

Outdoor Lab 3 - First Observations

1 Finding Objects

The best technique for finding an object depends on how bright it is. In this lab we will begin with objects which are naked eye visible, or have small offsets from bright stars, We will use the equatorial telescopes. In subsequent labs we will try more difficult objects.

As you proceed below, for each object begin with a long eyepiece with a large field of view when you are first trying to find it. Once you have centered the object of interest in the field using that eyepiece, you can insert a smaller eyepiece for a more magnified view.

Note that the image in *inverted* - upside down - in the finder but *upright* in the main eyepiece. It is also important to have a good idea of the size of the patch of sky you are looking at. In the finder, the field of view is about 7° , but in the main eyepiece it is much smaller.

2 Magnification and Field

Field Estimate: The True Field TF is related to the Apparent Field AF and the magnification M by $TF = AF/M$. The magnification M is given by $M = f_o/f_e$, where f_o is the focal length of the objective, and f_e is the focal length of the eyepiece. For your eyepiece, estimate the magnification and true field assuming that $AF = 40^\circ$.

$f_o(\text{mm}) =$ _____ $f_e(\text{mm}) =$ _____ $M =$ _____ $TF(') =$ _____

Field Measurement: Time the crossing of a star near $\text{Dec} = 0^\circ$ in the eyepiece field (with tracking turned off).

Time in minutes = _____ $TF(') =$ _____

3 Observing

You should try to find four or more objects, in increasing order of difficulty. Choose at least one from each category below: These are suitable for lab times in late January or February. Most of them are on Map 3 in Edmund.

1. Naked eye targets:

- (a) Jupiter
- (b) Mirfak
- (c) Aldebaran
- (d) Alcyone

2. Naked eye in finder scope:

- (a) Theta Tauri (6 arcminute double star)
- (b) Lambda Orionis (very close binary - can you separate it?)
- (c) NGC 663 (open cluster in Cassiopeia)

3. Using offset from naked eye star:

- (a) 30 Aries (wide double - to get it, offset East from Hamal)
- (b) M34 (open cluster - to get it, offset West from Algol)
- (c) NGC 2244 (sparse open cluster - to get it, offset South from Alhena)

4. Finally, reward yourself by finding M42, the Great Nebula in Orion.

On the next pages, record the characteristics of the objects you find, according to their type.

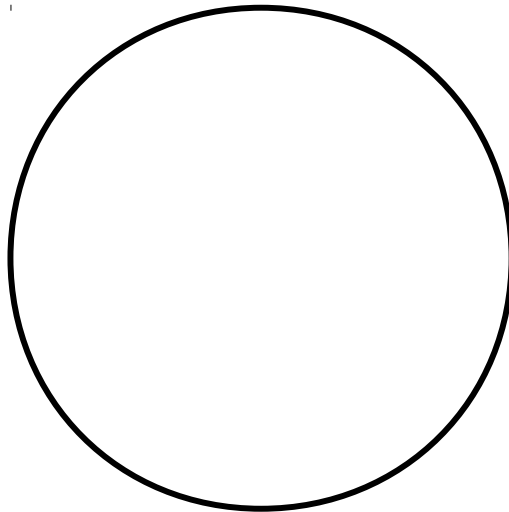
Binary: Sketch the binary with its actual orientation in the field of view in the circle provided. Label the stars with their colors and indicate which is brightest.

Open cluster: Sketch the brightest 5-10 stars with the actual orientation in the field of view.

Planet: Sketch the disk - indicate any features, shadows, phase, moons, etc.

Nebula: Sketch the nebula shape and the main star field in its vicinity.

In all cases you will need to expand the center of the field for the picture.

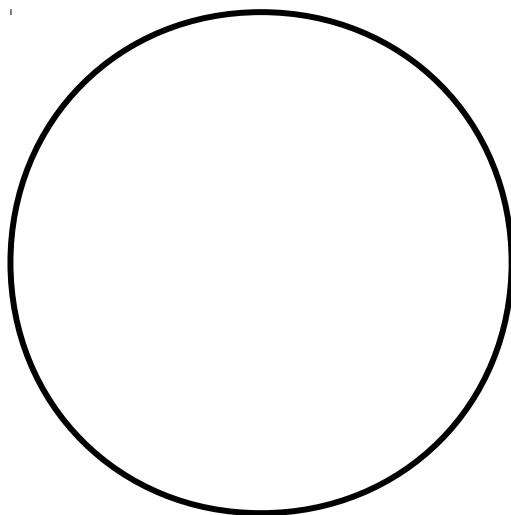


Object = _____

RA/Dec = _____

Type = _____

Size/Separation = _____

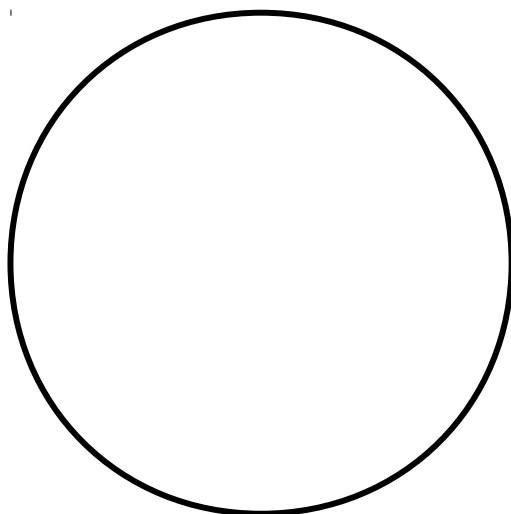


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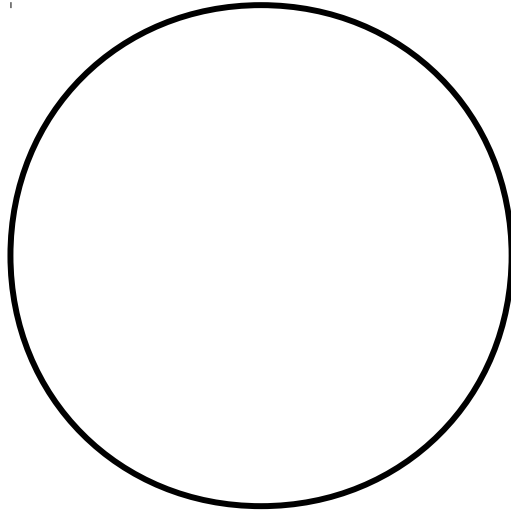


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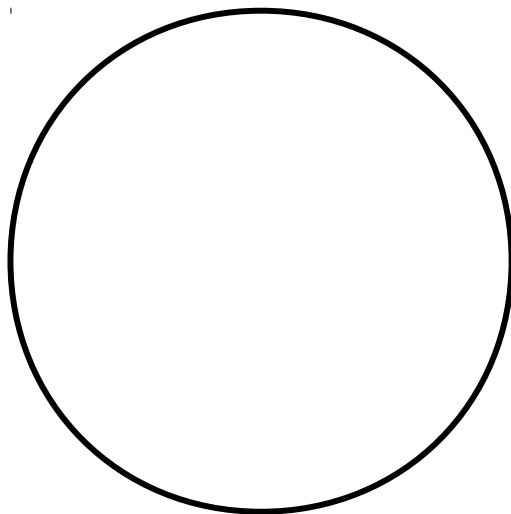


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Object = _____

RA/Dec = _____

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