$21^h\,33^m\,27^s$	Declination (J2000.0)	$-0°\,49'\,22''$
Size	$16' \times 16'$	Position Angle	90°
Magnitude	6.6	Other Designation	NGC 7089



Sky Chart



DSS Image (B, $21.0' \times 21.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

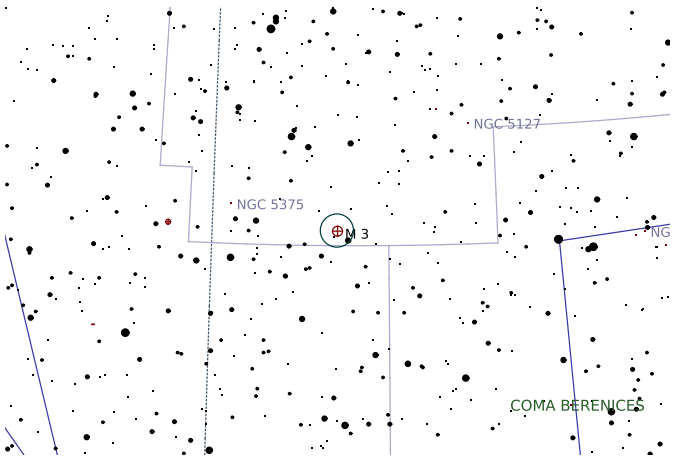
Sketch

FOV: _____

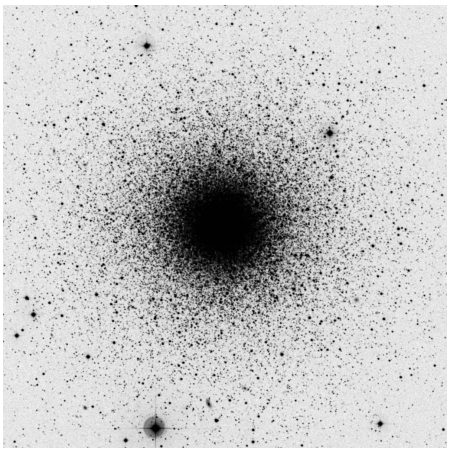
M 3

Globular Cluster in Canes Venatici

Right Ascension (current)	$13^h\,42^m\,48^s$	Declination (current)	$28°\,18'\,20''$
Right Ascension (J2000.0)	$13^h\,42^m\,11^s$	Declination (J2000.0)	$28°\,22'\,34''$
Size	$18' \times 18'$	Position Angle	90°
Magnitude	6.3	Other Designation	NGC 5272



Sky Chart



DSS Image (B, $23.0' \times 23.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

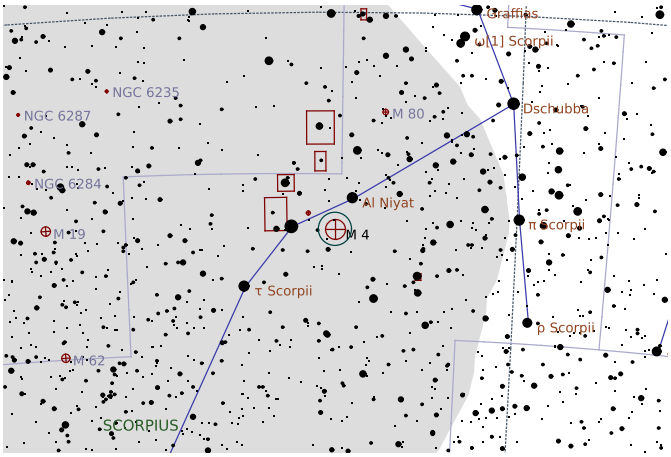
_____

M 4

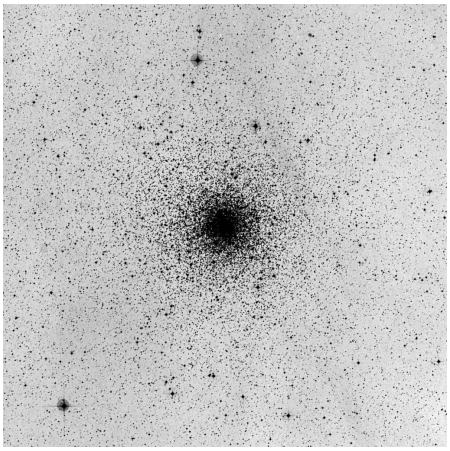
Globular Cluster in Scorpius

Right Ascension (current)	$16^h\,24^m\,24^s$	Declination (current)	$-26°\,33'\,10''$
Right Ascension (J2000.0)	$16^h\,23^m\,35^s$	Declination (J2000.0)	$-26°\,31'\,29''$
Size	$36' \times 36'$	Position Angle	90°
Magnitude	5.4	Other Designation	NGC 6121

Description: A low surface brightness, but well resolved globular cluster. Might be easier to locate with binoculars than with a telescope. Stars resolved even in small telescopes.



Sky Chart



DSS Image (B, $41.0' \times 41.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

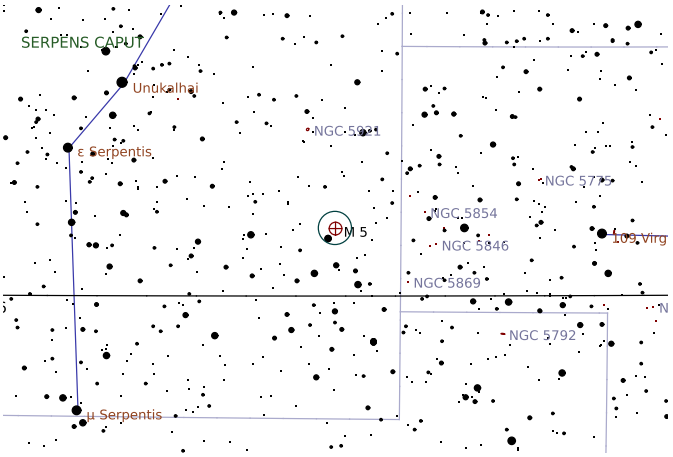
_____

M 5

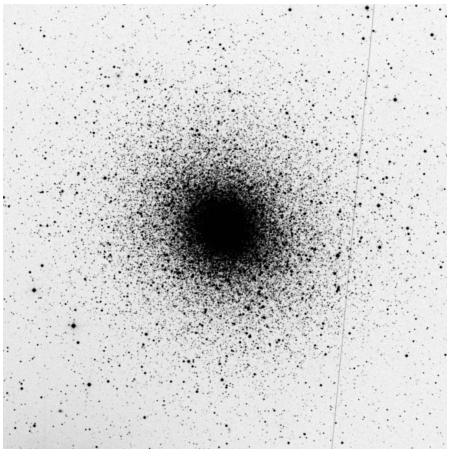
Globular Cluster in Serpens Caput

Right Ascension (current)	$15^h\,19^m\,13^s$	Declination (current)	$2°\,02'\,03''$
Right Ascension (J2000.0)	$15^h\,18^m\,33^s$	Declination (J2000.0)	$2°\,05'\,00''$
Size	$23' \times 23'$	Position Angle	90°
Magnitude	5.7	Other Designation	NGC 5904

Description: A bright globular cluster.



Sky Chart



DSS Image (B, $28.0' \times 28.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

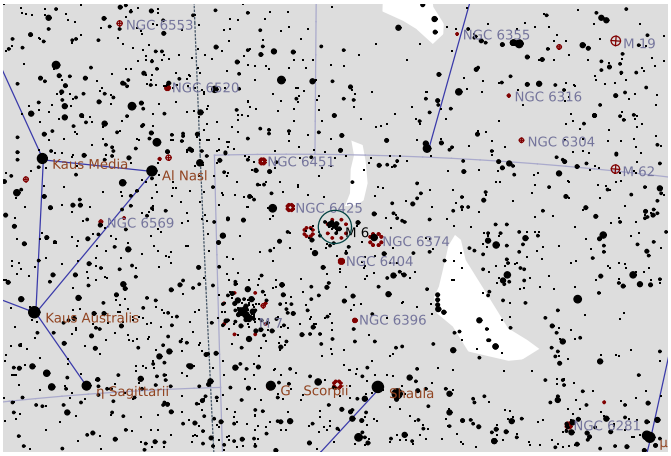
FOV: _____

M 6 (Butterfly Cluster)

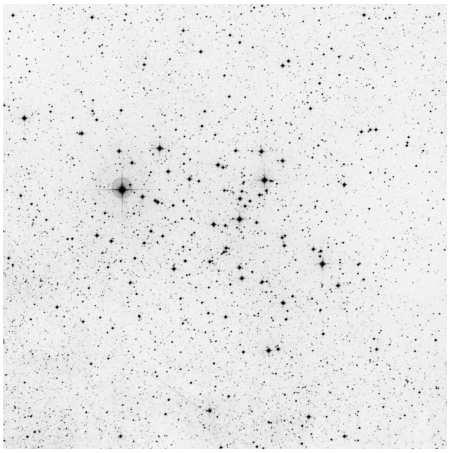
Open Cluster in Scorpius

Right Ascension (current)	$17^h\,41^m\,08^s$	Declination (current)	$-32°\,16'\,14''$
Right Ascension (J2000.0)	$17^h\,40^m\,17^s$	Declination (J2000.0)	$-32°\,16'\,00''$
Size	$33' \times 33'$	Position Angle	90°
Magnitude	4.2	Other Designation	NGC 6405

Description: With a telescope, try to observe the butterfly pattern of stars that gives this cluster its name.



Sky Chart



DSS Image (R, $38.0' \times 38.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

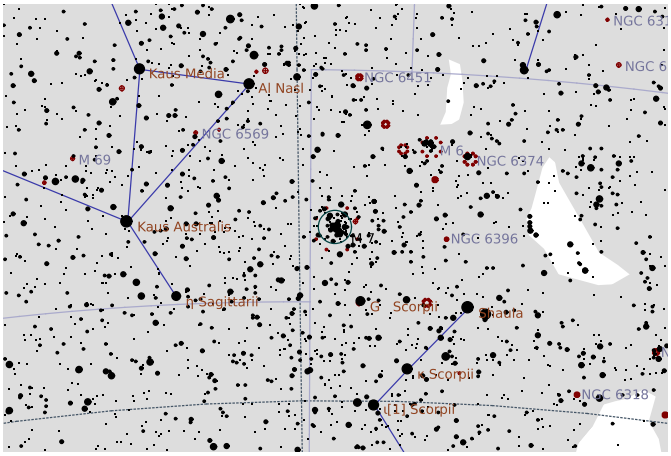
FOV: _____

M 7 (Ptolemy's Cluster)

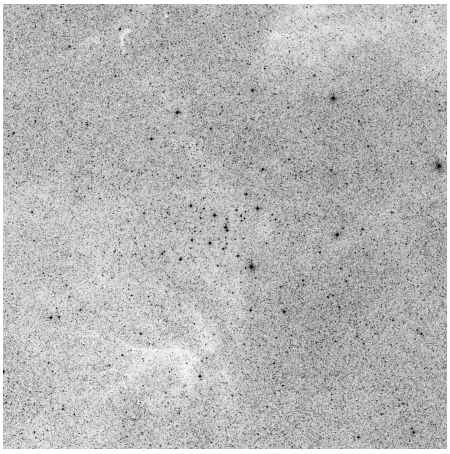
Open Cluster in Scorpius

Right Ascension (current)	$17^h\,54^m\,38^s$	Declination (current)	$-34°\,46'\,57''$
Right Ascension (J2000.0)	$17^h\,53^m\,46^s$	Declination (J2000.0)	$-34°\,47'\,00''$
Size	$75' \times 75'$	Position Angle	90°
Magnitude	3.3	Other Designation	NGC 6475

Description: A remarkable cluster with few bright stars. Can be viewed with the naked eye from city skies at times.



Sky Chart



DSS Image (R, $75.0' \times 75.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

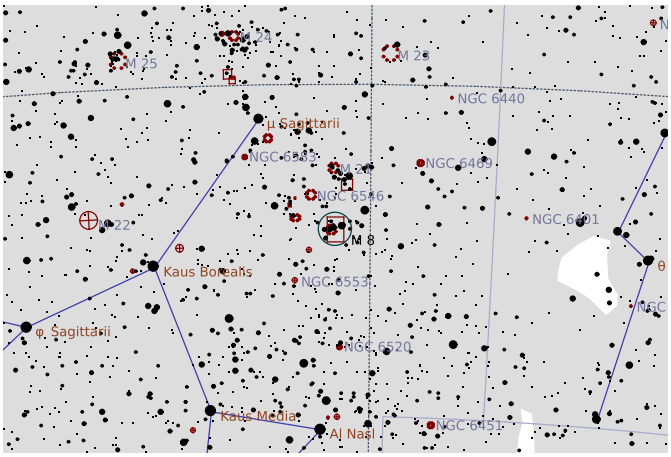
_____

M 8 (Lagoon Nebula)

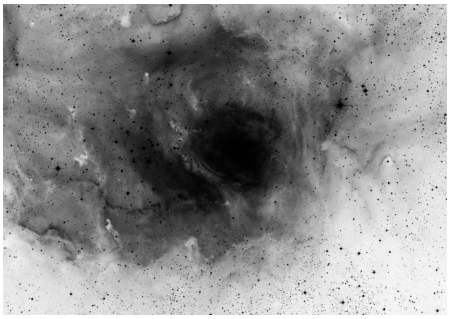
Gaseous Nebula in Sagittarius

Right Ascension (current)	$18^h\,04^m\,36^s$	Declination (current)	$-24°\,22'\,49''$
Right Ascension (J2000.0)	$18^h\,03^m\,48^s$	Declination (J2000.0)	$-24°\,23'\,00''$
Size	$45' \times 30'$	Position Angle	90°
Magnitude	5.8	Other Designation	NGC 6523

Description: The cluster is easily visible. The brightest parts of the nebula may be visible from city skies with a telescope..



Sky Chart



DSS Image (R, $50.0' \times 35.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

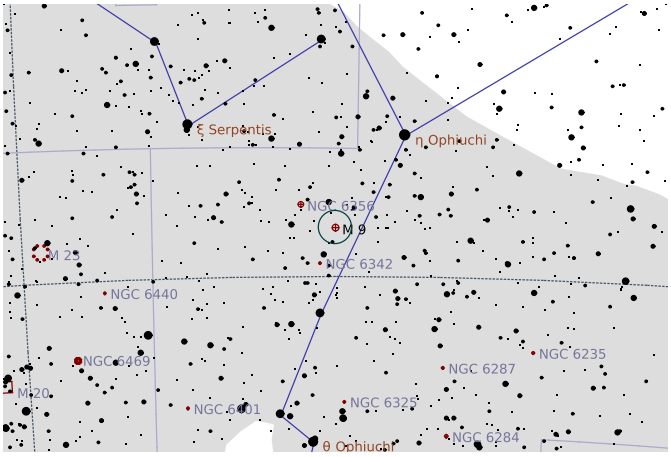
* Description: _____

_____

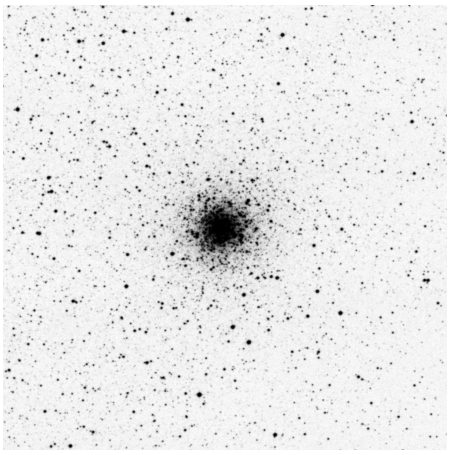
M 9

Globular Cluster in Ophiuchus

Right Ascension (current)	$17^h\,19^m\,57^s$	Declination (current)	$-18°\,31'\,39''$
Right Ascension (J2000.0)	$17^h\,19^m\,11^s$	Declination (J2000.0)	$-18°\,30'\,57''$
Size	$12' \times 12'$	Position Angle	90°
Magnitude	7.8	Other Designation	NGC 6333



Sky Chart



DSS Image (R, $17.0' \times 17.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

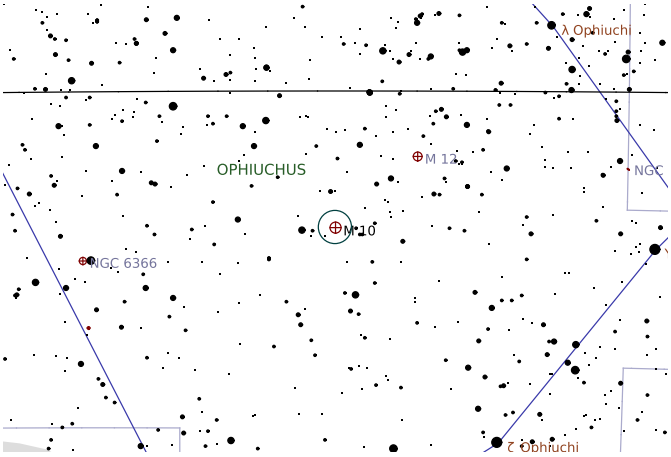
Sketch

FOV: _____

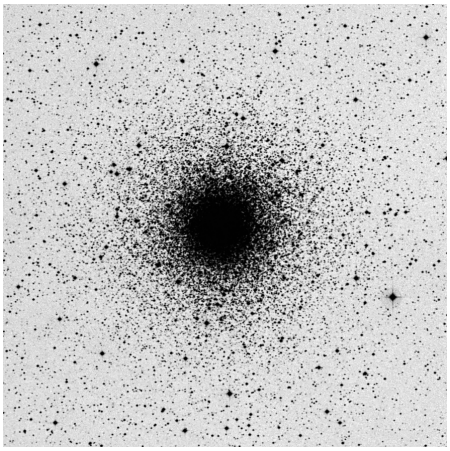
M 10

Globular Cluster in Ophiuchus

Right Ascension (current)	$16^h\,57^m\,49^s$	Declination (current)	$-4°\,07'\,08''$
Right Ascension (J2000.0)	$16^h\,57^m\,08^s$	Declination (J2000.0)	$-4°\,05'\,56''$
Size	$20' \times 20'$	Position Angle	90°
Magnitude	6.6	Other Designation	NGC 6254



Sky Chart



DSS Image (B, $25.0' \times 25.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

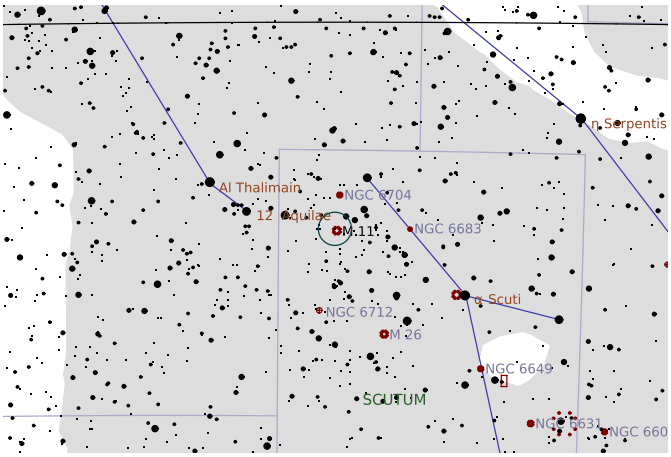
FOV: _____

M 11 (Wild Duck Cluster)

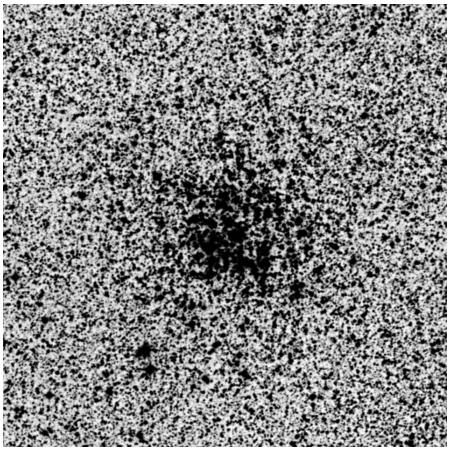
Open Cluster in Scutum

Right Ascension (current)	$18^h\,51^m\,48^s$	Declination (current)	$-6°\,14'\,59''$
Right Ascension (J2000.0)	$18^h\,51^m\,06^s$	Declination (J2000.0)	$-6°\,16'\,00''$
Size	$11' \times 11'$	Position Angle	90°
Magnitude	5.8	Other Designation	NGC 6705

Description: A compact, very rich, remarkable open cluster! May look like a nebula at first glance in small telescopes.



Sky Chart



DSS Image (R, $16.0' \times 16.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

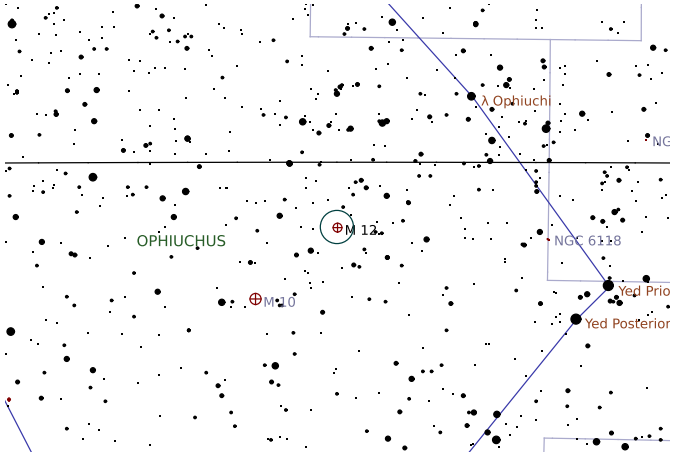
* Description: _____

_____

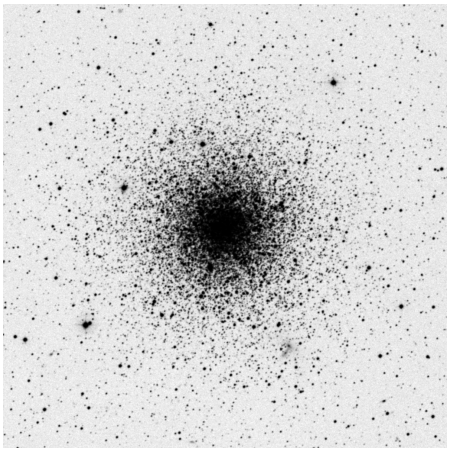
M 12

Globular Cluster in Ophiuchus

Right Ascension (current)	$16^h\,47^m\,55^s$	Declination (current)	$-1°\,58'\,13''$
Right Ascension (J2000.0)	$16^h\,47^m\,14^s$	Declination (J2000.0)	$-1°\,56'\,50''$
Size	$16' \times 16'$	Position Angle	90°
Magnitude	6.1	Other Designation	NGC 6218



Sky Chart



DSS Image (B, $21.0' \times 21.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

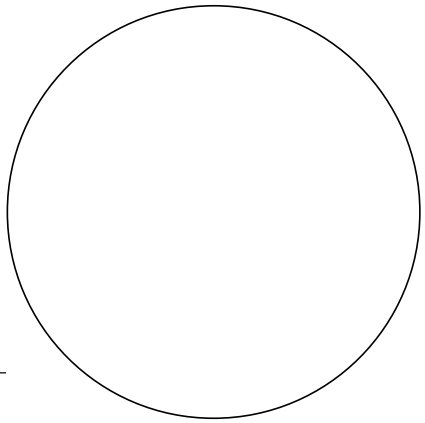
_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____



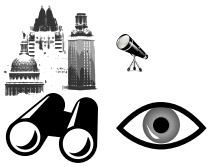
Sketch

FOV: _____

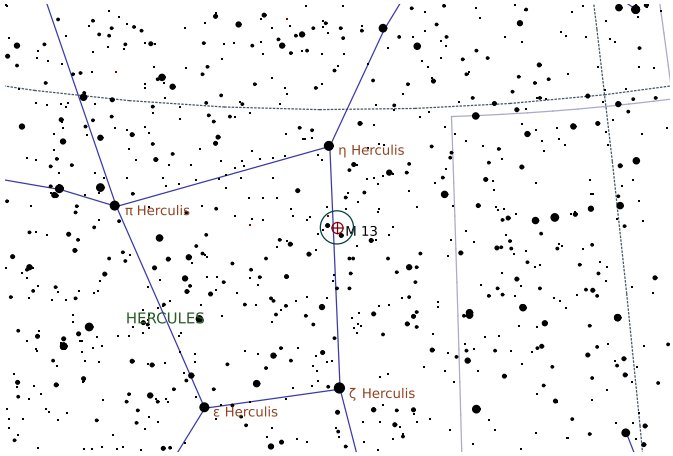
M 13 (Hercules Cluster)

Globular Cluster in Hercules

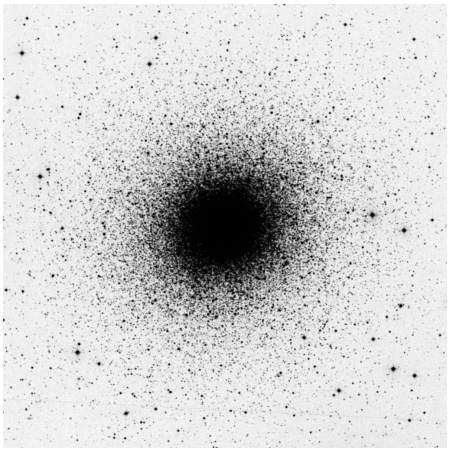
Right Ascension (current)	$16^h\,42^m\,09^s$	Declination (current)	$36°\,25'\,58''$
Right Ascension (J2000.0)	$16^h\,41^m\,41^s$	Declination (J2000.0)	$36°\,27'\,39''$
Size	$20' \times 20'$	Position Angle	90°
Magnitude	5.8	Other Designation	NGC 6205



Description: A very remarkable globular cluster! Almost entirely resolved in most telescopes. Surface-brightness is somewhat low.



Sky Chart



DSS Image (B, $25.0' \times 25.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

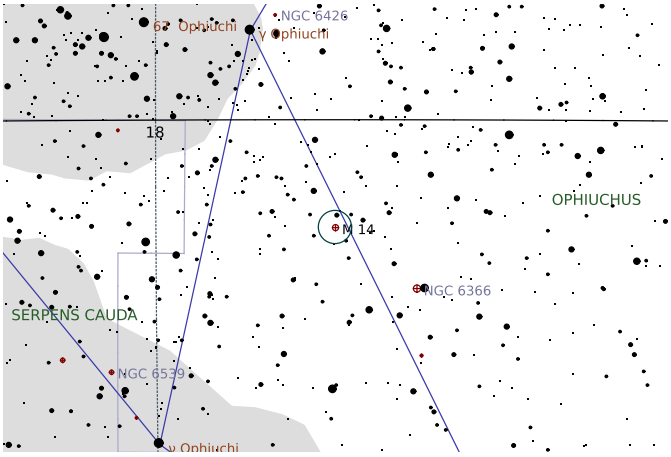
* Description: _____

_____

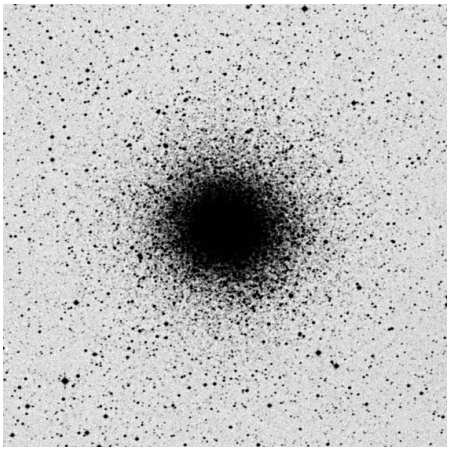
M 14

Globular Cluster in Ophiuchus

Right Ascension (current) Right Ascension (J2000.0)	$17^h\,38^m\,17^s$ $17^h\,37^m\,36^s$	Declination (current) Declination (J2000.0)	$-3°\,15'\,08''$ $-3°\,14'\,43''$
Size Magnitude	$11' \times 11'$ 7.6	Position Angle Other Designation	90° NGC 6402



Sky Chart



DSS Image (B, $16.0' \times 16.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

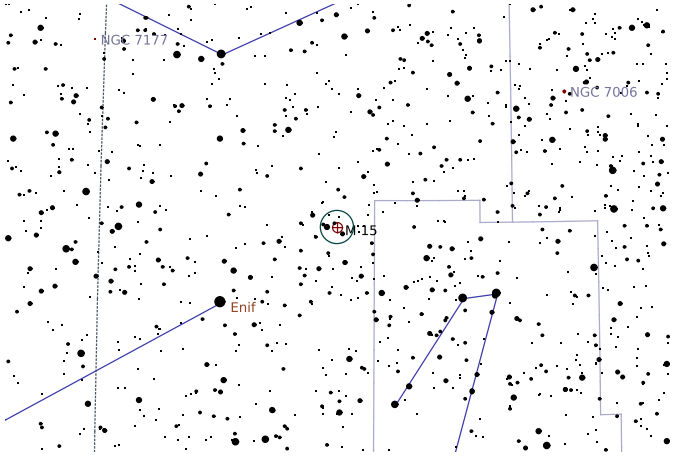
Sketch

FOV: _____

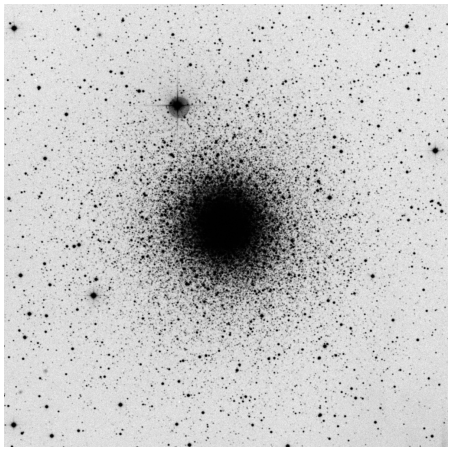
M 15

Globular Cluster in Pegasus

Right Ascension (current)	$21^h\,30^m\,35^s$	Declination (current)	$12°\,13'\,34''$
Right Ascension (J2000.0)	$21^h\,29^m\,58^s$	Declination (J2000.0)	$12°\,10'\,03''$
Size	$18' \times 18'$	Position Angle	90°
Magnitude	6.3	Other Designation	NGC 7078



Sky Chart



DSS Image (B, $23.0' \times 23.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

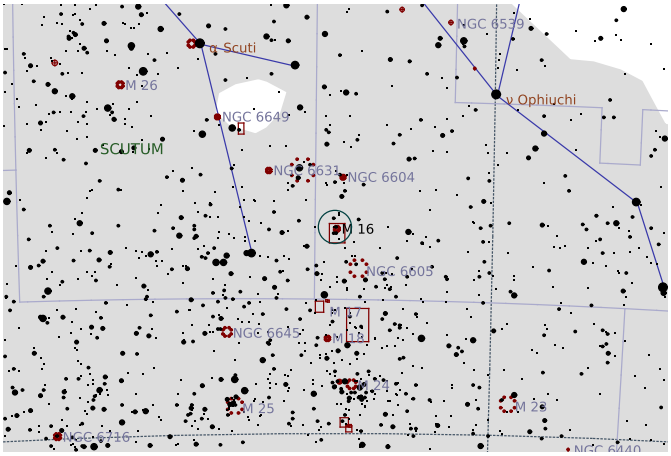
_____

M 16 (Eagle Nebula)

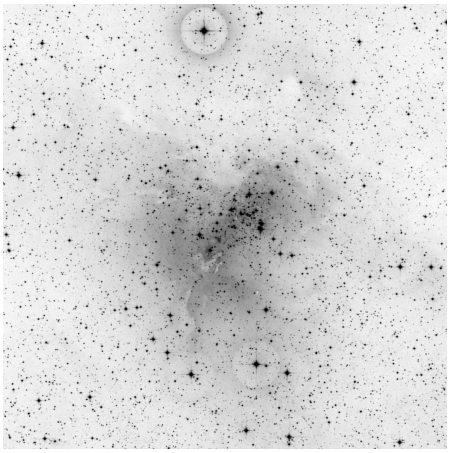
Open Cluster in Serpens Cauda

Right Ascension (current)	$18^h\,19^m\,32^s$	Declination (current)	$-13°\,47'\,24''$
Right Ascension (J2000.0)	$18^h\,18^m\,48^s$	Declination (J2000.0)	$-13°\,47'\,50''$
Size	$8' \times 8'$	Position Angle	90°
Magnitude	6	Other Designation	NGC 6611

Description: The nebula is itself rather faint and takes dark skies to observe. The cluster is easy.



Sky Chart



DSS Image (I, 5.0' ×35.0')

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

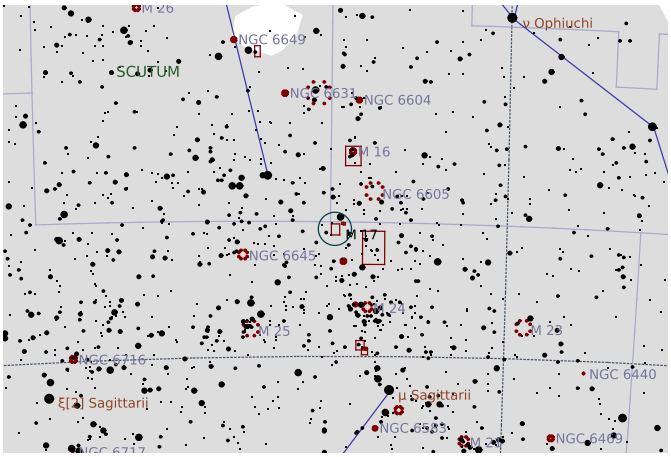
FOV: _____

M 17 (Swan Nebula, Omega Nebula)

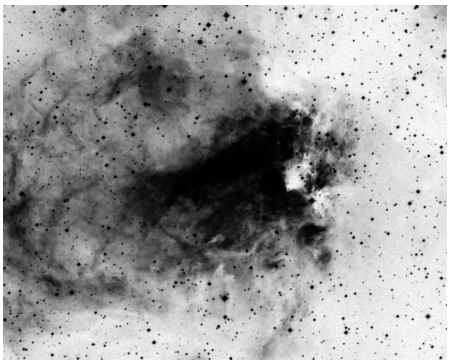
Gaseous Nebula in Sagittarius

Right Ascension (current)	$18^h\,21^m\,33^s$	Declination (current)	$-16°\,10'\,32''$
Right Ascension (J2000.0)	$18^h\,20^m\,48^s$	Declination (J2000.0)	$-16°\,11'\,00''$
Size	$20' \times 15'$	Position Angle	90°
Magnitude	6	Other Designation	NGC 6618

Description: Very remarkable high surface brightness nebula! Looks like a check-mark in smaller telescopes, and a swan in larger ones.



Sky Chart



DSS Image (R, $25.0' \times 20.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

FOV: _____

* Description: _____

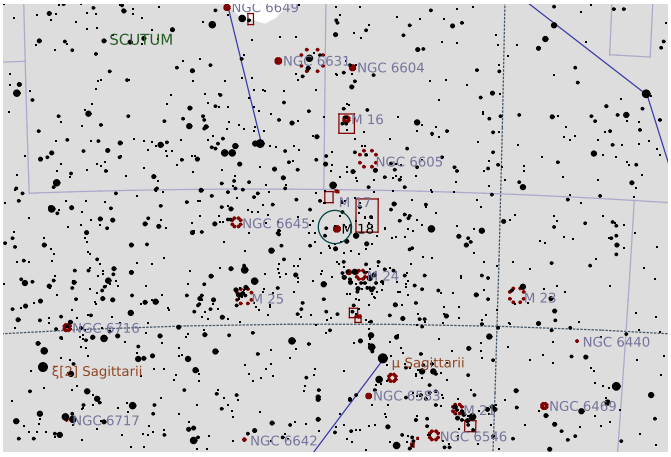
_____

Sketch

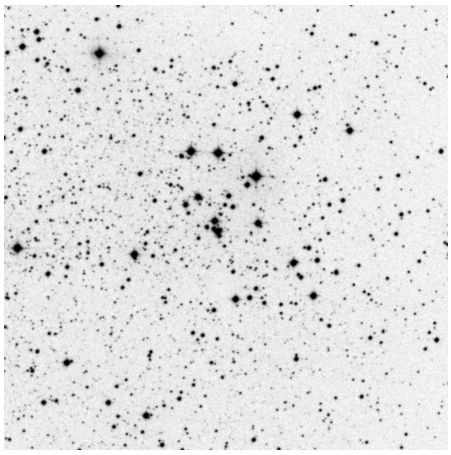
M 18

Open Cluster in Sagittarius

Right Ascension (current)	$18^h\,20^m\,43^s$	Declination (current)	$-17°\,05'\,38''$
Right Ascension (J2000.0)	$18^h\,19^m\,58^s$	Declination (J2000.0)	$-17°\,06'\,06''$
Size	$7' \times 7'$	Position Angle	90°
Magnitude	6.9	Other Designation	NGC 6613



Sky Chart



DSS Image (R, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

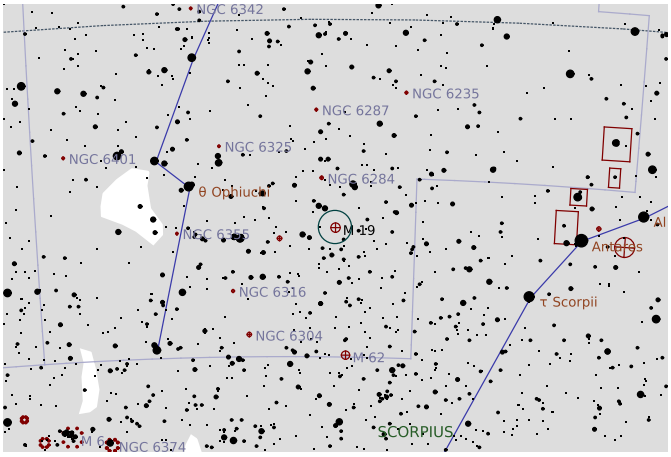
Sketch

FOV: _____

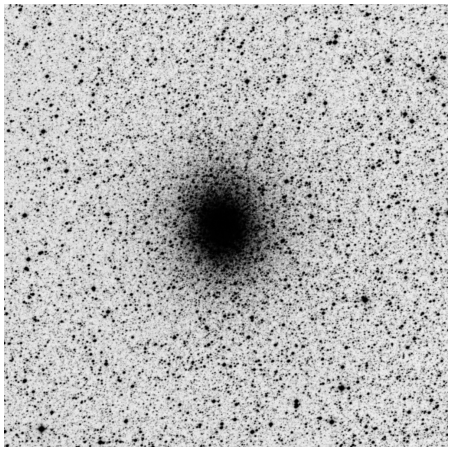
M 19

Globular Cluster in Ophiuchus

Right Ascension (current)	$17^h\,03^m\,26^s$	Declination (current)	$-26°\,17'\,01''$
Right Ascension (J2000.0)	$17^h\,02^m\,37^s$	Declination (J2000.0)	$-26°\,16'\,03''$
Size	$17' \times 17'$	Position Angle	90°
Magnitude	6.8	Other Designation	NGC 6273



Sky Chart



DSS Image (R, $22.0' \times 22.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

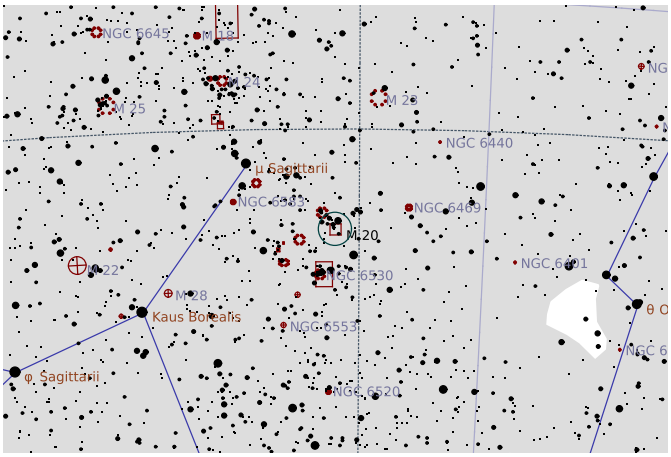
FOV: _____

M 20 (Trifid Nebula)

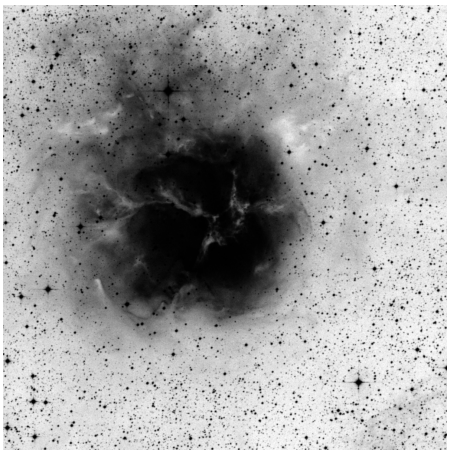
Gaseous Nebula in Sagittarius

Right Ascension (current)	$18^h\,03^m\,05^s$	Declination (current)	$-23°\,01'\,51''$
Right Ascension (J2000.0)	$18^h\,02^m\,18^s$	Declination (J2000.0)	$-23°\,02'\,00''$
Size	$20' \times 20'$	Position Angle	90°
Magnitude	8.5	Other Designation	NGC 6514

Description: The nebula is somewhat dim and may be hard to observe with a telescope, although not impossible, from city skies. Looks like a star with a glare at first glance.



Sky Chart



DSS Image (R, $25.0' \times 25.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

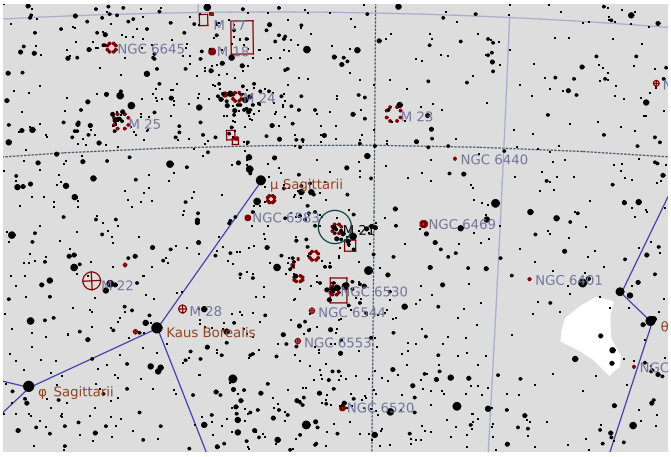
* Description: _____

_____

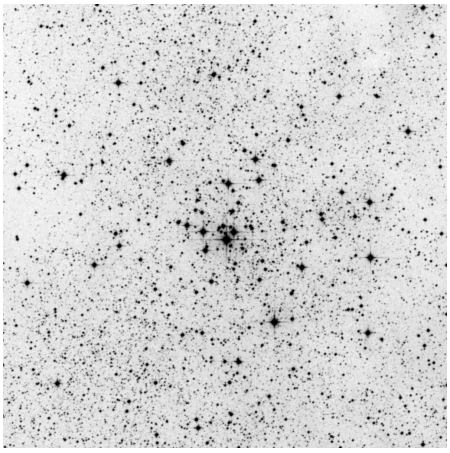
M 21

Open Cluster in Sagittarius

Right Ascension (current)	$18^h\,05^m\,00^s$	Declination (current)	$-22°\,29'\,13''$
Right Ascension (J2000.0)	$18^h\,04^m\,13^s$	Declination (J2000.0)	$-22°\,29'\,24''$
Size	$16' \times 16'$	Position Angle	90°
Magnitude	5.9	Other Designation	NGC 6531



Sky Chart



DSS Image (R, $21.0' \times 21.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

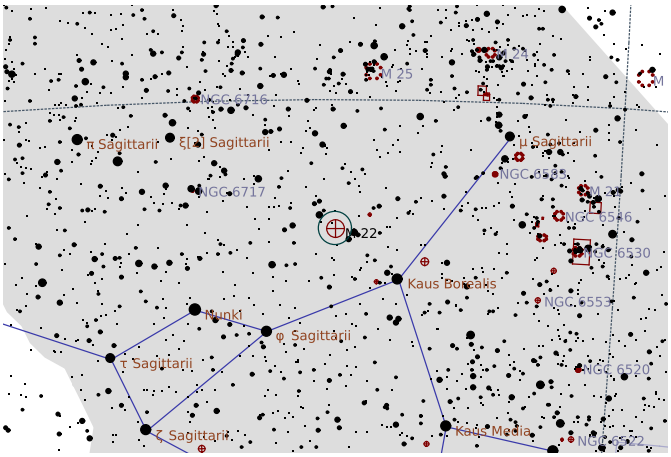
FOV: _____

M 22

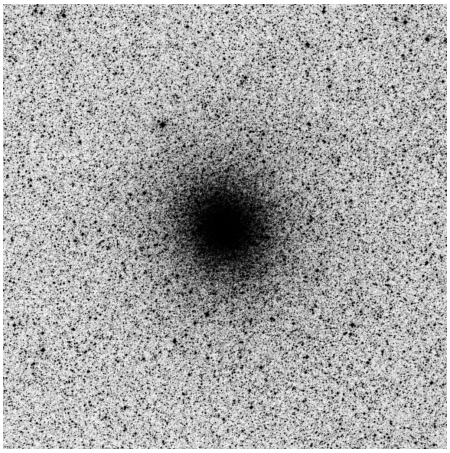
Globular Cluster in Sagittarius

Right Ascension (current)	$18^h\,37^m\,11^s$	Declination (current)	$-23°\,53'\,22''$
Right Ascension (J2000.0)	$18^h\,36^m\,24^s$	Declination (J2000.0)	$-23°\,54'\,10''$
Size	$32' \times 32'$	Position Angle	90°
Magnitude	5.2	Other Designation	NGC 6656

Description: A nice globular cluster.



Sky Chart



DSS Image (R, $37.0' \times 37.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

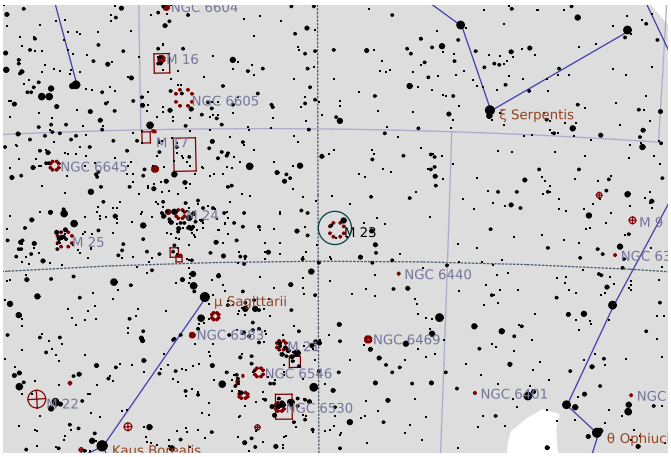
FOV: _____

M 23

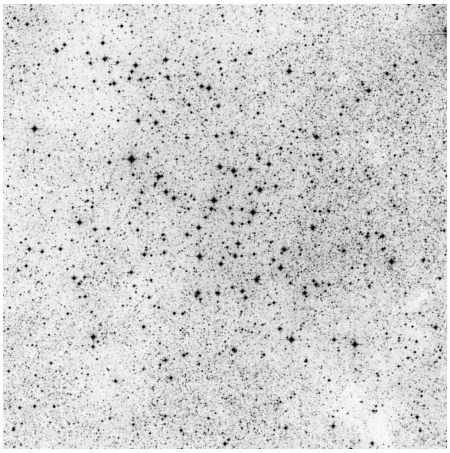
Open Cluster in Sagittarius

Right Ascension (current)	$17^h\,57^m\,46^s$	Declination (current)	$-19°\,00'\,58''$
Right Ascension (J2000.0)	$17^h\,57^m\,00^s$	Declination (J2000.0)	$-19°\,01'\,00''$
Size	$25' \times 25'$	Position Angle	90°
Magnitude	5.5	Other Designation	NGC 6494

Description: Beautiful open cluster.



Sky Chart



DSS Image (R, $30.0' \times 30.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

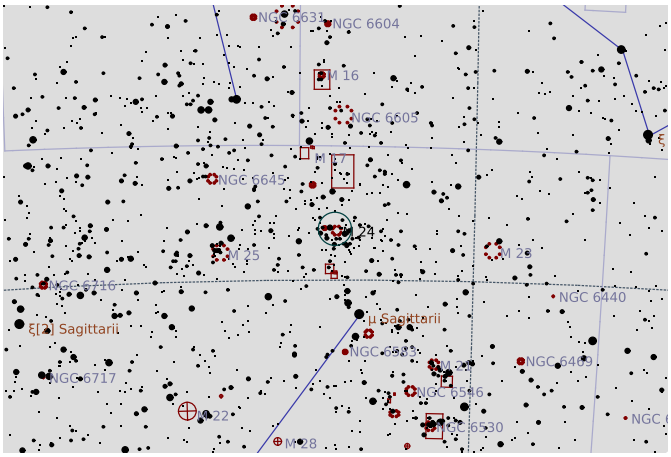
FOV: _____

M 24 (Delle Caustiche)

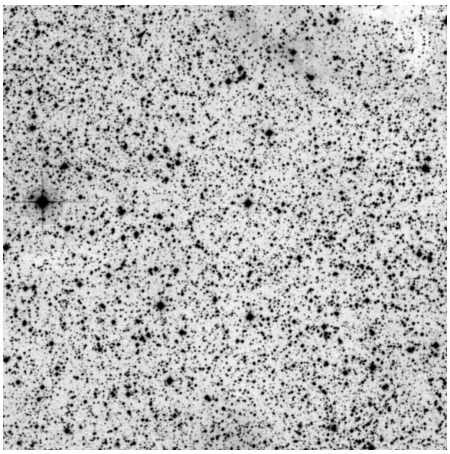
Open Cluster in Sagittarius

Right Ascension (current)	$18^h\,17^m\,40^s$	Declination (current)	$-18°\,28'\,35''$
Right Ascension (J2000.0)	$18^h\,16^m\,54^s$	Declination (J2000.0)	$-18°\,29'\,00''$
Size	$15' \times 15'$	Position Angle	90°
Magnitude	4.6	Other Designation	–

Description: This is actually a star cloud in the Milky Way. Visible to the naked eye even from light-polluted skies on exceptional nights!



Sky Chart



DSS Image (R, $20.0' \times 20.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

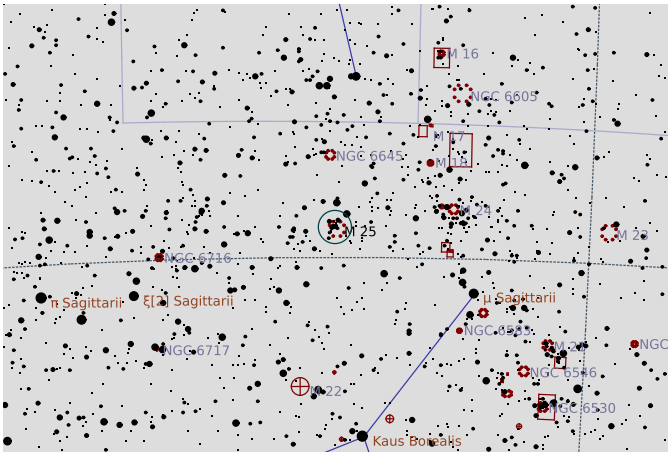
Sketch

FOV: _____

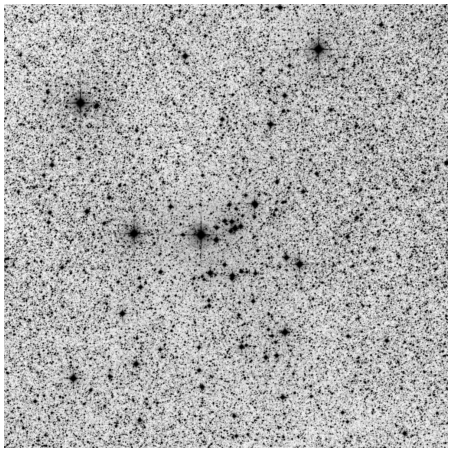
M 25

Open Cluster in Sagittarius

Right Ascension (current)	$18^h\,32^m\,32^s$	Declination (current)	$-19°\,06'\,12''$
Right Ascension (J2000.0)	$18^h\,31^m\,46^s$	Declination (J2000.0)	$-19°\,06'\,54''$
Size	$26' \times 26'$	Position Angle	90°
Magnitude	4.6	Other Designation	IC 4725



Sky Chart



DSS Image (R, $31.0' \times 31.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

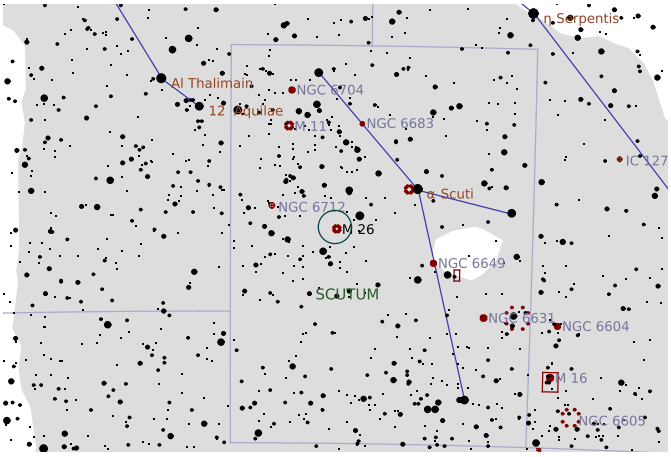
Sketch

FOV: _____

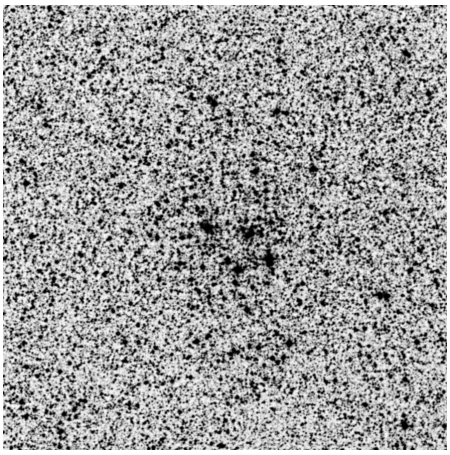
M 26

Open Cluster in Scutum

Right Ascension (current) Right Ascension (J2000.0)	$18^h\,46^m\,01^s$ $18^h\,45^m\,18^s$	Declination (current) Declination (J2000.0)	$-9°\,21'\,55''$ $-9°\,22'\,50''$
Size Magnitude	$10' \times 10'$ 8	Position Angle Other Designation	90° NGC 6694



Sky Chart



DSS Image (R, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

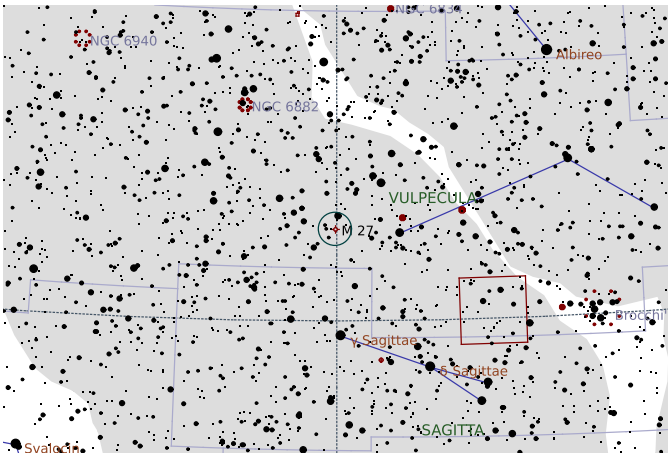
FOV: _____

M 27 (Dumbbell Nebula)

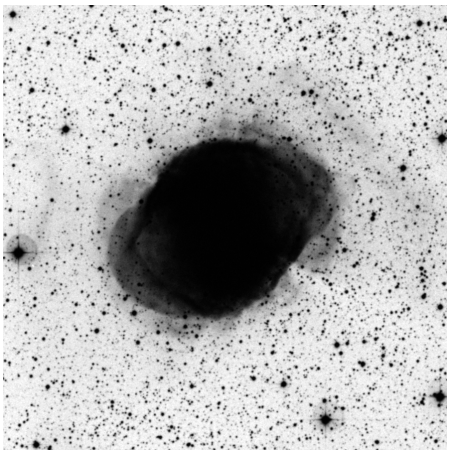
Planetary Nebula in Vulpecula

Right Ascension (current)	$20^h\,00^m\,09^s$	Declination (current)	$22°\,45'\,28''$
Right Ascension (J2000.0)	$19^h\,59^m\,36^s$	Declination (J2000.0)	$22°\,43'\,18''$
Size	$6.7' \times 6.7'$	Position Angle	90°
Magnitude	7.4	Other Designation	NGC 6853

Description: Easy to see the dumbbell shape that gives the nebula its name. Large telescopes from dark skies may even show the outer wisps that are seen in the DSS image.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

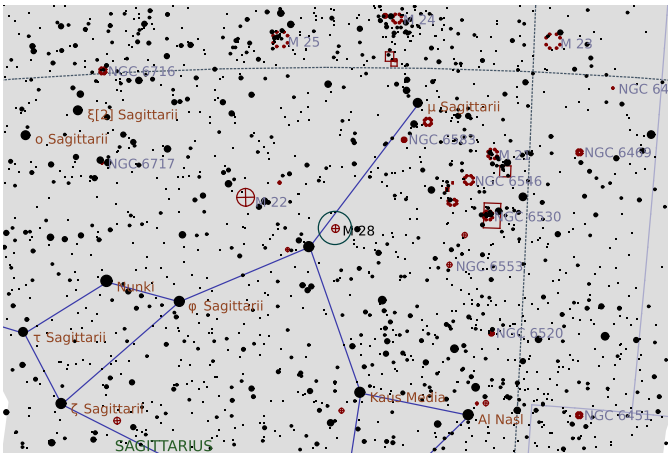
_____

M 28

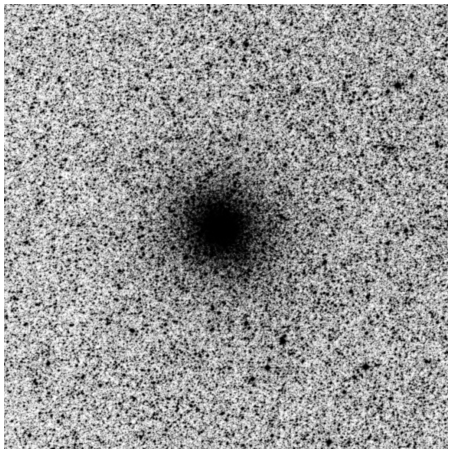
Globular Cluster in Sagittarius

Right Ascension (current)	$18^h\,25^m\,20^s$	Declination (current)	$-24°\,51'\,35''$
Right Ascension (J2000.0)	$18^h\,24^m\,32^s$	Declination (J2000.0)	$-24°\,52'\,10''$
Size	$13.8' \times 13.8'$	Position Angle	90°
Magnitude	6.9	Other Designation	NGC 6626

Description: Small globular cluster.



Sky Chart



DSS Image (R, $18.8' \times 18.8'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

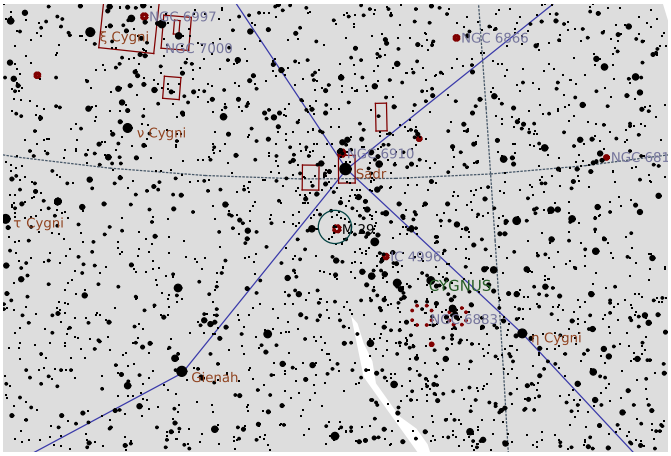
_____

M 29

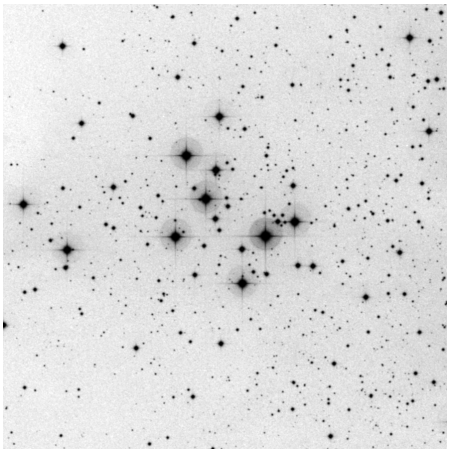
Open Cluster in Cygnus

Right Ascension (current)	$20^h\,24^m\,26^s$	Declination (current)	$38°\,32'\,29''$
Right Ascension (J2000.0)	$20^h\,23^m\,58^s$	Declination (J2000.0)	$38°\,29'\,54''$
Size	$10' \times 10'$	Position Angle	90°
Magnitude	6.6	Other Designation	NGC 6913

Description: A sparse cluster of just a few stars.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

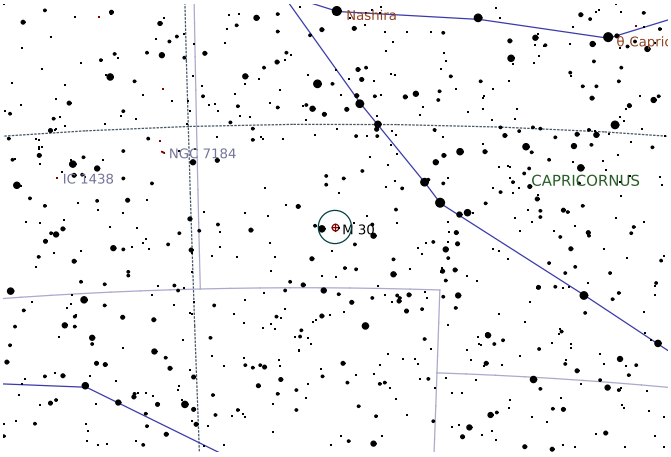
Sketch

FOV: _____

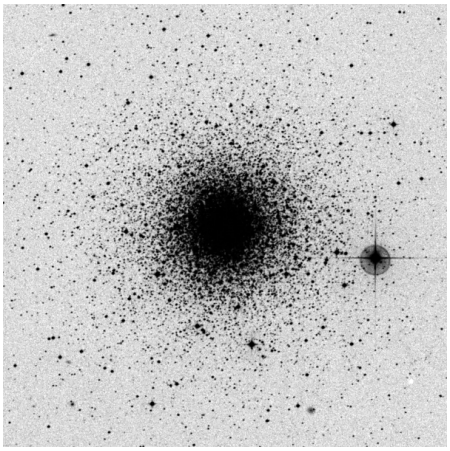
M 30

Globular Cluster in Capricornus

Right Ascension (current)	$21^h\,41^m\,06^s$	Declination (current)	$-23°\,07'\,05''$
Right Ascension (J2000.0)	$21^h\,40^m\,22^s$	Declination (J2000.0)	$-23°\,10'\,43''$
Size	$12' \times 12'$	Position Angle	90°
Magnitude	6.9	Other Designation	NGC 7099



Sky Chart



DSS Image (B, $17.0' \times 17.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

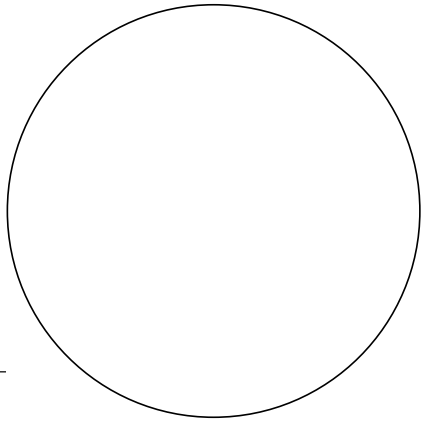
_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____



Sketch

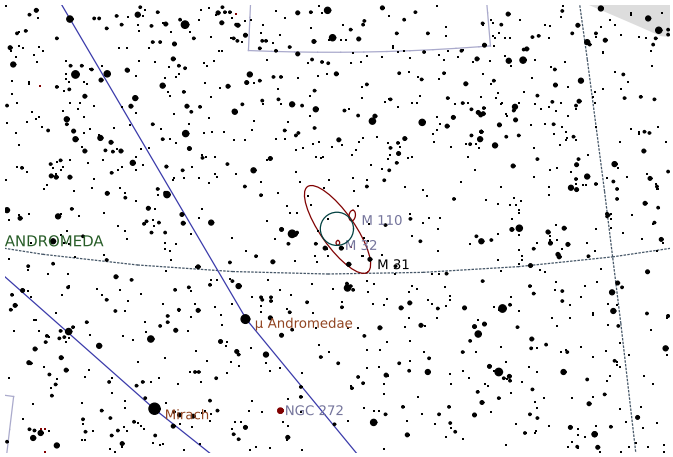
FOV: _____

M 31 (Andromeda Galaxy)

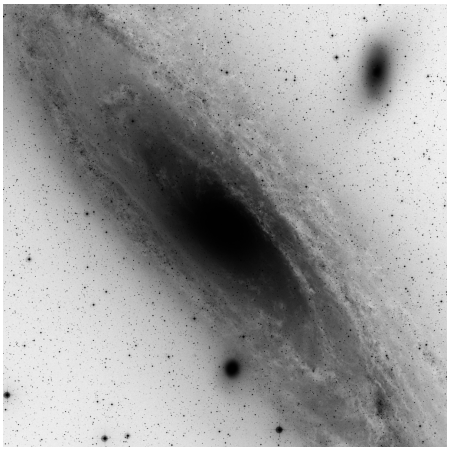
Galaxy in Andromeda

Right Ascension (current)	$00^h\,43^m\,27^s$	Declination (current)	$41°\,20'\,36''$
Right Ascension (J2000.0)	$00^h\,42^m\,44^s$	Declination (J2000.0)	$41°\,16'\,08''$
Size	$189.1' \times 61.7'$	Position Angle	55°
Magnitude	3.4	Other Designation	NGC 224

Description: Our remarkable galactic neighbor appears majestically to the naked eye from a dark site. In city conditions, it may be hard to see more than the central high-surface brightness core.



Sky Chart



DSS Image (B, $75.0' \times 75.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

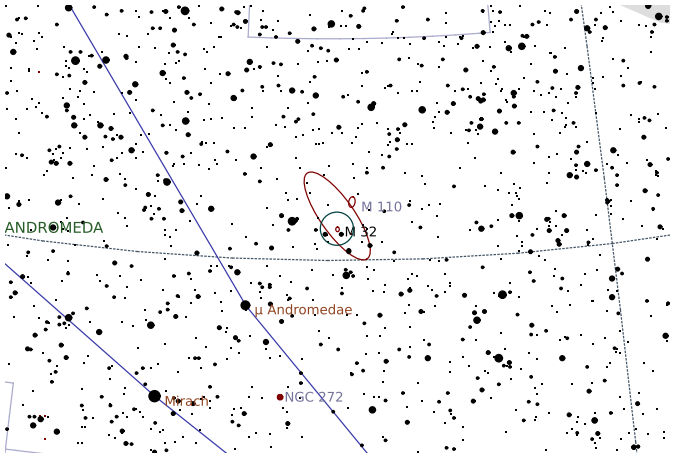
_____

M 32

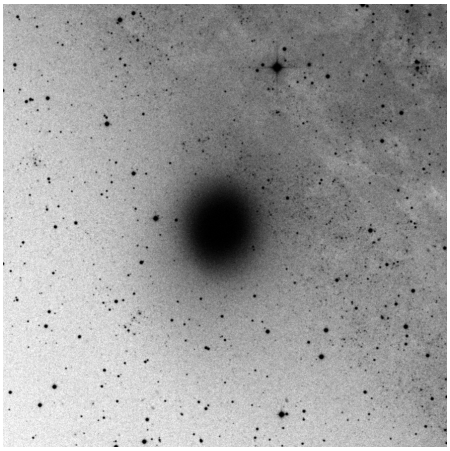
Galaxy in Andromeda

Right Ascension (current)	$00^h\,43^m\,24^s$	Declination (current)	$40°\,56'\,25''$
Right Ascension (J2000.0)	$00^h\,42^m\,41^s$	Declination (J2000.0)	$40°\,51'\,57''$
Size	$8.5' \times 6.5'$	Position Angle	$-89°$
Magnitude	8.1	Other Designation	NGC 221

Description: Has about the same surface-brightness as core of M31. Appears detached from M 31 in most telescopes, because outer parts of M31 are too faint to be seen. To avoid confusion with M 110, note M 32 is drastically easier to see, and if you see something nearly as bright as M 31's core, it is most definitely M 32, not M110.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

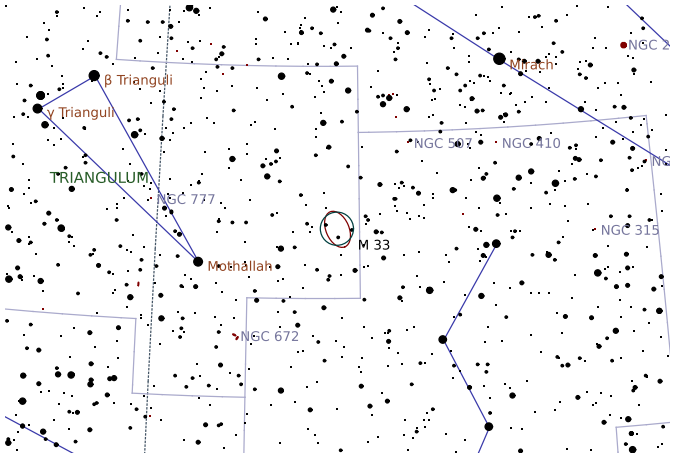
_____

M 33 (Triangulum Galaxy)

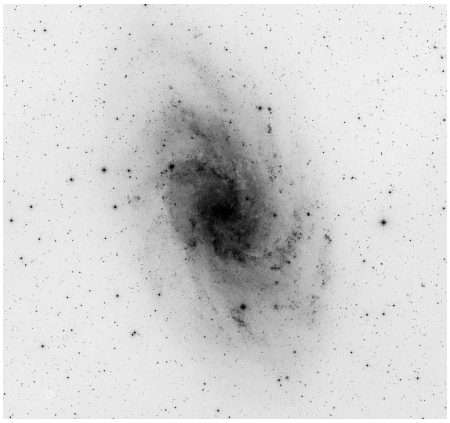
Galaxy in Triangulum

Right Ascension (current) Right Ascension (J2000.0)	$01^h\,34^m\,36^s$ $01^h\,33^m\,51^s$	Declination (current) Declination (J2000.0)	$30°\,43'\,36''$ $30°\,39'\,29''$
Size Magnitude	$68.7' \times 41.6'$ 5.7	Position Angle Other Designation	67° NGC 598

Description: A low surface brightness, but remarkable face-on spiral galaxy! While it is nearly impossible from city skies, binoculars will easily show it from a dark site. Visible to the naked eye under good sky conditions. Shows spiral structure even in $4'' \sim 6''$ telescopes. Look out for nebula NGC 604 in M33.



Sky Chart



DSS Image (B, $75.0' \times 70.1'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

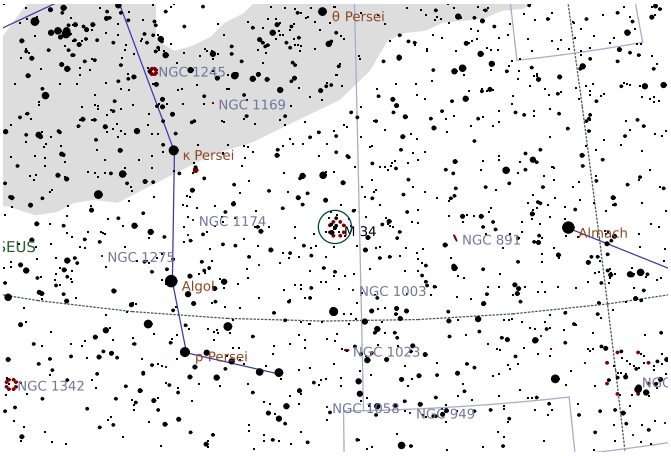
_____

M 34

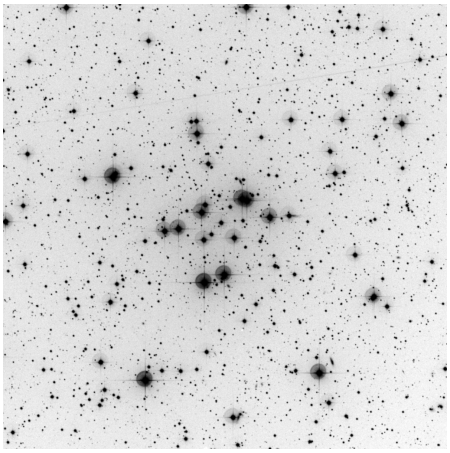
Open Cluster in Perseus

Right Ascension (current)	$02^h\,42^m\,57^s$	Declination (current)	$42°\,49'\,10''$
Right Ascension (J2000.0)	$02^h\,42^m\,05^s$	Declination (J2000.0)	$42°\,45'\,42''$
Size	$25' \times 25'$	Position Angle	90°
Magnitude	5.2	Other Designation	NGC 1039

Description: A sparse cluster of few bright stars. Naked eye target from dark skies.



Sky Chart



DSS Image (B, $30.0' \times 30.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

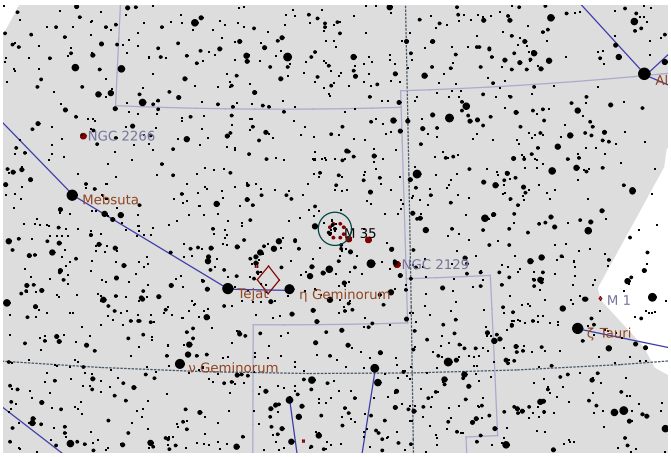
FOV: _____

M 35

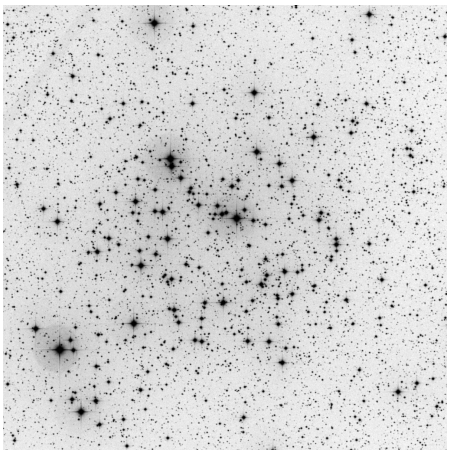
Open Cluster in Gemini

Right Ascension (current)	$06^h\,09^m\,50^s$	Declination (current)	$24°\,20'\,43''$
Right Ascension (J2000.0)	$06^h\,09^m\,00^s$	Declination (J2000.0)	$24°\,21'\,00''$
Size	$25' \times 25'$	Position Angle	90°
Magnitude	5.1	Other Designation	NGC 2168

Description: A bright cluster with many stars. Easy naked eye target from dark skies, sometimes even from city skies.



Sky Chart



DSS Image (B, $30.0' \times 30.0'$)

* Date: _____

* Time: _____

* Aperture: _____

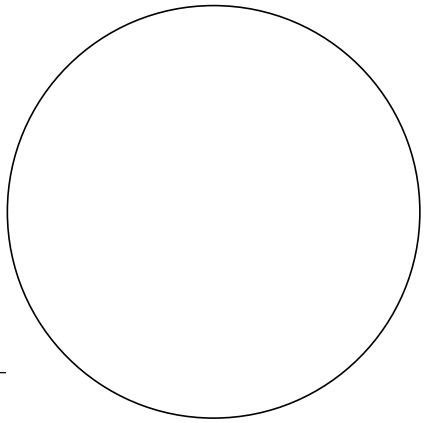
* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____



Sketch

FOV: _____

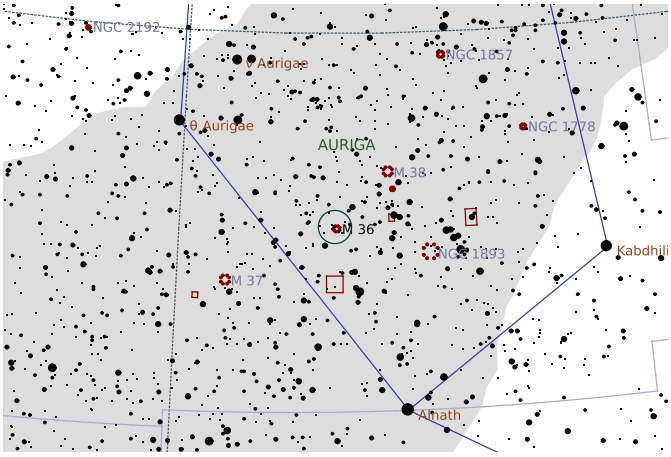
* Description: _____

_____

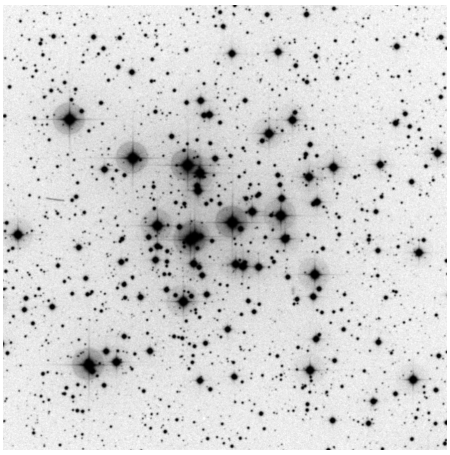
M 36

Open Cluster in Auriga

Right Ascension (current)	$05^h\,37^m\,11^s$	Declination (current)	$34°\,08'\,52''$
Right Ascension (J2000.0)	$05^h\,36^m\,17^s$	Declination (J2000.0)	$34°\,08'\,27''$
Size	$10' \times 10'$	Position Angle	90°
Magnitude	6	Other Designation	NGC 1960



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

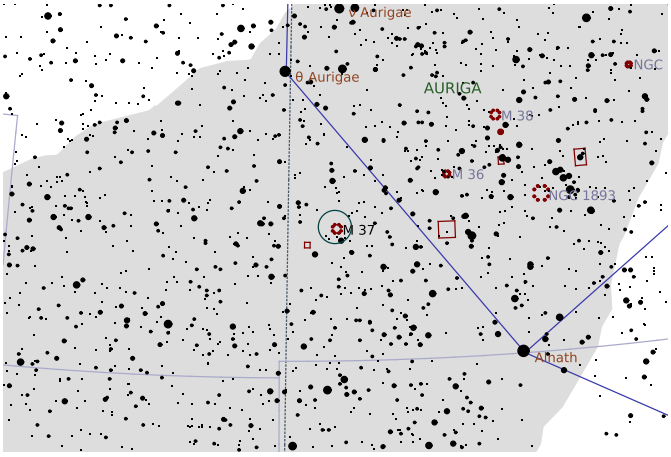
Sketch

FOV: _____

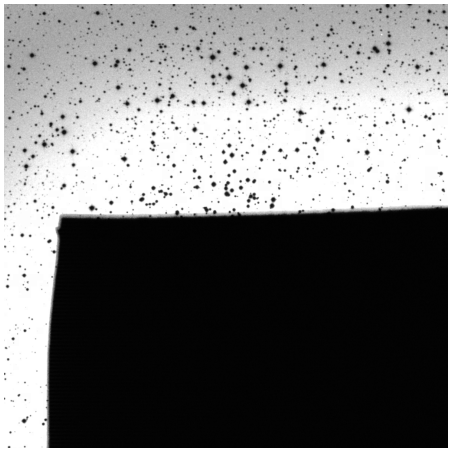
M 37

Open Cluster in Auriga

Right Ascension (current)	$05^h\,53^m\,11^s$	Declination (current)	$32°\,33'\,16''$
Right Ascension (J2000.0)	$05^h\,52^m\,18^s$	Declination (J2000.0)	$32°\,33'\,11''$
Size	$15' \times 15'$	Position Angle	90°
Magnitude	5.6	Other Designation	NGC 2099



Sky Chart



DSS Image (B, $20.0' \times 20.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

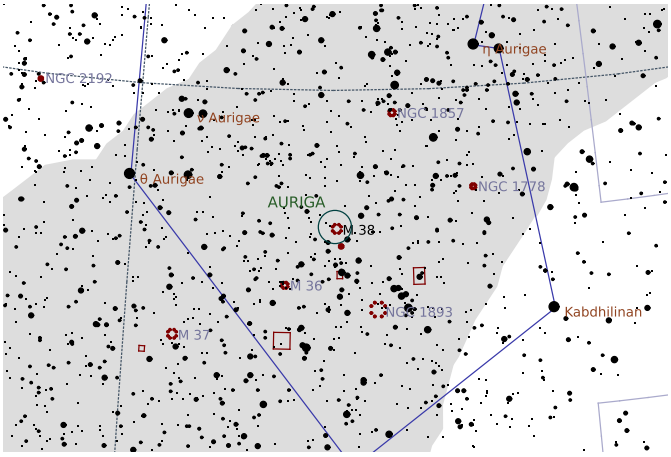
Sketch

FOV: _____

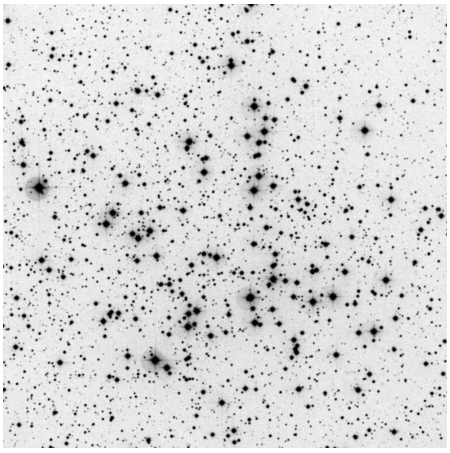
M 38

Open Cluster in Auriga

Right Ascension (current)	$05^h\,29^m\,37^s$	Declination (current)	$35°\,51'\,52''$
Right Ascension (J2000.0)	$05^h\,28^m\,42^s$	Declination (J2000.0)	$35°\,51'\,18''$
Size	$15' \times 15'$	Position Angle	90°
Magnitude	6.4	Other Designation	NGC 1912



Sky Chart



DSS Image (B, $20.0' \times 20.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

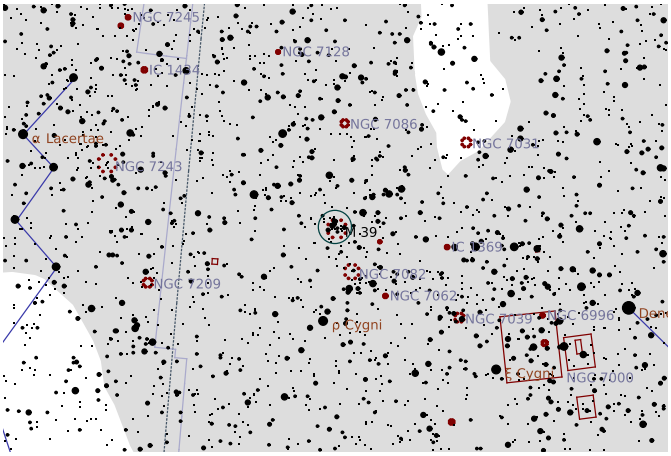
FOV: _____

M 39

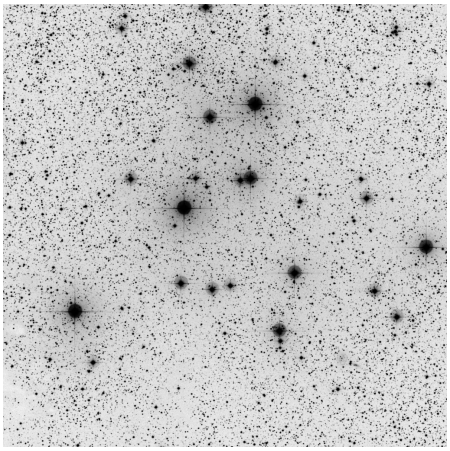
Open Cluster in Cygnus

Right Ascension (current)	$21^h\,32^m\,24^s$	Declination (current)	$48°\,28'\,50''$
Right Ascension (J2000.0)	$21^h\,31^m\,57^s$	Declination (J2000.0)	$48°\,25'\,15''$
Size	$31' \times 31'$	Position Angle	90°
Magnitude	4.6	Other Designation	NGC 7092

Description: A large, sparse open cluster of bright stars.



Sky Chart



DSS Image (B, $36.0' \times 36.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

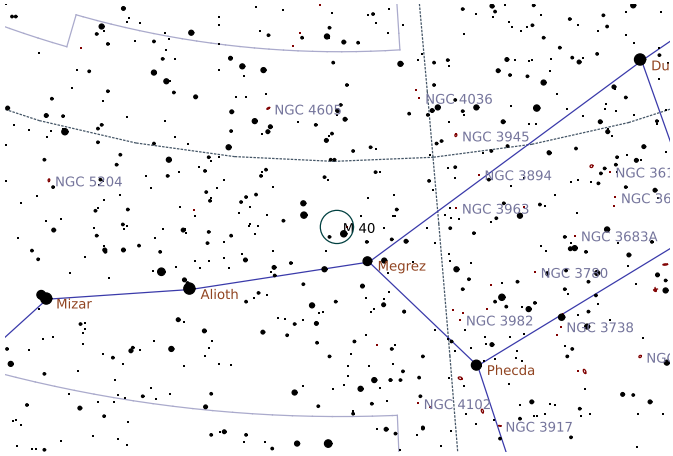
FOV: _____

M 40

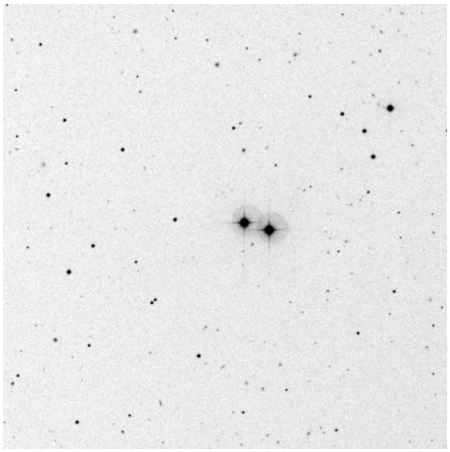
Catalog Star in Ursa Major

Right Ascension (current)	$12^h\,23^m\,03^s$	Declination (current)	$58°\,00'\,17''$
Right Ascension (J2000.0)	$12^h\,22^m\,24^s$	Declination (J2000.0)	$58°\,05'\,00''$
Size	$0' \times 0'$	Position Angle	90°
Magnitude	8.4	Other Designation	–

Description: This is a tight double star that Messier confused for a deep-sky object.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

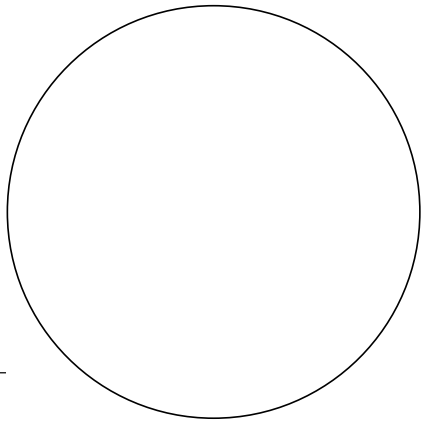
_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____



Sketch

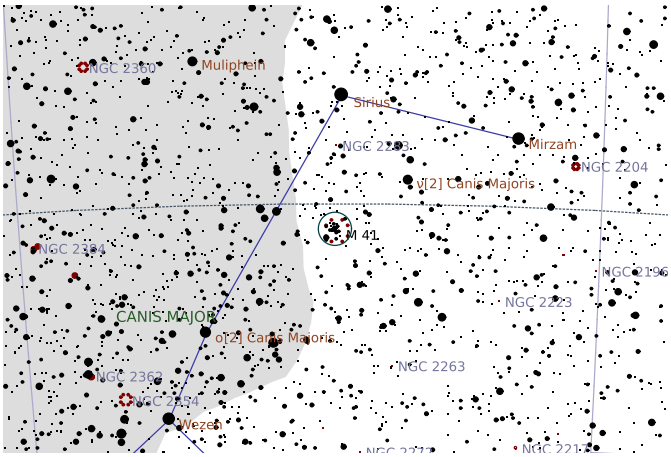
FOV: _____

M 41

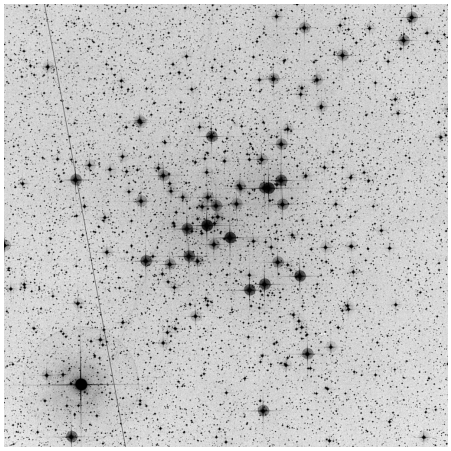
Open Cluster in Canis Major

Right Ascension (current)	$06^h\,46^m\,34^s$	Declination (current)	$-20°\,46'\,24''$
Right Ascension (J2000.0)	$06^h\,45^m\,59^s$	Declination (J2000.0)	$-20°\,45'\,15''$
Size	$39' \times 39'$	Position Angle	90°
Magnitude	4.5	Other Designation	NGC 2287

Description: A remarkable open cluster of bright stars. Visible to the naked eye from dark skies, and sometimes even from city conditions.



Sky Chart



DSS Image (B, $44.0' \times 44.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

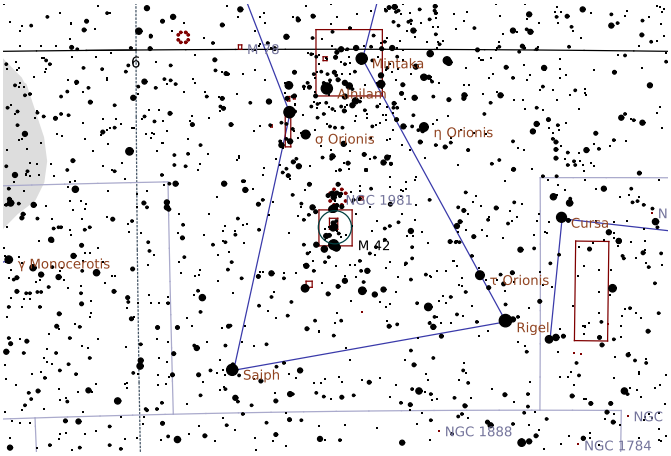
_____

M 42 (Orion Nebula)

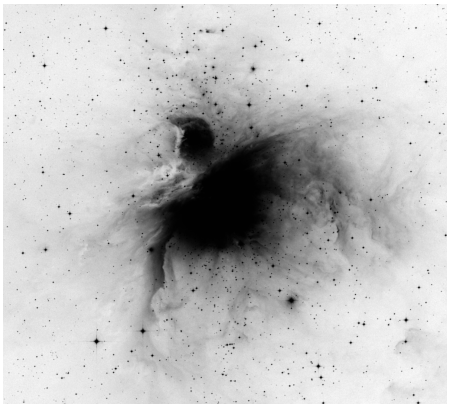
Gaseous Nebula in Orion

Right Ascension (current)	$05^h\,35^m\,57^s$	Declination (current)	$-5°\,23'\,09''$
Right Ascension (J2000.0)	$05^h\,35^m\,17^s$	Declination (J2000.0)	$-5°\,23'\,25''$
Size	$65' \times 60'$	Position Angle	90°
Magnitude	4	Other Designation	NGC 1976

Description: The remarkable great Orion nebula! Visible to the naked eye as a fuzzy star in the sword of Orion from darkish skies. If viewing through a telescope, try separating the four stars in the "heart" of the nebula the constitute the "Trapezium"



Sky Chart



DSS Image (I, 0.0' ×45.0')

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

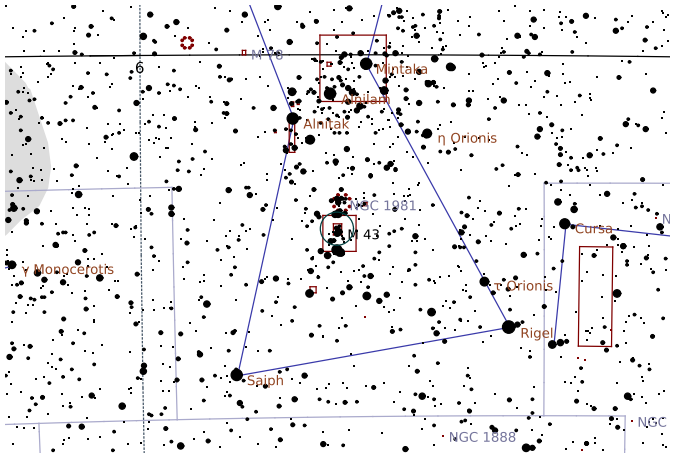
FOV: _____

M 43 (De Mairan's Nebula)

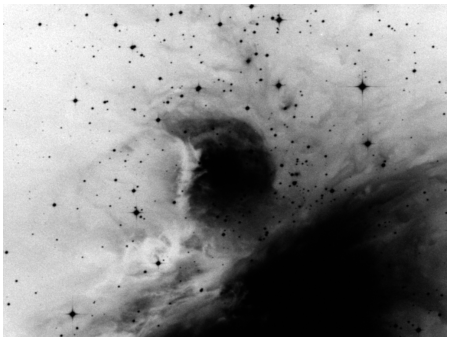
Gaseous Nebula in Orion

Right Ascension (current)	$05^h\,36^m\,11^s$	Declination (current)	$-5°\,15'\,47''$
Right Ascension (J2000.0)	$05^h\,35^m\,31^s$	Declination (J2000.0)	$-5°\,16'\,03''$
Size	$20' \times 15'$	Position Angle	90°
Magnitude	6.8	Other Designation	NGC 1982

Description: A comma shaped, fainter nebulosity around a star, just "above" (imagining Orion standing erect) the Trapezium, separated from M 42 by a streak of darkness. Might need darkish skies.



Sky Chart



DSS Image (I, 0.0' ×15.0')

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

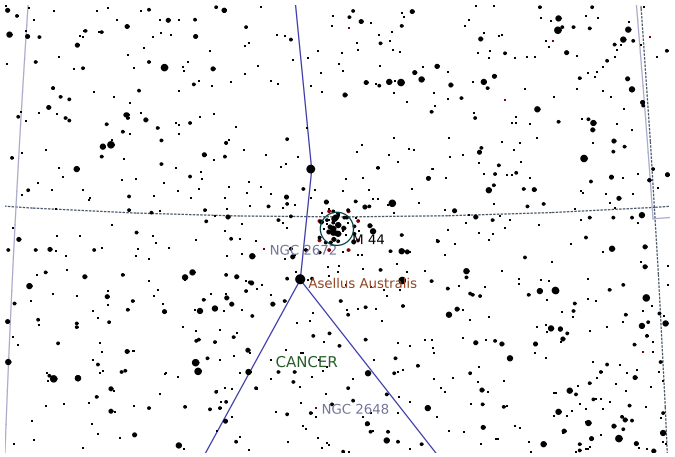
_____

M 44 (Praesepe, Beehive Cluster)

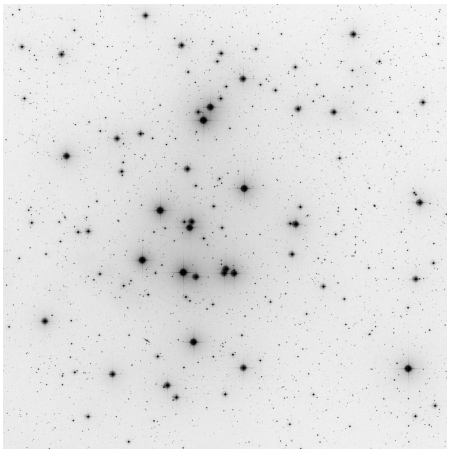
Open Cluster in Cancer

Right Ascension (current)	$08^h\,40^m\,44^s$	Declination (current)	$19°\,37'\,18''$
Right Ascension (J2000.0)	$08^h\,39^m\,57^s$	Declination (J2000.0)	$19°\,40'\,21''$
Size	$70' \times 70'$	Position Angle	90°
Magnitude	3.1	Other Designation	NGC 2632

Description: A large, sparse open cluster of few bright stars. Easy naked eye object from darkish skies. Might be hard to locate in the city owing to the faintness of the stars of Cancer.



Sky Chart



DSS Image (B, $75.0' \times 75.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

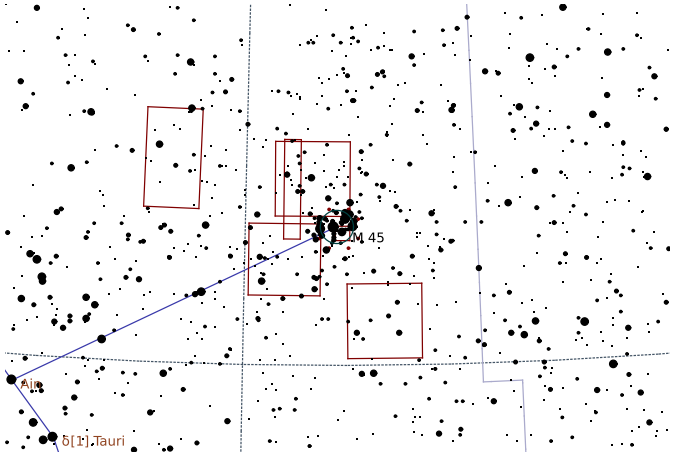
_____

M 45 (Pleiades)

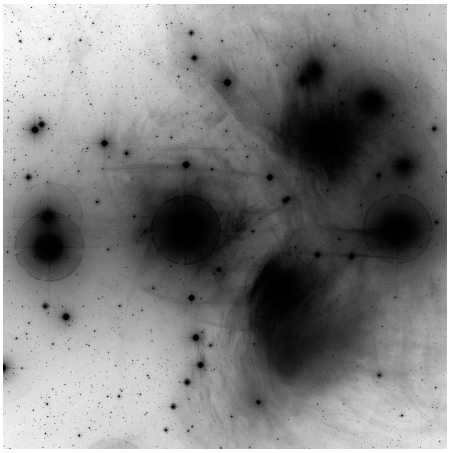
Open Cluster in Taurus

Right Ascension (current)	$03^h\,47^m\,48^s$	Declination (current)	$24°\,09'\,24''$
Right Ascension (J2000.0)	$03^h\,47^m\,00^s$	Declination (J2000.0)	$24°\,07'\,00''$
Size	$70' \times 70'$	Position Angle	90°
Magnitude	1.6	Other Designation	–

Description: The famous 'Seven sisters'. Easily seen with the naked eye even from the city.



Sky Chart



DSS Image (B, $75.0' \times 75.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

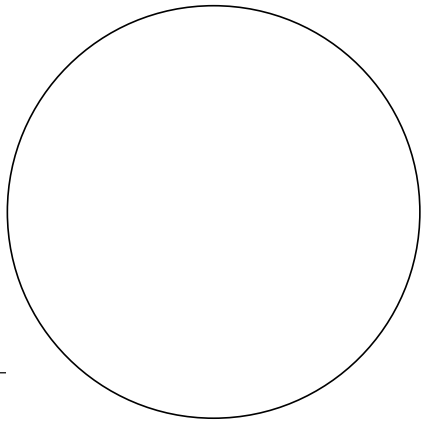
_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____



Sketch

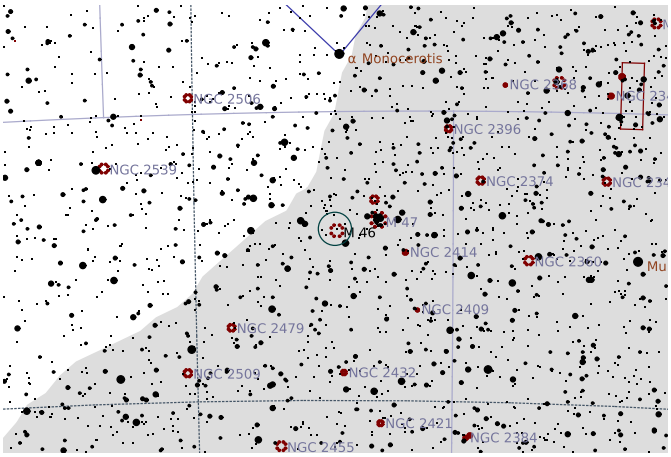
FOV: _____

M 46

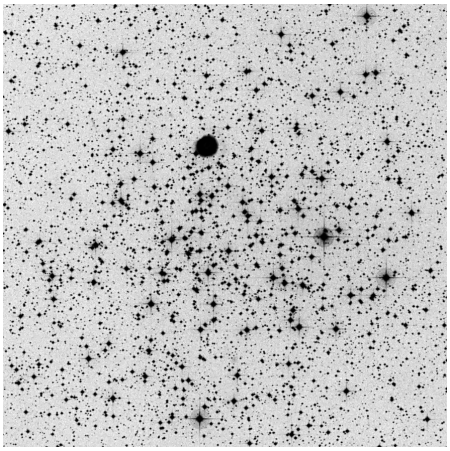
Open Cluster in Puppis

Right Ascension (current)	$07^h\,42^m\,24^s$	Declination (current)	$-14°\,50'\,44''$
Right Ascension (J2000.0)	$07^h\,41^m\,46^s$	Declination (J2000.0)	$-14°\,48'\,36''$
Size	$20' \times 20'$	Position Angle	90°
Magnitude	6.1	Other Designation	NGC 2437

Description: Fainter and richer in stars than the neighboring M 47. Foreground planetary nebula NGC 2438 lies in the view, seen in larger telescopes. Seen with the naked eye from dark skies.



Sky Chart



DSS Image (B, $25.0' \times 25.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

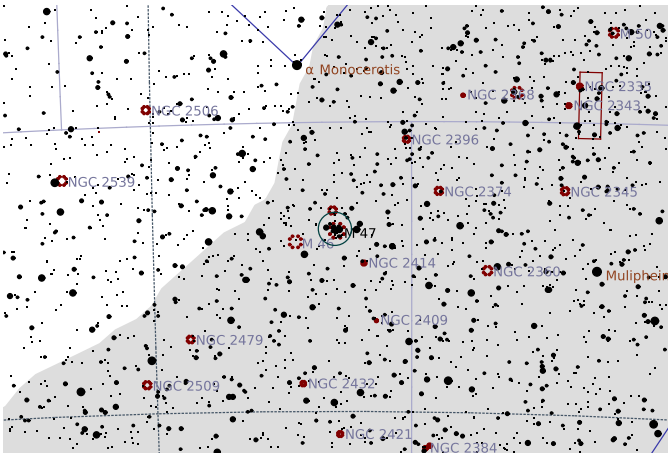
_____

M 47

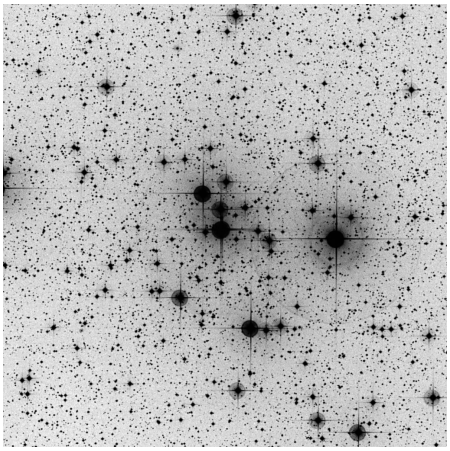
Open Cluster in Puppis

Right Ascension (current)	$07^h\,37^m\,13^s$	Declination (current)	$-14°\,30'\,50''$
Right Ascension (J2000.0)	$07^h\,36^m\,35^s$	Declination (J2000.0)	$-14°\,28'\,47''$
Size	$25' \times 25'$	Position Angle	90°
Magnitude	4.4	Other Designation	NGC 2478

Description: Brighter, but sparser than M 46. Easily seen with the naked eye. Seen with the naked eye from dark skies.



Sky Chart



DSS Image (B, $30.0' \times 30.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

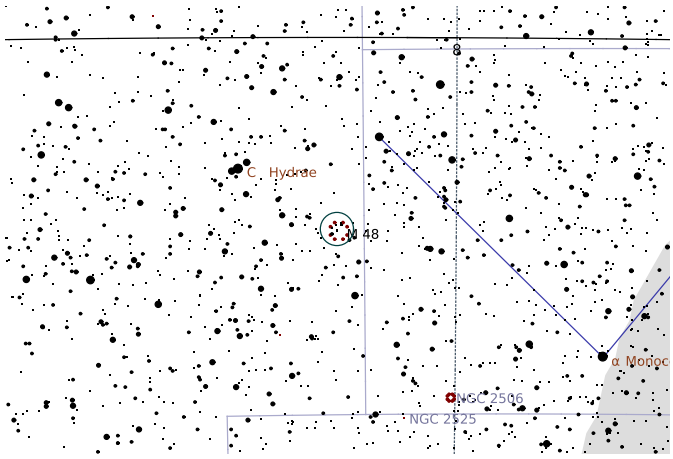
* Description: _____

_____

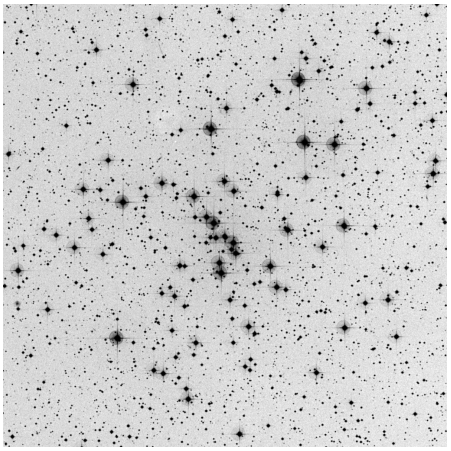
M 48

Open Cluster in Hydra

Right Ascension (current)	$08^h\,14^m\,24^s$	Declination (current)	$-5°\,47'\,41''$
Right Ascension (J2000.0)	$08^h\,13^m\,43^s$	Declination (J2000.0)	$-5°\,45'\,02''$
Size	$30' \times 30'$	Position Angle	90°
Magnitude	5.8	Other Designation	NGC 2548



Sky Chart



DSS Image (B, $35.0' \times 35.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

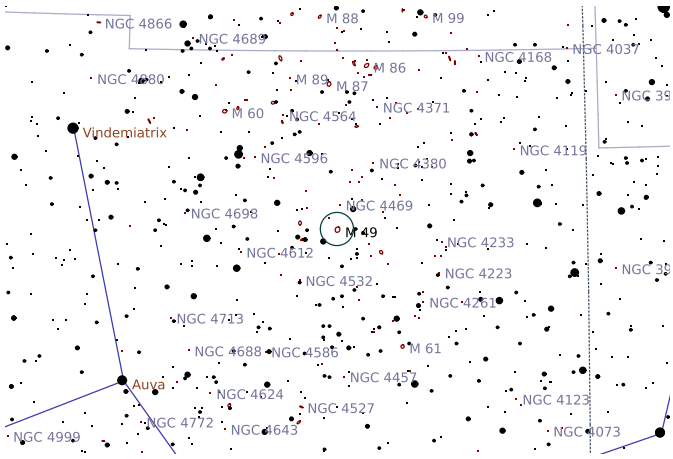
Sketch

FOV: _____

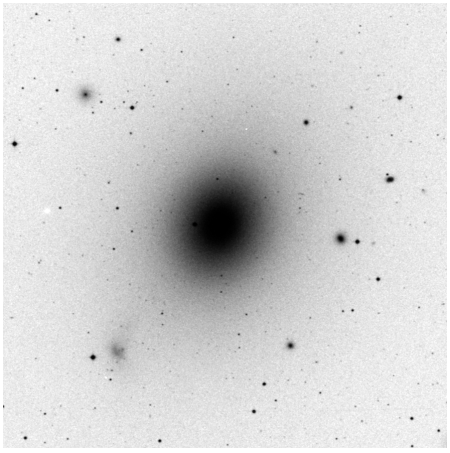
M 49

Galaxy in Virgo

Right Ascension (current) Right Ascension (J2000.0)	$12^h\,30^m\,27^s$ $12^h\,29^m\,46^s$	Declination (current) Declination (J2000.0)	$7°\,55'\,25''$ $8°\,00'\,00''$
Size Magnitude	$10.2' \times 8.3'$ 8.4	Position Angle Other Designation	$-65°$ NGC 4472



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

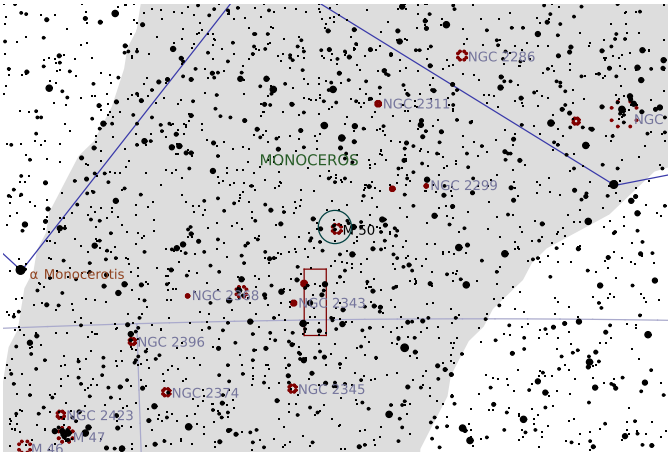
Sketch

FOV: _____

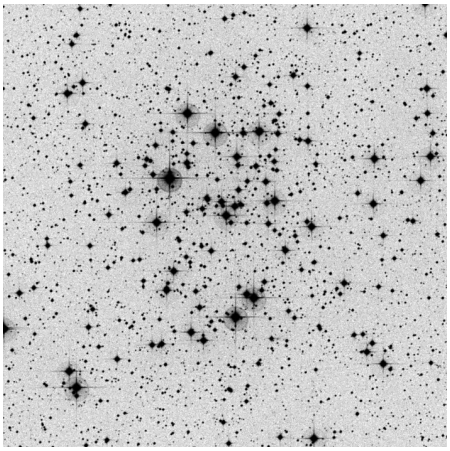
M 50

Open Cluster in Monoceros

Right Ascension (current)	$07^h\,03^m\,27^s$	Declination (current)	$-8°\,24'\,26''$
Right Ascension (J2000.0)	$07^h\,02^m\,48^s$	Declination (J2000.0)	$-8°\,23'\,00''$
Size	$15' \times 15'$	Position Angle	90°
Magnitude	5.9	Other Designation	NGC 2323



Sky Chart



DSS Image (B, $20.0' \times 20.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

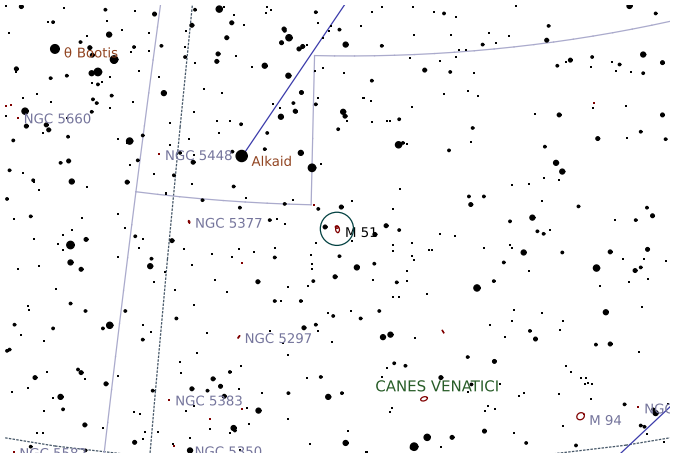
FOV: _____

M 51 (Whirlpool Galaxy)

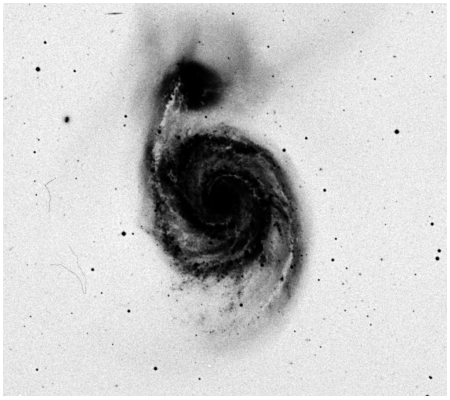
Galaxy in Canes Venatici

Right Ascension (current)	$13^h\,30^m\,26^s$	Declination (current)	$47°\,07'\,20''$
Right Ascension (J2000.0)	$13^h\,29^m\,52^s$	Declination (J2000.0)	$47°\,11'\,44''$
Size	$11.2' \times 6.9'$	Position Angle	83°
Magnitude	8.4	Other Designation	NGC 5194

Description: Look for the connecting arm, connecting the two interacting galaxies, seen even in smaller telescopes under dark skies.



Sky Chart



DSS Image (B, $17.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

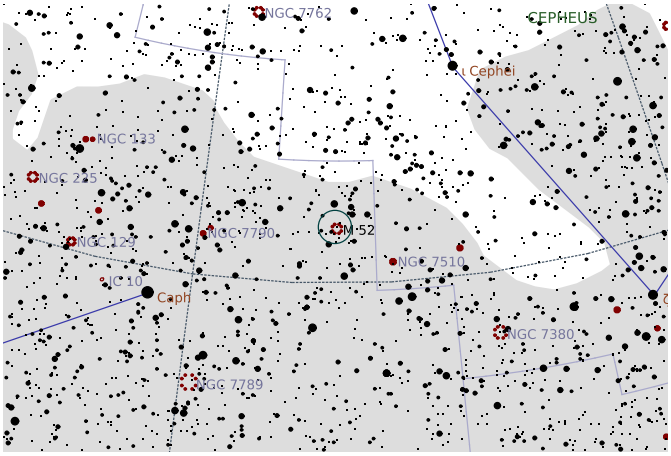
_____

M 52

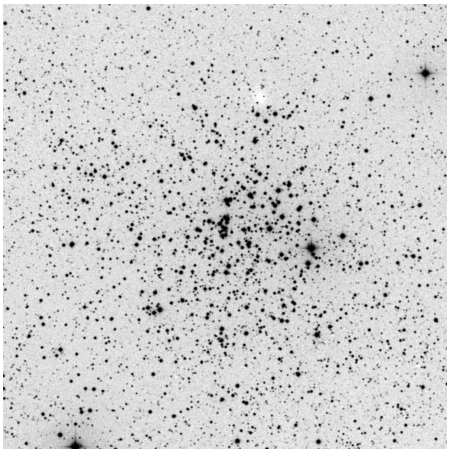
Open Cluster in Cassiopeia

Right Ascension (current)	$23^h\,25^m\,24^s$	Declination (current)	$61°\,40'\,55''$
Right Ascension (J2000.0)	$23^h\,24^m\,50^s$	Declination (J2000.0)	$61°\,36'\,23''$
Size	$16' \times 16'$	Position Angle	90°
Magnitude	6.9	Other Designation	NGC 7654

Description: Rich open cluster.



Sky Chart



DSS Image (B, $21.0' \times 21.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

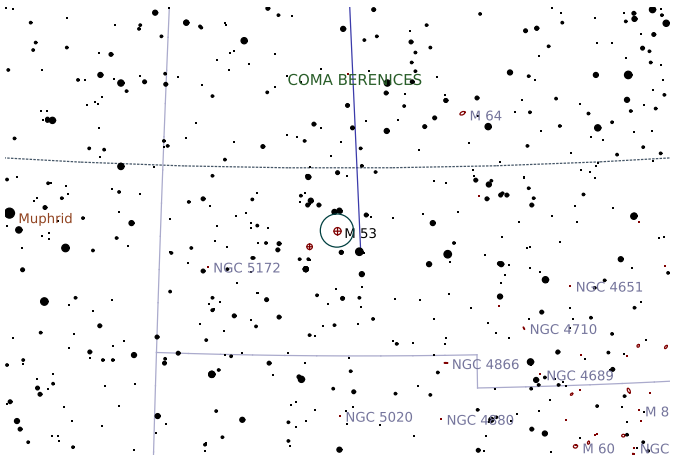
* Description: _____

_____

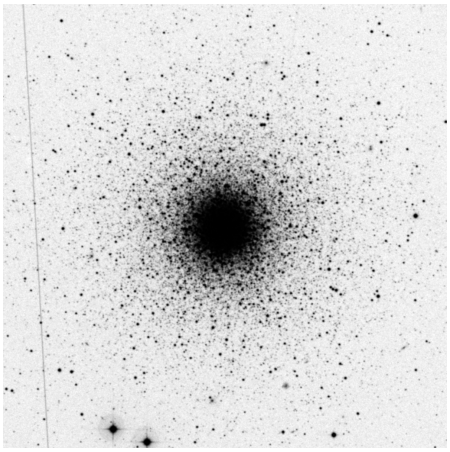
M 53

Globular Cluster in Coma Berenices

Right Ascension (current)	$13^h\,13^m\,34^s$	Declination (current)	$18°\,05'\,46''$
Right Ascension (J2000.0)	$13^h\,12^m\,55^s$	Declination (J2000.0)	$18°\,10'\,11''$
Size	$13' \times 13'$	Position Angle	90°
Magnitude	7.7	Other Designation	NGC 5024



Sky Chart



DSS Image (B, $18.0' \times 18.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

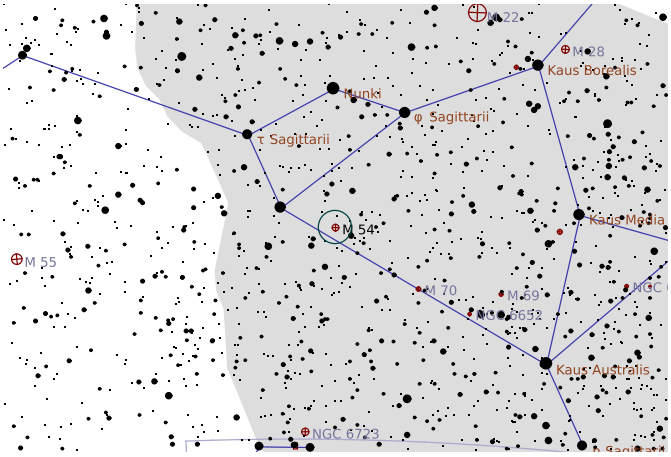
* Description: _____

_____

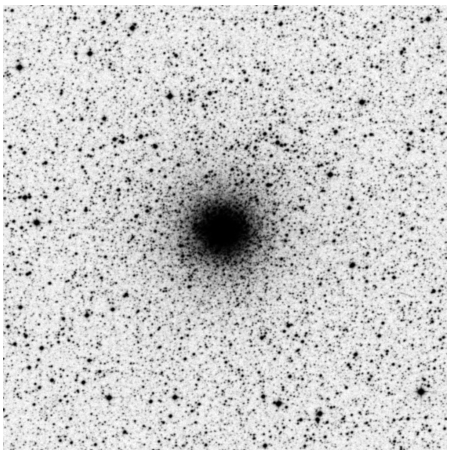
M 54

Globular Cluster in Sagittarius

Right Ascension (current)	$18^h\,55^m\,53^s$	Declination (current)	$-30°\,27'\,30''$
Right Ascension (J2000.0)	$18^h\,55^m\,03^s$	Declination (J2000.0)	$-30°\,28'\,40''$
Size	$12' \times 12'$	Position Angle	90°
Magnitude	7.7	Other Designation	NGC 6715



Sky Chart



DSS Image (R, $17.0' \times 17.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

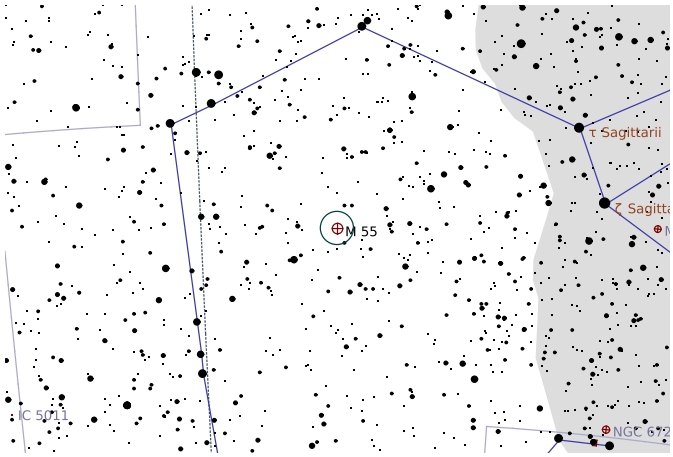
_____

M 55

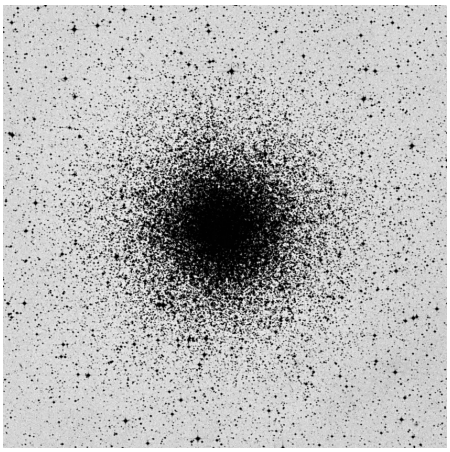
Globular Cluster in Sagittarius

Right Ascension (current)	$19^h\,40^m\,48^s$	Declination (current)	$-30°\,55'\,44''$
Right Ascension (J2000.0)	$19^h\,39^m\,59^s$	Declination (J2000.0)	$-30°\,57'\,42''$
Size	$19' \times 19'$	Position Angle	90°
Magnitude	6.3	Other Designation	NGC 6809

Description: Large globular cluster, somewhat low in surface brightness.



Sky Chart



DSS Image (B, $24.0' \times 24.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

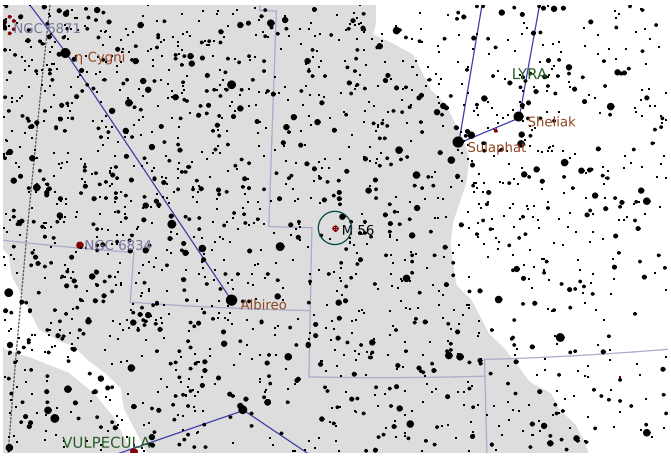
_____

M 56

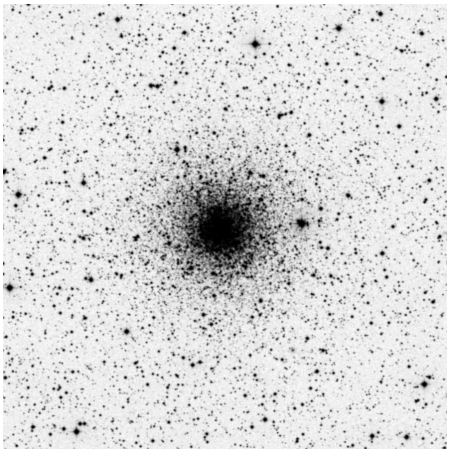
Globular Cluster in Lyra

Right Ascension (current)	$19^h\,17^m\,05^s$	Declination (current)	$30°\,12'\,30''$
Right Ascension (J2000.0)	$19^h\,16^m\,35^s$	Declination (J2000.0)	$30°\,11'\,07''$
Size	$8.8' \times 8.8'$	Position Angle	90°
Magnitude	8.4	Other Designation	NGC 6779

Description: One of the fainter globular clusters.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

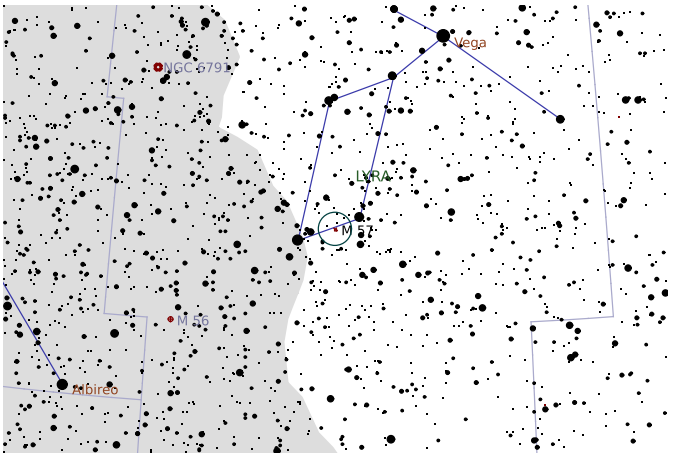
FOV: _____

M 57 (Ring Nebula)

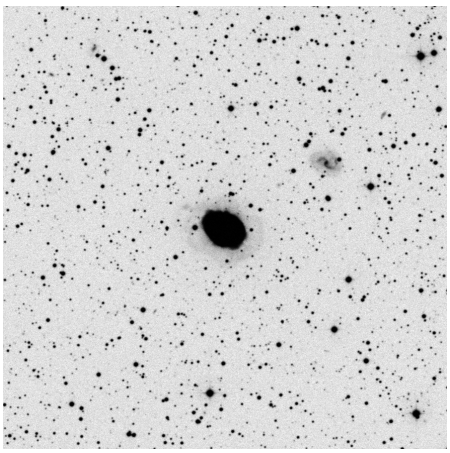
Planetary Nebula in Lyra

Right Ascension (current)	$18^h\,54^m\,03^s$	Declination (current)	$33°\,02'\,43''$
Right Ascension (J2000.0)	$18^h\,53^m\,35^s$	Declination (J2000.0)	$33°\,01'\,47''$
Size	$3' \times 2.4'$	Position Angle	35°
Magnitude	8.8	Other Designation	NGC 6720

Description: Remarkable, bright, planetary nebula! A central "hole" is easily visible at higher magnifications, affirming this object's ring shape.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

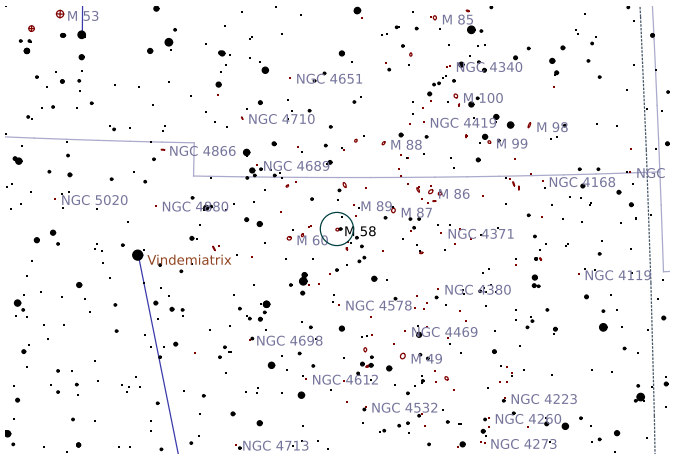
* Description: _____

_____

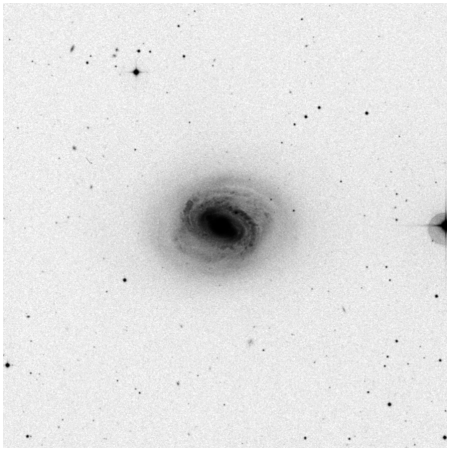
M 58

Galaxy in Virgo

Right Ascension (current)	$12^h\,38^m\,24^s$	Declination (current)	$11°\,44'\,32''$
Right Ascension (J2000.0)	$12^h\,37^m\,43^s$	Declination (J2000.0)	$11°\,49'\,06''$
Size	$6' \times 4.8'$	Position Angle	$-5°$
Magnitude	9.7	Other Designation	NGC 4579



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

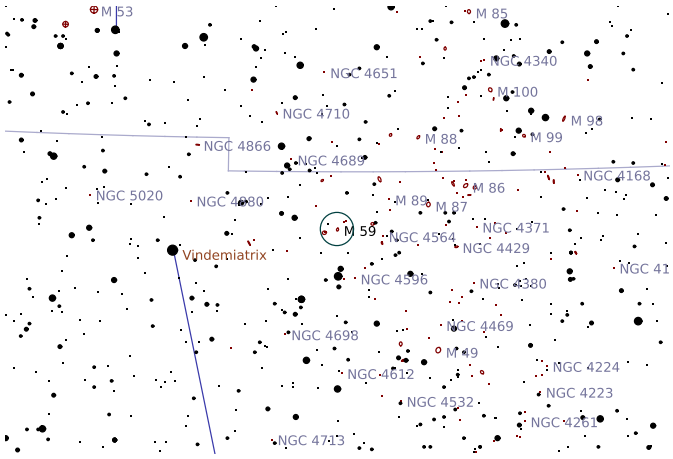
Sketch

FOV: _____

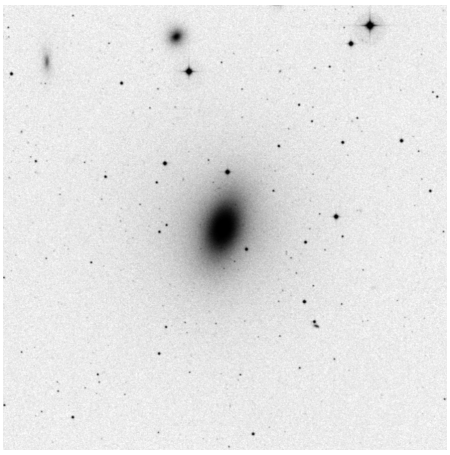
M 59

Galaxy in Virgo

Right Ascension (current)	$12^h\,42^m\,43^s$	Declination (current)	$11°\,34'\,17''$
Right Ascension (J2000.0)	$12^h\,42^m\,02^s$	Declination (J2000.0)	$11°\,38'\,50''$
Size	$5.4' \times 3.7'$	Position Angle	$-75°$
Magnitude	9.6	Other Designation	NGC 4621



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

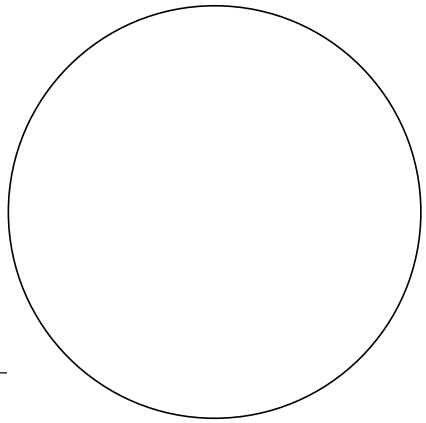
_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____



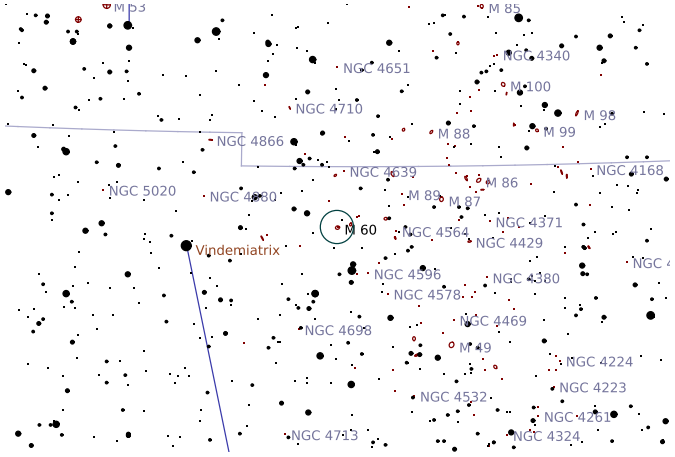
Sketch

FOV: _____

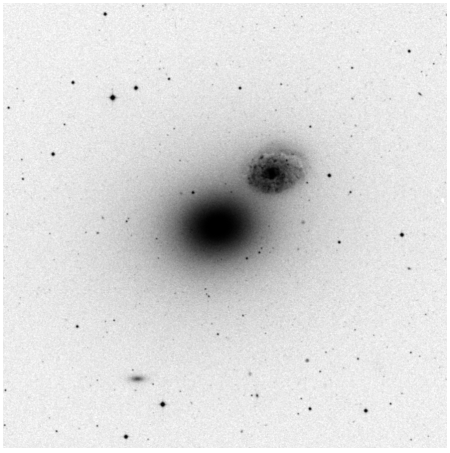
M 60

Galaxy in Virgo

Right Ascension (current)	$12^h\,44^m\,20^s$	Declination (current)	$11°\,28'\,38''$
Right Ascension (J2000.0)	$12^h\,43^m\,39^s$	Declination (J2000.0)	$11°\,33'\,11''$
Size	$7.6' \times 6.2'$	Position Angle	$-15°$
Magnitude	8.8	Other Designation	NGC 4649



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

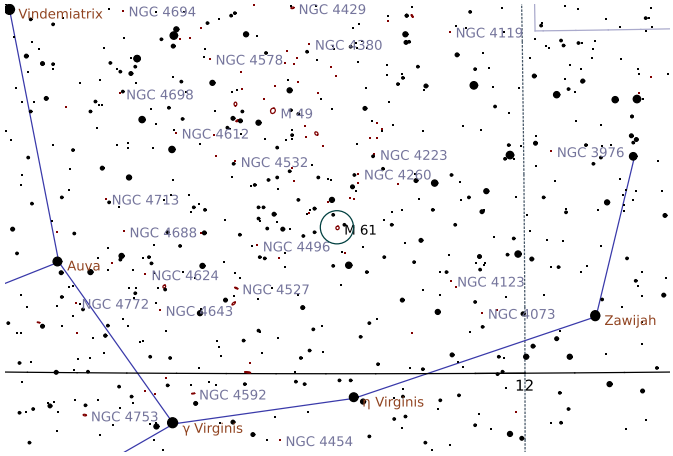
FOV: _____

M 61

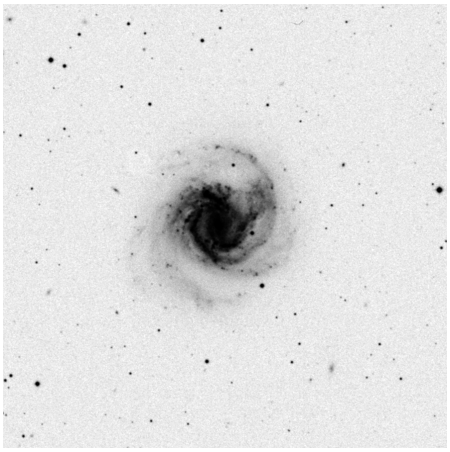
Galaxy in Virgo

Right Ascension (current)	$12^h\,22^m\,35^s$	Declination (current)	$4°\,23'\,47''$
Right Ascension (J2000.0)	$12^h\,21^m\,54^s$	Declination (J2000.0)	$4°\,28'\,22''$
Size	$6.5' \times 5.9'$	Position Angle	$-72°$
Magnitude	9.7	Other Designation	NGC 4303

Description: This galaxy may show spiral structure in larger telescopes (8") under good skies.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

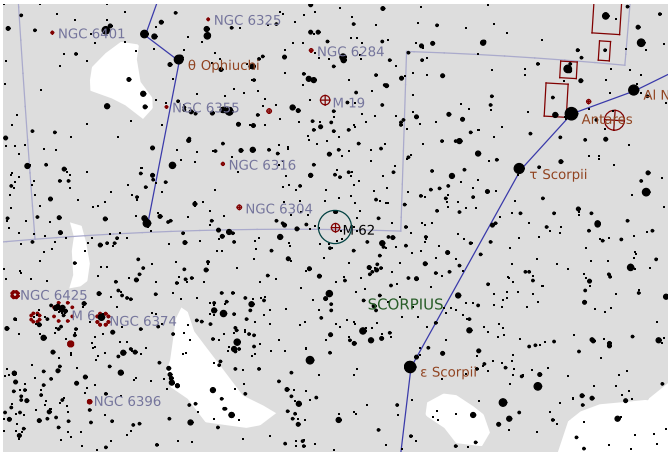
Sketch

FOV: _____

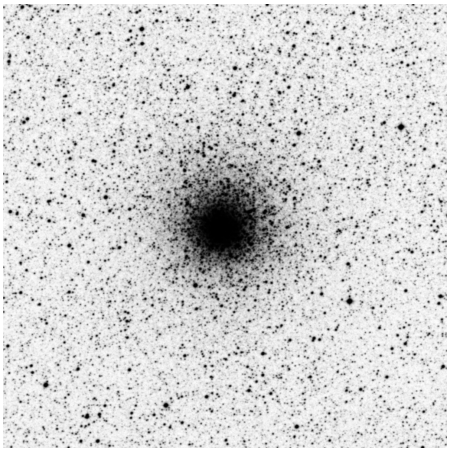
M 62

Globular Cluster in Ophiuchus

Right Ascension (current)	$17^h\,02^m\,02^s$	Declination (current)	$-30°\,07'\,41''$
Right Ascension (J2000.0)	$17^h\,01^m\,12^s$	Declination (J2000.0)	$-30°\,06'\,42''$
Size	$15' \times 15'$	Position Angle	90°
Magnitude	6.4	Other Designation	NGC 6266



Sky Chart



DSS Image (R, $20.0' \times 20.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

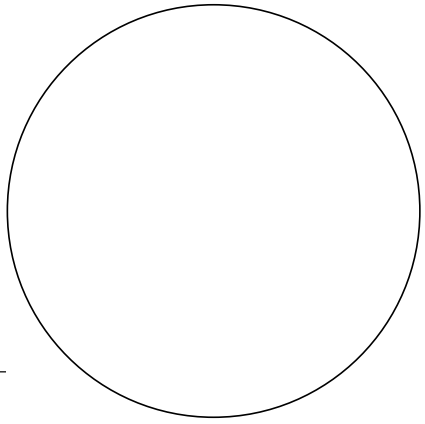
_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____



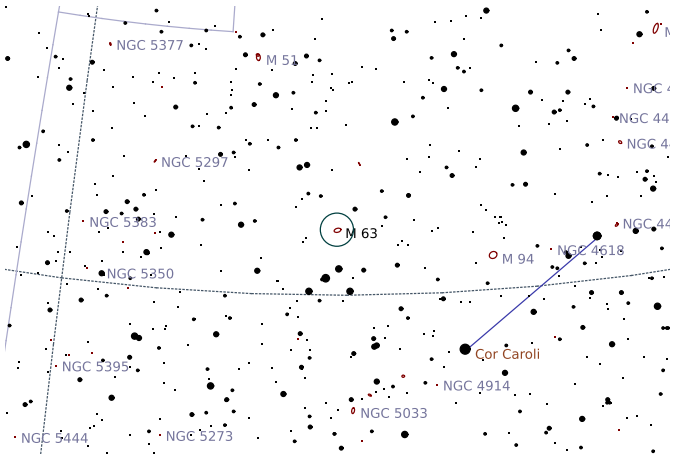
Sketch

FOV: _____

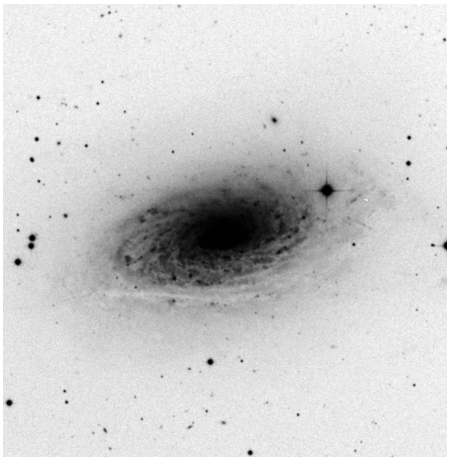
M 63 (Sunflower Galaxy)

Galaxy in Canes Venatici

Right Ascension (current)	$13^h\,16^m\,25^s$	Declination (current)	$41°\,57'\,30''$
Right Ascension (J2000.0)	$13^h\,15^m\,49^s$	Declination (J2000.0)	$42°\,01'\,59''$
Size	$12.6' \times 7.2'$	Position Angle	$-15°$
Magnitude	8.6	Other Designation	NGC 5055



Sky Chart



DSS Image (B, $15.0' \times 15.3'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

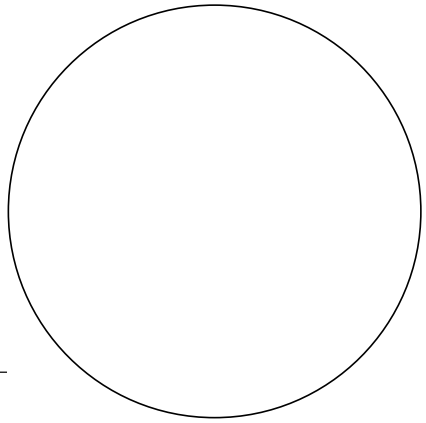
_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____



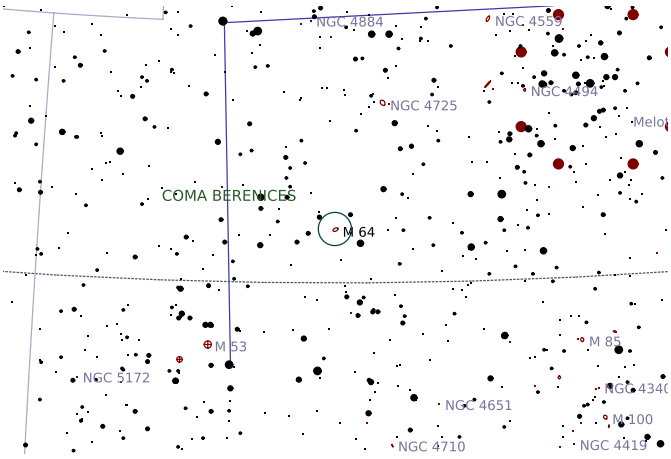
Sketch

FOV: _____

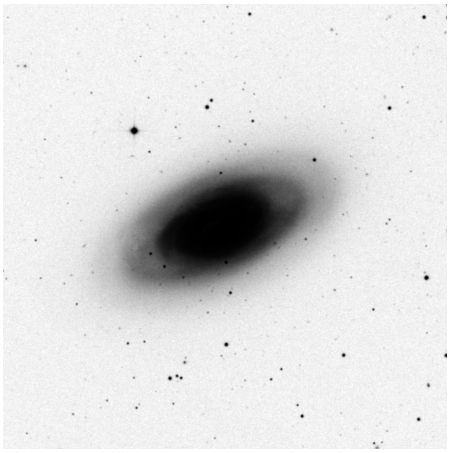
M 64 (Black-Eye Galaxy)

Galaxy in Coma Berenices

Right Ascension (current)	$12^h\,57^m\,23^s$	Declination (current)	$21°\,36'\,28''$
Right Ascension (J2000.0)	$12^h\,56^m\,43^s$	Declination (J2000.0)	$21°\,40'\,59''$
Size	$10' \times 5.4'$	Position Angle	$-25°$
Magnitude	8.5	Other Designation	NGC 4826



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

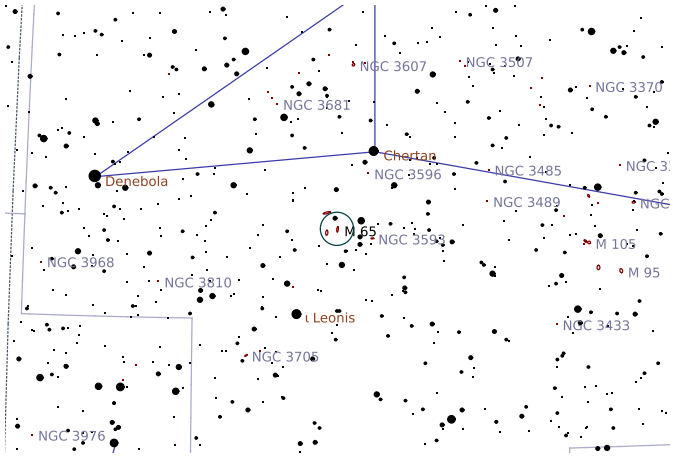
FOV: _____

M 65

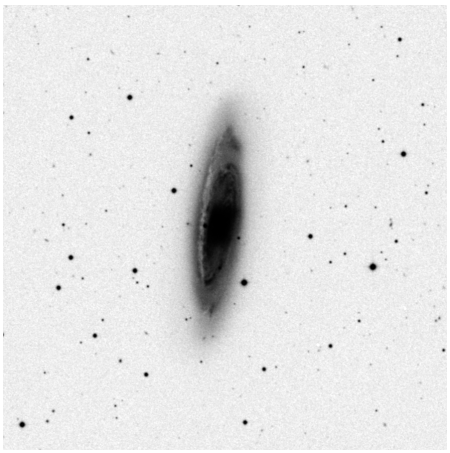
Galaxy in Leo

Right Ascension (current)	$11^h\,19^m\,38^s$	Declination (current)	$13°\,00'\,53''$
Right Ascension (J2000.0)	$11^h\,18^m\,55^s$	Declination (J2000.0)	$13°\,05'\,27''$
Size	$9.8' \times 2.9'$	Position Angle	$-84°$
Magnitude	9.3	Other Designation	NGC 3623

Description: Part of the Leo Triplet. To distinguish from M 66, note that M 65 does not have a foreground star nearby. The third member of the triplet is NGC 3628.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

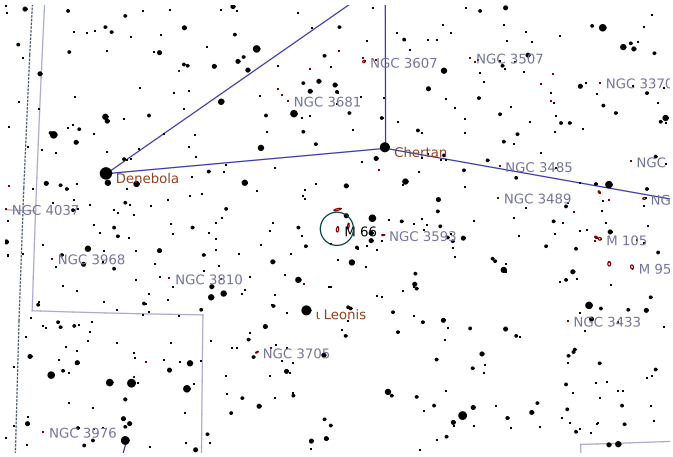
_____

M 66

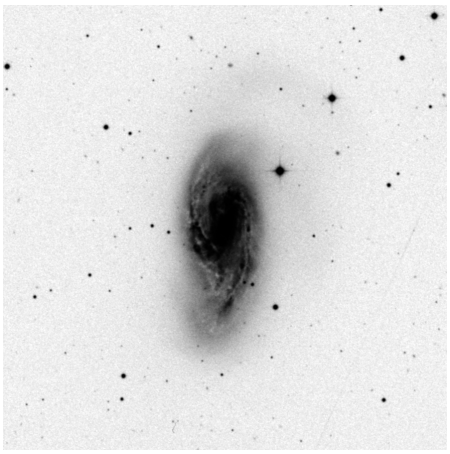
Galaxy in Leo

Right Ascension (current)	$11^h\,20^m\,57^s$	Declination (current)	$12°\,54'\,49''$
Right Ascension (J2000.0)	$11^h\,20^m\,15^s$	Declination (J2000.0)	$12°\,59'\,24''$
Size	$9.1' \times 4.1'$	Position Angle	$-83°$
Magnitude	8.9	Other Designation	NGC 3627

Description: Part of the Leo Triplet. To distinguish from M 65, note that M 66 has a fairly bright foreground star near it. The third member of the triplet is NGC 3628.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

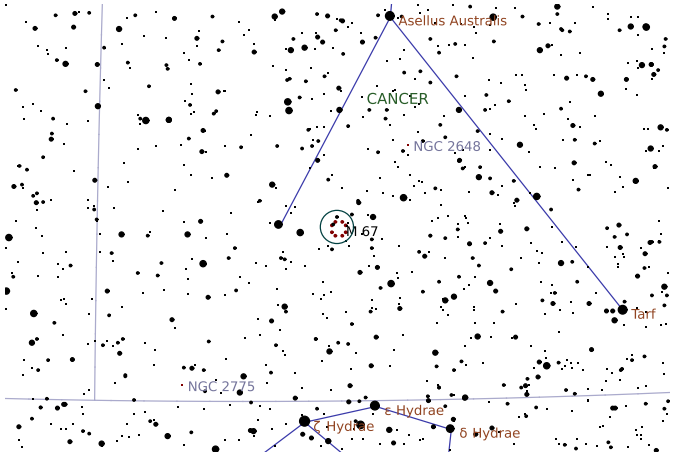
_____

M 67

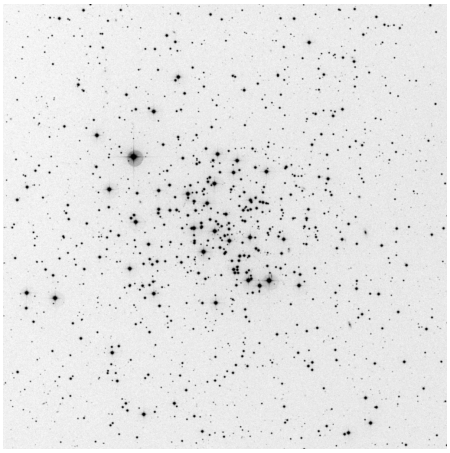
Open Cluster in Cancer

Right Ascension (current)	$08^h\,52^m\,09^s$	Declination (current)	$11°\,45'\,47''$
Right Ascension (J2000.0)	$08^h\,51^m\,24^s$	Declination (J2000.0)	$11°\,49'\,00''$
Size	$25' \times 25'$	Position Angle	90°
Magnitude	6.9	Other Designation	NGC 2682

Description: A rich open cluster.



Sky Chart



DSS Image (B, $30.0' \times 30.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

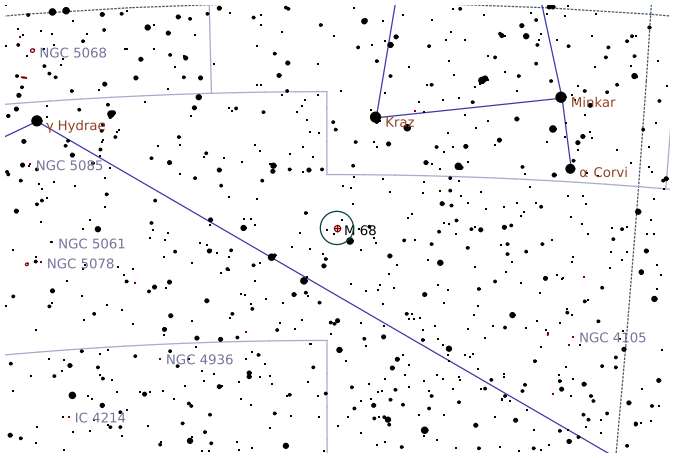
_____

M 68

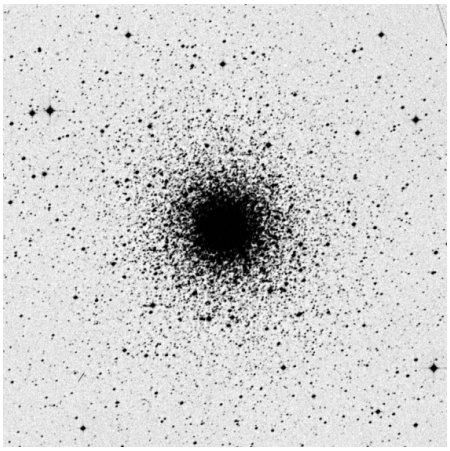
Globular Cluster in Hydra

Right Ascension (current)	$12^h\,40^m\,11^s$	Declination (current)	$-26°\,48'\,54''$
Right Ascension (J2000.0)	$12^h\,39^m\,28^s$	Declination (J2000.0)	$-26°\,44'\,32''$
Size	$11' \times 11'$	Position Angle	90°
Magnitude	7.3	Other Designation	NGC 4590

Description: One of the fainter globular clusters.



Sky Chart



DSS Image (B, $16.0' \times 16.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

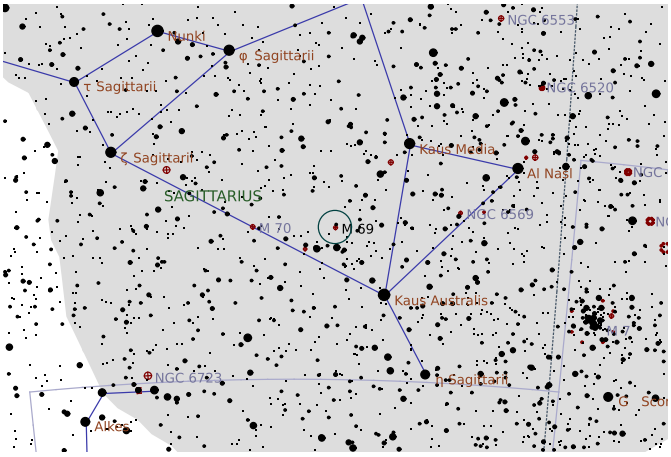
* Description: _____

_____

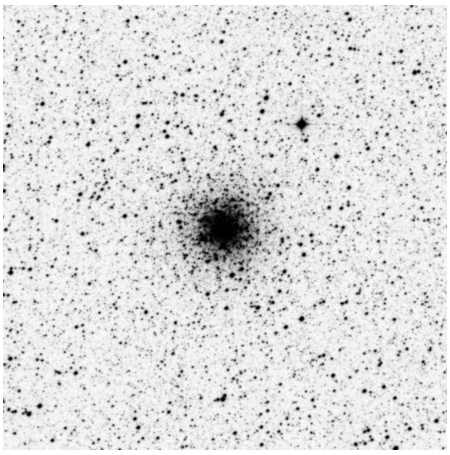
M 69

Globular Cluster in Sagittarius

Right Ascension (current)	$18^h\,32^m\,14^s$	Declination (current)	$-32°\,20'\,06''$
Right Ascension (J2000.0)	$18^h\,31^m\,23^s$	Declination (J2000.0)	$-32°\,20'\,51''$
Size	$7.1' \times 7.1'$	Position Angle	90°
Magnitude	8.3	Other Designation	NGC 6637



Sky Chart



DSS Image (R, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

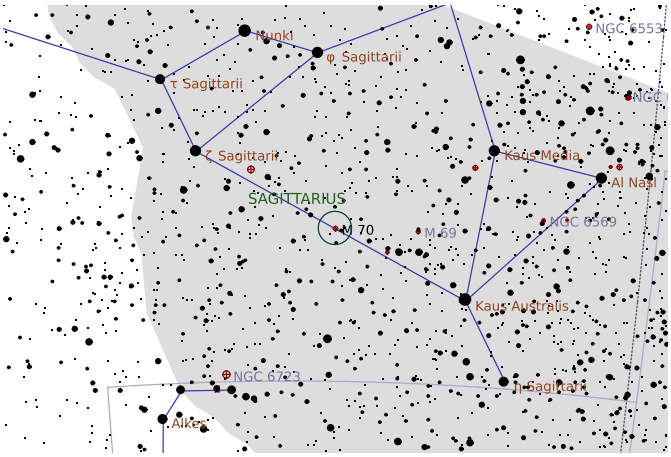
FOV: _____

M 70

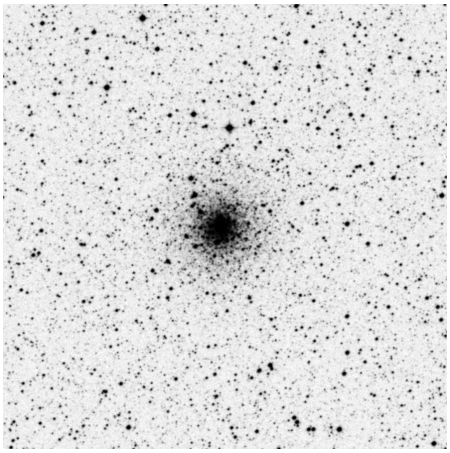
Globular Cluster in Sagittarius

Right Ascension (current)	$18^h\,44^m\,03^s$	Declination (current)	$-32°\,16'\,31''$
Right Ascension (J2000.0)	$18^h\,43^m\,12^s$	Declination (J2000.0)	$-32°\,17'\,29''$
Size	$8' \times 8'$	Position Angle	90°
Magnitude	7.8	Other Designation	NGC 6681

Description: A tiny globular cluster. Be careful not to confuse this with a star.



Sky Chart



DSS Image (R, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

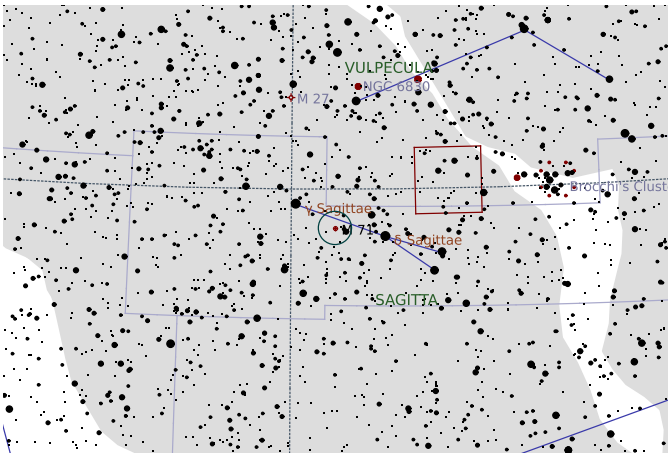
_____

M 71

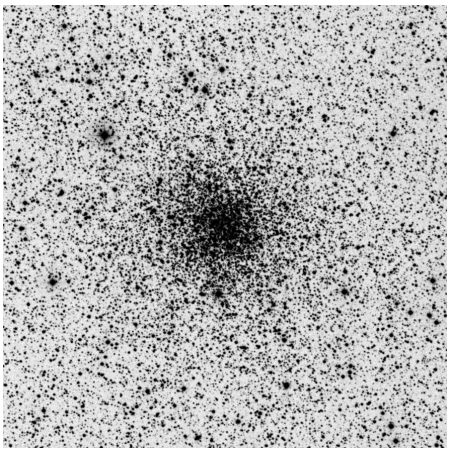
Globular Cluster in Sagitta

Right Ascension (current)	$19^h\,54^m\,20^s$	Declination (current)	$18°\,48'\,49''$
Right Ascension (J2000.0)	$19^h\,53^m\,46^s$	Declination (J2000.0)	$18°\,46'\,44''$
Size	$7.2' \times 7.2'$	Position Angle	90°
Magnitude	8.4	Other Designation	NGC 6838

Description: One of the fainter globular clusters. But remarkably well resolved. Very nice from darker skies.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

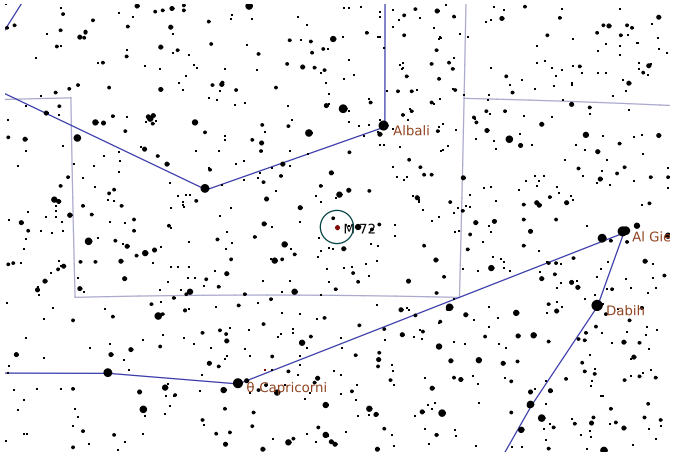
* Description: _____

_____

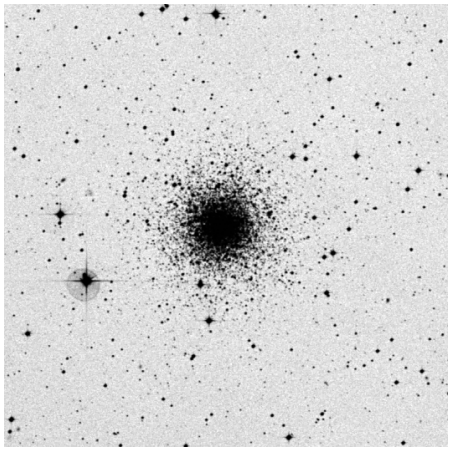
M 72

Globular Cluster in Aquarius

Right Ascension (current)	$20^{h}\,54^{m}\,09^{s}$	Declination (current)	$-12°\,29'\,07''$
Right Ascension (J2000.0)	$20^{h}\,53^{m}\,27^{s}$	Declination (J2000.0)	$-12°\,32'\,11''$
Size	$6.6' \times 6.6'$	Position Angle	90°
Magnitude	9.2	Other Designation	NGC 6981



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

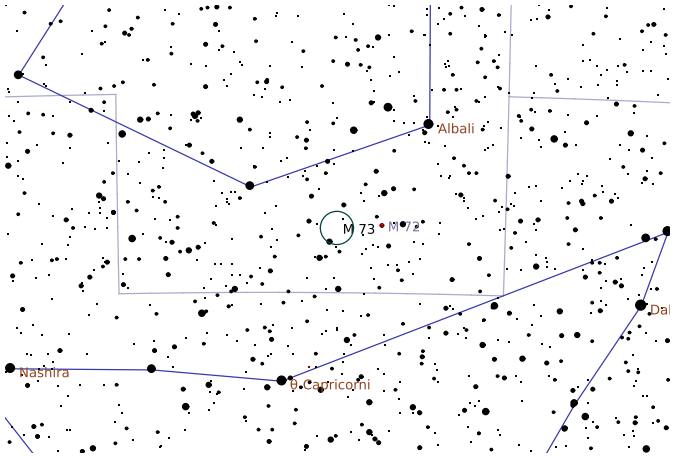
FOV: _____

M 73

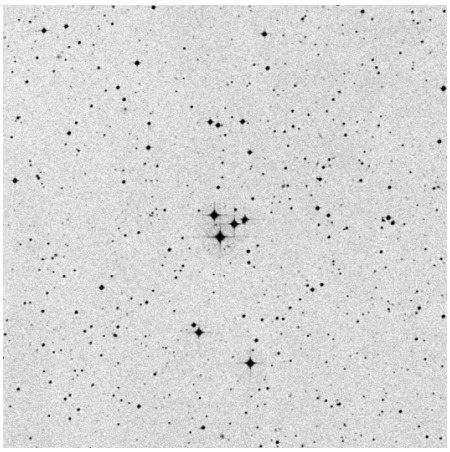
Open Cluster in Aquarius

Right Ascension (current)	$20^h\,59^m\,38^s$	Declination (current)	$-12°\,34'\,59''$
Right Ascension (J2000.0)	$20^h\,58^m\,56^s$	Declination (J2000.0)	$-12°\,38'\,07''$
Size	$1.4' \times 1.4'$	Position Angle	90°
Magnitude	8.9	Other Designation	NGC 6994

Description: An asterism of about 4 stars that Messier mistook for a deep-sky object.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

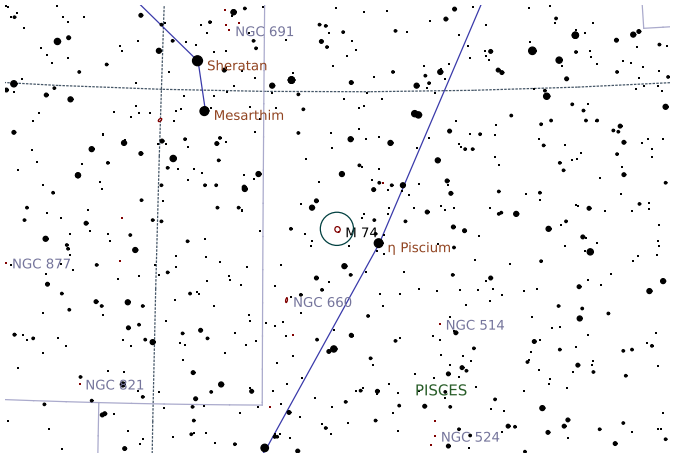
FOV: _____

M 74 (The Phantom)

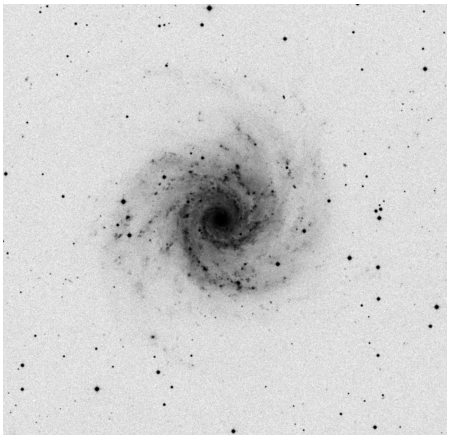
Galaxy in Pisces

Right Ascension (current)	$01^h\,37^m\,23^s$	Declination (current)	$15°\,51'\,01''$
Right Ascension (J2000.0)	$01^h\,36^m\,41^s$	Declination (J2000.0)	$15°\,47'\,00''$
Size	$10.5' \times 9.5'$	Position Angle	65°
Magnitude	9.4	Other Designation	NGC 628

Description: Arguably the toughest Messier object, this galaxy is a very low surface brightness face-on galaxy. Dark skies are a must. Easy to star hop from η Piscium.



Sky Chart



DSS Image (B, $18.5' \times 18.0'$)

* Date: _____

* Time: _____

* Aperture: _____

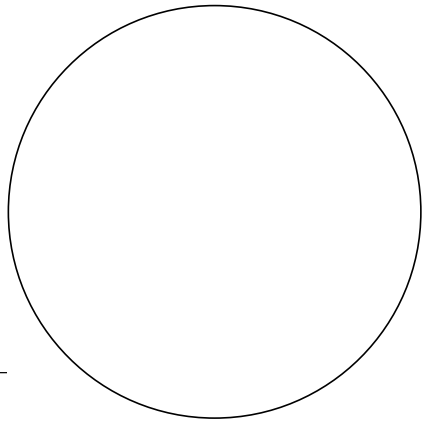
* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____



Sketch

FOV: _____

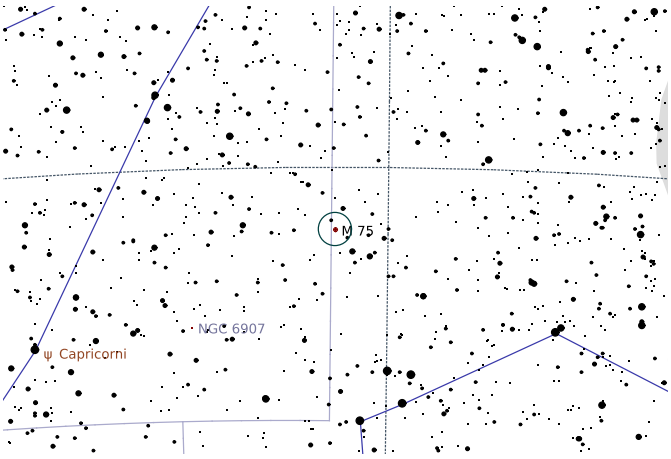
* Description: _____

_____

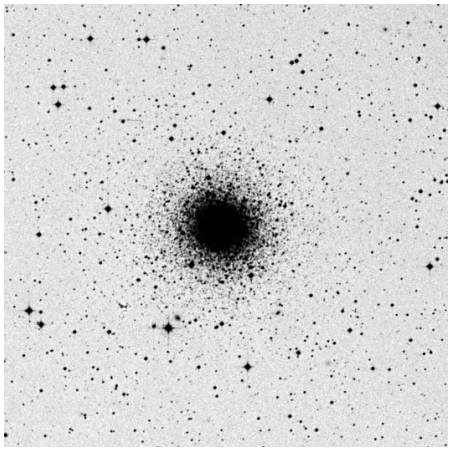
M 75

Globular Cluster in Sagittarius

Right Ascension (current)	$20^h\,06^m\,49^s$	Declination (current)	$-21°\,52'\,53''$
Right Ascension (J2000.0)	$20^h\,06^m\,04^s$	Declination (J2000.0)	$-21°\,55'\,15''$
Size	$6.8' \times 6.8'$	Position Angle	90°
Magnitude	8.6	Other Designation	NGC 6864



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

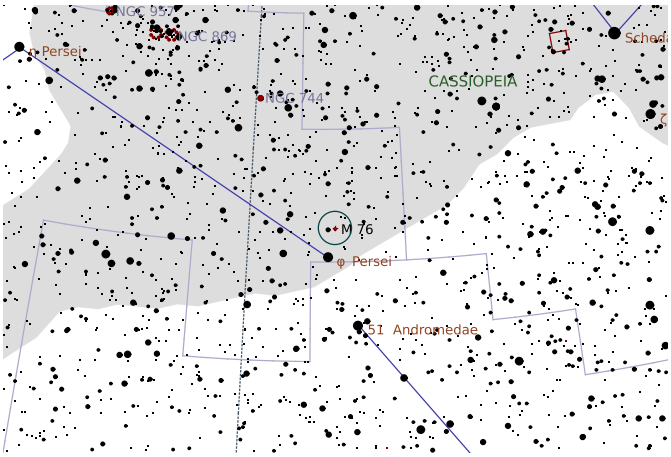
_____

M 76 (Little Dumbell Nebula)

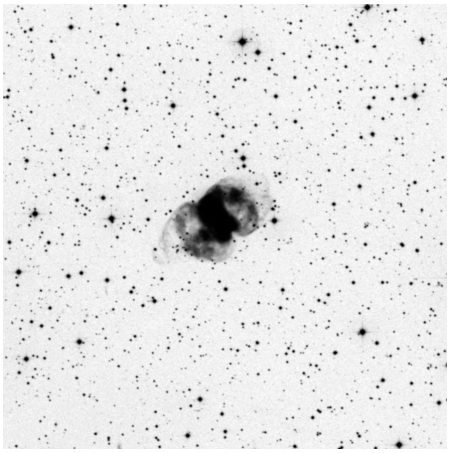
Planetary Nebula in Perseus

Right Ascension (current)	$01^h\,43^m\,08^s$	Declination (current)	$51°\,38'\,26''$
Right Ascension (J2000.0)	$01^h\,42^m\,18^s$	Declination (J2000.0)	$51°\,34'\,17''$
Size	$3.1' \times 3.1'$	Position Angle	90°
Magnitude	10	Other Designation	NGC 650

Description: A planetary nebula that is similar to the dumbbell nebula, albeit much smaller, and much fainter.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

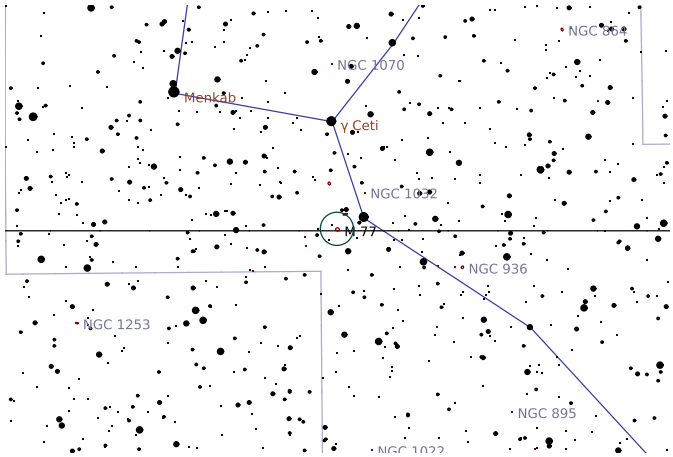
FOV: _____

M 77 (Cetus A)

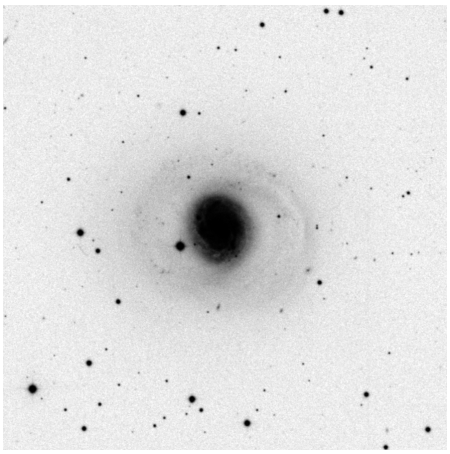
Galaxy in Cetus

Right Ascension (current)	$02^h\,43^m\,21^s$	Declination (current)	$0°\,02'\,27''$
Right Ascension (J2000.0)	$02^h\,42^m\,40^s$	Declination (J2000.0)	$-0°\,00'\,46''$
Size	$7.1' \times 6'$	Position Angle	20°
Magnitude	8.9	Other Designation	NGC 1068

Description: An active "Seyfert" galaxy with a very bright core. The visible portion is small, but high in surface brightness.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

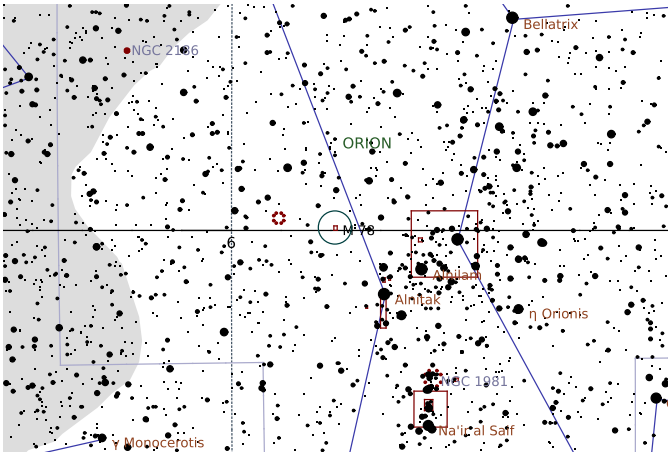
_____

M 78

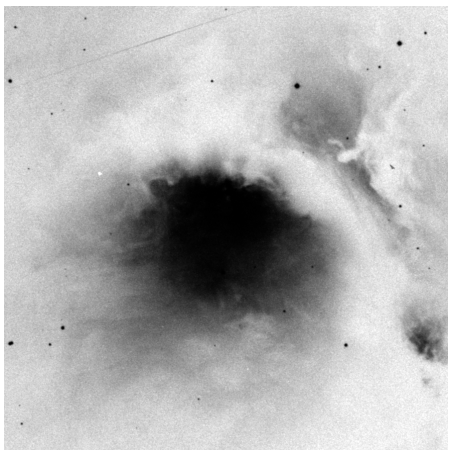
Gaseous Nebula in Orion

Right Ascension (current)	$05^h\,47^m\,27^s$	Declination (current)	$0°\,04'\,13''$
Right Ascension (J2000.0)	$05^h\,46^m\,45^s$	Declination (J2000.0)	$0°\,04'\,10''$
Size	$8' \times 6'$	Position Angle	90°
Magnitude	8	Other Designation	NGC 2068

Description: A reflection nebula.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

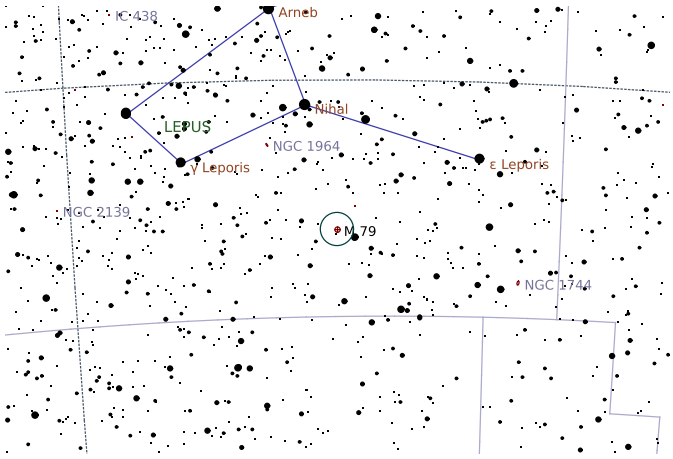
Sketch

FOV: _____

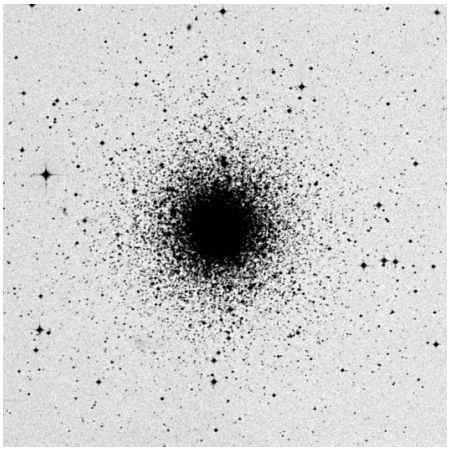
M 79

Globular Cluster in Lepus

Right Ascension (current)	$05^h\,24^m\,43^s$	Declination (current)	$-24°\,31'\,01''$
Right Ascension (J2000.0)	$05^h\,24^m\,10^s$	Declination (J2000.0)	$-24°\,31'\,25''$
Size	$9.6' \times 9.6'$	Position Angle	90°
Magnitude	7.7	Other Designation	NGC 1904



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

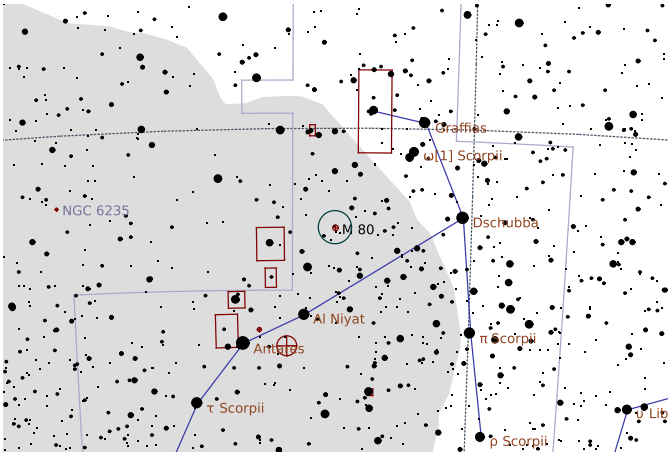
FOV: _____

M 80

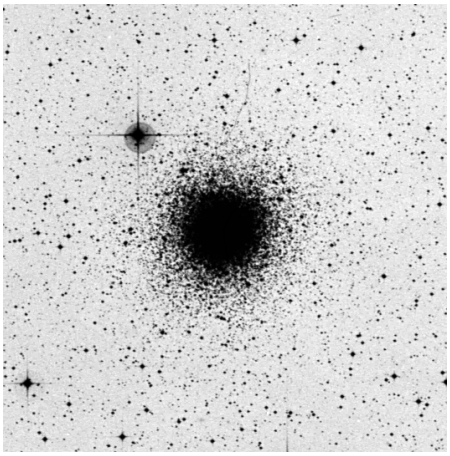
Globular Cluster in Scorpius

Right Ascension (current)	$16^h\,17^m\,49^s$	Declination (current)	$-23°\,00'\,17''$
Right Ascension (J2000.0)	$16^h\,17^m\,02^s$	Declination (J2000.0)	$-22°\,58'\,28''$
Size	$10' \times 10'$	Position Angle	90°
Magnitude	7.3	Other Designation	NGC 6093

Description: One of the smaller globular clusters.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

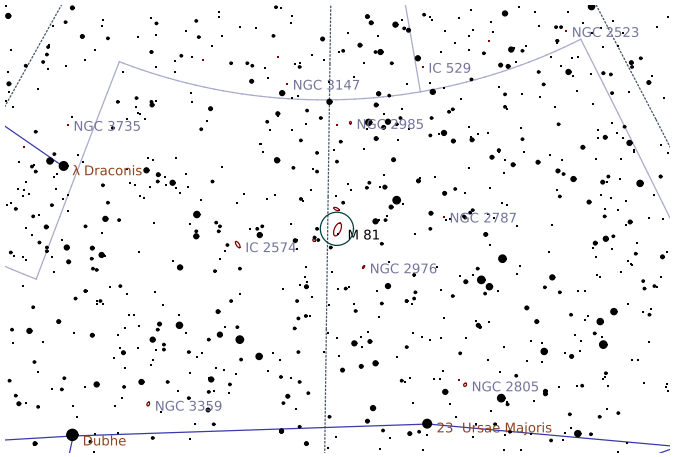
_____

M 81 (Bode's Galaxy)

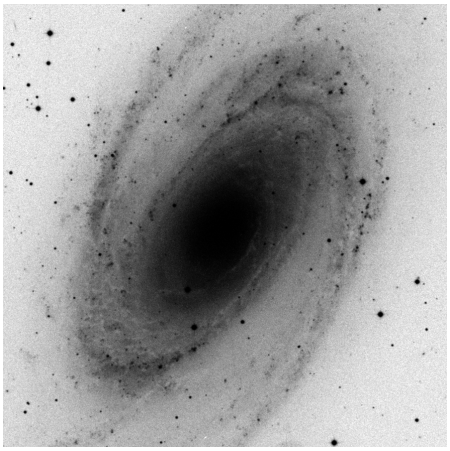
Galaxy in Ursa Major

Right Ascension (current)	$09^h\,56^m\,41^s$	Declination (current)	$69°\,00'\,03''$
Right Ascension (J2000.0)	$09^h\,55^m\,33^s$	Declination (J2000.0)	$69°\,04'\,02''$
Size	$24.9' \times 11.5'$	Position Angle	$-67°$
Magnitude	6.9	Other Designation	NGC 3031

Description: A remarkable galaxy. To distinguish from its neighbor M 82, note that M 82 is rather thin and cigar shaped, whereas M 81 is more thicker.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

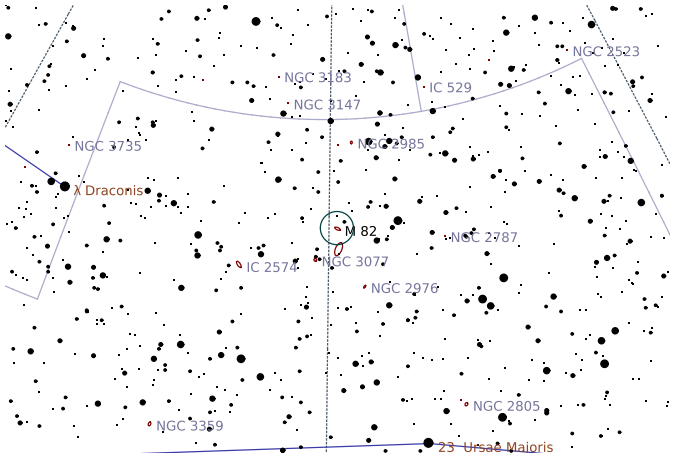
_____

M 82 (Cigar Galaxy, Ursa Major A)

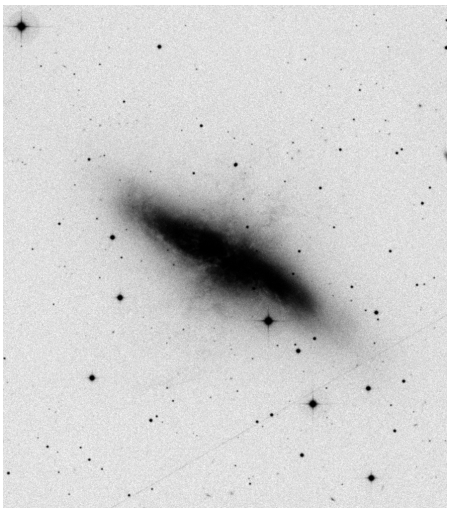
Galaxy in Ursa Major

Right Ascension (current)	$09^{h}\,57^{m}\,02^{s}$	Declination (current)	$69°\,36'\,59''$
Right Ascension (J2000.0)	$09^{h}\,55^{m}\,54^{s}$	Declination (J2000.0)	$69°\,40'\,59''$
Size	$11.2' \times 4.3'$	Position Angle	25°
Magnitude	8.4	Other Designation	NGC 3034

Description: A remarkable galaxy. To distinguish from its neighbor M 81, note that M 82 is rather thin and cigar shaped, whereas M 81 is more thicker.



Sky Chart



DSS Image (B, $15.0' \times 17.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

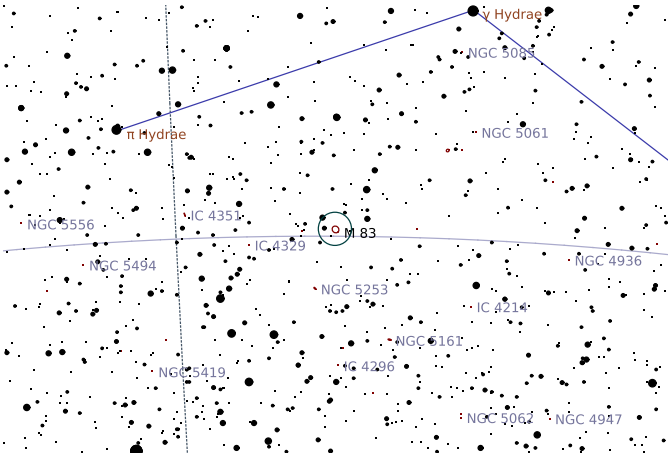
FOV: _____

M 83

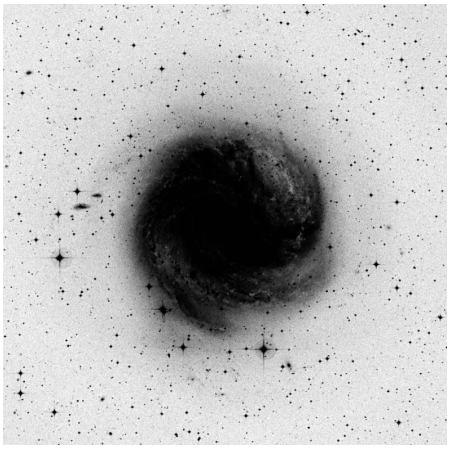
Galaxy in Hydra

Right Ascension (current)	$13^h\,37^m\,46^s$	Declination (current)	$-29°\,56'\,01''$
Right Ascension (J2000.0)	$13^h\,37^m\,00^s$	Declination (J2000.0)	$-29°\,52'\,02''$
Size	$12.9' \times 11.5'$	Position Angle	46°
Magnitude	7.5	Other Designation	NGC 5236

Description: A beautiful barred spiral galaxy, that will show a bar and hints of spiral structure even in smaller telescopes from dark skies. Best viewed from dark skies.



Sky Chart



DSS Image (B, $22.3' \times 22.2'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

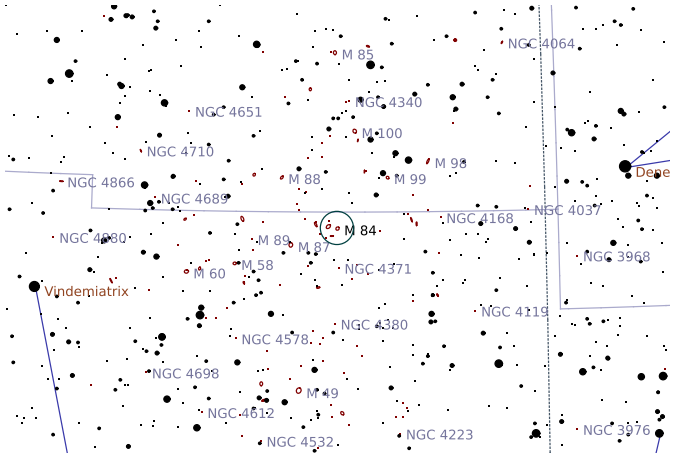
_____

M 84 (Markarian Chain)

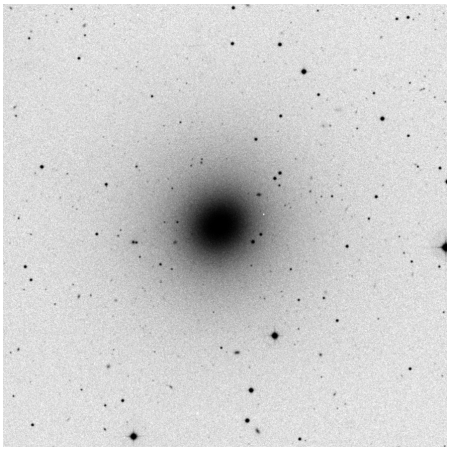
Galaxy in Virgo

Right Ascension (current)	$12^h\,25^m\,44^s$	Declination (current)	$12°\,48'\,37''$
Right Ascension (J2000.0)	$12^h\,25^m\,03^s$	Declination (J2000.0)	$12°\,53'\,13''$
Size	$6.5' \times 5.6'$	Position Angle	$-45°$
Magnitude	9.1	Other Designation	NGC 4374

Description: Part of the Markarian Chain.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

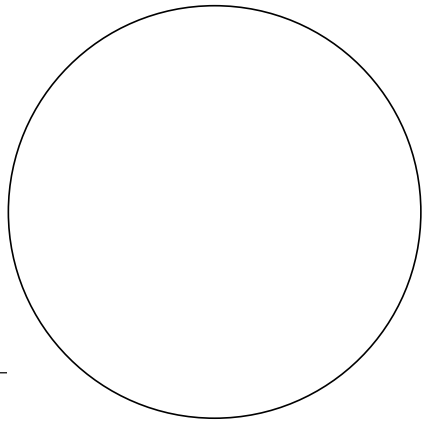
* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____



Sketch

* Seeing: _____

Observation Location: _____ FOV: _____

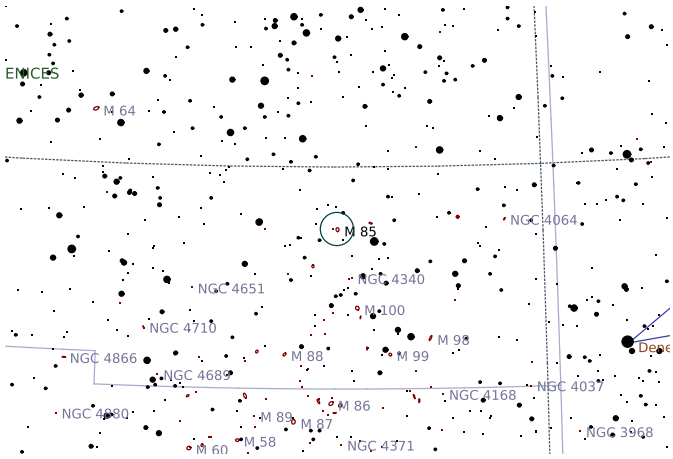
* Description: _____

_____

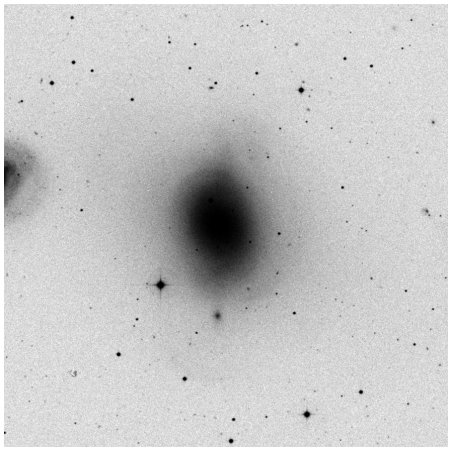
M 85

Galaxy in Coma Berenices

Right Ascension (current)	$12^h\,26^m\,04^s$	Declination (current)	$18°\,06'\,50''$
Right Ascension (J2000.0)	$12^h\,25^m\,23^s$	Declination (J2000.0)	$18°\,11'\,27''$
Size	$7.1' \times 5.5'$	Position Angle	85°
Magnitude	9.1	Other Designation	NGC 4382



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

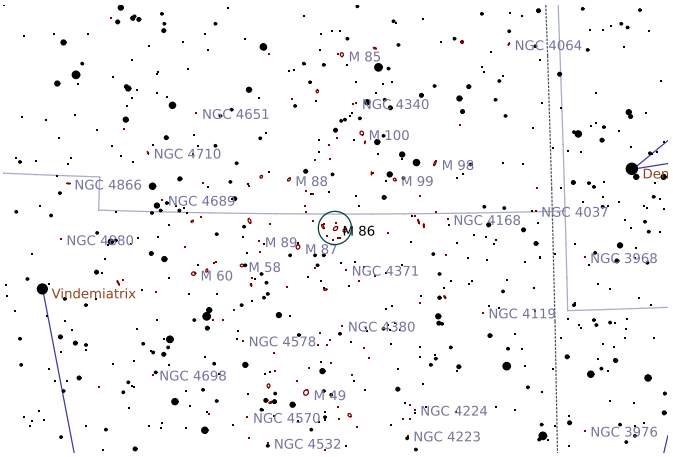
FOV: _____

M 86 (Markarian Chain)

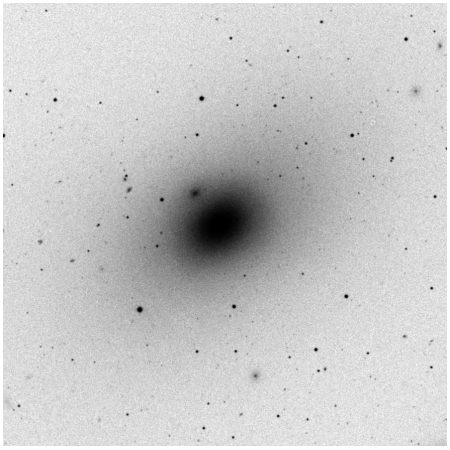
Galaxy in Virgo

Right Ascension (current)	$12^h\,26^m\,52^s$	Declination (current)	$12°\,52'\,11''$
Right Ascension (J2000.0)	$12^h\,26^m\,11^s$	Declination (J2000.0)	$12°\,56'\,47''$
Size	$8.9' \times 5.8'$	Position Angle	$-40°$
Magnitude	8.9	Other Designation	NGC 4406

Description: Part of the Markarian Chain.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

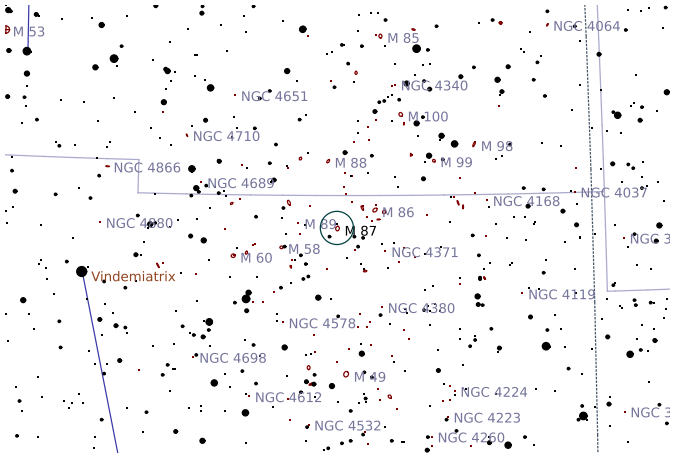
FOV: _____

M 87 (Virgo A)

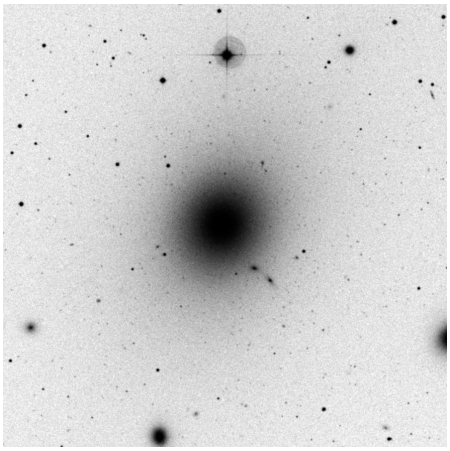
Galaxy in Virgo

Right Ascension (current)	$12^h\,31^m\,30^s$	Declination (current)	$12°\,18'\,51''$
Right Ascension (J2000.0)	$12^h\,30^m\,49^s$	Declination (J2000.0)	$12°\,23'\,26''$
Size	$8.3' \times 6.6'$	Position Angle	$-80°$
Magnitude	8.6	Other Designation	NGC 4486

Description: One of the brightest, active elliptical galaxies in the Virgo cluster of galaxies.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

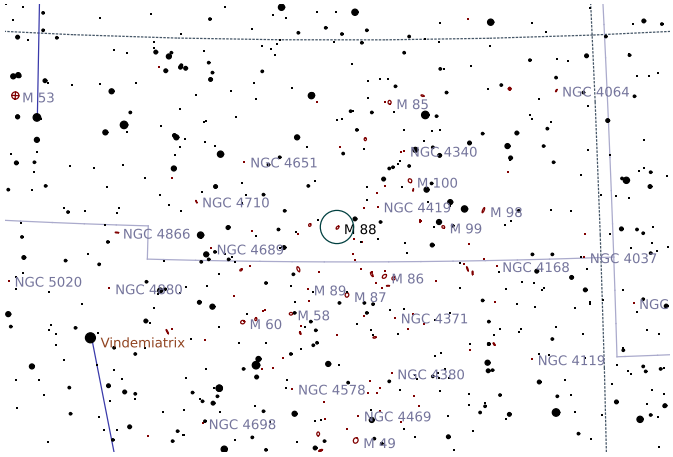
Sketch

FOV: _____

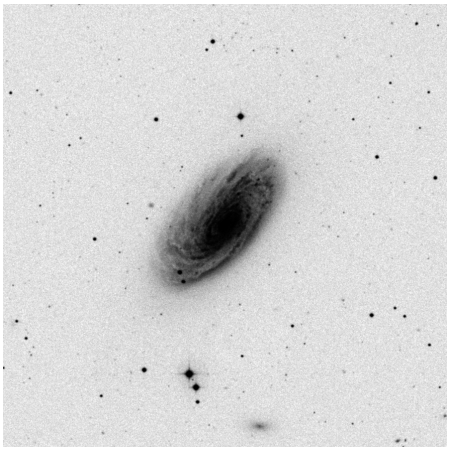
M 88

Galaxy in Coma Berenices

Right Ascension (current)	$12^h\,32^m\,40^s$	Declination (current)	$14°\,20'\,35''$
Right Ascension (J2000.0)	$12^h\,31^m\,59^s$	Declination (J2000.0)	$14°\,25'\,11''$
Size	$6.8' \times 3.7'$	Position Angle	$-50°$
Magnitude	9.6	Other Designation	NGC 4501



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

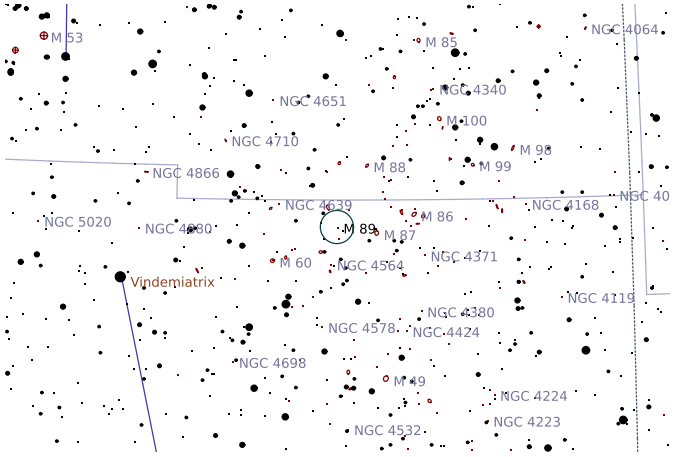
Sketch

FOV: _____

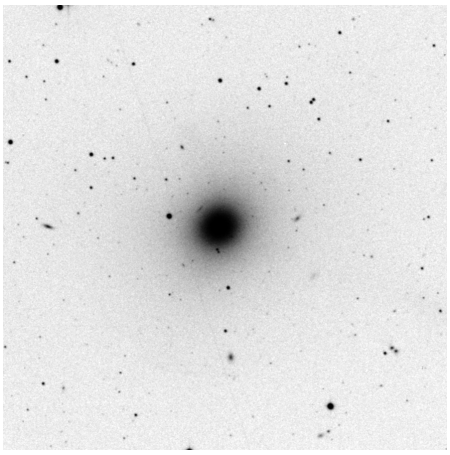
M 89

Galaxy in Virgo

Right Ascension (current) Right Ascension (J2000.0)	$12^h\,36^m\,20^s$ $12^h\,35^m\,39^s$	Declination (current) Declination (J2000.0)	$12°\,28'\,47''$ $12°\,33'\,22''$
Size Magnitude	$3.5' \times 3.5'$ 9.8	Position Angle Other Designation	90° NGC 4552



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

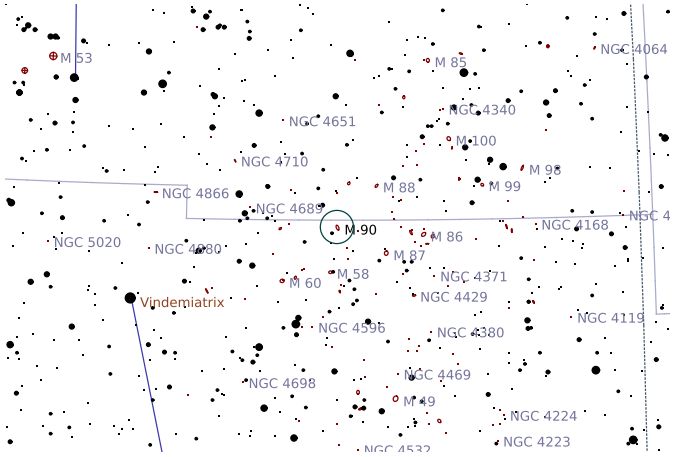
Sketch

FOV: _____

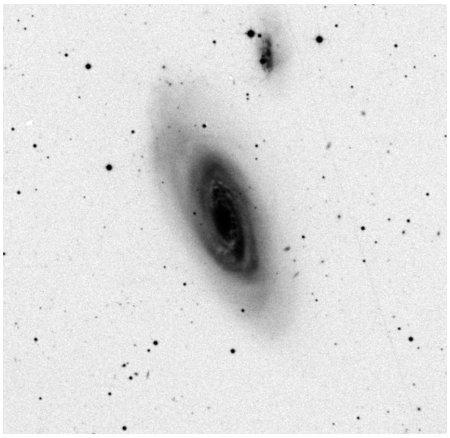
M 90

Galaxy in Virgo

Right Ascension (current)	$12^h\,37^m\,31^s$	Declination (current)	$13°\,05'\,16''$
Right Ascension (J2000.0)	$12^h\,36^m\,50^s$	Declination (J2000.0)	$13°\,09'\,50''$
Size	$9.5' \times 4.4'$	Position Angle	67°
Magnitude	9.5	Other Designation	NGC 4569



Sky Chart



DSS Image (B, $15.5' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

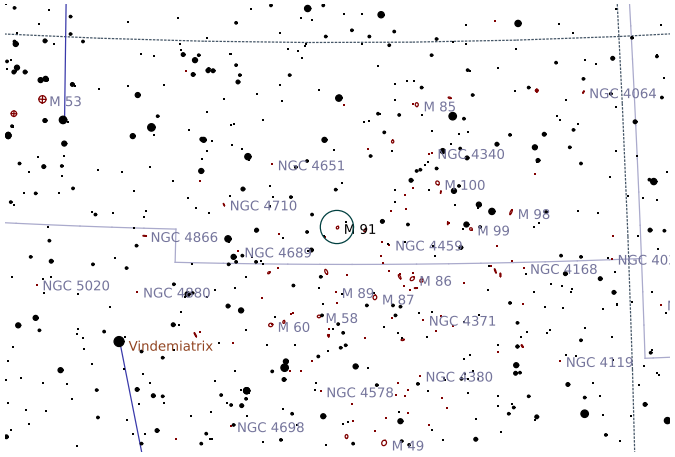
Sketch

FOV: _____

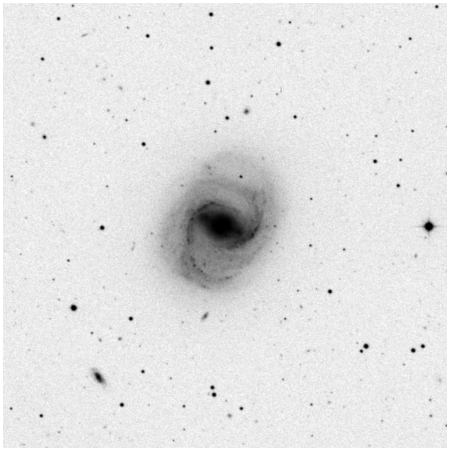
M 91

Galaxy in Coma Berenices

Right Ascension (current)	$12^h\,36^m\,07^s$	Declination (current)	$14°\,25'\,12''$
Right Ascension (J2000.0)	$12^h\,35^m\,26^s$	Declination (J2000.0)	$14°\,29'\,47''$
Size	$5.2' \times 4.2'$	Position Angle	$-60°$
Magnitude	10	Other Designation	NGC 4548



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

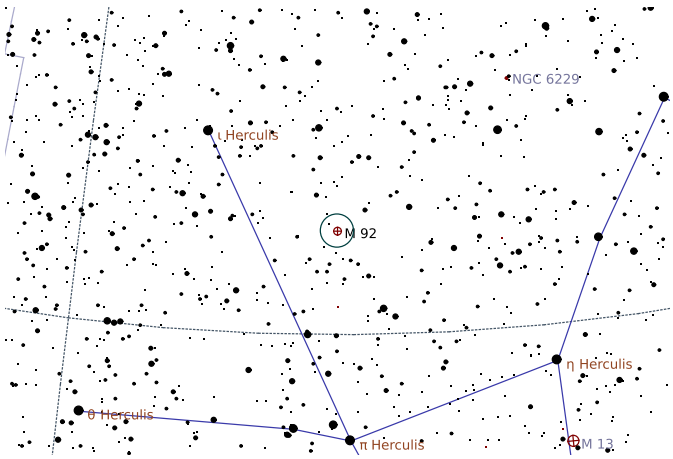
Sketch

FOV: _____

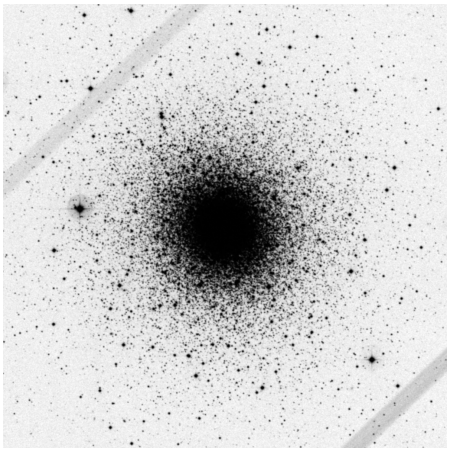
M 92

Globular Cluster in Hercules

Right Ascension (current)	$17^h\,17^m\,30^s$	Declination (current)	$43°\,07'\,12''$
Right Ascension (J2000.0)	$17^h\,17^m\,07^s$	Declination (J2000.0)	$43°\,08'\,13''$
Size	$14' \times 14'$	Position Angle	90°
Magnitude	6.5	Other Designation	NGC 6341



Sky Chart



DSS Image (B, $19.0' \times 19.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

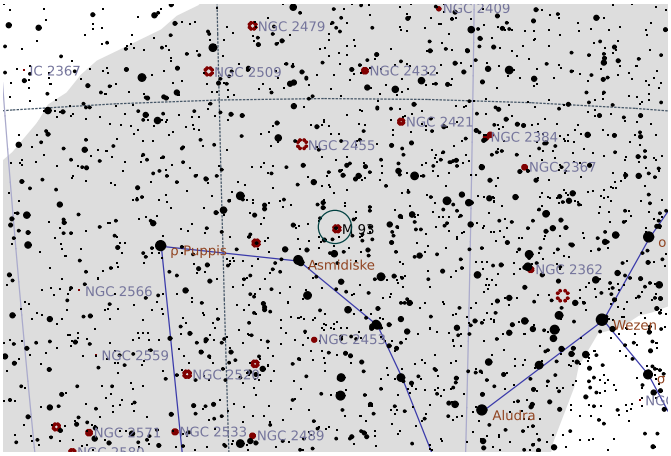
_____

M 93

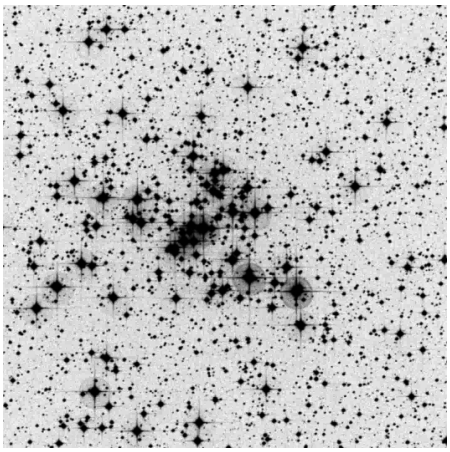
Open Cluster in Puppis

Right Ascension (current)	$07^h\,45^m\,04^s$	Declination (current)	$-23°\,53'\,23''$
Right Ascension (J2000.0)	$07^h\,44^m\,29^s$	Declination (J2000.0)	$-23°\,51'\,11''$
Size	$10' \times 10'$	Position Angle	90°
Magnitude	6.2	Other Designation	NGC 2447

Description: A beautiful, rich, bright open cluster.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

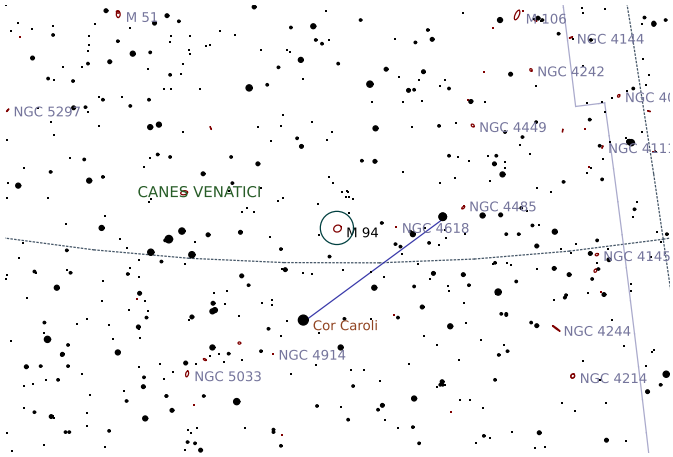
FOV: _____

M 94

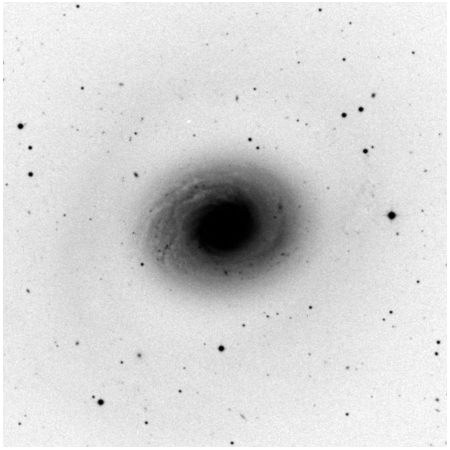
Galaxy in Canes Venatici

Right Ascension (current) Right Ascension (J2000.0)	$12^h\,51^m\,31^s$ $12^h\,50^m\,53^s$	Declination (current) Declination (J2000.0)	$41°\,02'\,41''$ $41°\,07'\,17''$
Size Magnitude	$14.4' \times 12.1'$ 8.2	Position Angle Other Designation	$-27°$ NGC 4736

Description: Galaxy with a high surface brightness core. Somewhat difficult but not impossible from city skies.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

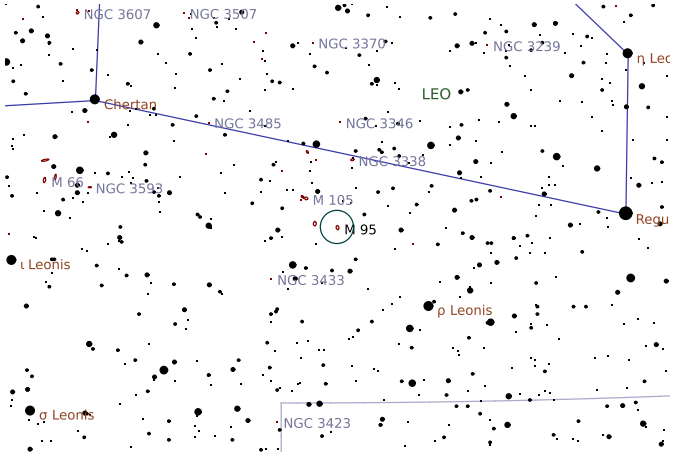
_____

M 95

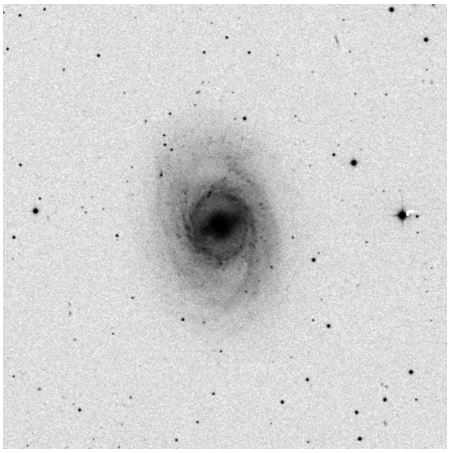
Galaxy in Leo

Right Ascension (current)	$10^h\,44^m\,40^s$	Declination (current)	$11°\,37'\,48''$
Right Ascension (J2000.0)	$10^h\,43^m\,57^s$	Declination (J2000.0)	$11°\,42'\,12''$
Size	$7.4' \times 5'$	Position Angle	77°
Magnitude	9.7	Other Designation	NGC 3351

Description: Part of the "other" Leo triplet.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

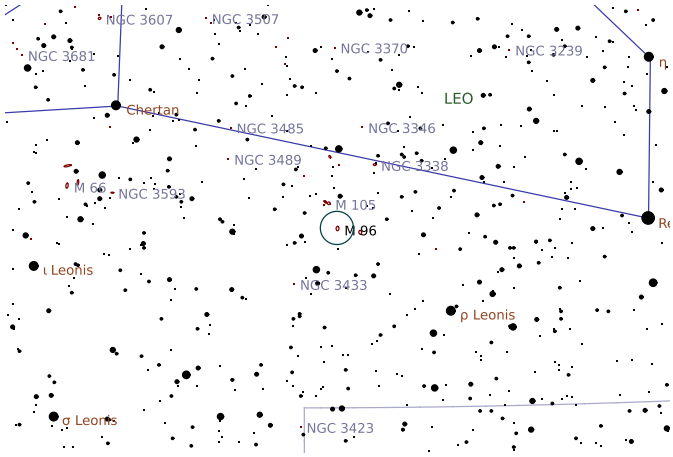
FOV: _____

M 96

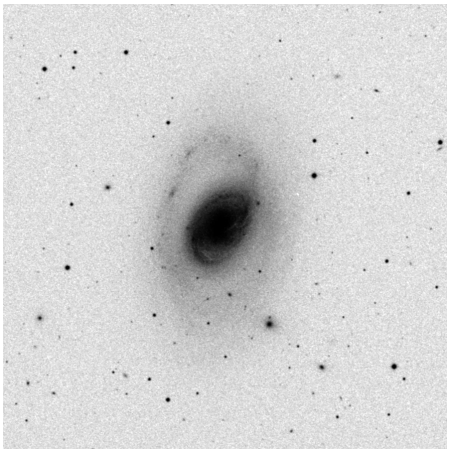
Galaxy in Leo

Right Ascension (current)	$10^h\,47^m\,28^s$	Declination (current)	$11°\,44'\,47''$
Right Ascension (J2000.0)	$10^h\,46^m\,45^s$	Declination (J2000.0)	$11°\,49'\,12''$
Size	$7.8' \times 5.2'$	Position Angle	$-86°$
Magnitude	9.3	Other Designation	NGC 3368

Description: Part of the "other" Leo triplet.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

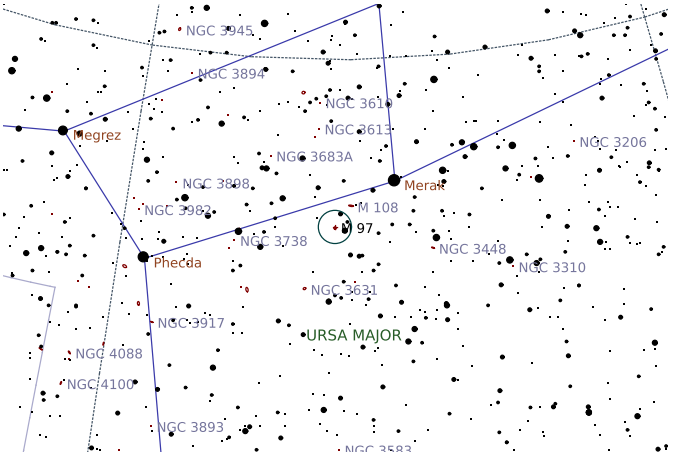
FOV: _____

M 97 (Owl Nebula)

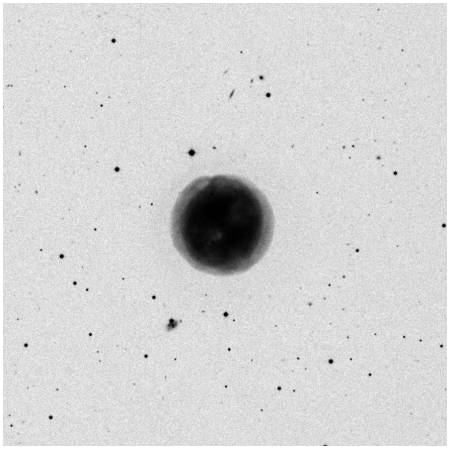
Planetary Nebula in Ursa Major

Right Ascension (current)	$11^h\,15^m\,34^s$	Declination (current)	$54°\,56'\,33''$
Right Ascension (J2000.0)	$11^h\,14^m\,47^s$	Declination (J2000.0)	$55°\,01'\,10''$
Size	$2.8' \times 2.8'$	Position Angle	90°
Magnitude	9.9	Other Designation	NGC 3587

Description: A rather faint, large, round planetary nebula. Dark skies are required.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

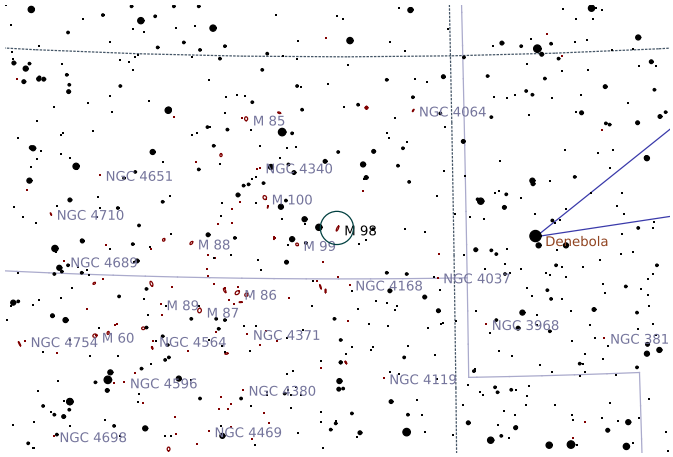
_____

M 98

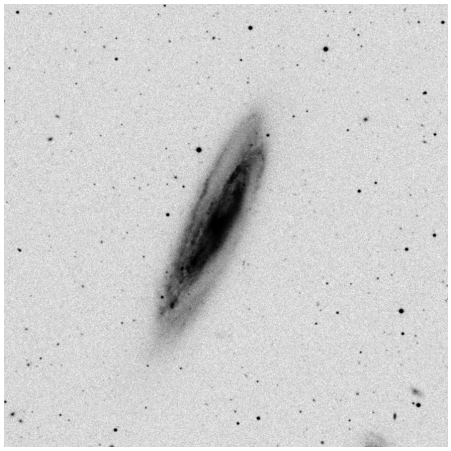
Galaxy in Coma Berenices

Right Ascension (current)	$12^h\,14^m\,28^s$	Declination (current)	$14°\,49'\,20''$
Right Ascension (J2000.0)	$12^h\,13^m\,47^s$	Declination (J2000.0)	$14°\,53'\,58''$
Size	$9.8' \times 2.8'$	Position Angle	$-65°$
Magnitude	10	Other Designation	NGC 4192

Description: A nice edge-on spiral galaxy very close to the star 6 Comae Berenices.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

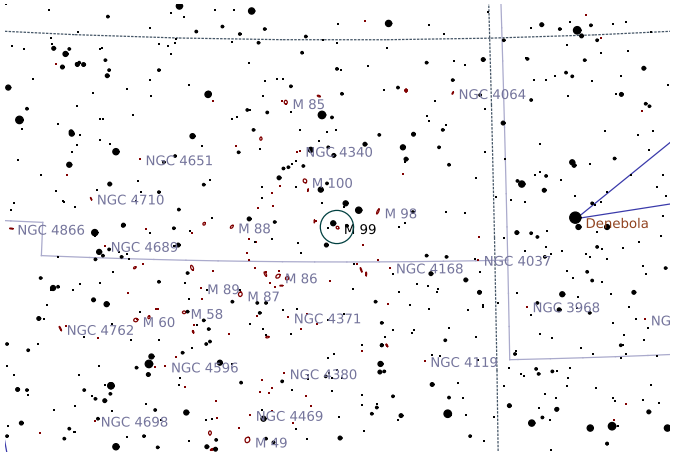
Sketch

FOV: _____

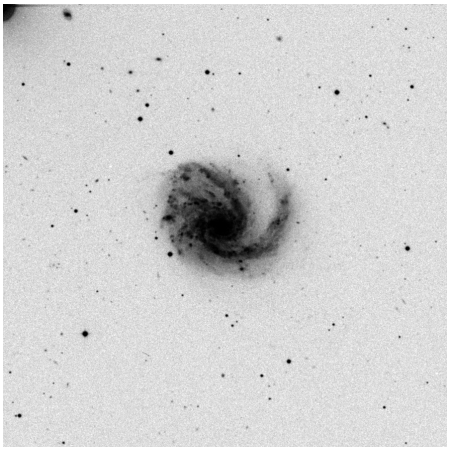
M 99

Galaxy in Coma Berenices

Right Ascension (current)	$12^h\,19^m\,30^s$	Declination (current)	$14°\,20'\,26''$
Right Ascension (J2000.0)	$12^h\,18^m\,49^s$	Declination (J2000.0)	$14°\,25'\,03''$
Size	$5.3' \times 4.6'$	Position Angle	39°
Magnitude	9.9	Other Designation	NGC 4254



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

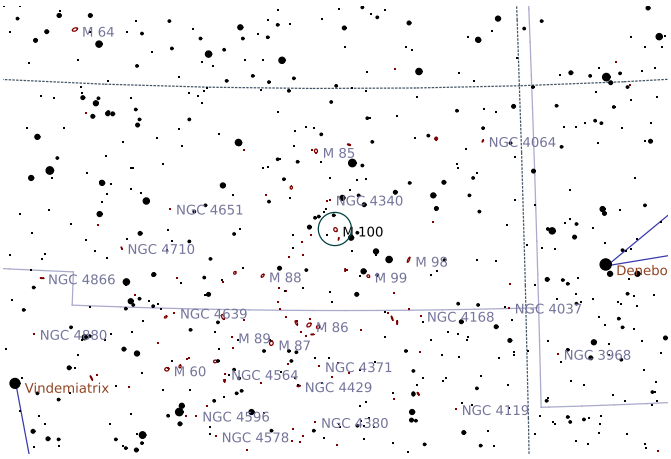
Sketch

FOV: _____

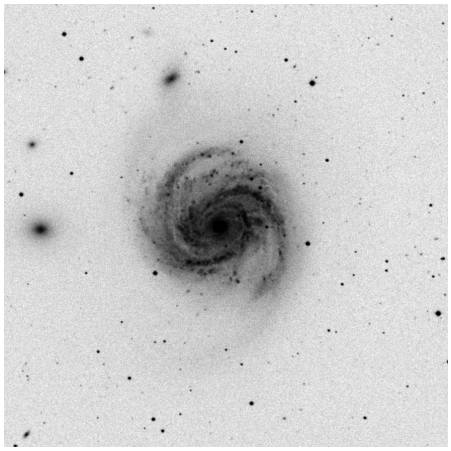
M 100

Galaxy in Coma Berenices

Right Ascension (current)	$12^h\,23^m\,35^s$	Declination (current)	$15°\,44'\,45''$
Right Ascension (J2000.0)	$12^h\,22^m\,54^s$	Declination (J2000.0)	$15°\,49'\,22''$
Size	$7.5' \times 6.1'$	Position Angle	60°
Magnitude	9.4	Other Designation	NGC 4321



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

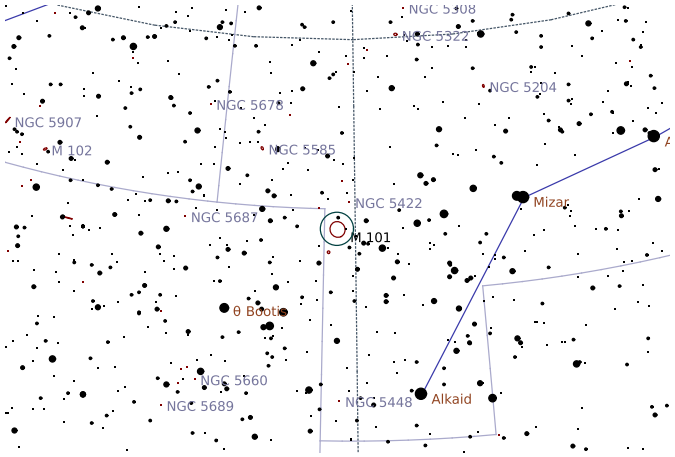
FOV: _____

M 101 (Pinwheel Galaxy)

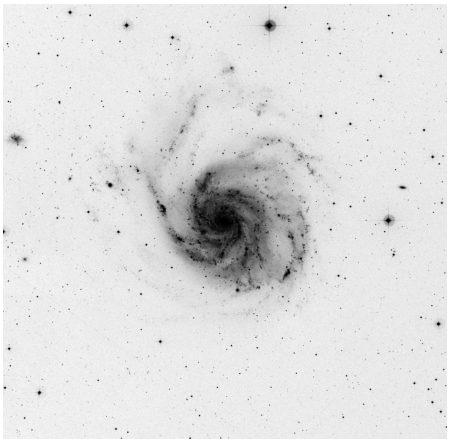
Galaxy in Ursa Major

Right Ascension (current) Right Ascension (J2000.0)	$14^h\,03^m\,40^s$ $14^h\,03^m\,12^s$	Declination (current) Declination (J2000.0)	$54°\,16'\,51''$ $54°\,20'\,58''$
Size Magnitude	$28.8' \times 26.9'$ 7.9	Position Angle Other Designation	64° NGC 5457

Description: A large, low surface brightness spiral galaxy, sometimes easier seen with binoculars. Dark skies are necessary. In very dark skies, this object is very remarkable!



Sky Chart



DSS Image (B, $42.7' \times 41.8'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

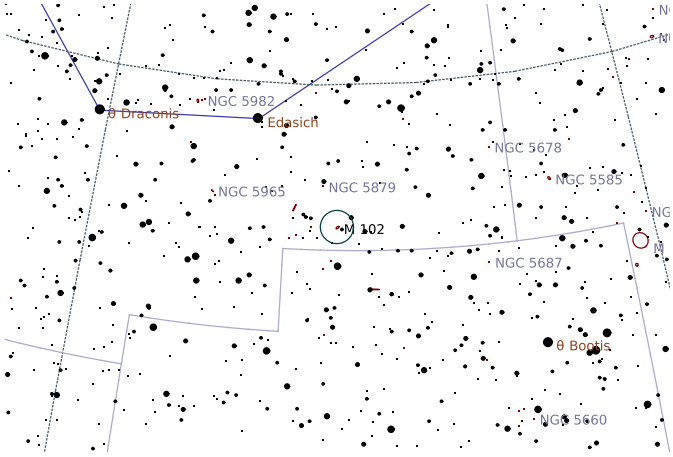
* Description: _____

_____

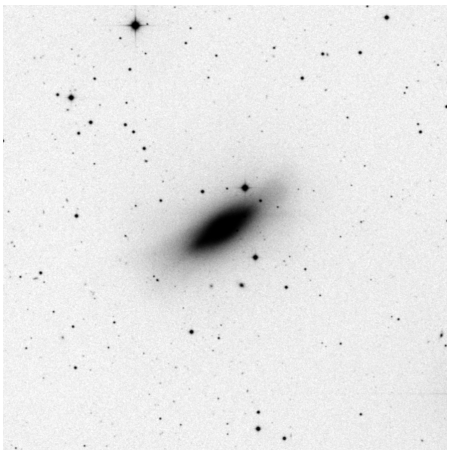
M 102

Galaxy in Draco

Right Ascension (current) Right Ascension (J2000.0)	$15^h\,06^m\,50^s$ $15^h\,06^m\,29^s$	Declination (current) Declination (J2000.0)	$55°\,42'\,29''$ $55°\,45'\,49''$
Size Magnitude	$6.5' \times 3.1'$ 9.9	Position Angle Other Designation	$-38°$ NGC 5866



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

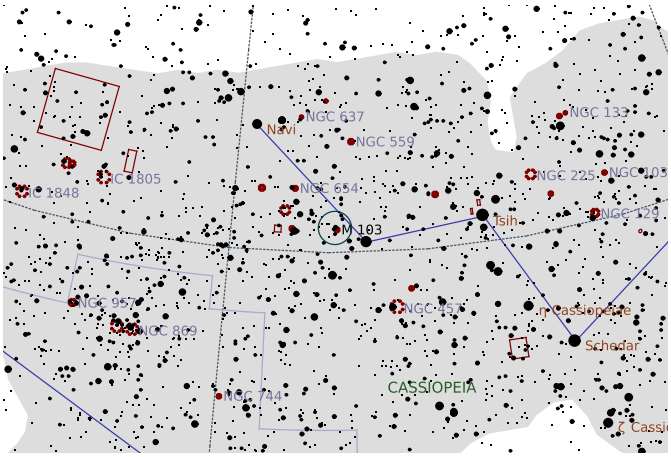
FOV: _____

M 103

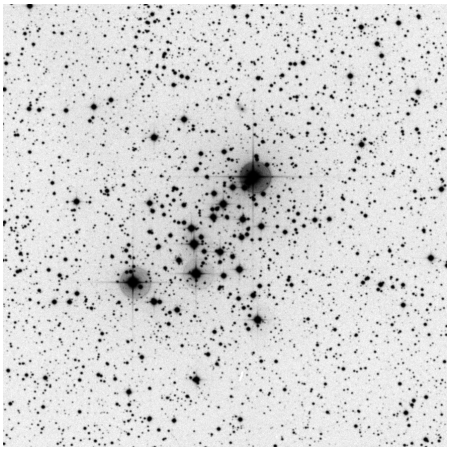
Open Cluster in Cassiopeia

Right Ascension (current)	$01^h\,34^m\,14^s$	Declination (current)	$60°\,43'\,45''$
Right Ascension (J2000.0)	$01^h\,33^m\,21^s$	Declination (J2000.0)	$60°\,39'\,29''$
Size	$6' \times 6'$	Position Angle	90°
Magnitude	7.4	Other Designation	NGC 581

Description: A sparse cluster of few bright stars.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

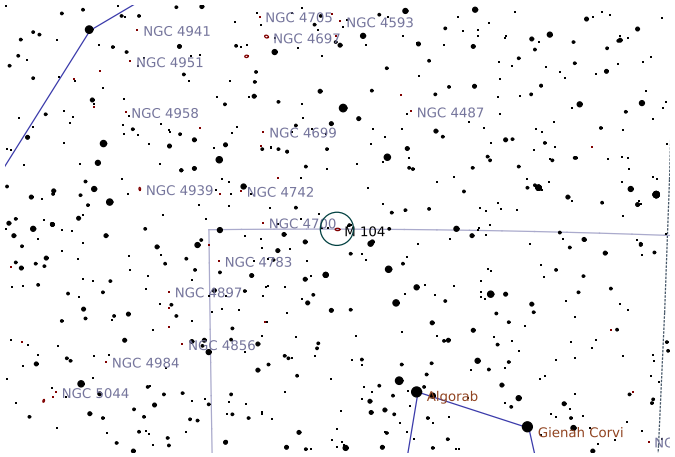
FOV: _____

M 104 (Sombrero Galaxy)

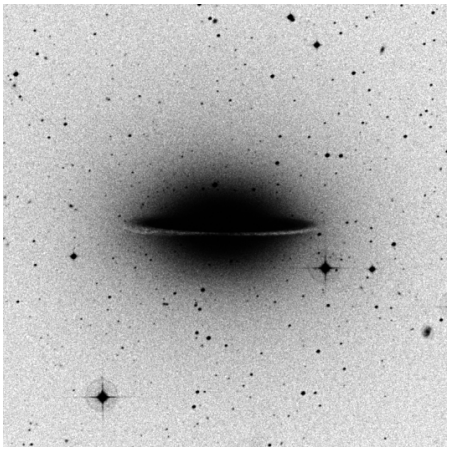
Galaxy in Corvus

Right Ascension (current)	$12^h\,40^m\,41^s$	Declination (current)	$-11°\,41'\,47''$
Right Ascension (J2000.0)	$12^h\,39^m\,59^s$	Declination (J2000.0)	$-11°\,37'\,21''$
Size	$8.6' \times 4.2'$	Position Angle	$1°$
Magnitude	8	Other Designation	NGC 4594

Description: A very remarkable spiral galaxy viewed edge-on. Prominent dust lane and central bulge with a bright core. Looks like a Mexican hat and hence the name. Try to construct the full 3D view of this object.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

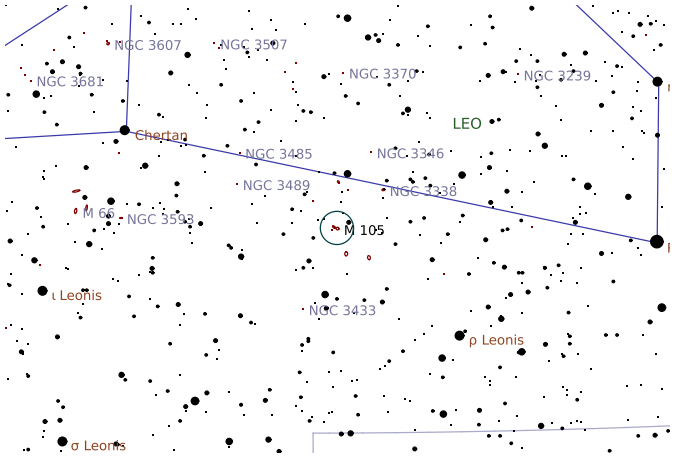
_____

M 105

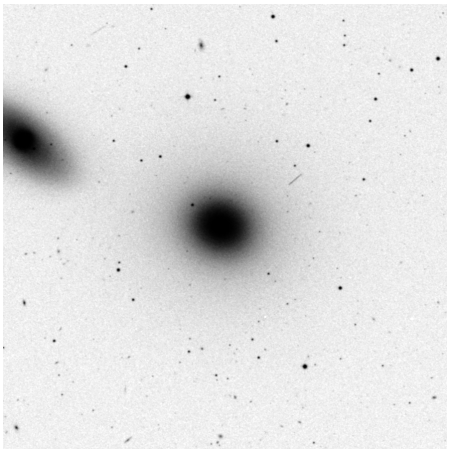
Galaxy in Leo

Right Ascension (current)	$10^h\,48^m\,32^s$	Declination (current)	$12°\,30'\,26''$
Right Ascension (J2000.0)	$10^h\,47^m\,49^s$	Declination (J2000.0)	$12°\,34'\,52''$
Size	$5.3' \times 4.8'$	Position Angle	19°
Magnitude	9.3	Other Designation	NGC 3379

Description: Part of the "other" Leo triplet.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

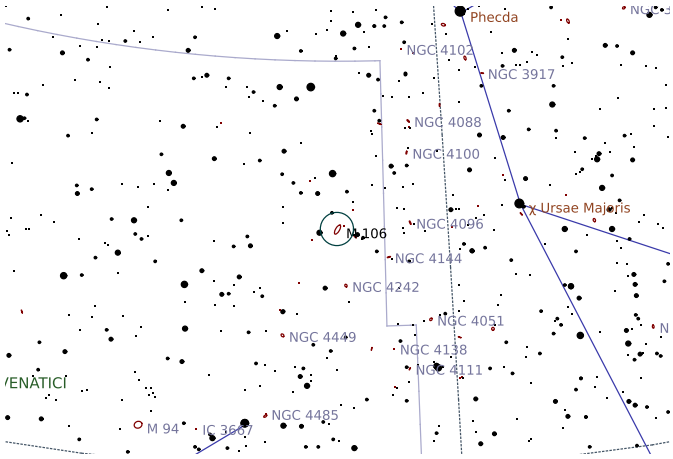
Sketch

FOV: _____

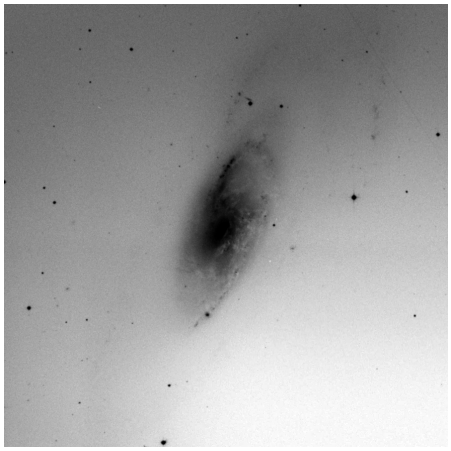
M 106

Galaxy in Canes Venatici

Right Ascension (current)	$12^h\,19^m\,37^s$	Declination (current)	$47°\,13'\,43''$
Right Ascension (J2000.0)	$12^h\,18^m\,57^s$	Declination (J2000.0)	$47°\,18'\,25''$
Size	$18.6' \times 7.2'$	Position Angle	$-60°$
Magnitude	8.4	Other Designation	NGC 4258



Sky Chart



DSS Image (R, 5.0' ×15.0')

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

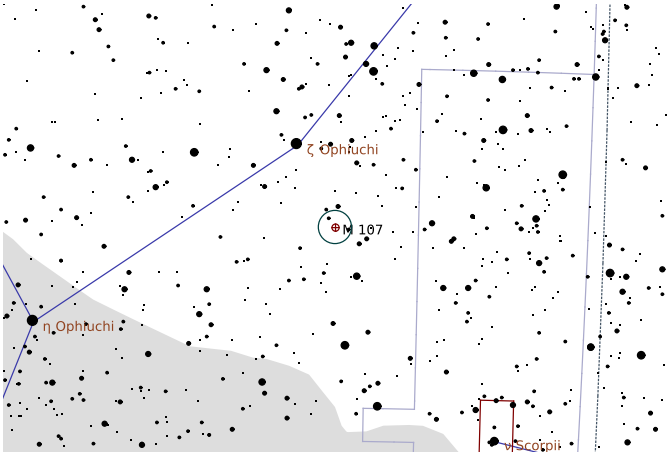
Sketch

FOV: _____

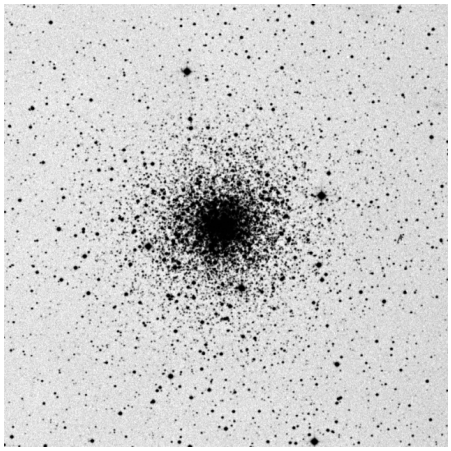
M 107

Globular Cluster in Ophiuchus

Right Ascension (current)	$16^h\,33^m\,15^s$	Declination (current)	$-13°\,04'\,47''$
Right Ascension (J2000.0)	$16^h\,32^m\,31^s$	Declination (J2000.0)	$-13°\,03'\,11''$
Size	$13' \times 13'$	Position Angle	90°
Magnitude	7.8	Other Designation	NGC 6171



Sky Chart



DSS Image (B, $18.0' \times 18.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

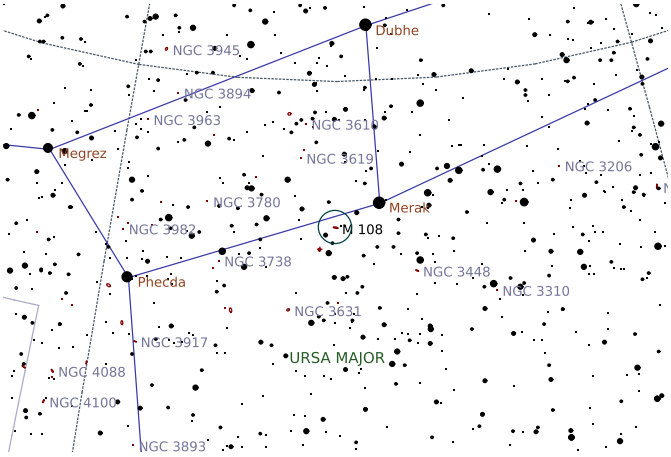
Sketch

FOV: _____

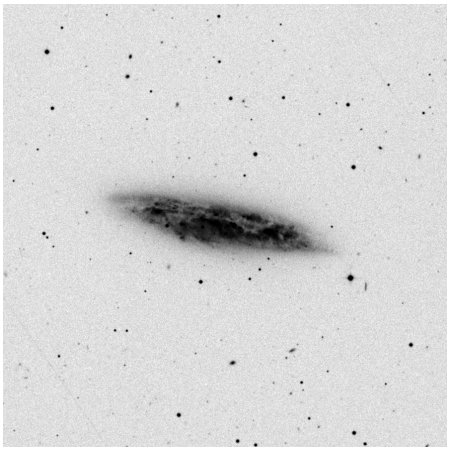
M 108

Galaxy in Ursa Major

Right Ascension (current) Right Ascension (J2000.0)	$11^h\,12^m\,17^s$ $11^h\,11^m\,29^s$	Declination (current) Declination (J2000.0)	$55°\,35'\,46''$ $55°\,40'\,22''$
Size Magnitude	$8.6' \times 2.4'$ 10	Position Angle Other Designation	10° NGC 3556



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

* Description: _____

_____

Sketch

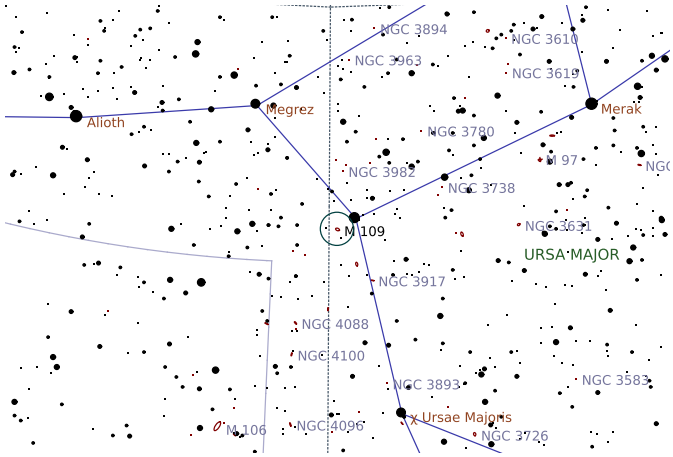
FOV: _____

M 109

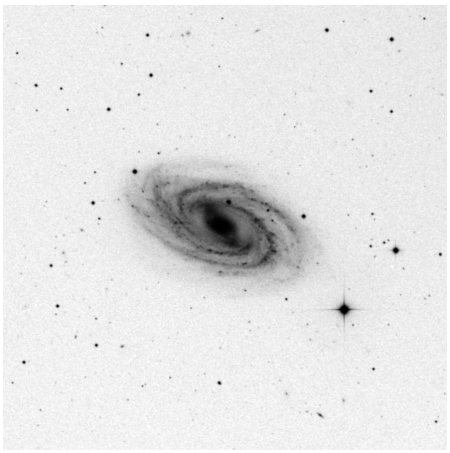
Galaxy in Ursa Major

Right Ascension (current)	$11^h\,58^m\,17^s$	Declination (current)	$53°\,17'\,42''$
Right Ascension (J2000.0)	$11^h\,57^m\,35^s$	Declination (J2000.0)	$53°\,22'\,25''$
Size	$7.5' \times 4.4'$	Position Angle	22°
Magnitude	9.8	Other Designation	NGC 3992

Description: Competing with M 74 for the faintest of the Messier catalog, especially from lower latitudes, this barred spiral galaxy needs dark skies. But from dark skies, you can discern the bar fairly easily with 8" of aperture.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

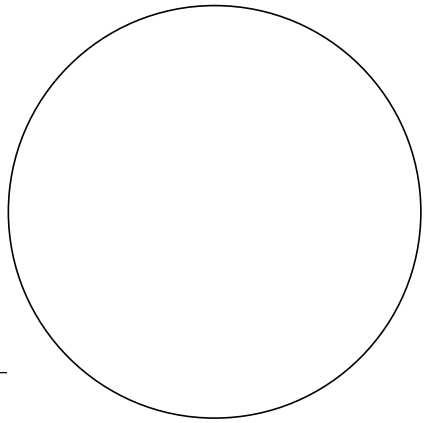
* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____



Sketch

FOV: _____

* Description: _____

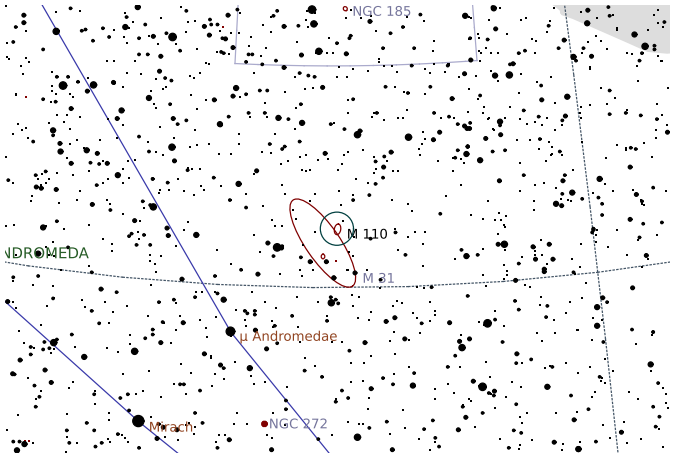
_____

M 110

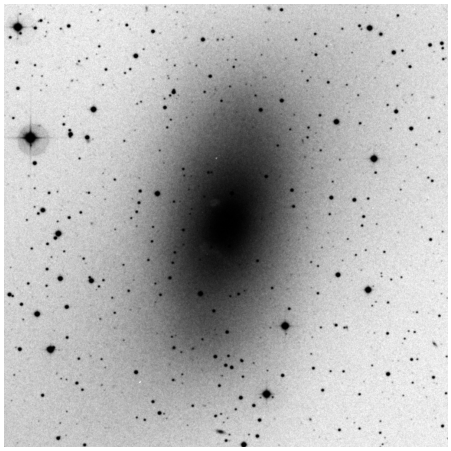
Galaxy in Andromeda

Right Ascension (current) Right Ascension (J2000.0)	$00^h\,41^m\,05^s$ $00^h\,40^m\,22^s$	Declination (current) Declination (J2000.0)	$41°\,45'\,35''$ $41°\,41'\,07''$
Size Magnitude	$19.5' \times 11.5'$ 8.1	Position Angle Other Designation	$-80°$ NGC 205

Description: Fainter companion of M 31. Binoculars may be able to discern. M 110 appears more distant from M 31 in telescopes than in photographs because outer parts of M 31 are low surface brightness and not seen easily. See also M 32.



Sky Chart



DSS Image (B, $15.0' \times 15.0'$)

* Date: _____

* Time: _____

* Aperture: _____

* Power: _____

Equipment Details: _____

_____

* Seeing: _____

Observation Location: _____

Sketch

FOV: _____

* Description: _____

_____

